ACTA UNIVERSITATIS UPSALIENSIS
*Uppsala Dissertations from the Faculty of Science and Technology*
146

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# Innovation Resistance

## Moving Beyond Dominant Framings

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Dissertation presented at Uppsala University to be publicly examined in Häggsalen, Lägerhyddsvägen 1, Box 169, 751 04, Uppsala, Friday, 12 November 2021 at 10:00 for the degree of Doctor of Philosophy. The examination will be conducted in English. Faculty examiner: Professor Hervé Corvellec (Lunds Universitet).

**Abstract**
Fornstedt, H. 2021. Innovation Resistance. Moving Beyond Dominant Framings. *Uppsala Dissertations from the Faculty of Science and Technology* 146. 329 pp. Uppsala: Acta Universitatis Upsaliensis. ISBN 978-91-513-1300-9.

Science, Technology and Innovation (STI) research has mainly had an outlook that frames innovation in a pro-innovation, pro-firm, manner. Connected to this perception of innovation is a view of human and non-human resistance as a temporary unwanted response that will eventually be overcome. Studies on innovation resistance avoiding the pro-firm and pro-innovation bias are rare, and the findings provide a fragmented understanding of innovation resistance. Moreover, despite focusing on challenging the lingering pro-innovation bias, Critical Innovation Studies have not yet explained why this bias, accompanied by a derogatory view on resistance, lingers in academic writings.

Therefore, this study aims to shed light on central presuppositions and limitations of the scholarly knowledge production on innovation and innovation resistance. Specifically, it aims to empirically explore the manifestation of innovation resistance and the dynamics involved in its entanglement with innovation processes. This is achieved through reviews of extant literature combined with an actor-network analysis of interviews, public documents and news articles concerning three different innovation processes.

Using an actor-network theory lens, the study finds that innovation resistance is a process *between* programmes that manifests when an innovation programme intercepts an Other programme. The process consists of layered movements of resistance that entangle the Other with the innovation actor. The movements are conceptualised as non-programmatic behaviour, distortion, estrangement/interessement and rejection. The process enables the Other actor's agency and restricts the innovation actor's agency. The resistance can prompt accommodation from the innovation actor, consequently shaping the innovation process. For the Other, innovation resistance can protect from the influence of an unwanted innovation process. It can also be how the excluded Other (re)gains influence over an innovation process by which it is affected.

Moreover, the study finds that the scholarly knowledge production around innovation and its resistance has been conducted from within the mega programme of Industrial Capitalism, including Top Tier journals and the Innovation Studies tribe programmes. Consequently, they lock out Other actors (such as the more than human world, people of colour, women, workers and research non-programmatic with the Top Tier journals and the Innovation Studies programmes), making them essentially invisible or negligible in the innovation research. This explains the narrow system boundaries of the field (allowing researchers to assume that innovation processes lead to a positive sum-game) and the pejorative view on resistance.

*Keywords:* Innovation; Innovation Resistance; Barriers to Innovation; Actor-Network Theory; Critical Innovation Studies; Science, Technology and Innovation Studies; Knowledge production; Innovation in the Anthropocene; Sustainability

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ISSN 1104-2516
ISBN 978-91-513-1300-9
URN urn:nbn:se:uu:diva-453894 (http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-453894)

# Sammanfattning

Innovation är ett begrepp som åtnjuter privilegiet att oftast betraktas och framställas som en del av en lösning, sällan en del av ett problem. Denna tendens att på förhand förutsätta att innovation ger, på det stora hela, fördelaktiga effekter är ett välkänt men bestående problem i innovationsforskningen. Detta är särskilt tydligt inom det stora fältet kallat vetenskaps-, teknik- och innovationsstudier (på engelska STI). Vanan att förknippa innovation med utveckling i en önskvärd riktning är dock relativt ny. Från antiken till mitten av artonhundratalet sågs innovation mestadels som en oönskad företeelse. Sedan dess har en ny syn på innovation byggts upp då begreppet börjat förknippas med framsteg, vetenskap, teknik, kapitalism, företagande, ekonomisk tillväxt, konkurrens och välfärd. Dessutom har innovation börjat framställas som lösningen på stora komplexa ekonomiska, sociala och ekologiska problem.

När innovationsbegreppet laddats upp med så många positiva associationer blir det nästan ofrånkomligt att motstånd mot innovation ses med viss skepsis eller till och med aversion. Så har också varit fallet i mycket tidigare forskning kring innovationsmotstånd. Denna forskning har ofta bedrivits med utgångspunkt i den organisation som initierat, bedrivit och lett innovationsprocessen. Innovationsprocessens positiva effekter har, omedvetet och oartikulerat, tagits för givna, mycket på grund av innovationsfenomenets positiva effekt på företagande och ekonomisk tillväxt. Fokus har varit på det värde som innovationen kan ge det innoverande företaget i form av sådant som konkurrensfördelar, framgång och överlägsenhet. Ekonomiska relationer har mestadels varit i fokus och de viktigaste aktörerna har framträtt som innoverande företag, kunder och stater. Motstånd mot innovation, både från människor och icke-mänskliga aktörer såsom regleringar, har ofta framställts som något destruktivt som bör identifieras för att sedan övervinnas. Motståndet har vanligen studerats frånkopplat sin egen kontext och från innovationsprocessens perspektiv. I innovationslitteraturen finns därför en kvardröjande tendens att betrakta innovation som något inneboende gott medan innovationsmotstånd ses med oblida ögon.

Kritiska innovationsforskare har på senare år gett förnyad uppmärksamhet åt denna tendens att okritiskt generalisera innovation som något positivt. Dock har de ännu inte förklarat varför denna snedvridning, åtföljd av en negativ syn på motstånd, fortfarande dröjer sig kvar i akademiska studier. Denna avhand-

ling söker därför kasta nytt ljus på bakomliggande orsaker till centrala förutfattade meningar och begränsningar i den akademiska kunskapsproduktionen kring innovation och innovationsmotstånd. Därtill undviker denna avhandling att värdera innovationen högre än motståndet och studerar därför innovation och innovationsmotstånd på ett mer likvärdigt sätt än de flesta tidigare studier. De få studier som undvikit att se innovationsmotstånd som en antagonist till innovationsprocessen har gett en fragmenterad förståelse av innovationsmotståndet. Därför syftar denna avhandling också till att ge ökad förståelse för fenomenet innovationsmotstånd genom att empiriskt utforska manifestationen av motståndet samt dess dynamiska sammanvävning med innovationsprocessen.

Syftet har uppfyllts genom studier av akademisk litteratur, samt intervjuer och studier av sekundärkällor kring tre olika innovationsprocesser, två i sjukvården samt en på energimarknaden. Det analytiska verktyget har varit aktör-nätverks teori (ANT). Denna sociologiska teori bygger, enkelt uttryckt, på att världen ses som uppbyggd av relations/associationsnätverk av mänskliga och icke-mänskliga aktörer som enrolleras in i program vilka har en riktning och någon form av mål. En innovationsprocess ses i denna avhandling som ett sådant program.

I motsats till mycket tidigare innovations- och ANT-forskning, framhåller denna avhandling förtjänsterna med att betrakta två program samtidigt. Då framträder att innovationsmotstånd är en process *mellan* program som manifesterar sig när ett annat program sammanstöter med ett innovationsprogram. Motståndsprocessen består av överlappande rörelser. Dessa rörelser kan förstås som små gradvisa förändringar av de aktörsnätverk som innovationsprocessen och den andra processen består av. Motståndsrörelserna har konceptualiserats med hjälp av begrepp från Galis och Lee (2014) samt Helgesson och Kjellberg (2005/2020). Sett från det andra programmets perspektiv konceptualiseras rörelserna som *förvrängning* av innovationsprogrammets identitet, *avlägsnande* från innovationsprogrammet, *avvisande* från innovationsprogrammet och begränsande av innovationsprogrammets agens. Till detta kan läggas rörelser av *icke-programmatiskt beteende*, som uppstår när en aktör i ett program beter sig på ett sätt som skiljer sig från programmets intentioner och/eller visar sig ha en identitet som skiljer sig från den identitet programmet tillskrivit den. Motståndet ger upphov till anpassning av innovationsprogrammet. Detta formar innovationsprogrammet och är en viktig del av dess utveckling.

Från det andra programmets perspektiv kan motstånd vara ett sätt att skydda sig från oönskad påverkan från en innovationsprocess. Det kan också vara ett sätt för exkluderade aktörer att få inflytande över ett innovationsprogram vars aktivitet påverkar dem. Det andra programmet har nämligen inte bara sin identitet i att vara emot innovationsprogrammet. Ofta ligger identiteten främst

i något annat. Det andra programmet har nämligen en egen rörelseriktning, ett eget mål och ett eget sätt på vilket det söker forma omvärlden. Motståndet som uppkommer i mötet med innovationsprogrammet uppstår främst på grund av att detta skiljde sig från innovationsprogrammets rörelseriktning, mål och tillvägagångssätt.

Avhandlingen har tagit idéen om program inuti program, samt utelåsning från program genom motståndsrörelser till makronivå. Detta har möjliggjort ökad förståelse för den akademiska kunskapsproduktionen kring innovation och innovationsmotstånd. Studien visar att mycket innovationsforskning har bedrivits inifrån det stora megaprogrammet industriell kapitalism som inkluderar högrankade tidskriftsprogram samt fältet Innovationsstudiers akademiska klanprogram. Dessa program har stängt ute aktörer såsom djur, växter, geosystem, rasifierade, kvinnor, arbetare och forskning som är icke-programmatisk med högrankade tidskriftsprogram samt Innovationsstudiers akademiska klanprogram. Denna utestängning har gjort dessa perspektiv näst in till osynliga eller negligerade i innovationsforskningen. Detta förklarar de smala systemgränser (företag-kund) som satts upp i mycket innovationsforskning och varit begränsande för studiet av innovationsmotstånd. Inom dessa smala gränser är det möjligt att dra slutsatsen att innovationsprocessen på det stora hela leder till något fördelaktigt. Vidgas däremot systemgränserna, blir det mycket svårare att göra beräkningen att en innovationsprocess på totalen har ett positivt utfall. Detta förklarar den ihållande tendensen bland innovationsforskare, att se innovation som något inneboende gott och motstånd som något oönskat.

# Acknowledgement

Even though I am fully responsible for the content in this book, I am much indebted to a number of people whose insights and wisdom have helped me shape this work. *Marcus Lindahl*, you have been a continuous source of inspiration, critique and encouragement, which has pushed this manuscript into becoming much better in every iteration. I am so grateful for your continuous emphasis on this thesis being my own and for encouraging me to write about something that I find really interesting. *David Sköld*, your meticulous comments and ideas, have been such a great input to this work. I am very grateful for your reading through seemingly endless number of pages to help me mould this into a comprehensive piece. I am also glad that you introduced me to a number of critical thinkers whose work I otherwise would not have dared to read. *Beata Segercrantz*, thank you for your insightful comments and suggestions that made this manuscript so much better. I am so honoured and happy that you were able to take on the work of reviewing an earlier version of this manuscript and provide such valuable feedback in my final seminar. *Cecilia Enberg*, thank you for all your feedback and wisdom in my half-time seminar. Your insightful questions helped me think about whether this should be a monograph or a compilation, and you asked this one important question that stayed with me, *'what kind of researcher would you like to be?' Ylva Askfors*, it has been so fun to do research with you. Thanks for sharing your insights on the healthcare universe and for not hesitating to embark on the endeavour to investigate the sutures together with me. I would never have been able to write chapter six in this thesis if it had not been for you. *Ali Yakhlef*, thank you for all your insights into formulating research questions, they aided me a lot when writing chapter one. *Tommy Jensen*, I am grateful for your inspiring methodological ponderings that were very helpful when writing appendix 1. *Caroline Ingvarsson*, thanks for your valuable inputs and discussions around what eventually turned out to be chapter two in this thesis. I want to extend thanks to the *Lars Erik Lundberg Foundation for Research and Education* for financing part of this thesis work. I also want to thank all the *interviewees* that made this study possible.

At the department of Industrial Engineering and Management, a number of people have been around to give me the academic setting I needed in the socialisation process of becoming a researcher. *Nina Fowler*, thanks for many nice chats and (on my part) ungraceful ballet dancing. I really appreciate you sharing your experiences and wisdom about teaching and the PhD process.

*Isak Örhlund,* thanks for all our nice chats and moments of being 'pissed off' yet constructive together. It has been great to have you to turn to whenever the impending climate crisis is ignored. *Petter Bertilsson Forsberg,* thank you for all your general pleasantness and encouragement. *Per Fors,* it has been great to collaborate with you in teaching and to get sustainability and ethics input from you. *Fouad El Gohary,* thanks for cheering me on and not hesitating to join me in a bit of resistance here and there. *Jessica Garcia,* thanks for collaboration in teaching and all the encouraging phone calls to see if I was still sane. Thanks, *Emil Svensson,* for good lunch-talks, initiating PhD after work and being my STS-partner in crime. *Carl Kronlid,* it has been nice to discuss and sometimes share a sigh over the mysteries of the research studies as well as the management and administration of this thing called University. *Matthew Davies,* thanks for the zoom-jokes that light up solitary days in corona confinement. *Paul Plummer,* thanks for your kindness in helping me with last minute English-checks. *Jolanda van Rooijen, Kristofer Severinsson, Ines Khadri, Marvin Schliemann, Lakshmi Salelkar* and *Eva Svanberg,* thanks for sharing your PhD time at IndTek with me.

*Åse Linné,* thanks for having my back and sending encouraging and helpful e-mails. *Cajsa Bartuch,* thanks for all your encouragement and for believing in me. *Annika Skoglund,* thank you for your advice and guidance in times when things were a bit rough. *Ulrika Persson Fischier,* thanks for all our nice chats, for getting me out in a sailboat and your input into entrepreneurship and sustainability teaching. *Enrico Baraldi,* I am grateful for your encouragement and for helping Ylva and me with our early version of the suture case. *Simon Okwir,* I am so grateful for all our chats and for your kindness and encouragement during this thesis work. *Andrea Perna,* thanks for all your help in finding my way in Ancona, Italy. It has been and still is great to work with you on our joint projects. *Klas Palm,* thanks for spreading your enthusiasm and for all our discussions on sustainability issues at the university. *Göran Lindström,* thank you for helping me out in teaching the SINReM students and for cheering me on. *Mattias Ureda* and *Amos Ng,* I am glad you believe I know something about sustainable innovation – I hope you are right. *Nina Kivinen,* it has been nice to chit-chat with you in the hallway and get your input on an earlier version of this manuscript. *Thomas Lennerfors,* thanks for inviting me into a number of interesting things. I suspect you do not even remember yourself how many those are. For every invite and every question, you have made me feel a little bit more like a scholar.

I am also grateful to my group outside the walls of the Ångström laboratory. To all the people in the CEMUS Research Forum (CEFO): *Lakin Anderson, Matilda Andersson, Elin Boyer, Lars Rudebeck, Vincenza Ferrara, Fatemeh Johari, Venugopal Reddy Thandlam, Pascoal João Gota, Jossias Humbane, Anselmo Matusse, Rebekkah Hammar, Holly Jayne Redman* and *Fabian En-*

*gel*, thanks for helping me to see that this thesis was bigger than my department and for enabling me to peek over the borders of my discipline. And especially, *Sachiko Ichihara* and *Isak Stoddard*, thanks for nice chats, interesting discussions and for always having a moment to spare for stupid and very, very intelligent questions.

Moreover, the support of my family should not be forgotten.

*Britt-Marie and Torgny Fornstedt*, thank you for giving my children a summer holiday with you in the Stockholm archipelago and thus, me more time to write this thesis.

*Mum, dad, bro, Kristina, Nils and Johan Lundgren* thank you for keeping this thesis in your prayers and for keeping track of important deadlines even though you claim to not understand what this thesis is all about. But as Pippi Longstocking says, *'play the trumpet without a trumpet is the hardest thing you can do'*. In the same way, understanding a thesis before it actually is a thesis, is a very tricky thing. At least now, it is finished and thus, your chances of understanding it has increased substantially. I also want to extend a special thanks to *Kristina* for language checking the Swedish summary.

*Minoo* and *Alva*, thank you for inspiring me in so many different ways. Minoo, your critical scientific approach as a one-year-old was amazing. You did not settle with a verbal statement from your parents but insisted on needing several months of empirical data collection to finally draw the conclusion that humans do not have tails. Alva, you have illustrated the deep interconnectedness between humans and non-humans for me, time and time again. Through you, I have been able to clearly see the difference between a two-year-old *without* a balloon (in a miserable pile on the floor) and a two-year-old *with* a balloon (laughing and skipping about the room).

Finally, *Rickard*, if we define 'writing a thesis' as being successful, then you are the man behind this successful woman. Thank you for making the lovely cover and the beautiful pictures that make this thesis so much more accessible. It is not just the pictures though. So much in this thesis is refined and clarified through our discussions at the kitchen table. Thank you for listening, rephrasing and bouncing ideas. I will never forget the first time I pitched my thesis idea to you, and you went from thinking that the whole thing was rather dull to being quite excited and believing it to be interesting. And then, the next thing I know, you start to describe walking the kids to pre-school, in terms of different actors with different programmes. Thank you for making this thesis reach at least one step outside of the ivory tower.

# Contents

*People who do not live their lives in academic books and indeed time-pressed scholars can, if they prefer, browse through this book. A suggested read is to start with the abstract or Swedish summary, followed by the introduction (Ch. 1). After that, all chapter summaries could be read, ending with the conclusions (Ch. 11).*

# Abbreviations

| | |
|---|---|
| AB | Aktiebolag, or in English Joint-Stock Company |
| AIR | Active Innovation Resistance |
| ANT | Actor-Network Theory |
| BAT | Best Available Technology |
| CeHic | Centre for E-health in Collaboration |
| CIS | Community Innovation Survey |
| CR | Cognitive Rigidity |
| EEA | European Economic Area |
| EEC | European Economic Community |
| ER | Emotional Reaction (to imposed change) |
| GDP | Gross Domestic Product |
| GNP | Gross National Product |
| IP | Intellectual Property |
| IPR | Intellectual Property Rights |
| IRC | inclination to resist changes |
| IS | Innovation studies |
| IVO | Inspektionen för Vård och Omsorg, or in English the Health and Social Care Inspectorate |
| MNC | Multinational company |
| MSB | Myndigheten för samhällsskydd och beredskap, or in English the Civil Contingencies Agency |
| NBER | National Bureau of Economic Research |
| OECD | Organisation for Economic Co-operation and Development |
| OI | Open Innovation |
| OPP | Obligatory passage point |
| POC | People of colour |
| R&D | Research and Development |
| RQ | Research question |
| RS | Routine seeking |
| SDG | Sustainable Development Goal |
| SDI | Strategic Defence Initiative, also called Star Wars |
| SKL | Sveriges Kommuner och Landsting, or in English the Association of Municipalities and Counties of Sweden |
| SOL | Sortiment och Leveransinformation, or in English Range of Products and Delivery information |
| SPIS | Science Policy and Innovation Studies |
| SPRU | Science Policy Research Unit |

| | |
|---|---|
| SQS | Status Quo Satisfaction |
| SSI | Surgical Site Infections |
| STF | Short-Term Focus |
| STI | Science, Technology and Innovation |
| STS | Science and Technology Studies |
| UN | United Nations |
| US | United States |
| USSR | Union of Soviet Socialist Republics |
| VGR | Västra Götaland |
| VR | Vetenskapsrådet, or in English the Swedish Science Council |

# 1. Introduction

In the early 1980s, the US Congress approved the launch of a 60 billion dollar innovation project with the noble aim of achieving World Peace and ending the Cold War. President Roland Reagan was very concerned about a potential nuclear war and a possible Soviet victory. To prevent this, he wanted to build a strategic defence system to protect America. The system would be placed in space and include satellites with weapons able to shoot down any incoming Soviet missiles. To succeed with this, Reagan called upon the scientific community *'who once gave us the nuclear weapons, to turn their great talents to the cause of mankind and world peace; to give us the means of rendering these weapons impotent and obsolete'* (Oreskes & Conway, 2012/2010, p. 43). Surely, the scientists who had had no problem accepting military R&D funding in the past would oblige. This innovation was said to have the potential to bring about world peace. Additionally, the technology and much of the science it was based on would be brand new and exciting. Military activity is known in innovation literature to be a significant source of the development of technological innovation (Mowery, 2010). Surely that must be desirable, especially for scientists?

However, in May 1986, 6,400 academics had signed a pledge not to accept any government money from the missile defence research programme (Oreskes and Conway 2012, p. 43). Thus, they actively declined research funding. What was happening? Scientists were resisting major development, and what might turn into a radical innovation project! Were they against world peace and the end of the Cold War? Were they playing into Soviet hands? Had they been listening to arguments based on deceptive science? Or were they just close-minded, inferior people who acted irrationally?

Let us stop here for a minute. This is, of course, a story about the Strategic Defence Initiative (SDI), which many know under the name 'Star Wars'. If the resisting scientists had been asked to explain why they did not want this particular innovation to come about, they would have answered things like: 'it would be provocative to the Soviets', 'it is impossible to test properly without shooting large amounts of missiles on ourselves', and 'if one side believes they

are safe they might be tempted to launch the first strike which would increase the risk of nuclear war'[1] (Oreskes and Conway, 2012, p. 43).

The example of Star Wars is one of military development, but it is not only in issues related to war that innovation escapes labels such as good or bad. Consider, for instance, the innovation process around the steamboat. The steamboat enabled more affordable transatlantic journeys so that European people could leave hard and oppressive home situations and start new lives across the sea. It also enabled recreational outings and easier travel for affluent people (Laestadius, 2018, pp. 90-91). Besides enabling a good life for some people in the Global North, the steamboat – as many other innovations sprung out of the industrial revolution – was also dependent on fossil fuel use. A usage that contributes to climate change and threatens to push the earth into a climate so different from the current one, as would a new ice age (Steffen, et al., 2018). The steamboat was also crucial[2] for making colonisation cheap and easy as it enabled invaders to travel inland in a way that they were previously unable (Headrick, 1979). Thus, it can be said to have been an innovation that meant freedom to many Europeans and the opposite for many Africans, Asians and native Americans.

Now, this thesis will neither elaborate on 'Star Wars' nor the steamboat. The reason why it begins with these examples is to illustrate one important starting point of this thesis. Namely the following, just because something can be described as an innovation project,[3] it cannot automatically be assumed to be inherently good and worth pursuing. Both SDI and the steamboat illustrate that an innovation process is open-ended, and the assessment of its value connected to the assessor. Yet, there is a prevailing tendency to assume that innovation is always positive in a general sense. If we look at some common definitions of innovation, they do, however, not claim that innovation is capable of delivering outcomes that could be said to be objectively good (see table 1). Instead, they (according to Baregheh et al.'s 2011 review of definitions) portray the aim of innovation as related to competition, success, economy, superiority, differentiation, advantage and value, predominantly seen from the social context of organisations and firms.

[1] Other arguments were that it is impossible to build a technological defence system that is perfect and thus it could encourage the Soviets to build more war heads as they can be sure that some get through but not all; and if Soviets believed that it might work they might have been tempted to attack before the system was built.

[2] Aided by steamboats, innovations in malaria medicine and in firearms, area after area in Africa was colonised. (Headrick, 1979).

[3] It might be argued that this was not an innovation since it was neither developed nor spread. However, when considering innovation processes, the story could be seen as the first stages of this process, the idea and design phase. Scholars have been known to repeatedly study innovation development with no account of its diffusion. In the same sense, the SDI project could very well have been called an innovation project in the 80s by those who assumed that it would be developed and spread.

The tendency to view innovation as inherently good is called the pro-innovation bias. It has been a known problem in innovation literature, at least since the 70s (Rogers and Shoemaker, 1971; Rogers, 2003, p. 106) and is still very much present in modern innovation studies (Godin & Vinck, 2017b, p. 319). A value judgment thus accompanies innovation. It is often expected that innovation brings something good and positive for an organisation, the economy or society at large (Godin & Vinck, 2017a, p. 2; Knight, 1967), and the value is often described in economic terms (Vinck, 2017).

| Definition of innovation | Reference |
|---|---|
| carrying out of new combinations" that include introduction of new goods, ... new methods of production, ... the opening of new markets, ... the conquest of new sources of supply ... and the carrying out of a new organisation of any industry. | Schumpeter & A. (1934, p. 66) |
| An idea, practice, or object that is perceived as new by an individual or other unit of adoption | Rogers (1983, p. 11). |
| A new idea which may be a recombination of old ideas, a scheme that challenges the present order, a formula, or a unique approach which is perceived as new by the individuals involved | Van de Ven 1986, p. 591) |
| Innovation is conceived as a means of changing an organization, either as a response to changes in the external environment or as a pre-emptive action to influence the environment. Hence, innovation is here broadly defined to encompass a range of types, including new product or service, new process technology, new organization structure or administrative systems, or new plans or program pertaining to organization members. | Damanpour (1996, p. 694) |
| A technological product innovation is the implementation/commercialisation of a product with improved performance characteristics such as to deliver objectively new or improved services to the consumer. A technological process innovation is the implementation/adoption of new or significantly improved production or delivery methods. It may involve changes in equipment, human resources, working methods or a combination of these. | The Oslo Manual, OECD, (1997, p. 8) |
| Innovation is the multi-stage process whereby organisations transform ideas into new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace | Baregheh et al. (2011) |

*Table 1: List of examples of well cited definitions of innovation*

It is not only scholars who have a pro-innovation bias in their way of understanding innovation, the idea is prevalent in society as well. The Swedish Government, for instance, has instituted a National Innovation Council chaired by the Prime Minister, with the task to

> use innovation to help find solutions to the major societal challenges and promote long-term competitiveness and sustainably in Sweden (Swedish Government, u.d.).

Another example is the EU's Programme for Research and Innovation, Horizon 2020. It states that:

> research and innovation help deliver jobs, prosperity, quality of life and global public goods (European Commission, 2011, p. 2).

Moreover, innovation is part of the United Nation's ninth Sustainable Development Goal (SDG):

> Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation (UN, u.d.).

However, the concept did not always have such positive connotations. Before the 1850s, the word 'innovation' mostly had a pejorative meaning.[4] In those times, resistance to innovation was the norm, and innovation was seen as dangerous; this changed after the mid-1800s (Godin, 2015a, pp. 12, 37, 75-177, Koselleck, 2004, p. 269).

## 1.1 The construct of innovation as 'inherently good'

Since the 1850s, innovation has become a word that many, both within and outside academia, view as inherently good (Godin, 2015a; Godin, 2019). When innovation scholars view innovation in that light, it is connected to the concept being tied up with other dominant ideas and outlooks, loaded with positive connotations. A review of literature concerning these will be presented in chapter two. Here, we will be content with a rough picture that summarises some of the more common outlooks conveyed by innovation research within the wide array of economically inspired Science, Technology, and Innovation (STI)[5] disciplinary fields[6] (Soete, 2019). The fields of STI are not the only traditions conducting innovation research, but they are the most populated and cited ones (Nelson, 2013; Martin, 2012; Godin & Brandão, 2019) and could therefore be said to be the mainstream. The dominant ideas and outlooks of STI studies can be roughly summarised as follows:

1) Innovation's positive effect on economic growth is seen as a sufficient criterion for viewing innovation as beneficial (see Bagattolli & Brandão, 2019 and Gripenberg et al., 2012). Since the 1940s, innovation has been used to explain economic growth (Godin 2019, p. 72). Ever since Kuznets developed the concept after the great depression in the 1930s, economic growth has been seen by many as leading to decreased inequality and increased welfare (Fioramonti, 2013). Economic growth has come to be viewed as 'the natural state of the economy' since the 1930s (Alfredsson & Malmaeus, 2017, p. 68). It led

[4] With ancient Rome as an exception.
[5] The fields have also been called Science Policy and Innovation Studies (SPIS) (for an attempt to describe it, see Martin, 2012) and include the field called Innovation Studies (Fagerberg, et al., 2013). These acronyms field does not encompass all innovation research but can be said to be the dominant one (through journals such as Research Policy, etc.).
[6] The small but growing community of critical innovation scholars conduct research that rethink and debunk innovation narratives in STI but also in Science and Technology Studies (Godin & Brandão, 2019). This thesis however limits itself to considering the field of STI.

to increased equality up until the 1980s. Thereafter, despite GDP rise, inequality has risen both between people within a country and between countries (Piketty, 2013; Fulcher, 2004, p. 98; Harvey, 2005, p.16). Even though Kuznets was clear about economic growth not being designed to capture a society's well-being, 'economic welfare' has come to be viewed as always converging on 'social welfare' (Parrique, 2019, p. 54). As innovation is assumed to lead to growth, this has coloured the perception of innovation as well. Innovation research's focus on innovations' positive effect on economic growth has led to a neglect of other outcomes than positive ones (Gripenberg et al., 2012; see also Vinck, 2017). The focus on economic growth put economic values at the centre, and issues such as planetary limits (Meadows et al., 1972), human societies' increasing ecological footprints (Díaz, et al., 2019; Carson, 1962), exploitation of labour (Walsh, 2021) and unpaid activities – often symbolically linked to the female (Pettersson & Lindberg, 2013; Lindberg, 2012) – are rendered invisible. In recent years, there has been a move towards studying innovation said to be 'sustainable' or 'green'. In line with the Bruntland (United Nations, 1987) report, this is mostly done without abandoning the old goal of economic growth.

2) Innovation is put forward linearly, as leading to progress (see Thomas et al., 2017; Pinch & Bijker, 1993/1987). It is part of the west's construction of itself as 'modern' or 'advanced' compared to other regions of the world (Fougère & Harding, 2012). Even though there are studies about service and organisational innovations, innovation is predominantly seen as something technical (Godin, 2019, p. 133), and it is predominantly described as a product[7] (Baregheh et al., 2011; Segercrantz et al., 2017). The technology is seen as evolving linearly in a process where paradigm replaces paradigm[8] (Thomas, et al., 2017; Pinch & Bijker, 1993/1987). The technology is described as neutral, and writings about innovation rarely account for ideological-political tensions (Thomas, et al., 2017). Innovation management literature has a discourse of faith (Segercrantz, et al., 2017) in which it is assumed that innovation will lead to a positive sum-game and, therefore, to progress. The value of innovation is rarely contested (Greve, 2011). It is often put forward as the *solution* to any problem - be it social, economic (Godin, 2019, p.228, European Commission 2010, p. 2) or ecologic (Blok & Lemmens, 2015, p. 30). Moreover, it is predominantly framed as detached from the *cause* of problems (Sveiby et al., 2012a; Sveiby et al., 2012b, p. 254). This detachment preserves the ontology of the west as advanced (Fougère & Harding, 2012). Thus, with the competition between firms and countries as an exception, innovation is largely disconnected from structures of power and domination (Thomas, et al., 2017).

[7] In Baregheh et al.'s (2011) review of definitions, the word product was almost twice as common as 'service' and 'organisation'.

[8] That is, the S-curve of incremental innovation being replaced by a radical innovation beginning a new s-curve.

3) Innovation is seen as a means to proliferate private companies (Thomas, et al., 2017; Schumpeter, 1934/2012) that are viewed as a self-evident force of good (see also Alvesson, p. 7). The innovation management literature focuses on preserving the innovating firm (Segercrantz, et al., 2017), and innovation is, thus, put forward as a strategy to ensure capital accumulation for the elite (Walsh, 2021). The innovating firm's success is connected to economic growth and therefore seen as leading to social welfare (Parrique, 2019). The focus on the well-being of firms is often put forward as a neutral standpoint. Innovation is portrayed in a market setting and seen as driven by an economic necessity and technical rationality that is disconnected from politics and deliberation (Pfotenhauer & Juhl, 2017).

4) Innovation is oriented towards economic relationships and transactions, and the economy is seen as an autonomous sphere that is separate from the political realm (Walsh, 2021). The market relationships between firms and between the firm and its prospective clients are in focus (Thomas, et al., 2017; Lundvall, 2013). Social needs are consistently seen as converging market needs (Walsh, 2021), and aspects of reality that do not have a price tag go unnoticed. Innovation appears detached from nature and is only considered as a resource to be extracted or as a matter of private property (see Hornborg, 2016). Thus, issues of waste (see Parrique, 2019) and extraction go unnoticed (Sovacool, 2021). Areas where economic transactions take place and growth is generated are often symbolically linked to masculinity. Therefore, this focus overshadows unpaid activities often symbolically likened to the female (Pettersson & Lindberg, 2013 ) and a manner of organising life that does not follow the western ideas of economic rationality (Pansera & Owen, 2018).

5) Innovation is connected to competitive advantages, and accelerating it, is seen as desirable. In innovation management literature, there is a discourse of acceleration, and the focus is on increasing the innovation rate. Much focus is placed on discussing how to drive innovation and how to overcome barriers (Segercrantz, et al., 2017). There is an underlying urgency in the framing of innovation activities, and the word 'race' is often used (Hasu, et al., 2012). The race takes place between firms, regions and countries (Hasu, et al., 2012; Fagerberg & Godinho, 2005). The threat of competitors and of being left behind in the GDP race are important sources for the focus on acceleration (Hasu, et al., 2012). Innovation is seen as the primary strategy for a firm to stay competitive and maintain its market shares, and other possible strategies are rarely suggested (Leitner, 2017; Vinsel, 2017, Canibano, 2017).

This outlook frames innovation in an uncritical one-sided, linear, pro-growth, pro-firm, pro-capitalist manner and it can be strongly suspected that such a framing limits the analysis of innovation resistance.

## 1.2 The pejorative view on innovation resistance

From the notion of innovation as inherently good (Godin & Vinck, 2017), it is not far to the idea that it should also be developed and diffused. When the focus is on accelerating innovation rates, it is perhaps not surprising that many influential innovation studies view *resistance* or *barriers* as a temporary unwanted response that will eventually be overcome (Segercrantz, et al., 2017).

A general trend in innovation literature is that when the concept barrier is used, it can be associated with a number of human and non-human phenomena such as technology, social structure, processes, people, policy, etc. But when the word resistance is used, it is predominantly associated with humans (Heidenreich & Handrich, 2015; Oreg & Goldenberg, 2015; Ram, 1987; Sheth, 1981). In this thesis, the term 'innovation resistance' refers to both human and non-human resistance, and it is used to encompass a number of concepts such as resistance, barrier, impediment and inertia.[9]

Scholarly work on innovation resistance predominantly occupy itself with trying to identify (and understand) resistance to aid managers or others to overcome it (e.g. Dougherty, 1992; Korhonen & Kaarela, 2011; Lettice & Thomond, 2008; Polzin et al., 2016; Ram, 1989; Staudt, 1994; Stucki, 2019; Thomä, 2017). Studies have identified innovation barriers related to policy and law (Greis, et al., 1995; Hadfield, 2008), competitors (Eisen, 2014), methods for marketing and diffusing (Moberg & Dyer, 1994; Moore, 1991), risk awareness (Lim & Anderson, 2016), adopting organisations and their internal implementation and confirmation processes (Herzlinger, 2006), innovating organisations and their internal product development (Baldwin & Lin, 2002), the nature of the innovation itself (Johnson, 2010; Lowe & Sim, 2014), user resistance (Ram, 1987) and so on. A few reviews have been done on scholarly work around innovation barriers (MacVaugh & Schiavone, 2010; Lluch, 2011; Sandberg & Aarikka-Stenroos, 2014). Those have focused on categorisation and overviews, and they have been geared towards maximising adoption and overcoming barriers.

The majority of innovation research around innovation resistance have a pro-innovation starting point, and many studies tie the value of 'innovation' to its ability to contribute to firm survival (e.g. Das et al., 2008; Heidenreich & Kraemer, 2016). Innovation Resistance is often seen from the developing firm's perspective, and studies tend to promote continued innovation in one way or another (e.g. MacVaugh & Schiavone, 2010). Few attempts have been made

[9] Thus, when the word 'resistance' is used here, the scholarly work referred to might have used one of these words: 'barrier', 'resistance', technological inertia', 'hinder', 'impediment', 'challenge', 'hamper', 'limit', 'non-adoption, non-use' or 'rejection'. In other words, 'resistance' is used as an umbrella term for all these other concepts.

to study innovation resistance from other standpoints than that of the innovating firm (see Harrisson & Laberge, 2002 for an exception). Even when other grand challenges such as sustainability (Polzin, et al., 2016, p. 34; Stucki, 2019) or improved health (Ferlie, et al., 2005, p. 117) have been used to frame and motivate an intensified focus on innovation, the research tends to, nevertheless, stick with the firm-focus. This is because firms are seen as vehicles for these positive changes.

There is a tendency to label phenomenon seen as progressive as 'innovation' and innovation resistance as a reactionary antagonist (e.g. Juma, 2016). Thus, resistance is often seen as dysfunctional (Sandberg & Aarikka-Stenroos, 2014) or misinformed (Korhonen & Kaarela, 2011), and some even call the resistance process 'contagious' (Moldovan & Goldenberg, 2004, p. 426). Rogers (1983, p. 107) points out that late or non-adopters are often described stereotypically by change agents and others. In line with that, it is not uncommon in STI literature to portray people who resist in a demeaning manner, using words like 'inferior' (Talke & Heidenreich, 2014, p. 897), 'parochial self-interest' (Ram & Jung, 1991) and 'restrictive mindset' (Das, et al., 2018, p. 107). Some studies have, however, recognised that innovation resistance could lead to learning for the innovator, enhance quality control and push the development of better solutions (Baldwin & Lin, 2002; Heidenreich & Handrich, 2015; Mani & Chouk, 2018; Heiskanen, et al., 2007; Szmigin & Foxall, 1998; Oreg & Goldenberg, 2015). Yet, this 'beneficial' aspect of resistance is often treated like – as Oreg and Goldenberg (2015, p. 198) put it – a 'silver lining' of something predominantly viewed as dysfunctional.

Through its focus on innovating firms, a partial interpretation is made of innovation resistance. Many studies, to some degree, empathise with those who resist (Korhonen & Kaarela, 2011), and sometimes even say that resisting might be the most economically rational option (Sheth, 1981; Szmigin & Foxall, 1998, Rogers, 1983). Despite this, it is uncommon to promote the status-quo (Reilly & Sharkey Scott, 2014 is one exception) or the agenda of the resisting actor. Instead, studies tend to advocate for continued innovation activity (Sandberg & Aarikka-Stenroos, 2014) and implicitly (e.g. Moldovan & Goldenberg, 2004) or explicitly (e.g. Talke & Heidenreich, 2014) argue for a reduction of status quo satisfaction. Since the focus is mainly on the innovating firm, resistance is often perceived solely in that context, which means that other potential purposes of a phenomenon categorised as resistance are neglected or ignored. This becomes especially evident when 'regulation' (Hadjimanolis, 1999) is put forward as hindering innovation. That phenomenon could be said to serve other purposes than the one currently driving the firm-based innovation under study; yet, in many studies, these purposes are left out of the picture.

While the negative aspects of innovation are only a peripheral part of innovation research (Coad, et al., 2018), innovation resistance has primary been seen in an unfavourable light. The pro-innovation bias has been highlighted and challenged in numerous academic writings (e.g. Rogers, 2003), and critical voices have begun to challenge the common view on innovation (e.g. Godin & Vinck's, 2017, edited book). These critical voices have only begun to extend their critique to the conventional view on innovation resistance (Thomas, et al., 2017). Thus, most research on (human and non-human) innovation resistance has been conducted by STI scholars from an analytical starting point where the innovating capitalist firm is in focus, and the innovation is assumed to lead to a positive sum-game. This has led to most available literature around innovation resistance offering a shallow analysis of the resistance as seen from the perspective of the innovating firm.

## 1.3 Innovation resistance in Actor-Netwok Theory

The habit in STI research to choose a side and use a retrospective perspective when it is possible to be afterwise has been noted by actor-network (ANT) scholars (Akrich, et al., 2002). They have also emphasised that humans and non-humans are inescapably merged in a way that makes it hard to separate one from the other (Latour, 2007/2005, p. 75). Thus, to ANT scholars, the separation between non-human barriers and human resistance noted in innovation literature around innovation resistance would appear strange. Instead, they view an innovation process as consisting of both humans and non-humans interconnected through a network of associations (Latour, 1996).

When linear accounts of innovation processes suggest that innovation diffuses through its own virtues, and human resistance occurs due to the innovation being – as Akrich et al. put it – 'before its time and the users' (p. 203), ANT scholars mean that innovation is an actor that other actors adopt if it manages to disassociate these other actors from established networks and make them associate themselves with the innovation actor instead. The associations and disassociations are enacted through a number of movements, each of which slightly changes the involved actors, indicating that an innovation process and the resistance processes it encounters are interacting and entangled. This manner of viewing innovation and innovation resistance reconnects the innovation process to the context and enables an analysis that questions the technology and the choices it gives rise to (Akrich, et al., 2002). Thus, ANT views innovation as a process where actors struggle, exchange, debate, accept, reject or adapt to actions and decisions made (Harrisson et al., 2001). ANT studies on innovation have, indeed, been more successful in avoiding the uncritical analytical starting point related in 1.1.

The studies about innovation resistance using ANT are rare but not unheard of. Harrisson et al. (2001) and Harrisson and Laberge (2002) use ANT to study innovation resistance and manage to avoid the one-sided focus on managers. As is often the case with the use of ANT, however, they focus on one process – the innovation process. Yet, they do not promote this process over the countermovement of resistance. Harrisson et al. (2001) highlight that new production processes do not necessarily benefit the workers and do not necessarily lead to a better work-life or greater autonomy. Harrisson and Laberge (2002, p. 516) point out that worker's resistance to change can be seen as a countermovement to *'ideologies such as 'productivity', 'competitiveness' and 'efficiency"*.

In the emerging, but by comparison to STI, extremely marginal field of critical innovation studies[10] (Walsh, 2021), innovation resistance has been dealt with in (to my knowledge) only one study. Incidentally, this study also drew on ANT and was conducted by Thomas and colleagues. (2017). They studied innovation resistance as a type of re-innovation and argued that ideology is one key to understanding socio-technical resistance. They suggest that the study of innovation resistance gains in explanatory power if technology is not seen as neutral but connected to power structures. They invoked the term 'socio-technical resistance' to capture the alliance between technology and ideology. Thomas and colleagues (2017) argue that the innovation resistance process should be viewed as an analytical category in itself.[11]

In these three ANT writings about innovation resistance, the resistance is put forward as an agenda in itself, specifically geared towards an innovation process. Thus, the opposing party is portrayed as having resistance as its most prominent feature. The focus in these three writings is on resistance from organised humans. Thus, despite ANT's promise to include the non-humans in the analysis, they are not in focus. Miettinen (1999) and Mattila (2015) have highlighted that this focus on humans is common in ANT studies of innovation. They argue that, despite emphasising the symmetry between humans and non-humans, ANT studies bear traits of an asymmetrical focus on the managers of the innovation process and a focus on the humans rather than the non-humans (Miettinen, 1999). The few studies on innovation resistance using ANT seem to share this anthropocentric focus. A focus that points towards a separation between the human and the non-human not unlike the one found in STI research. While the three studies on innovation resistance eases up the

[10] The field is so small that it, according to Walsh (2021), comprises one edited volume "Critical Studies of Innovation" (Godin & Vinck, 2017), one earlier edited book "Challenging the Innovation Paradigm" (Sveiby, et al., 2012b) and a handful of articles.

[11] In his contribution to the field of critical innovation studies, Walsh (2021) comments on the work by Thomas et al. saying that innovation resistance demonstrates the limits of the capitalist firm's ability to use innovation to transform labour processes according to its agenda.

focus on the managers of the innovation processes, the agency of the non-humans remains downplayed.

Furthermore, none of the three studies elaborate on resistance in ANT terms. Thomas et al. (2017) are content to frame resistance as an alternative actor-network, an alternative socio-technical alliance, challenging a dominant (capitalist) actor-network. Harrisson et al. (2001) and Harrisson and Laberge (2002) draw on Callon's (1984/2007) ideas about the construction of an actor-network and see resistance as a failure to interest an actor to join a network. They argue that meaningful resistance leads to the re-configuration of a new network – a finding that suggests that resistance and innovation processes are entangled. Harrisson et al. (2001) and Harrisson and Laberge (2002), like many other ANT researchers on resistance unconnected to innovation (such as Knights & McCabe, 2016), do not focus on describing resistance in the language on ANT but tend to be content using the word resistance to describe what is going on. This shortcoming in the theoretical construct of ANT is noted by Galis and Lee (2014), but their theoretical elaboration into exclusion and powerlessness has not yet been invoked to explain innovation resistance.

Thus, in the field of ANT, the knowledge of innovation resistance is both undeveloped (to my knowledge, only three studies), fragmented (is resistance a network in itself, a failure to interest an actor or both?) and heavily focused on humans, neglecting the non-humans. The entanglement of resistance and innovation is hinted at but remains a supressed dimension in the studies. Additionally, it would seem that previous studies on innovation resistance using ANT have all focused on quite overt forms of resistance – resistance that threatens the actor-network and is noticed by its managers. Given the work by Star (1991) and Helgesson and Kjellberg (2005/2020) on unnoticed dissident behaviour within the network, it would be reasonable to suspect that innovation resistance need not be noticed from outside the network. However, these elaborations of ANT have not yet been used to give depth to the understanding of innovation resistance.

## 1.4 The aim of the study

Innovation, especially technological innovation, is a massive part of our social and material world. Decisions around technological innovation influence our society for an extended period of time (Winner, 1980), which is especially apparent when considering technological trajectories (e.g. Markard & Truffer, 2006) and lock-in effects (e.g. Foxon & Pearson, 2008; Arthur, 1989). Under these circumstances, resistance to the innovation process should come as no surprise. Indeed, Bauer (2015) means that it is not resistance that is strange; it is the absence of it that is peculiar. Since the mid-1800s, innovation has increasingly been caught up in a capitalist pro-profit and pro-growth paradigm

(Walsh, 2021) that has externalised concerns such as exploitation of labour, ecological degradation and people's health. However, the virtues of this paradigm have become increasingly challenged (O'Neill, et al., 2018; Parrique, 2019). The STI scholar Soete (2019) has even gone so far as to argue that STI research and policy are at a fundamental and existential crisis due to it being stuck in an industrial efficiently and consumerist mode that makes it unable to address these negative externalities. Therefore, it seems timely to offer an analysis of resistance to innovation that moves beyond the classic economic approach of STI and refrains from analysing innovation with a one-sidedly positive view on innovation.

Historians such as Staudenmaier (1995) describe the development of technological innovation as a power struggle. They describe it as a conflict where one group triumphs through successfully developing technology that represents their values and invested interests, while the other groups' wishes are downplayed. Thus, the historians are partly in agreement with the innovation scholars – they see a power struggle in innovation processes. However, in contrast to most innovation scholars, they do not pick a side in this struggle. Based on the insights from the historians, resistance can be viewed as a process through which society selects between technological options (Bruland, 1995). Another school of thought that can contribute to the understanding of innovation resistance is 'resistance studies', focusing on social resistance. These scholars highlight that resistance is not just 'against' something; it is 'for' something else (Baaz, et al., 2017).

Innovation processes are just one part of the fabric that builds our world, and resistance to it might benefit from being viewed as an element of this bigger picture. Innovation processes *and* other processes that pose resistance to it are important and exciting to study because they constitute a large part of how we construct our social and material world (Winner, 1980) and its impact on the planet (Latour, 2017/2015). Innovation research rarely try to understand human and non-human resistance as a process of its own originating in another view on how to shape the world. Often, only a fragment of it is described in the scholarly work – the piece that intercepts an innovation process (Thomas, et al., 2017). That piece is often put forward as an antagonist to a protagonist innovation process (e.g. Juma, 2016[12]) that is assumed to lead to a positive sum-game (Segercrantz, et al., 2017).

It can be suspected that the studies focusing on innovation resistance (albeit sometimes under different names such as barriers or impediments) have done so with a pro-innovation starting point, derived from the one-sided pro-growth, pro-firm view elaborated in 1.1. This has likely coloured the analysis

[12] The title of Juma's book is illustrative and reads "Innovation and Its Enemies: Why People Resist New Technologies".

of innovation resistance in most previous studies. Critical innovation scholars have made the pro-innovation bias their point of departure for a more critical analysis of innovation (Walsh, 2021). However, they have not yet extended much of their focus to exploring the relationship between the pro-innovation bias and innovation resistance. Despite critical scholars' attempt to increase the effort to challenge the pro-innovation bias, they have not yet given any suggestion on why this bias accompanied by a pejorative view on resistance lingers in the academic writings. Therefore, this thesis aims to:

> shed light on central presuppositions and limitations of the scholarly knowledge production on innovation and innovation resistance, and empirically explore the manifestation of innovation resistance and the dynamics involved in its entanglement with innovation processes.

This is an attempt to steer clear of the pro-growth, pro-firm, pro-capitalist outlook presented in 1.1, and the protagonist-antagonist perspective narrated in 1.2. The first part of this aim is handled by reviews of extant literature combined with the analytical finding made when addressing the second part of the aim. The second part focuses on three different innovation processes and mobilises ANT to address them analytically.

ANT has had a history of avoiding a one-sided perspective on resistance (e.g. Harrisson et al. 2001). Moreover, it is part of the theoretical work (Science and Technology Studies) that Soete (2019) has pointed to as a way out of the existential crisis of STI. In contrast to the outlook in 1.1, the use of ANT also enables an analytical starting point, where (1) the outcome of an innovation process is seen as undecided and uncertain, (2) the innovation processes are considered multi-directional, (3) a firm is seen as an actor among many, with a goal set up to serve its own purposes but with an uncertain outcome for both the firm and other actors, (4) relationships outside of the economic sphere are acknowledged and (5) speed and acceleration are not necessarily viewed as more desirable than alternatives such as slowing down or reflecting.

The STI research have focused on the firm's perspective when studying innovation resistance. This has led to a partial and shallow analysis of innovation resistance, focusing only on the moment when it is noticed by the proponents of the innovation process. This raises questions as to what associations the innovation resistance process has to other entities in the world and how the proponents of an innovation process are made aware of it. These wonderings have not been dealt with in an elaborate and satisfactory way by the ANT studies on innovation resistance. Therefore, the first research question is:

> RQ1: How does the innovation resistance process manifest itself when viewed with an ANT-inflected lens?

Moreover, the STI research often take a pro-innovation starting point, viewing innovation as progressive and innovation resistance in an antagonistic way. This has very likely influenced the previous studies on innovation resistance and nudged studies to overlook other perspectives than those of innovating firms and growth-focused States. ANT offers a way to move away from a one sided perspective and enables an analysis from a vantage point that is less ideologically tainted than much of the literature dominating the field. Furthermore, the STI research has, overall, treated both resistance and innovation in a static way hiding their dynamic properties. ANT, on the other hand, emphasises the dynamics between actors and highlights that no fixed contours can be granted to either innovating or resisting actors. Networks of actors are, according to ANT, not stable but constantly in construction. The previous work on innovation resistance using ANT have loosely connected resistance to changes within a network, but they have not elaborated on the entanglement of innovating actor and the resisting actor(s). Nor have they attempted to leverage the work by Galis and Lee (2014) and Helgesson and Kjellberg (2005/2020) to describe the innovation resistance process more elaborately. Therefore, the second research question is:

> RQ2: How can the dynamics of the entanglement between an innovation actor and a resisting actor be conceptualised, and complement dominant outlooks on how the two relate to one another?

This study complements the STI and indeed many STS studies' firm-focused perspective and suggests an alternative to the dominant view on human and non-human innovation resistance. This alternative considers the innovation resistance process as a process of its own. The study attempts to move closer to a holistic view of innovation resistance that takes multiple perspectives into account and does not presuppose that the development and diffusion of an innovation are the most desirable outcomes of a series of events involving proponents of an innovation.

Despite the scholarly awareness of the pro-innovation bias, little focus has been placed on the reasons behind its continued scholarly reproduction. Therefore, this thesis's third and last research question evolves around the scholarly production of 'innovation' – be it what it may – as a positive force in society, and resistance as an antagonist to this progressive force. The thesis seeks to leverage the insights provided through the inquiry into the innovation resistance process to render new light on this reproduction. Therefore, the last research question is the following:

> RQ 3: How can the expanded knowledge of the dynamics of the innovation resistance process be leveraged to understand the dominant scholarly knowledge production of how innovation relates to resistance?

This study tries to contribute to the small but growing field of critical innovation studies (Godin & Vinck, 2017b; Godin & Vinck, 2017), and it attempts a conversation with innovation scholars interested in barriers and resistance to innovation. Furthermore, it provides suggestions for the development of actor-network theory.

The research questions are answered by discussing and analysing literature and applying actor-network theory in three different empirical contexts. The empirical studies are qualitative and based on two studies in the Health Care Sector and one in the Energy market. The first study revolves around a low tech medical innovation process that is resisted due to its ambiguous clinical evidence, impact on nature and possible contribution to antibiotic resistance. The second study is a 'deregulation' or 'a restructuring and reform' of a former public monopoly, viewed as a systemic innovation that gives rise to a number of associated changes in technology, supply chain, service, etc. This process faces resistance from within when entities in the innovation process willingly or unwillingly follow deviant agendas. The third study concerns the development of a high-tech electrical product and illustrates the firm's internal resistance processes. The studies are based on interviews complemented with public documents, scientific articles, newspapers and webpages.

Research question 3 is answered using the insight into programmes and resistance processes gained through the inquiry into RQs 1 and 2 and the knowledge gained from a critical analysis of innovation literature (presented in chapters 2 and 3 of this thesis).

## 1.5 Structure of the thesis

The first three chapters (2–4) constitute a review and discussion around relevant literature that contribute to the understanding of innovation and innovation resistance. Chapters 5–9 are theoretical elaborations, followed by an analysis of the empirical examples and theorising based on the empirical analyses. Thereafter, follows an analysis (Ch. 10) that draws together the findings from the first and second part of the thesis. Finally, the thesis ends with some conclusions. A brief outline can be found below:

**Chapter 2** describes the social construction of contemporary common ideas around innovation. It makes salient the most important ideational threads with which 'innovation' is caught up and elaborates on the limitations to the study of innovation and innovation resistance that accompanies them.

**Chapter 3** explores the innovation resistance research in the high ranking journals, with a focus on resistance and barriers. The chapter is based on a review of articles about innovation resistance in the top 20 innovation journals

identified by Fagerberg et al. (2012). The chapter makes salient some of the dominant traits in the study of human and non-human innovation resistance.

**Chapter 4** is an inquiry into writings related to 'innovation resistance', looking beyond the framing of innovation resistance in top innovation journals.

**Chapter 5** presents the thesis' theoretical framework. It first positions this thesis in the innovation literature using actor-network theory, in general, and ANT studies on innovation resistance, in particular. Then follows an account of Actors Network Theory, emphasising the innovation resistance processes engaging with the innovation process. In ANT terms, this means a focus on the anti-programmes (Latour, 1991), dissidence (Callon, 1984/2007), treason (Galis & Lee, 2014), failed interessement (Harrisson & Laberge, 2002) as well as non-alignment and non-compliance (Helgesson & Kjellberg, 2005/2020). The innovation process under study is viewed as one of the different processes that strive to shape the social and material world.

**Chapters 6, 7 and 8** are empirical chapters, where three different stories are presented through the lens of the theoretical framework (Ch. 5), as this is a common and efficient way to relate ANT work. Each chapter ends with a summary of the most important theoretical insights. They give accounts from the Health care sector (Chapters 6–7) and the Energy market (Ch. 8) and account for the introduction of a low-tech medical innovation (Ch. 6), a systemic innovation (Ch.7) and the development of a high-tech innovation (Ch. 8).

**Chapter 9** is an analytical synthesis of the findings from the different (already analysed) empirical chapters. Here, the answers to RQ 1 and 2 are drawn out, and a new way of understanding innovation resistance is presented and put in relation to previous studies.

**Chapter 10** connects the analysis in chapter nine to the themes brought up in chapter two and, to some degree, chapters three and four. It uses actor-network theory to discuss the scholarly production of innovation and innovation resistance (RQ 3).

**Chapter 11** presents the thesis' conclusions and contributions, and **appendix 1** discusses the methodology.

# 2. Dominant associations with 'innovation' and some of the limitations they bring

In the endeavour to shed light on central presuppositions and limitations of the scholarly knowledge production on innovation and innovation resistance, and expand the knowledge of their dynamic entangled relationship, a deeper understanding of the dominant scholarly construction of the concept 'innovation' is needed. This chapter will occupy itself with that, leaving the dominant construction of 'innovation resistance' to the subsequent chapter.

Innovation research, like any research field, is marked by certain simplifications and assumptions. These are built into the research paradigm, and they are often not recognised (Rogers, 2003, p. 106) by the authors following it. According to Rogers (2003, p. 106), authors unaware of their own bias are particularly troublesome and dangerous in an intellectual sense. One underlying idea in the contemporary literature around innovation is that it brings a value that exceeds the cost for it or leads to a positive sum-game that outweighs negative feedback or substitute effects (Cantwell, 2005, p. 561). Viewing innovation in that manner likely colours the perception of innovation resistance. The primary focus of Critical Innovation Scholars has been to problematise this notion (often called the pro-innovation bias), and they directly challenge the supposition of innovation as inherently good.

In this chapter, the associations made with the concept 'innovation' are made visible in order to denaturalise the contemporary ideas of innovation and innovation resistance, reconnect them to power-structures and avoid a false neutrality. It describes how 'innovation' from the 1850s and onwards associated itself with new layers of ideas and associations. By doing so, it provides a history of the most common associations prevalent in innovation studies today and relates the limitation they brings to the study of innovation and innovation resistance. Bringing these out in the light is important when striving to avoid an uncritically positive view on innovation which likely feeds into a corresponding negative take on resistance. The lists of limitations presented are by no means exhaustive; rather, they summarise the critique brought forward so far by critical innovation scholars, complemented with a discussion of STI

scholars' contributions[13] as well as an ecological critique[14] put forward by human and economic ecologists. Thus, this chapter justifies and fleshes out the narration of the common outlooks and ideas of STI research, and its limitations (earlier related briefly in 1.1).

## 2.1 The times when 'innovation' had pejorative meaning and resistance to it was the norm

During the 1900s, the word innovation had almost purely positive connotations, according to Godin's study (2015a) of historical text regarding innovation. However, Godin's study shows that viewing innovation as something 'good' has not always been the habit of people using the term. For most of the over 2500 years that the concept has been used, it has essentially been seen in a pejorative light and the innovator him/herself as 'a heretic, a cheater, a revolutionary' (Godin, 2015b, p. 37). For example, in western Europe in the 1600s and 1700s, it was common to accuse others of 'innovating', which was often met by casting the accusation back with a 'YOU are the innovateur!' (Godin, 2015a, pp. 101-121).[15] Godin means that we can use one sentence to sum up how innovation was talked about before 1850, 'as introducing change in established order'. In Europe, especially Britain, innovation was seen as something that threatened the power advantage of the elites and thus had to be discouraged. Therefore, resisting innovation was perceived by both the king and the church as a natural response, and innovation itself came with negative

[13] The literature review was conducted through reading the two major works in critical innovation studies: "Critical Studies of Innovation" (Godin & Vinck, 2017) and "Challenging the Innovation Paradigm" (Sveiby, et al., 2012b), Godin's work on the history of innovation and construction of the field Innovation studies, feminist writings on innovation and writings found through reading through the reference lists in the already reviewed works. This was complemented through reading Schumpeter's book "A Theory of Economic Development", the book 'Innovation Studies': Evolution & Future Challenges (Fagerberg, et al., 2013) and the Oxford Handbook of Innovation (Fagerberg, et al., 2006) as well as other overviews of the field of Innovation studies. The structure of the chapter is based on the historical work by Godin, a number of books in the Oxford series of short introductions (such as the introduction to capitalism, neoliberalism, etc.) and the history of economic growth as related by Parrique (2019), Roine (2014) and Jackson and Stymne (1996). The scholarly knowledge production was reviewed through reading critical works concerning the research process and the research institutions as well as critical works on the production of innovation research.

[14] As critical scholars, to my knowledge, have not yet extended their critique based on ecological arguments.

[15] Other examples are that Plato was clearly against innovation in culture and education (Laws VII: 797b as quoted in Godin 2015a, p. 24). Aristotle resisted it in politics (Godin 2015a, p. XX). In 1548, the King of England, Edward VI, issued a *'Proclamation Against Those That Doeth Innouate'* which targeted people who were innovating in religion (Godin 2015a, pp. 75-76).

connotations.[16] However, in the mid-1800s, the view on innovation started to shift (Godin, 2015a, pp. 168-230). This shift was connected to a number of associations to other concepts. This narrative will begin with '*progress'*.

## 2.2 Progress

The process of changing connotations of 'innovation' began as early as 1789 when a few European writers started to associate the term with the newly re-introduced word 'progress' (Godin, 2015a p.168; Koselleck, 1979/2004, pp. 266-267). The construction of 'progress' enforced a linear view on time and societies' development. Western thinkers constructed the idea that some societies were more developed than others. Western people began to see themselves as advanced compared to others and sought to catch up or overtake them (Koselleck, 1979/2004, pp. 266-267). According to Grubacic and Graeber (2020), the construction of the notion of 'social evolution' (that Tugot called 'progress' in 1750) was a direct riposte to an indigenous critique of the liberal state and private property and thus a conscious move to render an indigenous critique of the western way of organising society toothless.

With the association to progress came a view on nature as an endless resource. In Nisbert's (1980) account of the history of 'progress', he says that a fundamental idea tied to the concept 'progress' from the times of the Greek until the time of his writing was:

> ...the belief in what Descartes called the "invariability of the laws of nature." Implicit in this belief, or certainly deducible from it, was a confidence that nature's resources would never give out; that the only real challenge was man's capacity for exploiting them.

This notion of 'progress' travelled into association with the word 'innovation' from the 1700s and onward. Koselleck says that it:

> ...became a general empirical principle of scientific invention and its industrial application, that they gave rise to an expectation of progress that could not be calculated in advance (Koselleck, 1979/2004, p. 269)

One reason behind this could be said to be the British democratisation (Crick, 2002, p. 32) which began in the 1700s and enabled middle class manufacturers and entrepreneurs who were more amendable to change to engage in politics (Freeden, 2015) and gain linguistic control (Koselleck, 1979/2004, p. 252).

[16] Of course, this was not a pure divide between innovating being seen as bad before the 20th century and good after it. Instead, the varying and competitive conceptualisations did and do coexist both before and after the 20th century. The dominant conceptualisations are what is described here.

Godin also points to another important reason why the word innovation began to gain a positive meaning. Namely that another concept had also started to be seen in a positive light; the other word was 'revolution'. Both the word 'revolution' and the word 'innovation' lost much of their pejorative meaning during this time, and innovation became revolutionary in a positive sense (Godin, 2015, p. 172).

The association with progress comes with limitations, and five such limitations will now be presented.

(1) The word progress is often put forward as a neutral concept disconnected from power structures. This might nudge a researcher into viewing innovation as a neutral concept as well as obscuring the conflict-lines between different stakeholders (Thomas, et al., 2017). The way 'progress' is used in innovation literature is linked to the construction of the west as advanced compared to other parts of the world. According to Pansera and Owen (2018), a key moment in inaugurating an era of aggressive economic interventions in the global south was in 1949 when U.S. President Truman (1964) held a speech where he framed some parts of the world as undeveloped and in need of technology from the west. He claimed that this technology would lead to greater production, which in turn would lead to peace and prosperity. Connected to this is the measure of economic growth as a sign of progress. Measurement and comparison of economic growth ignore different visions of what wealth is and enforces a western capitalist idea of progress on other countries even though their aspirations and traditions might not be aligned with these ideas (Parrique, 2019, p. 57). It portrays what is predominantly white imaginaries of the future as natural and ignores its reproduction of oppressive orders of patriarchy and white privileges (Pecis & Berglund, 2021). Thus, when it is said that innovation leads to progress, what is predominantly meant is that technological innovation under capitalism leads to a western idea of progress. An idea that relies heavily on technology, capitalist markets and assumes endless natural resources (Nisbet, 1980). This has marginalised the global south's vibrant universe of experiments opposed to commodification and seeking alternatives to progress, development and modernity (which are concepts that have been pushed upon them by the west) (Pansera & Owen, 2018). It enforces a world view where technology and capitalism are self-evident forces of good. It risks downplaying alternative modes of organising society and innovation processes that focus on principles outside the economy, such as social justice, empowerment, democracy, equality and degrowth[17] principles (Pansera & Owen, 2018).

[17] Degrowth should not be understood as the opposite of economic growth. It is not recession but a call for sufficiency and a call to stop focusing on and caring about economic growth. It can be understood as striving "neither to have more, nor to have less - but to have enough. Enough income for a household to satisfy its needs, enough profit for companies to ensure their

(2) When innovation as positive is part of constructing the western ontology - marking the west as advanced (Fougère & Harding, 2012), innovation becomes an ally in the power struggle rather than an object for intellectual scrutiny. Thus, the importance of innovation leading to a positive sum-game is political. If innovation leads to negative consequences, the ontology of the west would be threatened. If innovation does not lead to a positive outcome, if progress is not reached, then the west would lose its self-constructed status as 'advanced' (Fougère & Harding, 2012). Moreover, the fast belief that innovation (be it what it may) leads to progress obscures the fact that every innovation carries the potential for undesirable consequences (Gripenberg, et al., 2012). Stilgoe et al. (2013) suggest that unforeseen, potentially harmful and/or transformative, innovation impacts are probable. Despite this, innovation researchers are mainly concerned with direct, anticipated and desirable consequences (Sveiby et al., 2012a). Innovation is often assumed to have desirable consequences (Segercrantz, et al., 2017), be ethically sound and within the boundaries of the law (Söderberg, 2017). When innovation is assumed to lead to progress, there is less of a need to study the actual consequences of innovation processes. This downplays the uncertainty in the innovation process and that innovation has unknown value prior to its adoption (Greve, 2011).

(3) The firm belief of innovation leading to progress might lead to recharacterising phenomenon previously seen as innovation as – when adverse effects are made salient- not being innovations after all. Sometimes, a 'no true Scotsman' argument[18] (The Internet Encyclopedia of Philosophy, u.d.) is used to explain away harmful effects of innovation. In order to rescue the generalisation that all innovations are good, phenomena with adverse effects are re-characterised as not being innovations. Soete (2013) has noted this in the case of financial innovations. He points out that after the financial crisis of 2008, many economists tried to portray finical products like Credit Default Swaps or securitisation as 'wind-making' innovations or illustrations of lack of risk management knowledge. Instead, Soete emphasises that when these were introduced and spread, they were ‘truly innovations in the real sense of the word’ (p. 141). Just because the products, after a while, began to be seen by many as harmful to the economy and society, the label 'innovation' cannot be removed. If the definition of innovation was changed to dictate that innovation must, by necessity, lead to long-term societal gain, it would become very hard to use the concept to describe any phenomenon appearing in contemporary times.

financial sustainability, enough revenues for governments to guarantee high-quality public services. Eventually, it is a call to right size the scale of the market economy to a level where it can secure well-being in a way that is socially and ecologically sustainable" (Parrique, 2021).

[18] The classical example is when one person says that "all Scotsmen are brave". Then, another person says that "McDougal is a Scotsman and he ran from the enemy". The first person replies "that is just prof that McDougal is no *true* Scotsman" (The Internet Encyclopedia of Philosophy, u.d.).

(4) Viewing innovation as leading to progress enforces a linear view on innovation processes where only one outcome is possible. These kinds of narratives are often constructed in hindsight when the outcome is known to the analyst. It paints a picture of a linear process where paradigm replaces paradigm, and it is assumed that the prevailing innovation is the 'best'. This obscured the multidirectional character of an innovation process and hides that different social groups with different visions for how the world should be shaped influence the process and the direction of the development (Thomas, et al., 2017; Pinch & Bijker, 1993/1987). The 'winning' innovation process, in that light, becomes the innovation process that was most beneficial for a certain group of stakeholders rather than objectively 'good'. This renders other social groups visible, groups that suffer adverse effects from the 'winning' innovation process.

(5) Connecting innovation to progress makes it seem like innovation linearly and accumulatively improves the conditions for humans and nature. However, what constitutes progress is a social construct that has changed throughout history (Nisbet, 1980) and what is seen as progress might change depending on which point in time the analysis is made. Even though the value of an innovation might be perceived to be known after adoption, there may be a good cause to re-evaluate this as time goes by and as more stakeholders are involved in making a value judgment. Time is essential when considering value judgments. The year after Rogers wrote his seminal book "Diffusion of Innovation", he reflected upon his early work. He then realised that when he, in his youth, categorised a farmer as a laggard (implying that the farmer was behind and not well informed), this farmer was by present-day standards *'a super innovator in organic farming'* (Rogers, 1983, p. 191). That farmer had opposed the new methods and tools because of the impact they had on the environment. In hindsight, this person resisted the innovation in his time, which made him a laggard, but he was very early in embracing a way of farming today considered 'innovative'. This story illustrates the influence of both the person interpreting the situation and the point in time when the analysis is made. Rogers' (1983, p. 191) account demonstrates a shift in values from productivity to ecological diversity. What was neglected once can be valued later, or vice versa. Our knowledge of the future is so limited that it becomes impossible to assess innovation processes' full impact (Blok & Lemmens, 2015). What we consider progress now might be seen as destructive later.

## 2.3 Technology and Science

According to Godin's historical analysis, until the 1800s, 'innovation' was not connected to either science or progress. This changed during the 1800s when progress became linked with science, and they almost became one and the

same (Godin, 2015a, p. 177). Then, innovation got into science through the useful arts, and inventors started to use the word in their writings (Godin, 2015a, p. 177). Godin means that '*Technological* innovation' came out of a tension between science and societal action. Research for its own sake was not enough anymore; it had to be useful for society; it had to be applied (Godin, 2015a, p. 12). In the 1940s, the economic historian Rubert Maclaurin created the first research programme that studied technological change. Godin's study shows that during 1941–1943, Maclaurin (and many others) shifted his vocabulary from talking about technological change to talking about innovation. Maclaurin saw innovation as a linear process in time, from research to commercialisation; thus, innovation started to be seen as applied research (Godin, 2015a, p. 12-13, 124). Godin identifies two research traditions that emerged during the 1900s, which were pioneers in the scholarly inquiry into innovation. The innovation as technology was the focus of both of these. The first tradition emerged predominantly in American institutions involving American scholars, while the second tradition – often called 'Innovation Studies' – mostly involved Europeans (Godin, 2012). Both these traditions are now considered parts of the larger Science, Technology and Innovation (STI) field (see Matrin, 2012 and Soete, 2019).

The association with technology is connected to at least two limitations connected to feminist and ecological critique. These limitations are not only contingent on the association with technology; they are also due to other factors such as, perhaps most importantly, structures of patriarchy (Walby, 1990) and modernity (Heidegger, 1977).[19] In this narrative of the construction of the dominant view on innovation, the limitations are most salient in connection to technology.

(1) With the connections to science and technology came a symbolical association to masculinity (Pettersson & Lindberg, 2013) and thus, activities symbolically linked to the female became largely invisible in innovation research. The study of innovation and the policy implications it gives rise to are often symbolically linked to male-dominated sectors of the economy (Pettersson, 2007; Lindberg, 2010; Lindberg, 2012). This began to be highlighted at the end of the 1990s when a feminist critique emerged. The feminist scholars questioned the dominant portrayal of innovation as either gender blind or male-dominated (Pettersson & Lindberg, 2013). Innovation researchers have, throughout the 1900s, predominantly been male and used a male gaze that influenced the view on innovation and innovation policy (Pettersson & Lindberg, 2013). Innovation has been constructed as male and white, largely ignoring the inequality structures that has led to the exclusion of (racialized) women (Pecis & Berglund, 2021). As a result, innovation policies have tended

[19] Heidegger (1977) describes 'modernity' as marked by the mode of 'enframing' – meaning that humans step outside of nature to dominate and control it.

to prioritise male-dominated economic sectors, male-dominated networks and men in general[20] (Lindberg, 2012). The dominating view on innovation as technological builds on stereotypical notions of gender and promotes certain masculinity types as the norm. This has led to a marginalisation of women, female-dominated sectors of the economy, as well as service and social innovation (Pettersson & Lindberg, 2013).

(2) The association with technology (together with the association with progress) also brought with it a view on nature as detached from technology. Technology is often seen as the means through which humans control and dominate nature (Laestadius, 2018). Nature is foremost seen as a resource that has no value unless it is owned by someone that put a price on it (see Parrique, 2019). The innovation models depend on the acceptance and tolerance for waste production. Moreover, the linear economy[21] (in which much innovation literature situates itself) depend on landfill as the primary 'dispose option' (Gregson, et al., 2015). Most technological product innovations depend on products becoming obsolete and thrown away without too much consideration. Humanity has historically deployed sky, water and land for waste disposal with little concern for the consequences, and indeed the consequences were relatively manageable when people were few and unspoiled territory plentiful. However, there are limitations to the capacity with which the earth can absorb and neutralise the waste unleashed upon it (Simpson, et al., 2005). Despite this, the production of waste is largely invisible in innovation models.

## 2.4 Capitalism and Corporations

While the social innovators of the 1800s were connected to socialism and portrayed by capitalists as a threat to capitalism and private property (Godin, 2019, p. 229), technical innovation became associated with the capitalist economic system. When Joseph Schumpeter (1926) published the new edition of his book from 1911, "The Theory of Economic Development", 'innovation' was a fundamental piece of the puzzle when explaining capitalist economic development[22] (Elliott, 1983/2012; Godin, 2019). Schumpeter did not see changes as something driven by external forces such as increased capital, population growth, or a shift in consumer taste (Schumpeter, 1911/2012, pp. 62-66). Instead, he saw change as drawn from inside the economy. He explained it as new combinations or innovations which he saw as the engine of capitalism (Schumpeter, 1943, pp. 82–83). According to Godin's (2012) reading,

[20] Lindberg (2012) showed that during the period 2002–2010, Sweden's Innovation policy promoted male-dominated areas in 80% of the cases.
[21] In the linear economy, materials are extracted, consumed and discarded (Whalen, 2020, p. 1).
[22] 'Innovation' had very little place in the first edition (Godin, 2019, p. 189).

Schumpeter did not focus on writing a theory of innovation, but he was resurrected by Freeman in the 1970s[23] when he launched the research tradition called 'innovation studies' (that later grew into being a part of the STI). Freeman used Schumpeter's name to legitimise his ideas (Godin, 2012) and therefore Schumpeter, and his capitalist framing of innovation has remained influential in innovation research. The early innovation research was conducted in a time that Fulcher (2004) called 'managed capitalism' (sometimes referred to as Keynesian).[24] Johnstone and McLeish (2020) call this period an economic golden age, marked by rapid and stable economic growth and rising prosperity in North America and Western Europe.

Godin's historical studies show that in the mid-1900s, 'innovation' almost always meant technological innovation, and technological innovation was often understood as product innovation. According to Godin (2019, p. 133), the reason behind this is that innovation at this time was oriented towards the market, and the *commercialisation* of inventions is the affair of firms. The success of technological innovation was considered to depend on profitability and consumption. The products were invented to be put on a market and sold with profit, and the theory of production (which is tied to consumption) was an essential part in constructing the 'technological innovation' (Godin, 2019, pp. 133-135).

In the 60s and 70s, the conditions in the world economy changed. The global competition increased much due to the emergence of the container industry and the rise of 'tiger' economies such as Japan and Taiwan. In the 1970s, stocks, property and savings collapsed (Harvey, 2010, pp. 29-51) and this put pressure on the old, industrialised societies. As a response, neoliberal ideology began to influence governments (Fulcher, 2004, pp. 41-46, 48) and an era of capitalism that Fulcher (2004, p. 47) calls 'remarketized capitalism' began. After the 1970s, there was an increased focus on ensuring economic growth, individualism and freedom of choice (Fulcher, 2004, p. 47). These were also the times when Ronald Reagan coined the expression 'trickle-down' economy, meaning that if the rich were allowed to get even richer, greater prosperity

[23] According to Godin (2012), Freeman used Schumpeter's work to legitimise his own ideas of innovation to tie it to commercialisation. Rather than being the introduction of technological invention in firms, Freeman describes it as the commercialisation of technological invention. However, Godin (2012) points out that Schumpeter does not talk about innovation as necessarily being commercialised, it is only the first of his five examples of 'commodities' that are connected to commercialisation. When Freeman starts to talk about unemployment, he calls what he is doing 'neo-Schumpetarianism', even though Schumpeter had little to say about unemployment and wages (Godin, 2012). This way of reconstructing the history of the field in retrospect is something Godin (2019, p. 178) tied to 'innovation' now being not just a research field but also an ideology in itself.

[24] In these times, competition and market regulations declined, and state management and control increased. Both unions and industry became more organised, and 'Full Employment' was important for post-war governments after the great depression of the 1930s (Fulcher, 2004, pp. 41-46).

would eventually trickle down throughout the entire society (Rifkin, 1995/2001, p. 39). Segercrantz et al. (2017) has shown that when innovation is studied, firm-based innovations are often in focus, i.e. the innovator is usually an established firm or an entrepreneur who starts a firm. Additionally, contemporary dominant innovation management literature constructs innovation practices through a firm's self-preservation discourse, which means that innovation is often framed as important for firms that want to stay in business and increase their market shares (Segercrantz, et al., 2017). Thomas et al. (2017) claim that dominant innovation literature is geared towards maximising firm income, and Pfotenhauer and Juhl (2017) argue that innovation has been naturalised around the technology-market dyad in the dominant innovation literature.

In the early 1980s, the idea of nourishing an 'entrepreneurial spirit', i.e. innovating and commercialising ideas, spread from the private sphere to the public as the public administration model 'New Public Management' started to spread rapidly (Steger & Roy, 2010, p. 13). This was also when the neoliberal ideology of bringing more activities to the marketplace reached academia. The Bayh-Dole Act from 1980 in the United States was one clear indication of the emergence of this trend of involving universities within the economic sector, which spread to most countries in the global north (Bertilsson Forsberg, 2018, p. 13). This meant a new focus on the commercialisation of academic research and its possible effect on economic growth (Harvey, 2005, p. 61; Shore & Wright, 1999, p. 563). This focus is still apparent today and a research field of its own (Severinsson, 2016, pp. 15, 51). On a governmental level, universities are often seen as a breeding ground for innovators, who might become entrepreneurs, creating new industries and employment opportunities (Alvesson, et al., 2017, p. 43).

The association with capitalism and corporations comes with limitations, and six such limitations will now be presented.

(1) The firm's primary goal of profit risk being downplayed and research promoting innovation unwittingly becoming pro-profit. When innovation is framed as a capitalist endeavour, this connects it to a (neoliberal) capitalist ideological view of the world that values profit, management, client relations, markets and entrepreneurship. When the focus is on corporations, profit becomes the ultimate goal[25] of a vast majority of studied innovation processes. Schumpeter saw capital accumulation as a result of economic development (Schumpeter, 1911/2012, pp. 62-64 Elliott, 1983/2012), and it is also the primary goal of innovation under capitalism (Walsh, 2021). This makes any secondary goal dependent on the fulfilment of this primary one. The attempt to

[25] Innovation projects within or outside the firm that do not contribute to, or jeopardise, this goal risk facing firm-based resistance (see Juma, 2016, p. 41).[25]

make a profit is superior to the aim of improving the conditions of their (prospective) clients, even though these two objectives are often believed to be dependent on each other (Hasu, et al., 2012; Hübner, 1996). Since the firm's primary objective as an organisational form is profit, this is also the primary objective for most innovation processes studied by innovation scholars. Resistance to these kinds of processes is, therefore, intentionally or not, resistance to the innovating actor's capital accumulation.

(2) The analysis risk unintentionally becoming pro-firm and portraying firms as self-evident forces of good (see Alvesson, et al., 2009, p. 7[26]). Underlying this is perhaps a belief in Reagan's trickling-down economy. When the focus is on firms, the problem formulation – that is, the starting point of the innovation process – lies in the hands of these kinds of organisations. Even though they advisably take input from prospective clients and other relevant stakeholders, they are the innovation process' managers. Winner (1980) has shown that in worst-case scenarios, these people can influence innovation processes to adhere to racist ideals or weaken unions. When firms are represented in a one-sided uncritical manner, the researcher's ability to critically analyse the firm's innovation activity becomes limited. It then becomes an expression of an ideology of elites (Alvesson, et al., 2009) that risks uncritically viewing any opposing forces in a derogatory light. Alvesson et al. (2009) argue that subscription to this ideology leads to reproduction and legitimation of the status quo. An activity that does not come forward as very innovative.

(3) The analysis risk unknowingly promotes neoliberal capitalist values. The focus on firms' well-being is apparent in innovation literature (Segercrantz, et al., 2017). When assuming that innovation is good for society, the focus is often on firms. There is an underlying assumption that the well-being of these organisations and their owners is aligned with society's well-being. The focus on the proliferation of firms is closely connected to capitalist values and neoliberal ideology. In the neoliberal ideology, innovation is an essential means to enhance productivity and survival in a competitive market. Central to neoliberalism are values such as 'competitiveness', 'self-interest' and 'an entrepreneurial spirit' (Steger & Roy, 2010, pp. 11-13). These are also cornerstones in Schumpeter's description of the motives for an entrepreneur to innovate[27] and apparent in the innovation management discourse (Segercrantz, et al.,

[26] They have noted this habit among management scholars.

[27] Schumpeter's three drivers for an entrepreneur: (1) ...the dream and the will to found a private kingdom, usually, though not necessarily a dynasty. The modern world does not know any such positions, but what may be attained by industrial or commercial success is still the nearest approach to medieval lordship possible to modern man (Schumpeter, 1911/2012, p. 93); (2) ...the will to conquer: the impulse to fight, to prove oneself superior to others, to succeed for the sake, not for the fruits of success, but for success itself. From this aspect, economic action becomes akin to sport – there are financial races, or rather boxing matches (Schumpeter, 1911/2012, p. 93); and (3) ...the joy of creating, of getting things done, or simply of exercising one's energy and ingenuity (Schumpeter, 1911/2012, p. 93).

2017). Writers and commenters about neoliberalism seem to agree that, intentionally or not, neoliberalism led to the reconstruction of the economic elite's power (Harvey, 2005; Fulcher, 2004; Styhre, 2013). Therefore, it would seem likely that research that adheres to neoliberal ideals, by uncritically promoting innovation for the well-being of firms, risks becoming research for the economic elite. Additionally, when the firm's well-being is in focus, this likely colours the analysis of phenomena that threaten this well-being.

(4) The focus on firms leads to a focus on problem-solving for an economic elite and risks downplaying problems affecting non-affluent social groups. The vast majority of firm-based innovations are developed for actors who can pay for it,[28] be it with their purse or through the social welfare system in the country they dwell in. The problems addressed are, therefore, predominantly the issues held by these actors. Even when 'innovation for the poor' or 'innovation from the bottom of the pyramid' is addressed, the focus is predominantly on monetary transactions and market relationships (Pansera & Owen, 2018).

(5) The firm perspective can lead a researcher to assume that only products or practices undesirable for the users are outcompeted (Soete, 2013). Neglecting the user perspective can make a researcher blind to a firm's tendency to engage in innovation processes that lead to what Calvano (2006) calls 'destructive creation'. Destructive creation occurs when innovation is allowed to affect the value of the existing stock of goods to prompt the innovating firm's targeted clients to renew their purchase. Soete (2013) argues that on a broader societal level, innovation does *not* predominantly destroy a few incumbents to the benefit of many newcomers. Instead, it often benefits the few at the expense of the many. This kind of innovation practises are profitable for a corporation (Calvano, 2006). Still, they do not, by default, renew society's dynamics and, thus, do not automatically lead to increased welfare and economic development (Soete, 2013). Furthermore, destructive creation is connected to the older term planned obsolescence (London, 1932), i.e. purposely making sure that sold products age somehow to prompt continued sales (Bulow, 1986; Packard, 1960).

[28] Innovation outside of the market economy does however target a multitude of actors, independent of their economic abilities.

Obsolescence can be created through making products: unfashionable, non-compliant with new software,[29] expensive and hard to repair,[30] or designed to break after a specific time.[31]

(6) The focus on commercialising research gives an innovation researcher a pro-innovation milieu that risks blinding them to innovation processes' adverse effects. Innovation scholars often find themselves in a context where researchers are prompted to initiate commercialisation processes and start their own firms (Fowler, 2017, pp. 15-22; Bertilsson Forsberg, 2018). Collaboration between universities and the industry is cherished (Severinsson, 2016) and the linear model of innovation as commercialised research is nurtured by university-owned incubators (Kolympiris & Klein, 2017). Innovation scholars are known to advocate that the university's' main task is to produce knowledge that solve grand challenges (Widmalm, 2016) and the same scholars who study innovation are often asked to teach students how to innovate.

## 2.5 Economic Growth

Godin's (2015, 2019) historical studies show that the first tradition of innovation research emerged in the 1940s. This happened when the scholarly focus shifted from 'technological unemployment' to 'technological change' to 'technological progress' to 'technological innovation'. Technological innovation emphasised *commercialisation*, which the other concepts did not (Godin, 2019, pp. 2-3; Godin, 2012; Godin, 2010). Technological innovation inherited a focus on increased productivity and economic growth from the literature stream on 'technological change' (Godin, 2019, pp. 72, 133-135).

Economic growth was first measured with the Gross National Product (GNP),[32] a measurement developed after the Great Depression of the 1930s

[29] This is referred to as *Planned systemic obsolescence*. Apples TV refusal to allow software deplores to develop new apps for older versions of Apple TV is one such attempt (Hattersley, 2019).
[30] This is referred to as *prevention of repairs.* Example of this is, washing machines being designed to be hard to repair making which made it cheaper for consumers to buy new ones (Poulter, 2015) and Apple making it hard to repair their phones at an affordable price instead pushing consumers to buy a new phone (Beres & Campbell, 2016).
[31] This is referred to as *contrived durability*. BBC could report that "Apple admitted that older iPhone models were deliberately slowed down through software updates" (bbc.com, 2018) which both Apple and Samsung was later fined for (Gibbs, 2018).
[32] In 1991 the Bush administration started to use Gross Domestic Product (GDP) instead of GNP. According to Czech (2013, p. 26) the reason for this being that foreign firms implanted in the US had begun to grow faster than US firms outside of the US. A switch from GNP (where American firms inside the country as well as around the globe were included) to GDP (where foreign firms within the US were included, and not US firms outside the country borders) enabled the US government to claim higher growth rates. Fioramonti (2013, p. 41) mean that the switch was also used to give the illusion that disadvantageous countries in the global south were

when the United States hired the economist Simon Kuznets[33] to prepare the first set of national accounts.[34] These accounts were used to provide an overview of the American economy and assess the government's policies (Fioramonti, 2013). Growth was the focus, and to Kuznets 'Innovation' was the explanans (phenomenon explaining another phenomenon) and not the explanandum (the phenomenon that is explained).[35] Moreover, Kuznets' theory of income inequality contributed to a view of economic growth minimising income inequality. He developed the theory using data from 1913–1948 that tentatively foresaw that increased productivity would at first lead to increased inequality, but later this inequality would diminish (Roine, 2014, pp. 18, 30). Kuznets was connected to the think tank 'National Bureau of Economic Research' (NBER) that had an influential role in the first school of innovation research (Godin, 2010). This connection to economic growth, according to Godin, became one of two[36] fundamental motivations for the study of innovation. Studying innovation became a way to learn about the causes of economic growth (Godin, 2019, p. 124). This focus was not only salient in the first tradition; in the 70s, when the second tradition – 'Innovation studies' – emerged, economic growth was seen as the ultimate outcome of innovation activities there as well (Godin, 2012), and leading scholars in that school of thought criticised Meadows et al.'s report on 'Limits to Growth' (Soete, 2019). Since then, numerous studies have focused on the connection between innovation and economic growth.[37] Thus, innovation leading to economic growth is now widely accepted in the academic community (Pianta, 2005, p. 569), and it is seen as a goal of innovation in the STI tradition (Soete, 2019).

The association with economic growth comes with some limitations; six of these will now be laid out.

growing while in reality the growth were due to growth in foreign firms established in the country.

[33] In addition, two younger economists, Milton Gilbert and Robert Nathan.

[34] It was later changed by the U.S. during the Cold War, for political reasons, to be measures with gross domestic product (GDP) (Parrique, 2019).

[35] This was also the way Schumpeter treated innovation.

[36] The other fundament argument was to study the *generation* of technological change (Freeman, 1974, pp. 15-17, 27) according to the analysis by Godin (2019, p. 124).

[37] Numerous studies have studied the connection between innovation and economic growth. For instance, Bart Verspagen (2005) has presented an overview of this research in a chapter in the Oxford Handbook of Innovation. Schmookler's (1966) book "Invention and Economic Growth" remains one of the most influential within innovation studies in the new millennia, and it is labelled as a classic by Fagerberg and Verspagen (2009). In Nelson and Winters' (1982) "An evolutionary theory of Economic Change", they propose an alternative to neo-classical economics and among other things argue that innovation is central to economic growth. That book remains the most highly cited publication in the field of science policy and innovation studies (Martin, 2012).

(1) Innovations' positive effect on economic growth risk nudging a researcher into assuming that innovation is a purely positive phenomenon. When innovation is said to contribute to economic growth, this is often presumed to also directly lead to diminished economic inequality and increased social welfare. 'Economic welfare' has come to be viewed as always converging 'social welfare' (Parrique, 2019, p. 54). This despite Kuznets, being clear about GNP not being designed to capture a society's well-being. Neither GNP nor GDP offer information on income and wealth distribution. Thus, GDP may rise even though poverty levels remain the same if the wealth is concentrated at the top. Until the 1980s, Simon Kuznets' theory of increased productivity and economic development, leading to diminishing inequality, held true for the countries in the Global North. After that the curves began to look quite different (Roine, 2014). Thomas Piketty and colleagues (2013) have shown that if data are included from the years after the 1980s, it becomes clear that the income inequality went up at the beginning of the 1980s despite the tremendous increase in productivity. According to Piketty et al. (2013), it is no longer clear that the vast majority of the population in affluent countries reap benefits from economic growth. Moreover, data from 1980 show that despite continued economic growth, income inequality has also risen between countries (Fulcher, 2004, p. 98). This data was not yet available for the innovation scholars operating in the 1970s and 1980s, thus they developed their theories with the assumption that had dominated in previous decades.[38] Nonetheless, if it is not possible, with certainty, to say that the economic growth is unquestionably good for society, it becomes much harder to view 'innovation' (be it what it may) as inherently good due to its contribution to economic growth.

(2) The belief that innovation is inherently good due to it contributing to economic growth risks blinding a researcher to any adverse effects of the innovation (Gripenberg, et al., 2012). When this measurement is used, there is an underlying assumption in the (especially quantitative) academic papers and governmental reports about innovation that 'the more innovation, the better', never mind what the innovation actually does or its consequences. It is assumed that all innovations are part of improving society by generating GDP growth. In this logic, the fact that something can be categorised as a commercialised innovation is primary; its consequences are secondary. As long as it leads to growth, it is assumed to be good. However, there are no costs included in the measurement, so economic activity generated by welfare-reducing innovations counts as generating higher GDP. GDP does not subtract the costs for damages on ecosystems and earth systems (Parrique, 2019). For example, the purchase of innovations needed to clean up more effectively after an oil spill would translate into increasing GDP, consequently making environmental damages count as something positive that boosts innovation activity. The

[38] They were however aware of other more apparent issues such as unemployment and the environment (Freeman, 1974, Godin, 2012).

cost of damages on ecosystems and earth systems are to this day largely absent in value judgement on effects of innovation processes.

(3) The focus on economic growth promotes the belief in techno-fixes (as opposed to system changes) for social and ecological problems. An increasing number of scholars caution that a focus on growth makes it harder to act in a way that more thoroughly challenges the established systems (Hagbert, et al., 2018; O'Neill, et al., 2018), which needs to change to tackle the huge ecological and climate challenges. Since the dawn of industrialisation, economic growth has been closely linked to fossil fuel usage and $CO_2$ emissions without calculating it as costs (Laestadius, 2013, pp. 73-88). Innovation has a clear role in this, and other grand challenges facing humanity. Sveiby et al. (2012b, p. 254) put it like this.

> ...an unavoidable observation is that many of the economic, ecological and social challenges confronting us on the planet today are caused by direct effects or indirect consequences of previous innovations (Sveiby, et al., 2012b, p. 254)

'Innovation' often enjoys the privileged position of always being part of the solution, never part of the problem. For instance, Juma (2016, pp. 31-32) thinks that technology can solve the issue with negative externalities, such as extensive use of scarce natural resources or the transformation of previously common goods into property.[39] But at the same time, as innovation solves one problem, it often leads to new problems. This is a good thing in the economic growth paradigm as more problems widen the scope for new profit-generating innovations contributing to more economic growth. This growth-focus strengthens the 'techno-scientific belief that new innovations will always solve the problems caused by other innovations or the innovation process' (Hasu, et al., 2012, p. 90). Thus, a focus on economic growth means being stuck in an old paradigm that supports old power-structures and industries. This risks leaving radical transformational system changes under-studied.

(4) The connection to economic growth risk leading researchers to one-sidedly favour the study of economic relationships. The invention of GDP enabled the economisation of social life:

> Parents, children, citizens, artists, intellectuals, workers, farmers, entrepreneurs, soldiers and any other social categories were all conflated into two categories: producers and consumers (Fioramonti, 2013, p. 48).

[39] Juma (2016, pp. 31-32) sees the resistance to innovation due to it leading to ecological degradation as misguided and means that it confuses technological advancements in general with the impacts of 'specific technologies'. Technological innovation with adverse effects is thus the occasional bad apple for Juma, not a sign of a system failure.

Classical Economics view the world in that manner, reducing the social to numbers, rendering other aspects of reality invisible. Economics is often framed as neutral and rational (Raworth, 2017), and many innovation scholars in the 'Innovation Studies' tradition have their roots in economics and are mostly interested in innovation's economic objectives. Therefore, they favour understanding innovation in relation to its effect on economic issues, such as economic growth and international competitiveness (Lundvall, 2013, pp. 43-44). In the STI tradition, innovation is portrayed as detached from politics and deliberation and as driven purely by economic necessity and technical rationality (Pfotenhauer & Juhl, 2017). According to Lundvall (2013), innovation scholars in the field of Innovation Studies explicitly or implicitly favour economic selection regimes over political ones. He contrasts this to Science and Technology Studies (STS) which, according to Lundvall, see science as serving wider objectives. Consequently, he argues that 'Innovation Studies' have a narrower, more economically-focused objective.

(5) With the favouring of economic relationships comes a neglect of relationships outside of the economy, often symbolically likened to the female. The focus on economic gain when measuring growth risks downplaying the value of non-monetary transactions (such as childcaring, community support and self-production) since they are not included in the measurement (Waring, 1988 as cited by Parrique). This risks lowering the perceived value of social innovation and non-profit innovations. It also risks leading researchers, funding agencies and academic journals to neglect the study of those kinds of innovations. Feminist innovation scholars have critiqued economic growth and monetary gain because it reinforces existing male power structures and innovation as a masculine activity. Neglecting social innovation also means ignoring female innovators (Pettersson & Lindberg, 2013; Lindberg, 2012).

(6) The focus on *increased* economic activity brought about by *more* innovation processes might lead to a neglect of the decline that also follows innovation processes (see Goulet & Vinck, 2017). It might also lead to a view that decline should be avoided. When the focus is on a firm's survival (Segercrantz, et al., 2017), the competitive elimination of that firm becomes undesirable. However, Schumpeter (1942) ties innovation to market competition and says that it can destroy existing industrial structures and practices and weaken their established positions. Despite this, innovation theorists often see innovation as the addition of something, and destruction is seen as an unimportant threat or a negative consequence (Goulet & Vinck, 2017). Goulet and Vinck (2017) argue that an optimistic conception of innovation is often promoted, and this 'dark side' of innovation is not included as a component of the innovation process. If the losers of the innovation process are neglected, and innovation is portrayed as a win-win situation for everyone involved (see Fougère et al., 2017), resistance to it becomes irrational.

## 2.6 Competition

When the first innovation research tradition emerged in the mid-1900s, the focus was not only on increased productivity and economic growth; it was also on the generation of new goods for competitive reasons, for getting a *competitive advantage*. This focus on competition initially only concerned firms competing in the marketplace but later came to be portrayed as taking place between countries as well. In the 1960s, the understanding of technological innovation became influenced by Trade Theory, which stipulated that new commodities originate in one country and the other countries follow and imitate, leading to a comparative advantage for the first country (Godin, 2019). The time between invention and diffusion began to be called a 'lag' (Posner, 1961). The difference between nations in generating and adopting innovations started to be called 'a technological gap'. These differences between countries became a significant policy concern[40] for innovation research. Technological innovation now became a matter of national competitiveness. The idea was that greater economic progress was to be achieved with technological innovation. This process had to be facilitated and accelerated by policymakers to ensure international leadership. Policy became concerned with eliminating the lags between invention and commercialisation and technological gaps between countries (Godin, 2019, pp. 135-136). This has contributed to there now being a whole research field around how poorer countries are catching up with the richer ones (Fagerberg & Godinho, 2005).

The association with competition comes with some limitations to the analysis of innovation and innovation resistance; three of these will now be presented.

(1) The analysis risk promoting speed at the expense of reflectivity. The emphasis on competition has contributed to an underlying urgency in the innovation activities, and the word 'race' is often used to explain what is going on. There is a race between firms, between countries and between regions, and in the dominant innovation discourse, there is a prevalent idea that everyone needs to partake in innovation processes (Hasu, et al., 2012). In innovation management discourse, there is a focus on accelerating the innovation rate (Segercrantz, et al., 2017), and engineering students are taught the virtue of diminishing time to market for new inventions (Schilling, 2017). Hasu et al. (2012) see this as a part of the 'speed imperative' that affects the ideas around innovation and many other parts of our human world (academic research publications being one of these). Innovation seems to be connected to a sense of urgency, which demands fast decision-making, based on limited information and simple generic models (Hasu, et al., 2012). Hasu et al. (2012) claim that this imperative is very seldom criticised and argue for a need to slow down to

[40] Freeman tied 'national policy' to the field of Innovation Studies (Godin, 2012, p. 407). He argued that national policy should make decisions on which kind of innovation to promote (Freeman, 1974, p. 41) – that they should promote innovation was self-evident.

get time to reflect. They also state that these issues are of limited concern for global capitalism. Firms benefit from consumers having a low level of reflexivity, not questing the increasing speed of consumption and the need to create new user needs. They also benefit from a low criticality of innovation systems (p. 89). When speed is of the essence, it becomes more important to constantly engage in profit-generating innovation activities than to make sure that the outcome of each innovation process brings as much societal or environmental value as possible.[41]

(2) The analysis risk downplaying ethical dimensions. Baucus et al. (2008) have noted that the innovation literature often leaves ethical considerations aside when fostering creativity and innovation. The competitive marketplace limits ethical behaviour.[42] Following Marx' argument in the Capital (1887), Graeber (2014) points out that the fear of being outcompeted forces managers and firm owners to act less ethically than they personally desire. Graeber argues that:

> The motivation for capitalists does not really matter; there is a particular dynamic within the system as a whole which means that you could be the nicest person in the world. You can have the best intentions possible; you could love your workers more than yourself - it does not matter. If you are in a competitive marketplace, there are constraints, and there is no reason to imagine that those constraints would go away even if everyone means well (Graeber, 2014).

Hasu et al. (2012) could be said to mostly agree with Graeber (and Marx), but they connect the low ethical capacity to the speed imperative that is, to a large degree, brought forth by competition. According to Hasu et al., this speed is accompanied by a 'mechanism for greed and unsustainability' (p. 89). While acknowledging that it could be socially desirable to speed up innovation development in areas that contribute to addressing social and environmental challenges (like lifting people from poverty and enabling the transition to renewable energy production), they believe that only a fraction of all innovations produced can claim to contribute to well-being and health or help to

[41] As a reaction to this focus on speed and the harmful effects of excessive technologies used by society, a 'slow innovation movement' has risen. Advocates of this movement call for a slowing down of the process to enable more citizens and customers to carefully shape technology. The idea is that a slower process will allow more time to understand, conceptualise, test and grow their idea or business, which would enable the solving of more complex problems (Leitner, 2017).

[42] For example, in 2007 ten big (mainly energy) companies made a plea to the Bush administration, asking it to abandon their strategy of using voluntary efforts to reduce global warming and instead issue mandatory policies that, among other things, included tax reforms (Seattle Times news services, 2007; The U.S. Climate Action Partnership, 2007). In short, they saw that they could not act according to their ethical principles without being outcompeted and were asking for regulations that would enable them to act according to what they thought was ethically right. This can be seen as asking the U.S. government for resistance or a barrier to continued harmful development.

solve social or environmental problems. Some of these even impact negatively on the environment and deepen social problems. Hasu et al. (2012) claim that the long-term thinking needed for ethical considerations does not fit well with innovation's speed imperative.

(3) When speed and competition between countries are of the essence, resistance risks being seen primarily as something that makes countries and firms fall behind in the race—subsequently casting human and non-human resistance to innovation in a pejorative light. This lends less focus on the goal and rationale behind the resistance and puts forward the firm-based innovation process as the only influential process worth studying.

## 2.7 Welfare and Wicked problems

In the 1960s and 70s, people started to become more aware of the increasing ecological footprints and the biodiversity loss caused by human societies (Díaz, et al., 2019; Carson, 1962). The first influential critique of the idea of limitless economic growth was put forward by Meadows et al. (1972). In their work, the idea that an economy can grow in all eternity was questioned. From that grew an increasing understanding of the planet's inability to sustain the rates of development it had hitherto seen (Parrique, 2019). In 1987, the Brundtland Report was published. It managed to place environmental issues firmly on the political agenda and defined 'sustainable development'.[43] In the Brundtland Report, innovation was portrayed as technological and commercialised. The report also stressed that continued economic growth was essential for both poverty reduction and improving the environment (United Nations, 1987). In 1990, the Intergovernmental Panel on Climate Change (IPCC) published its first report (IPCC, u.d.), and humanity, for the first time, knew enough to act to avoid climate change (Anderson, 2019).

Given the raised awareness of growing inequality (Piketty, 2013) and impeding ecological and climate catastrophe, a new research paradigm of innovation studies slowly began to gain momentum (Andersson, 2020, p. 2; Godin, 2015a, p. 251). It could be argued that this shift began in the 1960s when engineers used innovation to raise the status of their discipline, which was low compared to the status of the scientists. They did this by connecting innovation to social responsibility and highlighting its importance for national welfare

[43] 'Development that meets the needs of the present without compromising the ability of future generations to meet their own needs'.

(Godin, 2015a, p. 251). The theorists of the 60s and the 70s stressed that innovation is driven by social or societal needs, not by science.[44] In the 1970s, Freeman, and through him the Innovation Studies tradition, connected it to social welfare (Freeman, 1974). Without entirely abandoning the ideas of the old and still dominant paradigm where innovation is associated with economic growth, competitiveness and productivity, this new paradigm added other associations to innovation. Studies in this paradigm are often motivated as innovation being a solution to different wicked problems[45] that face society. Some prevalent challenges to tackle are climate change, resource depletion, poverty alleviation, ageing societies, etc. (von Schomberg, 2013 as cited by Block and Lemmens, 2015).

Godin states that from the 1960s and onwards, innovation became a 'Panacea for every socio-economic problem' (Godin, 2019, p. 228). The shift towards grand challenges as a driver of innovation is illustrated by what Block and Lemmens (2015) call the EU's most crucial research framework, Horizon 2020.

> Innovation is our best means of successfully tackling major societal challenges, such as climate change, energy and resource scarcity, health and ageing, which are becoming more urgent by the day (European Commission, 2010, p. 2).

The social innovation of the 1960s was accompanied by other adjectives in the 80s and 90s. These emphasised inclusion and more democratic governance of innovation while often acknowledging the term's ambiguity and ambivalence (Godin, 2019, p. 228-233). Adjectives used to define innovation were among others; 'Inclusive', 'User', 'Free', 'Democratic', 'Open', 'Responsible', 'Sustainable', 'Grassroot' and Eco' (Godin, 2019, p. 232). Innovations targeting environmental challenges alone are often called 'Environmental', 'Eco' or Green innovations (Schiederig, et al., 2012). 'Sustainable innovation' would include economic, ecological and social considerations (Schiederig, et al., 2012), whereas 'responsible innovation' demands multiple stakeholder perspectives and that social and ethical aspects are taken into account from the start of the innovation process and continuously throughout the process (Blok

[44] Thus, innovation scholars promoted a demand-based view rather than a science-push view (Where the scientific finding is the starting point of the process). This took the notion of innovation from the linear model (starting with basic science and ending in commercialisation) to a more systemic view with feedback loops. In the new view, science was but one factor among many (Godin, 2015a, p. 254).

[45] "Wicked problems' refer to that class of social system problems which are ill-formulated, where the in-formation is confusing, where there are many clients and decision makers with – conflicting values, and where the ramifications in the whole system are thoroughly confusing. The adjective "wicked" is supposed to describe the mischievous and even evil quality of these problems, where proposed "solutions" often turn out to be worse than the symptoms" (Churchman, 1967, p. 141).

& Lemmens, 2015). Innovations targeting the challenge of ageing populations and increasing healthcare expenditure are sometimes called healthcare innovation (Weberg, 2009).

During the 1990s, innovation for green growth or sustainable growth became increasingly popular and promised a better future without giving up the comforts of the present. Innovation literature around regime shifts, socio-technical transitions, niche formation and multi-level perspective, emerged during this time (Rudzite, 2019). According to Rudzite (2019), the new theories promoted drivers to sustainable innovation and attempted to remove barriers to them. A common denominator for all these innovative theories and the view on innovation held by the researchers engaged in them is that sustainable innovation produces prosperity, jobs and meets societal challenges at the same time (see also Blok & Lemmens, 2015, p. 30). Furthermore, the perspective used when viewing the innovation was predominantly economic, and technological innovation was mostly considered (except for when the adjective 'social' was used).

It is often assumed that firms are the best vehicles for bringing forth innovation that solves grand challenges. When innovation is framed as the 'panacea for every socio-economic problem' (Godin, 2019, p. 228), what is referred to is innovation under capitalism. With this comes at least three limitations that are related to the issues discussed in 2.3 but here addressed in connection to innovation's potential to solve wicked problems.

(1) To see innovation under capitalism as a solution to wicked problems evades discussions of system changes on macro-level. Innovation research and traditional research, which has grown out of the Innovation Studies tradition, predominantly refrains from studying innovative efforts that challenge the capitalist system (Feola, 2020). Thus, it limits the possible wicked problem solutions to those available in the dominant organising system of economic, social and natural life. Feola (2020, p. 242) argues that treating capitalism as a neutral given makes it near impossible to seriously analyse its economic, social, political and cultural dynamics and conditions. It also implies the impossibility that solving wicked problems might involve possibly fundamental changes in the capitalist system. Treating capitalism as an implicit given risks blinding a researcher to any adverse dynamics feeding into an analysis that presupposed an idealised image of capitalist economy.

(2) Innovation under capitalism is subjected to the limitations of the corporation as an organisational form. Most innovations targeting grand challenges are market-oriented and obligated to generate a profit for a firm (Blok and Lemmens, 2015; Thomas et al., 2017). This pressure puts certain limits on what problems can be addressed and which solutions can be considered. Additionally, it is a short-term goal that is difficult to combine with long-term

sustainable innovation and creativity (Hasu, et al., 2012). Innovating firms cannot gain money from all the social benefits that might come out of an innovation. Instead, they are motivated to innovate just enough so that the innovation becomes beneficial only in the regard in which they can also make money out of the generated benefit. Private firms have little incentive to engage in innovation processes that lead to high social benefits that no one pays for[46] and to permanently solve problems, as this would eventually render them redundant[47] (Foxon & Pearson, 2008). Powerful companies tend to favour profit maximising innovations over innovation with potential broad social benefits (Hübner, 1996). Even firms with strong environmental commitments tend to downplay or abandon these in times of low economic activity (Wright & Nyberg, 2017). Clients, on the other hand, are typically not willing to pay for a reduction of negative environmental externalities (Stucki, 2019), making corporations even less inclined to tackle societal problems (Kooijman, et al., 2017). Even though there might be an aspiration towards societal and/or ecological benefits, the market will constrain these. The creation of social welfare is, by necessity, pushed into being a secondary goal for the capitalist firm.

When innovation is put forward as a way out of poverty, the poor are framed as future consumers and sources of frugal inventions with commercialisation potential. This market focus limits the range, diversity, goals, motivations, possibilities and impacts of technological innovation, while at the same time marginalising alternative conceptualisation of technology. It nudges the research community to ignore innovations connected to the degrowth[48] endeavour that attempts to recover the harmonious relationship between human beings and with nature (Pansera & Owen, 2018). It also continues the neglect of (non-technical) innovation processes pursued by other actors such as non-profit organisations.

(3) The possible innovation processes aiming to meet grand challenges become limited to only include activities that also contribute to growth. Policy problems are framed as problems of 'too little innovation'. Policymakers

[46] Thus, the value that innovation brings is often, by design, limited to the value the innovation firm can charge. Foxon and Pearson (2008) argue that this is a reason for public support of research and development as well as economic instruments such as taxes or emissions trading schemes.

[47] The classic example is pharmaceutical companies striving not to find permanent or preventive cures but to develop good treatments. Another example is IT companies making sure that their (fully functioning) hardware becomes outdated due to refusal to make new software backwards compatible and ending support for older versions (Calvano, 2006; Soete, 2013).

[48] Innovation scholars rarely ask questions related to degrowth or post-growth; still, innovation for degrowth, rather than growth, does exist. It is a marginal yet growing literature stream within innovation research. The European Commission has, for example, recently given € 1 424 375 grant to focusing on innovation in a post-growth era. The new project will focus on how science, technology and innovation can be disentangled from growth and how it can flourish in a society that does not depend upon or seek to uphold endless economic growth (European Commission, 2021).

worldwide advocate that scientific activities, societies, institutions and individuals be geared towards innovation. If this is achieved, these policymakers believe that economic competitiveness can be achieved and grand challenges met (Pfotenhauer & Juhl, 2017). This focus on meeting grand challenges with more economic activity closes the door for possible solutions that include decline (Goulet & Vinck, 2017) or less economic activity (see Parrique, 2019).

## 2.8 Narrow system boundaries

The associations presented in the previous sections have contributed to innovation research with narrow system boundaries.[49] When 'innovation' is put forward as inherently good, this often means good for *the innovating firm* at a *certain point in time*. The narrow system boundaries (illustrated in a simplified manner below) are based on economic relationships between economic elites (owners and managers of firms, policymakers, and affluent clients, predominantly in the Global North). This focus explains why adverse effects such as $CO_2$ emissions, landfill, and excessive use of conflict minerals, as well as competing perspectives such as those of workers, women, the commons, indigenous people, plants, animals and earth systems are not taken into account in the research process.

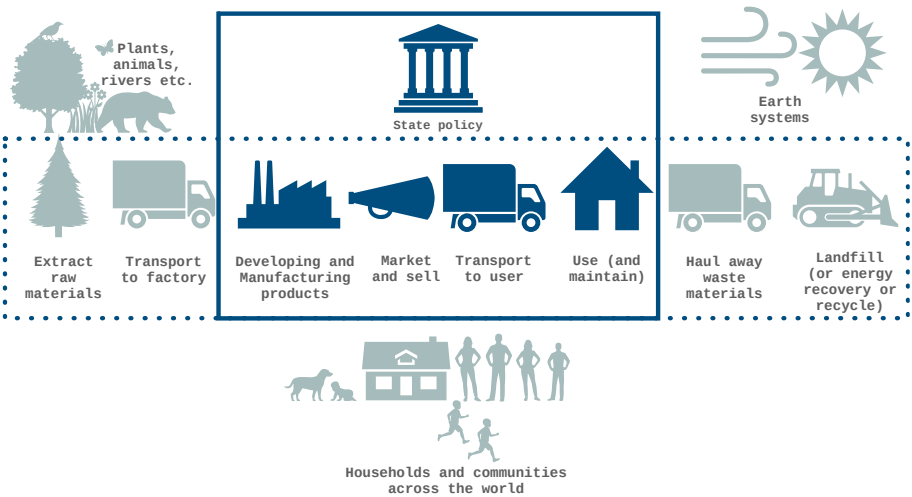


*Figure 1: The system boundaries of innovation research*

Innovation processes occur in an unequal world, where issues such as working conditions in mines and factories, depletion of natural resources, storage of

[49] For instance, when Juma (2016, p. 29) connects the likelihood of innovation being successful to 'the distribution of winners and losers', he only mentions produces and consumers.

waste and greenhouse gas emissions are neglected. Almost all technological innovations are connected to these concerns.

When the value of an innovation exceeds the monetary value of the person who invested in it, this is made possible due to technical ingenuity and part of the price being paid by someone else through their labour and through subjecting their land to various forms of extractions. It is also based on the usage of an energy source that often is fossil-based, which means that it contributes to climate change (Hornborg, 2016; Hornborg, 2012). As such, a technical innovation process today also exploits future generations' land and possibility of a good life on a hospitable planet (see Steffen et al., 2018).

In innovation processes, a number of different things are turned into resources (Hultman et al. 2021 refers to this process as 'resourcification'). Things such as oil and minerals (used in electronic devices) are turned into 'natural resources' and bought by international companies that refine and use them in innovation processes throughout the world. These resources are often stolen[50] from oppressed people by the dictators that harass them. The profit gained is used to buy weapons and buy off nascent resistance movements[51] (Wenar, 2008). Butt et al. (2019) highlight that 230 people were killed between 2014–2017 when defending their natural resources. Resources that later find their way into the global market and innovation processes. Butt et al. call this the 'supply chain of violence'. When Innovation management literature usually discusses resources, aspects such as these are ignored. Instead, they are discussed in relation to access and keeping the prices down. Little concern is put on the social arrangements of power needed to get these resources at a preferably low cost. An innovation process almost inevitably gets entangled in these structures of exploitation. This is the case even when the explicit purpose of the innovation is to solve a wicked problem or tackle a grand societal challenge (Sovacool, 2021; Fors, 2019).

While the effect of an innovation process might be beneficial to the users and bring profit to the innovating firm, it, at the same time, has neglected undesirable consequences for people and nature outside of the system boundaries (innovator-user). Perhaps the innovation's sum game only becomes positive if the system boundaries are narrow in space and time, and the consequences outside of the boundaries remain neglected.

The narrow system boundaries are supported by the context in which the research is conducted in at least four ways:

[50] Wenar is here assuming that the natural resources of a country belong to its people.
[51] Some examples given by Wenar of such states are: Nigeria, Equatorial Guinea (oil), Sierra Leone (diamonds), the Democratic Republic of Congo (minerals used for mobile phones, etc.).

(1) As suggested in 2.4, universities are influenced by neoliberal ideology and governed by new public management principles. The (neoliberal) competition and pressure to publish push researchers to splitting their contributions into smaller and smaller slices to boost publication numbers (Martin, 2020, p. 12). Researchers and peer-reviewers often favour specialisation and narrowing of research questions (see Hornborg, 2016, p. 8). PhD training, seminars and conferences largely mould researchers into pursuing 'rather elusive or vague theoretical contribution' (see George, 2014). Asking narrow research questions leads to the knowledge productions becoming, both fragmented and largely disconnected from overarching questions about 'the prospects of humankind' (Hornborg, 2016, p. 8; Laestadius, 2013). That the study of innovation had been conducted using narrow system boundaries is perhaps not so strange given these constraints.

(2) The universities are marked by 'the speed imperative' (Hasu, et al., 2012), affecting not only innovation activities but also academic publications. Academics are now expected to reach *high productivity* in a compressed time frame (Mountz, et al., 2015). Publishing short articles (rather than books) in high ranking journals is the main road to getting tenure and securing research funding, and it also serves as a basis on which departments are evaluated and compared (Alvesson, et al., 2017). High ranking journals often favour a certain kind of research. Some characteristics that journals consider as signs of 'high-quality research' are: (a) topics that fit neatly within contemporary popular theories – building on and tweaking them (Alvesson et al. 2017, pp. 46-48), (b) use positions that are pragmatic and positivist (Lund & Tienari, 2019, p. 105), (c) adhere to mainstream assumptions (Özkazanc-Pan, 2012), (d) emphasise detailed codification procedures or statistical techniques (Alvesson, et al., 2017, pp. 46-47) (e) downplay any social constructionist approach (Lund & Tienari, 2019, p. 105), (f) flatten out contributions that would be controversial, uncomfortable or disturbing for a disciplinary micro-tribe (Alvesson et al. 2017, pp. 46-48). Some of these journals also request that the articles include implications for managers, which is a clear indicator that the research is geared towards that audience. The problems of managers in relation to innovation then become crucial. This can nudge researchers to conform to the research, so it becomes acceptable for these top journals (Lund & Tienari, 2019; Alvesson, et al., 2017). It also potentially gives managers a considerable influence over which research questions to ask and which perspective to take.

(3) Academics tend to move in disciplinary or academic tribes. An academic tribe, according to Becher and Trowler (2001), is formed according to discipline and strongly conditions or determines the values, behaviours and practices of the academics living within it. One such tribe is Innovation Studies

which is a significant part of STI.[52] Scholars in this tradition have made explicit attempts to deliberate the boundaries of this tribe (Godin, 2014), for instance, explicitly excluding the field of Science and Technology studies (STS) from 'Innovation studies' (Lundvall, 2013, pp. 48-49; Martin, 2012).[53] When young scholars are trained to produce publishable studies within Innovation Studies (or any other tribe), they adopt the field's virtues along with its blind spots. The limitations pointed out in this chapter remain neglected or downplayed in this manner. Many innovation scholars come from business schools or engineering faculties, where part of the institution's identity is to focus on the study of (industrial) firms.[54] Alvesson et al. (2009) point out that universities and business schools, in particular, tend to have a conservative, cooperate capitalist or 'right-wing' influence on the research. The Innovation Studies tribe is also connected to what Alvesson et al. (2017) call silos in academia, preventing knowledge from being shared and tested across disciplines. Living an academic life within the Innovation Studies tribe (or any other tribe) narrows a scholar's area of expertise and nudges them into considering knowledge outside the tribe as detached from the field.

(4) Innovation research is often partly funded by corporations or change agencies. When scholars began to study innovation, this was 'often driven by external demand and/or funded by mission-oriented organisations' (Fagerberg, et al., 2013, p. 3). Rogers (2003) argue that research tends to be conducted from the innovator's viewpoint rather than from the receivers and attributes this to the tendency of most innovation diffusion research to be sponsored by change agencies[55] (Rogers, 2003, 1976, p. 294; Rogers and Agarwala-Rogers,

[52] There are several communities of scholars studying various aspects of innovation (Nelson, 2013), and it is not possible to relate all of those here. Instead, this section will focus on 'Innovation Studies', which is the largest research community (according to Nelson, 2013) that has made efforts to delineate their boundaries within innovation research.

[53] Especially noteworthy is that Martin (2012) explicitly excludes four research areas from Innovation Studies. For two of them (Energy and Environment Policy Research and Literature on Economic Development), he makes exceptions, 'where technology or innovation is a key element' (p. 1220). For a third area, 'scientometrics or bibliometrics research', he makes an exception, 'where the research is clearly linked to 'science policy', 'technology management', etc." (p. 1220). But for STS research, there are no exceptions. No matter how much it focuses of innovation or technology or how linked it is to policy or technology management, STS research does not get into the field of Innovation Studies, according to Martin. It is also worth noting that Martin is the first name in the non-alphabetically ordered list of members in the editorial board of one of the most influential innovation journals, Research Policy. Other STI scholars have argued for the inclusion of STS work in the field, but in the sense of welcoming STS contributions, not in the sense of STI scholars starting to engage in the already existing rich flora of STS work on innovation (see Godin, 2014).

[54] For example, the Science Policy Research Unit (SPRU) that researchers in the field 'Innovation Studies' describe as an essential catalyst in constructing their school of research, had an explicit focus on innovation *in the industry* (Fagerberg, et al., 2013).

[55] Change agencies exist to promote innovation. For instance, Vinnova, the public Swedish innovation agency, is one such source of funding, favouring research that leads to or promotes innovation (Vinnova, 2019).

1976, p. 176, footnote 11). Sandström and Hällsten (2008) argue that the committees deciding on which grant applications to accept often favour mainstream ideas and theory building. Since the mainstream prefers firm-focused innovation processes, this might make it easier to get funding for this kind of work. In addition, some institutions that conduct or fund research are directly funded by corporations,[56] which colours the common assumptions, aims and research questions.

## 2.9 Summary of the chapter

The chapter described how the concept 'innovation' went from being viewed mostly in a pejorative light in pre-1850 times, to getting positive connotations during the 1900s. This process is described as evolving through the concept becoming entangled with other ideas that became causative factors in changing the connotation of 'innovation'. These associations also came with limitations that have a bearing on the analysis of innovation resistance.

The connection to *progress* was described as, among other things, leading to a tendency to view innovation as neutral and disconnected from power structures, which obscure the conflict lines between different alternatives. It was also put forward as concealing the potential for undesirable consequences and enforcing a linear view on innovation processes. The associations to progress and *technology* (and other concepts) were put forward as connected to innovation's detachment from nature and the tendency to view innovation as connected to activates and areas symbolically likened to men.

Connected to the association with *capitalism* and *corporations* was, among other things, the risk of the research becoming pro-profit, pro-firm and pro-neoliberalism. The association to *economic growth* was described as connected to the assumption that innovating is a positive phenomenon. It was said to prompt a focus on growth generating techno-fixes to social and ecological problems and one-sidedly favouring economic relationships. The association to *competition* was described as being accompanied by a focus on speed, at the expense of reflectivity and a risk of downplaying ethical considerations.

[56] The National Bureau of Economic Research (NBER), which Kuznets (and Milton Freidman and Ronald Reagan's economic advisor Martin S. Feldstein) was connected to, has received half their funding from companies in the Fortune 500 list (Harvey, 2005, p. 44). NBER has also long been publishing technical and empirical studies broadly in support of corporate-friendly neoliberal ideas. A Swedish example is the research institute Ratio, which the Confederation of Swedish Enterprise (Svenskt Näringsliv) partly finances. According to their webpage, Ratio is the voice of enterprise in Sweden (Confederation of Swedish Enterprise, u.d.). While Ratio proudly ascertains that they are independent and do not have opinions, they also explicitly state that their research aims to investigate how corporations' conditions can develop and improve (Ratio, u.d.).

Competition between counties and regions risked putting resistance to innovation in a negative light. The association to welfare and solving wicked problems was put in connection to uncritically viewing corporations as able and willing to solve all wicked problems. This was put forward as limiting the possible innovations to those that solve wicked problems *and* contribute to growth. It was also said to led to an avoidance of discussing changes on macro-level.

All these associations and their limitations have contributed to narrow system boundaries of the innovation research. The narrow perspectives are amplified by the research context. The neoliberal university's favouring of journal publication leads to slicing up the research into narrow research questions. Academics are pushed to publish large quantities in pressed time-frames. The academic tribes favour more of the same research, and the research is often funded by change agencies or corporations. Only within these narrow boundaries can a positive sum-game be perceived.

Awareness of the limitations brought up in this chapter combined with an attempt to avoid them likely improve the analysis of innovation resistance. In the same sense, viewing innovation as a positive phenomenon likely limits the analysis of innovation resistance. This will be explored more in the next chapter, where the dominant framing of innovation resistance will be presented.

# 3. Dominant views on innovation resistance

The previous chapter occupied itself with the concept of 'innovation', the associations it is caught up with and the analytical limitations these brings to the study of both innovation and innovation resistance. This chapter will move on to investigate the other party in the relational pair that this thesis aims to explore, namely innovation resistance. It investigates the way in which 'innovation resistance' is described in top innovation journals. In so doing, it will be able to shed further light on the dominant scholarly knowledge production on innovation resistance, which was hinted upon in chapter two.

The chapter builds on an analysis of 48 articles from the top 20 innovation journals identified by Fagerberg et al. (2012)[57] (list of articles available in appendix 2). As Fagerberg and colleagues' journal list is used to find the sample, the analysis is tilted towards the field in STI called Innovation studies (IS). Using this field as a starting point gives an indication of how innovation resistance is viewed in that subfield – which their proponents claim is the largest (Nelson, 2013) and most influential (Fagerberg et al., 2012) field within innovation research.

Although readings outside of the sample is less visible in the chapter, they have nonetheless been crucial for the analysis.[58] They have been useful in ensuring that the account is not entirely detached from other writings and read with a particular mind to find accounts on innovation resistance that do not

[57]A search was conducted in the top 20 journals for articles with titles containing the word 'innovation' and at least one of the keywords: 'barrier', 'resistance', technological inertia', 'hinder', 'impediment', 'challenge', 'hamper', 'limit', 'non-adoption, non-use' or 'rejection'. This search generated a list of 128 articles. The titles in this list were first read through, and from that reading, 53 articles could be removed (mostly because the word 'challenge' often did not relate to innovation barriers or resistance); as a result, 75 articles remained. Thereafter, followed a read-through of abstracts, which resulted in 28 more articles being removed (in this step, book reviews and editorials were removed and articles, where it was something else rather than innovations that was put in connection to the keyword). Thereafter, 48 articles remained, and they became the basis for this analysis. Twenty-five of the articles were published between 2010 and 2019, twelve between 2000 and 2009, nine between 1990 and 1999, and one in the 80s.

[58] The other readings consisted mainly of three books "Innovation and its enemies: Why People Resist New Technologies" (Juma, 2016), "Resistance to Innovation - its sources and manifestations"(Oreg and Goldenberg, 2015) and "Atoms, Bytes and Genes - Public Resistance and Techno-Scientific Responses" (Bauer, 2015) as well a reading through around 100 abstracts and articles found through searchers on google scholars and through reading reference lists in relevant articles.

portray it in a derogatory way. When references are made to these, a footnote indicates that they were outside of the sample.

When the literature around barriers to innovation has been reviewed in the past, the focus has been to identify the different barriers that firms encounter and when they appear in the innovation process (Sandberg & Aarikka-Stenroos, 2014[59]; Lluch, 2011[60]; MacVaugh & Schiavone, 2010). This review was different. Instead of relating what has been discovered and claimed by others, the themes discussed were analysed inspired by deconstruction. The chapter present some of the 'blind spots' or aporias[61] detected in the top innovation journals' account of innovation resistance together with hierarchies and binary oppositions appearing within the texts. In this sense, the chapter conveys the sample's dominant associations between 'innovation resistance' and other ideas and discusses them in relation to other literature. In addition, the chapter also relates the openings for alternative views and interpretations perhaps not emphasised or even recognised by the authors. This is done by embracing the 'conceptual hospitality' (Ruitenberg, 2009; 2005) within the texts – meaning that nothing is added to them, but that they have been read with one eye on the taken-for-granted association that forms the hidden premises for these texts. In that manner, suppressed dimensions of 'innovation resistance' has been explored.[62]

Through this endeavour, the concept is opened up for possibilities beyond the dominant market-focused, pro-firm, pro-growth, pro-neoliberal understanding of 'innovation' and, to some degree, escapes being portrayed as a static category and phenomena. The chapter attempts to get away from the limitations of thought that come with unspoken hierarchies and implied associations (Rehn & De Cock, 2009). This ties into the thesis aim of shedding light on central presuppositions and limitations of the scholarly knowledge production on innovation and innovation resistance. Laying bare central traits in dominant views and highlighting the openness for alternative views also represents a step towards the aim[63] of laying bare a new understanding of the dynamic entangled relationship between innovation and innovation resistance – an understanding that goes beyond the established, ideologically influenced and ontologically suspect understanding of these concepts that marks much contemporary innovation research.

[59] Not in the sample
[60] Not in the sample
[61] Aporias could be understood as a philosophical puzzle, state of puzzlement, dilemma, paradox, etc.
[62] This is inspired by Derrida's ideas of Deconstruction. For more details, see appendix 1: A1.3.1.
[63] To remind the reader, the aim of the thesis is to 'shed light on central presuppositions and limitations of the scholarly knowledge production on innovation and innovation resistance, and empirically explore the manifestation of innovation resistance and the dynamics involved in its entanglement with innovation processes.' Here it is just expressed a bit more condense and brief.

Numerous terms are used to describe innovation resistance in the top innovation journals. The words considered here are 'barrier', 'resistance', 'impediment', 'hindrances', 'challenge', 'limit', 'technological inertia', 'non-adoption', 'non-use', and 'rejection'. These concepts are seen as connected to and revealing different aspects of 'innovation resistance'. The most common of these are 'barrier' and 'resistance'.

Both words can be seen as metaphors, and they both connect to several other synonyms and ideas, some of which are perceived as negative. However, both terms could also be connected to seemingly 'positive' ideas. The term 'resistance' bears some positive connotations and an aura of heroism when considering it in relation to the struggle against totalitarianism or fascism and when it is an element of civil disobedience (Bauer, 1995b). The same can be said of the term barrier when putting it in connection with 'the great barrier reef' that is home to valuable ecosystems or 'storm surge barriers' designed to prevent flooding in the area protected by it (UK Environment Agency, 2020/2014). This account attempts to refrain from general assumptions regarding whether resistance has beneficial or unbeneficial effects. However, since most accounts lean towards the pejorative, the account sometimes attempt to counterbalance this.

In the innovation literature, 'resistance' predominantly refers to human resistance. At the same time, 'barriers' can encompass a multitude of phenomena such as regulations, lack of financing, including resistance from workers or prospective users. In this thesis, all possible phenomena that someone has interpreted as working against an innovation programme's current goal and way of achieving it are referred to as 'resistance'. Since 'resistance' has been selected as representing the phenomenon under study, it is used as a term encompassing all of the concepts laid out above. The metaphor 'resistance' is not static in the same sense as 'barrier'. It is often connected to human agents (Bauer, 1995a; 1995b; 2015), but it is also associated with non-humans (Pickering, 1993). This opens up treating humans and non-humans as symmetric entities contaminated by each other and treating 'innovation resistance' as streaming from both human and non-human actors.

In this chapter, the field of Innovation studies and – with some exceptions – the journals identified by them are seen as representing the mainstream. The exceptions are the journal Human Relations, Organisation Studies and Journal of Management Studies that are known to accept critical work.[64] Three articles in the sample (Harrisson et al., 2001; Harrisson & Laberge, 2002; Landau,

[64] It should however be noted that innovation resistance is not as discussed in critical journals as it is in the top innovation ones. Not even the journal 'Prometheus' that is portraying itself as a critical innovation journal, has discussed the issue in any depth.

1993) come from these journals. They are different in character and will therefore not be discussed in detail in this chapter but instead presented in chapter four, which presents an alternative view on innovation resistance compared to the dominant one presented here.

The chapter begins with an account of the view on 'innovation' prevalent in the sample. Thereafter, follows a description of the salient ideas about resistance noticeable in the articles, along with a critical discussion around them. The chapter ends with an inquiry into alternative views on resistance to technology that lend insights, which will inform subsequent chapters.

## 3.1 A pro-innovation starting point

When describing innovation resistance, the associations made with 'innovation' are by no means unimportant. Therefore, this account begins by laying out the salient associations made between 'innovation' and other phenomena by the STI scholars in the sample of 48 articles.

In many of the articles, the definition of innovation was vague, and references were made to radical,[65] disruptive,[66] product,[67] service,[68] or technological[69] innovation. Occasionally, the concept 'innovation' was not defined.[70] Furthermore, it was not uncommon to refrain from motivating how or why 'innovation' was beneficial[71] and instead state things like '*successful product innovation is vital to many firms*' (Dougherty, 1992, p. 179).

Most studies made associations between innovation in a generalised sense and other phenomena such as competitiveness and increased productivity. Thus, most studies did not consider the multiplicity of possible innovation processes and that the outcome and their perceived benefits might differ (one expectation from this was Mani and Chouk, 2018).[72] The picture painted by the articles was one of fierce competition where innovation was needed to survive.

[65] This was the case for the article by Brüggemann et al. (2016).
[66] This was the case for the articles by Lettice and Thomond (2008) and Das et al. (2018).
[67] This was the case for the articles by Hölzl and Janger (2013), (2014) and Uyarra et al. (2014).
[68] This was the case for the articles by Hölzl and Janger (2013) and (2014).
[69] This was the case for the articles by MacVaugh and Schiavone, 2010).
[70] This was the case for the articles by Kim et al. (2018), Huang and Chi (2013), Moldovan and Goldenberg (2004), and Reilly and Sharkey Scott (2014).
[71] This was the case for the articles by D'Este et al. (2012), Kohn and Hüsig (2006), Talke and Heidenreich (2014), and Zobel et al. (2016).
[72] They tried to argue for the value of the innovation they studied. They started their paper explaining how the technology phenomena under study 'Internet of things' could benefit service sectors such as healthcare, insurance, transport and smart homes and open up new business opportunities. However, they did not mention any potential drawbacks and risks with the technology in their introduction.

One example of this was Das et al. (2018), who advocated for innovation, as they saw it as leading to both firm survival and market stability:

> Whether they like it or not, such radical innovations are needed to survive. (p. 97)

> Since the 2008 financial crisis, the financial industry is in need of innovation to increase stability and improve quality of services (p. 96).

While most authors had the well-being of the firm closest at heart, some focused on the innovation as leading to *user value*. Others took a meso/macro perspective and motivated the value of innovation by tying it to *capitalist market values* such as increased competition or economic growth. In line with the gradual change towards solving wicked problems, described in chapter two, some authors describe innovation as a way to approach *grand challenges such as climate change* or *improving health.* A few articles did not place a verdict on how valuable 'innovation' is (Harrisson, et al., 2001; Harrisson & Laberge, 2002). Occasionally, they acknowledged the possibility of the innovation process having adverse effects,[73] and sometimes they did not specify any desired outcome of innovation. For an overview of the outcomes of innovation that were put forward by the articles, see table 2 below.

| **Outcome of the innovation process** | |
|---|---|
| Survival of firms by giving them a competitive advantage | Das et al. (2018),<br>Heidenreich & Kraemer (2016),<br>Heiskanen et al. (2007),<br>De Massis et al. (2018),<br>Scaringella & Burtschell (2017) and Korhonen & Kaarela (2011) |
| Increased productivity of firms | Baldwin & Lin (2002) |
| Higher performance of firms | Baldwin & Lin (2002),<br>Joshi (2016),<br>Hossain (2018) and<br>Roud (2018) |
| Means of survival for firms | Hadjimanolis (1999),<br>Lettice & Thomond (2008) and<br>Das et al. (2018) |
| Growth of firms | Ram (1989) |
| Continued relevance of the firm | Reilly & Sharkey Scott (2014) |
| Increased competition on the market | D'Este et al. (2014) |
| Higher performance of the industry | Greis et al. (1995) |
| Economic growth | Hölzl & Janger (2014),<br>Huang & Chi (2013),<br>Scaringella & Burtschell (2017) and Uyarra et al. (2014) |
| Avoiding economic and social chaos | Staudt (1994) |
| User value | Mani & Chouk (2018) and<br>Szmigin & Foxall (1998) |

[73] This was the case for the articles by Abrahamson (1991), Heiskanen et al. (2007), Klein and Sorra (1996), Korhonen and Kaarela (2011) and Szmigin and Foxall (1998).

| | |
|---|---|
| Meet grand challenges (such as improving conditions for the poor, improving health, tackling climate change, improving energy efficiency or increasing welfare, handling grand challenges in general) | Bhatt et al. (2016), Ferlie et al. (2005, p. 117), Polzin et al. (2016, p. 34), Stucki (2019), Slayton & Spinardi (2016, p. 47), Brüggemann et al. (2016, p. 2054) and Kooijman et al. (2017, p. 70) |

*Table 2: Innovation was often said to lead to or be an important part in reaching the outcomes in the table.*

Innovation Resistance was often seen from the developing firm's perspective, and many of the articles only had one stakeholder perspective, predominantly the standpoint of the developing firm. Most articles identified the relevant stakeholders in an innovation process as being: (a) developing firm(s), (b) policymakers that should create favourable conditions for these firms, (c) individual or organisational users that should adopt the innovation and occasionally (d) collaborating firms and (e) the workers in the developing/ adopting firms.

Overall, the research in the top innovation journals dealing with innovation resistance tended to view innovation positively[74]. They were mostly focused on firms' well-being and upholding the capitalist ideal of markets. A few examples can be found in table 3.

**Focus on firm's well-being**

| | |
|---|---|
| Established firms are continuously under threat of game-changing transformations and new firms that disrupt the market...[]... Under the current market conditions, established financial services firms experience difficulties with embedding emerging technologies in order to explore and exploit new disruptive business propositions (Tushman and O'Reilly, 1996; Christensen, 1997). Whether they like it or not, such radical innovations are needed in order to survive. | Das et al., 2018, pp. 96-97) |
| The launch of new products is one of the most important activities of companies, often considered to be the lifeblood for organizations (Balachandra and Friar, 1997; Hess, 2009; Prins and Verhoef, 2007). Bringing new products successfully to market contributes substantially to long-term financial success (Bayus, Erickson, and Jacobson, 2003) and represents an effective strategy to enhance primary demand (Nijs, Dekimpe, Steenkamps, and Hanssens, 2001) as well as to foster the competitive position of the company | Heidenreich & Kraemer, (2016, p. 277) |
| Due to the increasing competition, advanced companies are extending their innovation efforts to include new areas outside the traditional technology domain or product and production development. | Korhonen & Kaarela, (2011, p. 480) |
| Today's organisations face increasingly discontinuous business environments, and it is well recognised that firms need to periodically engage in the process of radical innovation for long-term survival | Lettice & Thomond, (2008, p. 2) |

[74] Harrisson et al. (2001) and Harrisson and Laberge (2002) – who published their studies in more critical journals – were the only studies in the sample that did not favour innovation over resistance and refrained from promoting innovation. To facilitate readability, the detailed account of their understanding of innovations resistance will therefore be presented in the subsequent chapter that deals with innovation resistance beyond the fields of STI.

| | |
|---|---|
| helps to gain superior firms' performance | Hossain (2018, p. 67) |
| ... attain a more favourable market position, experience better financial outcomes, and enjoy greater market valuations relative to their less innovative counterparts. | Joshi, (2016, p. 435) |

*Table 3: Quotes from articles that illustrate firm-focus*

Thus, most journal articles on innovation resistance tend to promote innovation. When the authors of these articles motivate their study's relevance, most highlight that innovation is essential for one reason or another. The focus is predominantly on the firm, and most motivations align with what Segercrantz et al. (2017) refer to as a self-preservation discourse. It is also consistent with Baregheh et al.'s (2011) analysis of definitions of innovation, where they found that in the definitions of innovation, the aim of innovation was mainly described in terms of competition, success, economy and superiority. It was also predominantly put in connection with the context of organisations and firms. As the chapter unfolds, it will become apparent that the tendency to study 'innovation' from the vantage point of corporations colours the general view on the resistance.

A few dominant traits identified in the articles will be laid out in the following sections, starting with resistance described in a derogatory manner.

## 3.2 Resistance is seen as dysfunctional, irrational or misinformed

A majority (39 of 48) of the articles assumed that the innovation(s) under study was/were positive and desirable. Following this optimistic view on innovation, 30 of those 39 studies portrayed resistance in a pejorative manner. In other words, in these articles, a hierarchy between the concepts became salient. 'Innovation' was valued higher than the 'resistance' to it. The pejorative meaning of innovation resistance often became apparent through the words used to describe it. This section will first provide some examples of this from the sample and then illustrate how these pejoratives can travel from one study to the next. Finally, it relates how resistance is said to direct innovation processes into less favourable routes

### 3.2.1 Pejorative wording

The pejorative meaning of innovation resistance often became apparent through the words used to describe it. An example of this is the one question about innovation barriers in the influential Eurostat's Community Innovation Survey (CIS). This survey is the basis for three articles in this review (D'Este, et al., 2012; Hölzl & Janger, 2014; Hölzl & Janger, 2013). In this question, the undesirability of resistance is apparent through the wording. Words like 'lack',

'difficulties', 'too much' give a negative ring to the potential barriers the respondents are supposed to identify. The respondent cannot highlight anything beneficial in experiencing barriers to their innovations. The respondents of this survey are thus led to associate the barrier with dysfunctionality. This, in turn, colour the result that innovation scholars might draw from the survey. See the question used in the survey below:

**12.3 How important to your enterprise were the following barriers to innovation during 2012 to 2014?**

| | Degree of importance | | | | |
|---|---|---|---|---|---|
| | **High** | **Medium** | **Low** | **Not important** | |
| | *3* | *2* | *1* | *0* | |
| Lack of internal finance for innovation | ☐ | ☐ | ☐ | ☐ | *HFENT* |
| Lack of credit or private equity | ☐ | ☐ | ☐ | ☐ | *HCRE* |
| Lack of skilled employees within your enterprise | ☐ | ☐ | ☐ | ☐ | *HPER* |
| Difficulties in obtaining government grants or subsidies for innovation | ☐ | ☐ | ☐ | ☐ | *HSUBS* |
| Lack of collaboration partners | ☐ | ☐ | ☐ | ☐ | *HPAR* |
| Uncertain market demand for your ideas for innovations | ☐ | ☐ | ☐ | ☐ | *HDEM* |
| Too much competition in your market | ☐ | ☐ | ☐ | ☐ | *HCOMPH* |

*Figure 2: The only question in the Community Innovation Survey that dealt explicitly with resistance*[75]*. Source: The Community Innovation Survey 2014, the harmonized survey questionnaire, 23 July 2014*

As can be noted in the Community Innovation Survey questions, the word 'lack' is often used to describe an innovation barrier. This habit is apparent in other studies as well. For instance, Huang and Chi (2013) use words like,

[75] One question (4.1) dealt with "innovation activities that did not result in a product or process innovation", two questions (12.1-12.2) dealt with reasons for being a non-innovator. Questions 13.1-13.4 concerned the organisation's (and its innovations processes') environmental benefits.

'lack', 'weakness', 'too long', 'too difficult', 'inadequate', 'undesirable' when describing external barriers to innovation (p. 42). Out of the 17 barriers, they identify one that stands out, namely *'Faster and better return through importing technologies'* (Huang & Chi, 2013, table on p. 44). That is the only one of the 17 that is not associated with any negatively-sounding words. However, they do not emphasise this and continue to stress that barriers need to be overcome. Here, it is possible to take the viewpoint of 'the silent other' – those firms who view adopting other firms' innovations as better suited for them than producing their own innovations. Huang and Chi (2013) could have argued that this particular barrier should remain and that it is beneficial for the firm. At least its potential beneficial impact could have been presented as an avenue for future research. However, the researchers remain silent in this regard. Some additional examples are presented in table 4.

**Resistance as 'lack'**

| | |
|---|---|
| Issues such as a lack of availability of finance for innovative activities, a **lack** of technological knowledge or market opportunities for innovation, a **lack** of connectivity in the innovation system that impedes innovative collaboration, and the availability of skilled labour are related to the institutional and market context of an economy (Hölzl & Janger, 2014, p. 707) | Hölzl & Janger (2014) |
| **lack** of scientific and technical information, technological services, and technical support from vendors. (Baldwin & Lin, 2002, p. 2) | Baldwin & Lin (2002) |
| Therefore, those individuals who **lack** the knowledge sharing habits will be more likely to resist. (Chen & Kuo, 2017, p. 58) | Chen & Kuo (2017) |
| strong skill base is likely to compensate for **lack** of experience in innovation-related activities (D'Este, et al., 2014, p. 1) | D'Este et al. (2014) |
| **Lack** of time was the top-ranking internal barrier, followed by inadequate R and D and related facilities within the firm and inadequate financial means. (Hadjimanolis, 1999, p. 566) | Hadjimanolis (1999) |
| With regard to internal barriers, our barrier classification highlighted the **lack** of discovery, incubation, and acceleration and commercialization competencies (Sandberg & Aarikka-Stenroos, 2014, p. 1301) | Sandberg & Aarikka-Stenroos (2014) |

*Table 4: Quotes from articles illustrating that they frame resistance or barriers as a 'lack' of something. Markings in bold are added by the author and do not appear in the original texts.*

The word 'lack' is far from the only negative wording apparent in the sample. Moldovan and Goldenberg (2004) study '*negative word-of*-mouth' as a form of resistance. Heidenreich and Handrich (2015, p. 879) suggest that passive innovation resistance 'accounts for substantial *waste* in the US$135 billion spent each year in the United States on marketing new products that ultimately fail'.

The belief in innovation as a strong positive force is apparent throughout the sample. Das et al. (2018, p. 107), for example, treat innovation as a *solution* to a problem (the financial crisis of 2008), which stands in contrast to, for

instance, Sveiby (2012), who argues that innovation played a central role in bringing about this crisis.[76] Given the debate around this crisis in relation to risk management, the negative tone with which Das and colleagues speak about it is noteworthy (markings in bold made by the author):

> We have identified a number of key internal barriers from eight different innovation projects...[]... In line with this literature, our study echoes that a **restrictive** mindset (**overzealous risk management)** and an **unsupportive** organizational structure constitute key barriers in large financial services firms as well. (Das, et al., 2018, p. 107)

Despite the debate around the financial agencies taking too big risks and relying on the logic of being 'too big to fail', Das et al. use the word 'overzealous' without much reasoning around what warrants such judgement about the way risks were handled.

Rogers (1983, p. 107)[77] points out that late or non-adopters are often portrayed stereotypically by change agents and others. The tendency to stereotype and use negative wording is apparent in the sample as well. Talke and Heidenreich (2014) portray the resisting consumer using wordings with negative associations. Their literature review talks about consumers who resist innovation due to a fear of losing control over certain life situations, often due to a *lack* of confidence in their capability to use the product successfully. This group of users is described using words such as: *'rigidity', 'dogmatism', 'closed-mindedness', 'inferior'* (Talke & Heidenreich, 2014, p. 897). When Ram and Jung (1991) study forced adoption within organisations, they, to some degree, empathise with the adopters of the technology, highlighting that the adoption can be forced upon people. Even though they use the word 'force' with a negative ring, the innovation as beneficial prevails in their writing. They even use the somewhat condescending words *'parochial self-interest'* when describing individuals that resist a forced adoption process within an organisation. In other words, the researchers implicitly advocate subordination from the employees. They use their findings to make suggestions on how managers might strategise to ensure successful implementation. They do not use it to aid employees in better resisting innovations pushed onto them from the top through, for instance, attempting to reorganise the organisation more democratically. This stands in sharp contrast to Harrisson et al. (2001) who highlight that worker resistance can ensure recognition of employee demands.

[76] Sveiby (2012) is not a part of the sample. He argues that innovation contributed to the crash in the first place. Sveiby's account of the radical innovation *securitization* kept changing the professional context for financial actors so quickly that policy makers and the financial actors themselves were unable to keep up rendering them 'temporarily incompetent'.
[77] Not in the sample

### 3.2.2 Reproduction of the pejorative wording

Like any other scholar, innovation researchers always draw on previous work in their studies. This potentially reproduces pejorative associations with the phenomenon 'innovation resistance'. The valorisation and hierarchy between concepts in one study can live on in studies that draw on it. An example of this is Heidenreich and Handrich (2015) who set out to validate a scale that measures individual differences in passive innovation resistance. When doing so, they have a somewhat understanding tone towards the resisting consumer. They advocate a respectful approach towards them and claim to have an aspiration to understand these consumers psychology. They conclude that the consumer's personality-specific inclination to resist changes (IRC) and their situation-specific status quo satisfaction (SQS) are essential drivers of passive innovation resistance. To capture IRC, Heidenreich and Handrich (2015, emphasis made by the author) use Oreg's (2003) disposition, which they describe as follows:

> this paper thus proposes that the IRC dimension of PIR [Passive Innovation Resistance] includes four related but distinct elements of Oreg's (2003) IRC disposition: (1) routine seeking (RS), which refers to the tendency to resist change because people **fear a loss of control over certain life situations** (Nov and Ye, 2008); (2) **cognitive rigidity** (CR), related to the trait of **dogmatism**, which represents a form of **stubbornness and an unwillingness to consider alternative ideas or perspectives** (Rokeach, 1960); (3) emotional reaction to imposed change (ER) describes **a person's limited ability to cope** with change as a stressor (Swilley, 2010); and (4) short-term focus (STF) refers to the extent to which **individuals are distracted by the short-term.**

This quote reveals several value-laden words, which are marked in bold in the quote. Despite setting out to be respectful towards the people resisting change, the inheritance from Oreg (2003) made them use wording that could be said to be demeaning when describing the inclination to resist. Heidenreich and Handrich (2015) remind us that the ideas about operationalising IRC, as described in the quote, have been used in many contexts and cultures. Thus, it can be suspected that the negative wording lives on across different studies when scholars draw on Oreg's work.

Joachim, Spieth and Heidenreich (2018)[78] study what they refer to as active innovation resistance and test some potential psychological and functional barriers to adoption, previously identified by Talke and Heidenreich (2014). The list of Psychological barriers, in particular, contains several reasons for rejecting an innovation that by many would be perceived as sensible (see table 5). Joachim et al., however, encourage managers *to 'reveal measures to reduce these predominant barriers'* (p.11). However, they do not dwell on how firms should do just that. This leaves the reader wondering if they think these

[78] Not part of the sample but drawing on articles in the sample.

measures should be focused on marketing or if the innovation development process itself should be affected. This is an essential distinction because handing over the 'measures' to the marketing department would mean that the resisting party was not taken as seriously as if the 'measures' had been handed over to the R&D department.

| **Phycological AIR barrier** | **Definition** |
|---|---|
| Functional risk barrier | Fear that a product could be dysfunctional or malfunctional |
| Personal risk barrier | Perceiving an innovation as a threat to a consumer's physical condition or property |
| Economic risk barrier | Perceiving that innovation's costs are too high, and the investment would be a waste of financial resources |
| Social risk barriers | Worries that a related social group would not approve adoption |
| Information barrier | Perceiving information asymmetries with the conclusion that an innovation has undesirable consequences |
| Image barrier | Perceiving negative impressions associated with a brand or country of origin |
| Norm barriers | Evaluation that the innovation is conflicting with, for instance, family values, social norms or entrenched traditions |
| Usage barriers | Perceiving that consumption of innovation requires an undesirable disruption of established user patterns, workflows and routines |

*Table 5: List of Psychological barriers from Joachim et al. (2018)*

As many (34 of 48) of the studies in the sample had the innovating firms perspective as a starting point. This also coloured the view on innovations and their resistance. For instance, Mani and Chouk (2018) say that they attempted to *understand* the 'barriers that lead to consumers' resistance'. But given their focus on the benefits of the innovation under study and not its apparent drawbacks in the introduction, it would appear as if they decided from the start that regardless of what they found they would side with the innovating firm rather than the resisting actors. Thus, even though their theoretical contribution aims to 'provide better understanding', which could be seen as aspiring to be somewhat neutral, the starting point clearly favours the innovation and the innovating firm(s).

While most articles in the sample saw innovation in a favourable light and resistance in a derogatory one, two of the articles (Scaringella & Burtschell, 2017; Abrahamson, 1991) continued to give innovation resistance a negative connotation even though they acknowledged the possibility of the innovation having negative consequences.

### 3.2.3 Resistance direct development towards less desirable innovation

Different kinds of innovation are sometimes sorted into a hierarchy. This is prevalent in the way incremental and radical innovations are framed. The hierarchy between the two is that radical innovation is valued higher than incre-

mental. This distinction enables some scholars to highlight that innovation resistance can direct the innovation process into different possible outcomes. In these narratives, the resistance, however, directs in a less desirable direction. But, if we refuse to submit incremental and radical to this hierarchy and merely consider them as two kinds of innovation, these accounts can lead to the conclusion that resistance can direct the innovation process. Two examples of this were found in the sample (Brüggemann, et al., 2016; Joshi, 2016). In addition, two other studies also had suppressed dimensions of directionality (Zobel, et al., 2016; Reilly & Sharkey Scott, 2014). These four studies will now be presented:

(1) Brüggemann et al. (2016) treat intellectual property rights (IPR) as an undecided category in the framing of their article and seek to contribute to the discussion of whether these rights work as a barrier or enabler of innovation. Through an experiment involving a game[79], they find that IPR hinder the development of valuable innovations and prompt a shift towards developing more 'basic' innovations and a reliance on self-produced prior innovations. In the absence of IPR, Brüggemann et al. interpreted a more frequent occurrence of what they called 'more sophisticated and valuable' innovations. So, Brüggemann et al.'s (2016) result can be interpreted as the resistance encountered (i.e. IPR) directing the innovation activity away from what they called 'valuable innovation' to 'basic innovations'. Brüggemann et al. have a clear yet unspoken hierarchy between 'basic innovations' and 'sophisticated innovations'. In the game, the sophisticated innovation generated more (numeric[80]) value than the basic ones. This nudged Brüggemann and colleague's analysis to consider value as something measurable by a count of numbers – which resembles the logic of economic value. If the debate on what constitutes value is instead allowed to be an open question, it becomes easier to see that IP fosters basic innovations and hinders sophisticated ones. In other words, it resists one kind of innovation and promotes another.

(2) This ability to direct can also be observed in the study by Joshi (2016). In his study, there is a hierarchy where radical innovation is seen as more valuable than incremental. When reading this article, it is clear that even though Joshi does not emphasise it, the phenomenon 'Customer Orientation' can both help and hinder innovation, depending on which kind of reward system the developing organisation uses. When a strategy-based reward system is used, 'Customer orientation' becomes an enabler of radical product innovation. On the other hand, customer orientation poses resistance to radical product innovation when an outcome-based reward system is used. According to Joshi,

[79] Through a laboratory social experiment, where 192 participants took part in 18 sessions involving a Scrabble-like word-creation task.
[80] They used the same principle as the count of points in scrabble.

customer orientation will hinder radical product innovation when the customers are not interested in radical product innovations. Then, a strong customer orientation will force an organisation along a path that leads away from:

> radical product development initiatives and toward initiatives that entail incremental improvements in the technology that the organization has sold to the customer (p. 438).

Just as was the case with Brüggemann et al.'s IPR, Joshi's 'customer orientation' can direct the innovation activity away from radical and towards incremental innovation efforts. Thus, the phenomenon pose resistance to radical while at the same time encouraging incremental innovation. It might also be the case that:

> customer–organization relationships develop through iterations between organizational action and customer reaction (p. 438)

Consequently, the developing organisation's actions are informed by the customer's needs, and the product is modified according to customer feedback until the developing organisation perceives that the customer is pleased with the new product. Thus, customer orientation cannot be locked to any of the categories: help, hinder, resistance, acceptance, barrier or enabler. What category it is connected to depends on the context. It can be tied to any of the categories: help, enabler, acceptance in one context, and any of the categories: hinder, barrier, or resistance in another context.

(3) The study by Zobel et al. (2016) aims to clarify the role of intellectual property (IP) in connection with the adoption of open innovation (OI) practices. Their results point towards IP having a different role in different parts of the innovation process. In the development phase, *'the patent stocks of new entrants particularly drive their OI activities that focus on joint research at the technological frontier'* (p. 325). But in the diffusion phase, particularly when existing technologies are to be scaled up, they find that patents have a significantly negative effect on open innovation relationships (Zobel, et al., 2016). Thus, the article can be interpreted as describing IP as working against an innovation project in one phase and for it, in another – resistance in one phase, and enabler in another. From there, it is possible to argue that neither the category 'barrier, 'nor the category 'resistance' are locked ontological categories but ever-changing as the innovation process goes on. This also illustrates that binary oppositions such as barrier/enabler resistance/acceptance are not pure but always, as Derrida puts it, 'contaminated' by each other (Derrida, 2004; Langmann, 2013). For something to be interpreted as 'resistance', the vantage point of that which it resists has to be taken. If another vantage point is taken, the same phenomena might be interpreted differently, perhaps as an enabler of another innovation.

(4) Reilly and Sharkey Scott's (2014) article concerns an organisational innovation growing increasingly popular within Multinational companies (MNC). Namely, the turn away from federal organising of the MNC into fine-slicing their global organisation, turning subsidiaries into global factories. They see this shift as threatening subsidiary-driven innovation and potentially having a negative long-term effect on the firm's competitive advantage. They outline how federal organisational structures drive and enable subsidiary innovation and speculate on which kind of innovation activities the fine-slicing might give rise to. In other words, they acknowledge that organisational innovation may give rise to different types of innovation than the ones they currently see in the federal structure. Still, throughout the article, they tend to value the federal structure more than the global-factory one. So, even though they have a very positive view on innovation in general and discuss how MNC might drive innovation, they tend to argue against the global-factory structure, which is an organisational innovation.

Taken together, in the sample, 'innovation' is predominantly valued higher than 'NoVation' and 'resistance', and radical innovation is valued higher than incremental innovation. The emphasis on resistance as dysfunctional emerges when ideologically positioning 'innovation' as part of a firm-centred economic activity connected to ideas around competitiveness and economic growth. It is also linked to the notion that firms' well-being is directly correlated to the well-being of society at large. The hierarchy between resistance and innovation, suppresses the dimension of resistance that direct the innovation process. When the direction is seen as leading towards a less favourable path, the research loses sight of innovation resistance directional properties. This is somewhat in line with Bauer's (1995a)[81] reasoning that suggests that managerial or technocratic discourse often views human resistance as a structural or personal deficit rather than something potentially beneficial.

## 3.3 Resistance should be overcome or diminished

Most papers viewed innovation as something positive; therefore, an outspoken assumption was that resistance to that positive force needed to be removed or reduced. In that sense, the articles enforced a binary along the lines of old/bad. In 25 of the 48 articles, the authors set out to identify (and understand) barriers to aid managers or others in overcoming them.

One example of this is Chen and Kuo (2017), who set out to prove what they call 'the resistance theory' developed by Ram (1987[82], 1989) and Ram and Seth

[81] Not part of the sample
[82] Not part of the sample

(1989)[83] through a study of social media. When they do so, they take the innovating firm's perspective as Ram and Seth did before them; they assume that innovations should be spread, and barriers overcome. A second example is Hadjimanolis (1999), who set out to identify innovation barriers and see how managers rank them in terms of importance. A third example is Lettice and Thomond (2008), who identify five mental rejection strategies that prevent managers from allocating resources to disruptive innovation projects and propose a way to overcome them. A few other examples are presented in the table 6.

**Identify resistance to overcome it**

| | |
|---|---|
| This study suggests three intermediary processes which together can help overcome the barriers. (Dougherty, 1992, p. 196) | Dougherty (1992) |
| To successfully implement a service innovation, it is of utmost importance to overcome this resistance on both the organizational and individual level (p. 486). The study helps companies that try to avoid the pitfalls of innovation rejection (p. 499) | Korhonen & Kaarela (2011) |
| It was found that managers with restrictive mental models will adopt up to five disruptive innovation rejection strategies...[]... Initial longitudinal data suggests that rejection strategies can be overcome with holistic portfolio approaches. (Lettice & Thomond, 2008, p. 1) | Lettice & Thomond (2008) |
| We show that financial barriers to eco-innovation can be partly overcome by particular functions of institutional innovation intermediaries; this, in turn, mobilises private finance along the innovation process (Polzin, et al., 2016, p. 34) | Polzin et al. (2016) |
| in this article, the factors that drive innovation resistance have been identified: some strategies that firms can use to reduce innovation resistance have been suggested (Ram, 1989, p. 20) | Ram (1989) |
| The problems outlined so far now represent the set of tasks for innovation management. Only if these innovation barriers are overcome in a sensible manner will companies be in a position to push through innovation processes intra- and extra-organizationally (Staudt, 1994, p. 812) | Staudt (1994) |
| Only if we know which companies are primarily affected by these barriers, we can also identify hampered companies and address their problems (Stucki, 2019, p. 1243) | Stucki (2019) |
| firms trying to compensate for limited in-house R & D capabilities through collaboration with external partners have to overcome a number of knowledge and market barriers to innovation. (Thomä, 2017, p. 1327) | Thomä (2017) |

*Table 6: Quotes illustrating that the authors see resistance as something to overcome*

Overall, scholars who talk about overcoming barriers rarely stop to ask 'why' or 'if' the resistance has to be overcome. Even those who have openings and possibilities to reflect on this in their material seldom consider it. For instance, Chen and Kuo (2017) have data on resistance due to critique of social media treatment of personal information, etc. Despite this, they do not stop to consider *if* the resistance *should* be overcome. Instead, they join the line of researchers who identify innovation barriers and then make a recommendation to firms on how to overcome them. Hadjimanolis (1999) is another example of a study where it could have been possible to nuance the view on innovation barriers. This since he finds no correlation between economic performance

[83] Not part of the sample

and the importance of barriers and no correlation between innovativeness and the importance of barriers. Yet, he does not go as far as to question the underlying assumption that barriers have a negative effect on innovation and, in the long run, on society at large.

Thus, in the sample there, is a widespread habit to investigate resistance in order to be able to suggest how to overcome it. These articles assume that it is desirable to overcome the resistance. This assumption connects to the difference in perceived value between 'innovation' and 'resistance'.

## 3.4 Rationales behind the Resistance

Accounts of the rationale and intentions behind the resistance are predominantly absent in the sample, even though it is possible to get glimpses of it in the study of human resistance (one example being table 5). A few reoccurring phenomena portrayed as innovation resistance make the absence of these accounts a bit peculiar. These are regulations, status quo satisfaction, and loss avoidance.

### 3.4.1 Regulation

One instance of resistance that repeatedly occurs (in seven of the sample articles as well as other articles such as the systematic review of barriers to radical innovation by Sandberg and Aarikka-Stenroos, 2014[84]) is connected to regulation or, as it is sometimes framed, 'regulatory burdens' (e.g. Greis et al. 1995, p. 628). This barrier is not described as being designed by policymakers to reach some goal perceived as desirable for society. The potential benefits of the regulations are left outside of the picture. Hadjimanolis (1999), for instance, identifies *'government's environment, labour and consumer protection policies' and 'government market regulation policies*' (Hadjimanolis, 1999, p. 565) as barriers to innovation. His study is quantitative and uses factor analysis to look at innovation barriers. A factor analysis, among other things, means bundling up several variables (that correspond to specific questions in a survey) into factors. Two of his factors are particularly interesting when considering regulation as an innovation barrier; they are presented in table 7.

**Factors related to external barriers to innovation**

| *FACTOR 1: government market regulation policies* | *FACTOR 4: government's environment, labour, and consumer protection policies* |
|---|---|
| Wages policy | Government's health and safety policies |
| Social insurance policy | Government's environmental policy |

[84] On page p. 1298, they say that 'Unsupportive Government - Governments' actions hindering or failing to support radical innovation often manifest in regulations, laws, and standards'.

| | |
|---|---|
| Policy on patents and licenses | Lack of venture capital |
| Government policies on competition | |
| Consumer protection policy | Consumer protection policy |
| Effect of technical standards on new products | Bank policies on credit |
| Short-term economic, monetary and financial policies | Shortage of skilled labour |
| Policy on public contracts and government purchasing | Policy on public contracts and government purchasing |
| Innovation too easy to copy | Innovation too easy to copy |
| Government Policy to assist small firms | |

*Table 7: Factors related to external barriers to innovation – adapted from Hadjimanolis 1999, p. 567-568*

In the table, the factors identified as related to external innovation barriers include several things that would appear to be very positive for some members of society. Uncritically associating them with the pejorative 'innovation barrier' transforms them. Consequently, something initially set up to benefit the public is turned into a phenomenon with negative connotations. Hadjimanolis notes that these two factors are perceived quite differently in different sectors and interprets this as them having a different impact on the innovation efforts. Labour policies, for instance, have more significant influence in labour-intensive markets such as the textile industry. He does not take the chance to highlight the positive consequences that labour policies might also serve. This tendency to promote innovation over labour rights has also been noted by Walsh (2020)[85], who finds that policy geared towards promoting innovation often ends up working against policy designed to protect workers. To return to Hadjimanolis, he views barriers (such as labour rights) as dysfunctional, and in the article, it is not recognised that they might be set up by design to serve some other purpose. Hadjimanolis (1999) is not the only one portraying regulations as innovation barriers. This sceptical view on regulation is also taken up by other scholars in the sample, presented in table 8.

| **Regulation as innovation resistance** | |
|---|---|
| The external barriers include those in general innovation environment, or 'exogenous barriers' (e.g. government policies, laws and regulations) | Huang & Chi (2013, p. 37) |
| This analysis showed that the implementation of established practices in new regulations should be prevented because formalization of established practices hampers the innovation process towards innovative methods. | Kooijman, et al. (2017, p. 77) |
| Internationally oriented firms identify local problems with the administrative barriers and the flaws of regulation (e.g. imports and exports) | Roud (2018, p. 22) |
| In addition to these costs, all firms reported a series of other impediments to their technology adoption. These include institution-related problems associated with tax regimes, and government regulations and standards. | Baldwin & Lin (2002, pp. 1-2) |

[85] Not in the sample.

| | |
|---|---|
| Also, most survey-based contributions tend to focus on the effects of financial obstacles where there is a range of non-financial barriers—market, knowledge and regulation—that are crucial in the context of innovation policy and management. | D'Este et al. (2012, p. 483) |
| The other four environmental variables could be expected to influence any of the four innovation activities. These variables are (1) the availability of funding (FUND), (2) government regulations (REG), (3) the patent process (PATENT), and (4) the availability of general management expertise (MGMT). | Greis et al. (1995, p. 620) |

*Table 8: Quotes illustrating that regulation is seen as resistance to innovation*

This view on regulation is perhaps not surprising, given the neoliberal (University) context (Lund & Tienari, 2019)[86] in which innovation scholars operate. In the (neoliberal) story of innovation, it would seem as though there is little room to look at the aim of these regulations and what purpose they have. In the context of innovation studies, they tend to be portrayed as a hindrance. Thus, displaying a hierarchy between the innovation project's goal and the regulatory goal, where the innovation project's intentions are valued higher.

There are, however, exceptions to this valorisation. MacVaugh and Schiavone (2010, p. 215) state that: 'The anticipation of regulation also spurs inventive activity'. Uyarra and colleagues highlight that some regulations and policies are designed to aid innovation processes.

> For instance, the OECD (2011) examined a range of experiences in the use of targeted demand-side innovation policies, including public procurement, regulation, standards, user-led innovation initiatives, and 'lead market' policies (Uyarra , et al., 2014, p. 631)

Moreover, Polzin et al. (2016, p. 39) see that regulation is able to both help and hinder:

> the interviewees perceived a high path dependency on the private side regarding technologies and business models but also high regulatory and political uncertainty and inconsistent support for different technologies (i.e. picking the winner problem) on the public side.

Juma[87] (2016, pp. 95-120, 174-201) frames regulation differently depending on which case story he is telling. When he present the Dairy industry's resistance towards the new margarine, the resistance is said to use 'legislative instruments' (p. 117). But when he related the case of the refrigerator, safety regulation is put forward as crucial in shaping the technology (p. 197-198). In the margarine case, the legislation is part of the resistance in Juma's writing. But in the refrigerator case, it is not framed as resistance even though in both

[86] Not part of the sample
[87] Not part of the sample

cases, the regulation shapes the innovation process. In my reading, the main difference is that legislation is the antagonist in the margarine case, while it is a protagonist in the refrigerator case.

According to Pfotenhauer and Juhl (2017),[88] the interpretation of regulations as both resistance and as enabler of innovation is an expression of a limiting way to view the state. Here, it is portrayed in a neoliberal (Harvey, 2005; Fulcher, 2004)[89] manner as a facilitator or obstacle to economic activity. Other state functions such as the guarantee and development of labour rights or consumer protection are either left invisible or framed in a negative light.

### 3.4.2 Status quo satisfaction

To value the status quo above change is rare in the innovation literature (one exception in the sample is Reilly and Sharkey Scott, 2014). In five articles in the sample – especially those tied to marketing literature (as well as writings outside of the sample) – the resistance is explicitly tied to peoples' disinclination to abandon the familiar.

In Moldovan and Goldenberg's (2004) study of negative word-of-mouth, they, for instance, state that: *'Resistance to change often occurs because people are reluctant to abandon the familiar and are suspicious of the unfamiliar' (p. 427).* Early studies of human innovation resistance pointed out that consumers who are happy with their situation might have little inclination to adopt innovations (Ram, 1987; Sheth, 1981),[90] a sentiment that is echoed in the sample as well. Korhonen and Kaarela (2011, p. 485), for instance, note that innovation is not inherently beneficial for organisations; thus, resistance to it is not a negative concept in general. Additionally, they acknowledge that:

> 'People, in general, do not desire changes when they are satisfied (Judge et al., 1999; Wanberg and Banas, 2000) or close to their aspiration level (Greve, 1998). They also try to avoid risks related to innovation adoption'. (Korhonen & Kaarela, 2011, p. 485)

It has even been pointed out that people who resist innovation might be more common and more (economically) rational than innovation adopters (Sheth, 1981[91]; Szmigin & Foxall, 1998; Rogers, 1983[92]). Despite recognising this, the authors still predominantly tend to promote innovation albeit sometime on the prerequisite that consideration and adjustments are made to make people more inclined to see the value in the new.

[88] Not part of the sample
[89] None of these two references are part of the sample
[90] Not in the sample
[91] Not in the sample
[92] Not in the sample.

The advocating of creating dissatisfied consumers is most apparent in three of the sample articles (Talke & Heidenreich, 2014; Heidenreich & Kraemer, 2016; Heidenreich & Handrich, 2015). Talke and Heidenreich (2014, p. 904) see mental stimulation and self-visualisation in advertisements as promising ways to reduce consumers' status quo satisfaction. They also bring up 'benefit' comparison as a way to reduce what they call 'situational passive resistance', a resistance that comes from consumer's 'status quo satisfaction with extant products' (p. 905). They mention the status-quo bias, which would be when the consumer misses a better alternative due to being satisfied with the current situation. Talke and Heidenreich (2014) and Heidenreich and Handrich (2015) focus on the consumers' predisposition to resist innovations, calling this 'passive innovation resistance'. They differentiate between *passive innovation resistance*, which they say, 'results from a consumer's generic predisposition to resist innovations prior to new product evaluation' (p. 894), and *active innovation resistance* that they describe as 'an attitudinal outcome that follows an unfavourable new product evaluation' (p. 894). They impose a hierarchy between these two concepts, where active innovation resistance is viewed as more valuable than passive innovation resistance. This becomes even more apparent in the study by Heidenreich and Kraemer (2016), where they evaluate the effectiveness of marketing strategies on reducing the '*negative effects of passive innovation consumer resistance on adoption'* (Heidenreich & Kraemer, 2016, p. 277). They argue that the passive innovation resistance (where the consumer does not evaluate the new product) can lead to the rejection of innovations with superior functionality than existing alternatives. Here, they assume that just because something is superior to its predecessor, it is desirable to adopt. Implicit in their reasoning is the notion that if the product is superior to what the consumer is currently using, it is justified to take the consumer out of his/her current status as 'satisfied'. With this reasoning, 'satisfaction' becomes dysfunctional, at least from the study's firm-focused perspective. It is taken for granted in the discussion that firms ought to put an end to this satisfaction. Giving voice to 'the other' – in this case, the consumer could open up for a problematisation of this quest to disrupt a situation that might be valued by the Other. Talke and Heidenreich (2014) view the firm as more capable than the consumer of assessing whether or not a consumer would benefit from the innovation. This can be seen as a hierarchy where the firm's perspective and intention are valued higher than the consumer's viewpoint. It also shows a hierarchy between the firm's and the client's ability to properly understand and assess an innovation.

When they do point out some reasons behind the consumers' resistance, they mention that individuals are often emotionally attached to their products and that consumers tend to prefer well-tried products when exposed to innovation since the new product involves potential losses that outweigh potential gains.

Then, they immediately disapprove of this kind of considerations by saying that it is often irrational (Talke & Heidenreich, 2014, p. 898).

The tendency to see the status quo as a less desirable option is apparent outside of the sample as well. For instance, when Juma (2016)[93] talks about overcoming inertia forces, he claims that 'the challenge lies in balancing between the long-term benefits arising from innovation and the short time benefits of maintaining the status quo'. He assumes that long-term benefits will come from innovation, despite acknowledging the uncertain outcome of an innovation process.

Creating dissatisfaction with the status quo is potentially lucrative for a firm that wishes to sell innovations. The effort to generate malcontent to stimulate consumption has a slightly longer history than the scholarly traditions of innovation research, and it is tied to the ideology of consumerism (Parrique, 2019, p. 66).[94] Although modern consumer society was born in the 17th to 18th century in Western Europe and the Atlantic world (Trentmann, 2004),[95] the conscious move to create malcontent happened much later. Rifkin (1995/2001)[96] provides an account of how it developed in the U.S. It began in the early 1900s, at a time in history when the people in American were dominated by a protestant work ethic and valued parsimony and savings. This changed due to the American business community's conscious efforts to change the people's mentality and turn 'consumption from vice to virtue' (Rifkin, 1995/2001, p. 19). Rifkin put it like this:

> Early on, business leaders realized that to make people "want" things they had never previously desired, they had to create "the dissatisfied consumer" (Rifkin, 1995/2001, p. 20).

It is somewhat peculiar that innovation literature often transforms, *being pleased with your situation,* into an undesirable status. 'Status quo satisfaction' is commonly portrayed as a natural trait in potential users that, if possible, should be converted into status quo dissatisfaction, leading to a purchase of the innovation. Thus, innovation resistance might come from something so simple as satisfied and content people who do not believe that they need anything new to improve their situation.

### 3.4.3 Loss avoidance

At the same time, as a dissatisfied consumer is created, its previous status quo satisfaction is lost. From valuing the status quo, it is thus not far to perceiving

[93] Not part of the sample
[94] Not part of the sample
[95] Not part of the sample
[96] Not part of the sample

an innovation as a threat. This is also something that is put forward as an antecedent of resistance, according to the literature review in Oreg and Goldenberg's (2015)[97] book "Resistance to Innovation". They bring up that innovation can pose a threat to status, power and job security. An innovation's potential to lead to loss is glimpsed in a few of the sample articles, as suppressed dimensions. Two of these will now be elaborated.

(1) Nijssen et al. (2005) have studied the multi-dimensionality of firms' willingness to cannibalise on former investments, which is something they see as an essential ingredient in the development of radical innovation. With 'cannibalise', they mean; *'the organisational disposition to forego its investments and current competencies'* (p. 1400). Here, the wording used for the resistance could be seen as having a positive association (unwillingness to eat humans). They acknowledge that when a firm engages in radical innovation, they risk losing something valuable – the firm's prior investment in the old technology. Despite this, they do not see the resistance as protecting something useful. They say that by understanding the different dimension of willingness to cannibalise, managers can help their organisations to overcome the resistance to change. In a sense, this turns something previously perceived as negative (eating humans) into something positive that firms should engage in (only Nijssen et al. encourage firms to kill their old innovations rather than actual human beings).

(2) Klein and Sorra (1996) are well aware that the efficient implementation of an innovation does not guarantee that it will benefit the organisation. In their description of an organisation's internal implementation climate, they say that this climate can be *weakened* if an implementation is effective, and the usage of the innovation fails to enhance performance, that is, they connect innovation implementation to something that has negative connotations, 'weakened'. Nevertheless, they do not encourage innovation avoidance; instead, they aim to promote innovation. Their study connects the resistance to the implementation rather than the innovation itself (they see these two as separate entities). This becomes apparent in their description of a strong implementation climate:

> A strong implementation climate fosters innovation use by (a) ensuring employee skill in innovation use,(b) providing incentives for innovation use and disincentives for innovation avoidance, and (c) removing obstacles to innovation use (Klein & Sorra, 1996, p. 1060).

Interestingly, this quote assumes that a strong innovation climate does not need any checkpoints to ensure that the innovation is beneficial for the adopting organisation. This is despite having acknowledged themselves that there is indeed a possibility of such innovations entering the organisation. Instead,

[97] Not in the sample

they argue that the likelihood of an innovation contributing to *'improvements in profitability, productivity, customer service, and employee morale'* (Klein & Sorra, 1996, p. 1058) greatly increases with implementation effectiveness. They are thus putting the focus on effective implementation rather than efficient innovations. Whether Klein and Sorra are aware of it or not, the study nevertheless opens up the possibility of resistance leading to the avoidance of undesirable change. They consider resistance in relation to values and say that when an innovation fits poorly with existing values, then implementation becomes harder. One example is people at manufacturing plants valuing performance more than change and learning. They claim that there has to be a specific innovation-value fit for the innovation to be implemented efficiently. In other words, if the innovation does not fit the culture of the organisation, then implementation becomes harder. Consider what they say about the situation when the innovation-value fit is poor, and the implementation climate weak:

> When innovation-values fit is poor and implementation climate is weak, targeted innovation users are likely to regard their organization's weak implementation climate-its anaemic and erratic implementation policies and practices-with some relief. Targeted users are likely to be pleased to face little pressure to use the innovation. Unskilled, unmotivated, and opposed to innovation use, targeted users are unlikely to use the innovation at all. (Klein & Sorra, 1996, p. 1067)

When the innovation-value fit is poor, then a weak implementation climate contributes to employee relief (wording from their table on page 1066). So, innovation resistance (weak implementation climate) can guard potential adopters against an undesirable innovation; in this case, it leads to employee relief. One way of looking at this (which is not brought up by Klein and Sorra themselves) is that one form of resistance – 'poor innovation-value fit' – is aided by another form of innovation resistance – 'weak implementation climate' – to generate something that could be viewed as positive, namely 'employee relief'. In that way, innovation resistance can be said to work for the targeted innovation users and help them avoid an innovation that fits poorly with their values. Klein and Sorra argue that when the implementation climate is strong and the value fit poor, it is likely to give rise to innovation resistance since the prospective user would be forced to adopt an innovation that fits poorly with their values. Korhonen and Kaarela make a similar claim, namely that resistance to innovation might be due to the innovation not being compatible with the prospective adopter. Thus, they too open up for resistance, potentially protecting an organisation from a non-compatible innovation.

The acknowledgement of loss illuminates a rationale behind innovation resistance. Resistance is a means to avoid this loss.

## 3.5 Resistance could be leveraged

Most articles concerning human innovation resistance in the sample (e.g. Heidenreich & Handrich, 2015; Heidenreich & Kraemer, 2016; Talke & Heidenreich, 2014; Ram & Jung, 1991, Ram, 1989) view innovation in such a positive light that they advocate that managers use the more in-depth understanding of the consumers' resistance generated by the research, to promote and develop innovation. The notion of resistance leading to some form of learning is thus explicitly and implicitly laid out.

Some of the quantitative papers highlight that the detection of signs of firms encountering 'barriers to innovation' could be interpreted as the firm identifying areas of problem-solving and learning. D'Este et al. (2012) highlight that quantitative studies (e.g. Baldwin and Lin 2002) have found that innovating firms that engage vividly in innovating and adopting activities are also the ones reporting the most barriers. The finding of Huang and Chi (2013) point in a similar direction. Thus, both D'Este et al. (2012) and Huang and Chi (2013) suggest that to experience a barrier and realise its importance, a firm needs to be heavily invested in innovation activity. Thus, there is a positive correlation between innovation intensity and the likelihood of recognising innovation resistance. Baldwin and Lin (2002) suggest that quantitative surveys should interpret high rates of perceived innovation barriers, not as preventing innovation adoption but as an indication of how successful firms are at overcoming them. D'Este et al. (2012) have a similar agrument and say that

> ...engagement in innovation activity increases firms' awareness of the associated difficulties (D'Este, et al., 2012, p. 483).

Oreg and Goldenberg (2015, pp. 198-199)[98] argue that there is an often overlooked potential productive function of innovation resistance that they referred to as a 'silver lining' in an otherwise negative phenomenon. They argue that resistance serves as a gatekeeper, is a necessary part of the market, and enhances innovations' quality.

> Imagine a marketer's ideal world, a world with no resistance - in which consumers are keen to adopt anything new. What would innovation mean then? Without the obstacles and barriers, firms would swamp markets, probably with less sophisticated, less original, and lower standards. This marketers dream would likely become the consumers' nightmare (Oreg & Goldenberg, 2015, p. 198).

Some of the articles in the sample also point towards this silver lining and indicate that there is an opportunity for learning in innovation resistance. This

[98] Not in the sample

since the resistance can prompt adjustments in the technology that in turn reduces the resistance (Ram, 1989; Mani & Chouk, 2018; Heiskanen, et al., 2007; Szmigin & Foxall, 1998; Heiskanen, et al., 2007). The focus is to help the firms succeed. The findings of the studies are portraited as a way to learn from the innovation resistance in order to finetune future offerings in a way that reduces future resistance.

Heidenreich and Handrich (2015, p. 895) suggest that resisting people could be *'employed as counsellors in new product development to identify components or usage procedures that are too disruptive'.* This is in line with Heiskanen et al.'s (2007) suggestion to let the reasons behind innovation resistance underpin the set-up of concept testing. They recommend that firms use the testing as an opportunity to learn more about the consumers' viewpoints and concerns on how the product might impact their everyday life and society. Heiskanen et al. (2007) imply that resistance might give voice to otherwise neglected stakeholder perspectives. They nuance the picture of consumer resistance as being due primarily to a lack of understanding of the product's features and challenge the idea of educating the consumer to overcome all consumer resistance. Listening in to these objections made Heiskanen et al. (2007, p. 504) see that

> new technologies are often Janus-faced, involving both positive and negative aspects, which are often incommensurable and derive from different evaluation contexts.

Szmigin and Foxall are also advocating that learning from resistance feeds into further development processes. Their article opens up for innovation activity outside of both the firm and the economic system (i.e. potential customers finding their innovative solutions). However, they still suggest that this insight be used primarily within a firm setting. Thus, even an unusually reflective article promotes firm-based innovation. This illustrates that firm-based innovation processes are valued higher than innovations that do not generate economic transactions.[99]

De Massis and colleagues (2018) and Bhatt et al. (2016) take leveraging resistance one step further and narrate stories, where resistance (or limitations) has been turned into strengths. De Massis et al. studied small and medium-sized companies with recourse constraints that did not prevent them from remaining highly innovative. For instance, these firms had resource and growth constraints that could have made it hard to compete in a global market. However, they used their limitation to guide them into focusing on specific niches, which enabled them to '*dominate their narrowly defined market with regard to innovation while limiting investment requirements'* (2018, p. 129). Bhatt et

[99] Perhaps this kind of innovative activity only get space when social innovations are studied explicitly.

al. (2016) studied an entrepreneur attempting to develop a social innovation in rural India. Rather than focusing on overcoming challenges or barriers, the entrepreneur chose to internalise them.

The glimpses of learning possibilities in the sample are in line with Bauer (1995b)[100] who argues that in stories about innovations, the *contribution* of resistance often remains hidden, and resistance seldom gets credit for the success of innovation; instead, it usually has to take the blame for failure. According to Bauer (2015, p. 94),[101] resistance analyses are often a 'white-wash' of managerial risk-taking. It is used to shift the blame for a failure from the managers to the resisting party.

There are openings in some texts for innovation resistance, providing valuable feedback into the innovation process and leading to learning for the developing firm.[102] These authors, nevertheless, tend to still promote innovation and thus value it higher than NoVation. Despite opening up for beneficial consequences of resistance, they still have a hierarchy between resistance and adoption, where adoption is seen as more desirable. Even though the scholars open up for beneficial aspects of innovation resistance, no one in the sample argues for the possibility of altogether abandoning the innovation project due to justified and reasonable resistance.[103] Attention must be turned beyond the dominant STI framings of innovation resistance to find these kinds of sentiments, which will be done in the next chapter.

## 3.6 Summary of the chapter

In this chapter, the dominant mainstream view on innovation resistance was laid out. The concept 'innovation resistance' was used as an umbrella term encompassing scholarly writings around the concepts: 'barrier', 'resistance', 'impediment', 'hindrances', 'challenge', 'limit', 'technological inertia', 'non-adoption', 'non-use', and 'rejection'. A sample of 48 articles from top Innovation journals (Fagerberg et al., 2012) was used to investigate dominant views on 'innovation resistance' in the mainstream. The articles in the sample predominantly argue for innovation being valuable due to its ability to ensure firm

[100] Not part of the sample
[101] Not part of the sample
[102] They do however not go as far as Vinck (2017) who questions that it is only 'innovation' that give the competitive advantage and argue that failed innovation can lead to a number of seemingly beneficial outcomes for a firm, most significantly so through learning. He argues that failure is a superior compared to success when it comes to efficiency. Failure according to Vinck leads to a more efficient learning process and that failure open up the possibility for other innovation processes.
[103]We can however find it elsewhere for instance in Martin Bauer's (2015) work as well as in his edited book from 1995, 'Resistance to new technology'.

survival. Some articles also emphasise use-value, capitalist market values and the innovation's role in solving grand challenges.

Most articles in the sample share the assumption that innovation is beneficial and resistance dysfunctional. A majority of the articles set out to identify resistance to aid managers or policymakers overcome it. Competition and regulation are often identified as sources of innovation resistance and are often portrayed as a threat with no beneficial effect on innovation. Some articles in the sample open up for innovation resistance, directing the innovation process away from seemingly more valuable innovation to a less valuable one. There is a tendency among STI studies concerned with human innovation resistance to view status quo satisfaction as negative phenomena, advocating instead for increased dissatisfaction to enable innovation diffusion.

Some articles imply or clearly acknowledge that innovation may lead to some form of loss. Occasionally, there is openness in the narrative for innovation resistance to be seen as protecting from losing something perceived as valuable. Many of the articles open up the possibility for firms to leverage resistance through learning, internalisation and turning limitations into strengths.

# 4. Innovation resistance – an inquiry beyond dominant views

In this chapter, the inquiry into 'innovation resistance' will be continued by looking beyond the framing of innovation resistance in top innovation journals. This account serves to shed further light on 'innovation resistance' and its relationship to innovation. Thus, it constitutes a building block in the inquiry into the manifestation of innovation resistance and the dynamics involved in its entanglement with innovation processes. The section begin with an account of worker resistance, followed by a presentation of resistance from vested interests and dominant technological regimes. Thereafter, the perspective of historians focusing on resistance to new technology will be briefly presented. Lastly, some ideas presented by resistance scholars studying civil disobedience will be laid out.

## 4.1 Resistance to defend employment

The effect of innovations on employment is not commonly taken into consideration when its productivity-enhancing virtue is emphasised. When studying resistance to innovation, on the other hand, this is an important aspect. The debate around technological unemployment[104] closed in the 1940s on the note that the unemployment was only temporary (Godin, 2019, pp. 92-93). This debate opened again after a workshop held by Frey and Osborne in 2013, followed by an article by them in 2017 (Czarniawska & Joerges, 2020, pp. 4-6). A growing number of economists now, once again, suspect that technological innovation lies behind unemployment (Frey & Osborne, 2017).

Regardless of whether technological unemployment on a larger scale is temporal or not, the individual worker is affected. Walsh (2020) has recently argued that innovation has often been used by capitalists to gain power over workers, which has been widely contested by the workers. It is, however, common to downplay the consequences for workers, which colours how resistance

[104] That was one of the literature streams that fed into the first tradition of innovations studies.

is interpreted. The prevailing negative connotative meaning of the word 'Luddites' exemplifies this.[105] The Luddites resisted the technology introduced in the knitting industry in England in 1811-12. Sometimes, this movement is referred to as 'the Luddite Fallacy', meaning the people who resisted innovation that threatened their livelihood, were mistaken. The argument is that the technology not only destroyed jobs, it also changed the composition of employment – i.e. created new jobs. Nevertheless, the view on the Luddites as misinformed has been contested, by among others, Krugman (2013). He claims that it is uncertain if ordinary workers reaped any benefits in the early Industrial Revolution and that many workers evidently were hurt. To the threat of layoffs, horrible and lethal working conditions can be added (Malm, 2016, p. 223). The resistance from these days might be most remembered for the Machine breaking, but Randall (1995) points out that strikes and appeals to authority were also used. To that we might add the cultural resistance in the shape of poems and songs[106] (Malm, 2016, p. 223).

British Workers resisted technological innovations through machine breaking from the late 1700s to the late 1800s (Randall, 1995). According to Randall, resistance occurred when the technology threatened to take work from established labour groups and when the community under threat had previous experience from resistance as well as indigenous cohesion and leadership to sustain the resistance (Randall, 1995, p. 64). Thomas et al. (2017) highlight that the Luddite movement was part of a bargaining strategy, and Malm (2016, pp. 223-248) illustrates how the demands of the massive British machine breaking protests of 1842 converged into one single demand – the vote[107].

The effect of innovation on jobs is also crucial for workers today because our society uses work as a way to distribute wealth. Alvesson et al. (2009) point out that from a labour process theorist perspective, labour during times of monopolist capital has been systematically disadvantaged, yet resistant. In their book "Innovation resistance,"[108] Oreg and Goldenberg (2015) point out that innovation that poses a threat to job security gives rise to resistance. Seeking to preserve one's income source is then, in Oreg and Goldenberg's (2015) view, a rational reason for resisting innovation. To get an education to learn a new trade is not a simple solution to technological unemployment, argues Krugman (2013). Just as in the mid-1700s, the workers facing layoffs today need to support their families, which, in many counties, is not possible while

[105] For instance, Rotman (2013) takes pains to explain that Mcafee and Brynjolfsson (2012) are by no means 'Luddites', which is interesting when considering their research in connection to innovation resistance.
[106] When the Albion Mill went up in smoke in 1791, the satisfaction was expressed afterwards by songs in the streets of London (Malm, 2016, p. 223).
[107] Or rather the peoples Charter with reforms to make the political system more democratic, the most important part of which was men's voting rights.
[108] Which predominantly uses the concept 'innovation' with mostly positive connotation.

going through education to learn a new trade. To that can be added another similarity between unemployed workers today and in the 1700s. If people take time and spend money to learn new skills to compete on the labour market, they might find themselves ending up with a skill that the economy no longer wants since it can be substituted with technology (Krugman, 2013).

Science and technology scholars have paid attention to the effects of technology on the workplace at least since 1974 (Asdal, et al., 2007). This has been heavily influenced by Braverman (1974) who showed that technological change had been designed to strengthen the control over labour through the replacement of skilled workers. Noble (1984) argued that while technology is socially shaped, the scope for choice and action is limited by the capitalist system's political-economic logic. He argued that innovations have intensified the degrading of work through depletion of qualifications and skills, combined with stricter control. Attempts to increase productivity are often accompanied by an effort to increase control over workers, and authors of such strategies often meet resistance (Harrisson & Laberge, 2002). This resistance is often rooted in a desire to regain dignity when faced with work organisation that threatens workers' pejoratives, interests and autonomy (Harrisson & Laberge, 2002; Harrisson, et al., 2001). Harrisson and Laberge (2002) contemplate that workers' resistance to change is connected to a countermovement to the ideologies of productivity and efficiency:

> Conservative values – such as maintenance of the status quo in social structures and failure to recognise the human being as anything more than an instrument of production– are also connected to technology, itself reinforced by ideologies such as 'productivity', 'competitiveness' and 'efficiency' (Harrisson & Laberge, 2002, p. 516).

Landau (1993) brings up the connection between resistance and innovation induced loss on an individual worker level. He describes workers in a student office who aided consultants in developing an innovation that would make their work more efficient. These workers later resisted the innovation due to it leading to them losing their relationships with students and the head supervisor, along with their position of being able to rescue them from rigid bureaucratic problems. Landau summarised this as the workers losing the ability to: *'transform him/herself from a faceless public servant to a recognised individual'* (p. 10). This is similar to the findings in the review by Oreg and Goldenberg (2015),[109] which identified threat to status and power as a forebear of innovation resistance.

Bruland (1995) expresses that human resistance to new technology often tends to be seen as a Luddite form of worker resistance. She argues that this is a

[109] Not in the sample

limiting view since perceiving an innovation process' adverse effects is not confined to workers. Resistance can come from many sources such as businesses, public administration and politics (Bruland, 1995). This acknowledgement of the multiplicity of sources for resistance will be emphasised in the subsequent chapter when this thesis' analytical lens is presented. Worker resistance is the oldest and most famous form of social resistance to technology, and the thesis draws on the more nuanced and empathic way in which this kind of resistance has been viewed in recent years.

## 4.2 Resistance to defend investments

Innovation scholars seldom refer to corporations when they talk about resistance to technology – it is often the users that are said to resist innovation. However, the scholars are well aware of the difficulty for an innovation process to challenge existing technology. They talk about it in terms of inertia (Juma, 2016, p. 315), technological trajectory and lock-in effects. This section will briefly discuss these theories using the word 'resistance'. This since the presence of resistance is implicit but clear in these theories – although not drawn out into the open.

The innovation literature on technological paradigms (Nelson and Winter, 1982), large socio-technical system (Hughes, 1987.; Markard & Truffer, 2006) socio-technical regimes, technological trajectory and lock-in effects all indirectly speak about innovation resistance. In these theories, large dominant firms or regimes resist radical innovations from niche players.

Innovation is often path-dependent and cumulative (Mazzucato & Perez, u.d.), meaning that today's innovation builds on yesterdays in a trajectory. This can create a prevailing *lock-in* situation, where it is difficult to introduce something new that fundamentally changes the technology, as argued by Foxon and Pearson (2008). Therefore, the new technology has to compete with existing technology and the complete system in which it is embedded. Actors invested in dominant technology pathways are likely to engage in resistance to radical innovation (Foxon & Pearson, 2008). For example, firms opposed transgenic crops in the 1980–90s (Juma, 2016, pp. 224-256) and margarine in the late 1870–80s (Juma, 2016, pp. 95-120).

Large regimes put up institutionalised resistance in the shape of boundaries that dictate the degree of variation in innovation activity, meaning which problems to solve and the degree of radiality of the solution. The system is marked by a high degree of interdependence, meaning that a new product needs to be compatible with the system. An innovation might be perceived as having a positive impact on one part of the system, while having a negative impact on

another part. Markard and Truffer (2006) see that as an ‘obstacle for the transformation of the system’ (p. 611). The regime dictates the innovation selection and steers the focus of the innovation activities. The regime resists innovation that does not fit within it. Strong actors in these programmes are the well-established firms that tend to ‘oppose far-reaching innovations as these might endanger their market position’ (Markard and Truffer, 2006, p. 612) or 'jeopardize their long-term investments' (p. 615). Instead, they tend to focus on incremental innovation that keeps the development in the dominant technological trajectory (Markard & Truffer, 2006, p. 615).

Advocates of practice that does not fit within the regime might be seen as 'dissenting voices', as were the proponents of organic farming in the 1930s and 40s (Smith, et al., 2005). The proponents of the niche might see the regime as resisting their innovation process. The common innovation framework 'the multi-level-perspective' (Geels, 2002) builds on that notion. The idea being that a revolutionary innovation should first be protected in a niche where it can develop in relative peace from the strong players in the dominant regime. If it were to compete in the dominant regime from the start, it would risk subjection to intense resistance from the established actors. Vested interests from established players are a widespread source of resistance to innovation,[110] although it is seldom portrayed as such in the innovation literature. The narrative is often that the small actor resists the large one.

## 4.3 Resistance as part of a power struggle

When some historians study innovation processes, they tend to construct a success-story, similar to the linear model of innovation development,[111] while others describe technology development as conflictual. The second group of historians refine the view on innovation resistance. They see technological innovation development as a struggle where one group of people wins by successfully developing a technology that represents their values and invested interests, while another group loses. When technological development is labelled as a conflict, what is interpreted as resistance by one group of people can also be described as competing world views and vested interests (Staudenmaier, 1995). Touraine (1995) sees resistance to new technology as a part of the lengthy history of ideas related to democratic control of instruments of power. Mokyr (1992, p. 328) notes that

[110] For instance, highlighted by the IPCC report. There, 'vested interest' is seen as a barrier to a societal transition to a fossil free society (de Coninck, et al., 2018). A transition that can easily be described as a radical systemic innovation.

[111] Staudenmaier (1995) argues that these historians tend to see technology as rational, and therefore the unknown and the uncertain are seen as the primary forms of resistance to it.

> some resistance...[]... is inevitable. If every hare-brained technological idea were tried and implemented, the costs would be tremendous. Like mutations, most technological innovations are duds and deserve to be eliminated.

To determine which resistance protects and which hinders progress is hard to determine, even for historians (Mokyr, 1992, p. 328). This is in the eye of the beholder and one of the reasons why innovation processes can be seen as moulded through conflict. Bruland (1995) notes that even countries that are open to international innovations do not accept these without resistance. In that sense, resistance can be seen as a part of the process in which society selects between technological (Bruland, 1995) and non-technological options. Human Resistance, according to Burland, occurs when technologies clash with social organisation, cultural values, etc. Resistance may also be part of the process that adapts technology to a new setting (Bruland, 1995).

The historians illustrate that resistance can emerge when a particular innovation process leads to undesirable consequences. Bruland (1995) explains this by relating how a new fishing technique threatened the entire economic ecology of a coastal region in Norway, including existing political power structures and the possibility for poor fishermen to continue their trade. Thus, it was successfully resisted. Her research shows that consideration of phenomena outside of the traditional system boundaries of mainstream innovation studies can warrant resistance. In her example, this is demonstrated by fear of deforestation and exhaustion of fish stocks that motivated resistance to new technology (Bruland, 1995).

Bauer (2015) claims that the absence of resistance or not leveraging the existing resistance inflicts an opportunity cost. He suggests that the lack of resistance has a cost and can lead to destructive events, and he wonders if the Chernobyl disaster in April 1989 might have been avoided if there had been more public resistance to nuclear power in the Union of Soviet Socialist Republics (USSR). He has reason to wonder about this, since resistance to nuclear power in other countries has led to improved security standards (Rucht, 1995) and increased transparency of government departments handling these kinds of issues. It has also forced governments to make better cases for nuclear power involving not only economical but also environmental, commercial and scientific aspects (MacLeod, 1995).

Bauer (1995b) argues that from an innovators perspective, resistance to innovation should be seen as a vital sign that something has gone wrong. Bauer uses the metaphor of the 'acute pain' of the innovation process. He sees resistance as primarily a functional event in a social process all the while acknowledging that dysfunctionality is possible but secondary (Bauer, 1995b):

> Resistance affects socio-technical activity like acute pain affects individual processes: it is a signal that something is going wrong; it reallocates attention

> and enhances self-awareness; it evaluates ongoing activity; and it alters this activity in various ways to secure a sustainable future (Bauer, 1995a, p. 3).

If resistance is viewed as 'a sign that things are going wrong', argues Bauer (1995b, p. 393), it can be considered to be a form of communication directed to the innovator who needs to interpret and adjust future actions according to the interpretation made. This can lead to the termination of the innovation project or a tactical retreat (Bauer, 1995b). It can also lead to different degrees of learning – the most substantial of these leading to a complete redirection and change of output. This ties into the possibility for learning glimpsed in some of the articles discussed in chapter three (D'Este, et al., 2012; Heidenreich & Handrich, 2015; Mani & Chouk, 2018). Bauer (2015) claims that *'it is not resistance that needs an explanation but its absence; and if there is resistance, how we rise to the challenge, is the key question'* (p. 3). The 'we' here could be interpreted as the actors advocating the innovation project, but it could also apply to actors outside the innovation project who in other ways are engaged in shaping our world.

Suppose innovation is described as a result of a neutral linear process of progression. In that case, it is only seen as connected to the power structures of markets' productivity and competitive advantage, argues Thomas et al. (2017). Consequently, it becomes decoupled from all other structures of power and domination (Thomas, et al., 2017). Instead, they argue that ideology is key to understanding socio-technical resistance. They think that if scholars aim to study socio-technical resistance more accurately and descriptively in a way that has more explanatory power, they need to move away from the notion of technological neutrality and reconnect it to structures of power and domination. To take to heart, the historians' analytical point of seeing technological development as conflict would enable a move away from favouring one process (the innovation one). The conflict lines would become more explicit, and the different sides in the conflict can be analysed on more equal grounds.

## 4.4 Resistance to enable societal change or societal preservation

Resistance can be seen as a reaction to values held dear by the resisting party being neglected or threatened by the innovation process. Innovation resistance might enable values and perspectives being kept outside of the system boundaries to creep inside the system. For example, the planned obsolescence of

prevention of repairs has given rise to the 'right to repair' movement that successfully[112] pushes for the right to repair things that are broken.

Rogers (1983, p. 191) uses the word 'forced discontinuance' to refer to the conscious move to withdraw innovation previously promoted and seen as beneficial. To exemplify, he used the forced discontinuance of pesticides (which he calls agricultural chemical innovations) through rulings from the Food and Drug Administration. Forced discontinuance is, in Rogers' sense, very effective resistance to a previously accepted innovation whose adverse effects make it banned by law or regulation. In line with that, Goulet and Vinck (2017) point out that innovation processes can be geared towards outcompeting technologies and practices, perceived as limiting or harmful to humankind or nature. Direct attempts to promote withdrawal can be met with resistance. The opponents often emphasise the risk of the advancement of the innovation being lost when it is removed. Withdrawal can be advocated when there is a debate on the supposed benefits, and dangers are tied to the innovation; some examples are mobile phones, nanotechnology, tilling and genetically modified food (Goulet & Vinck, 2017).

This possibility of invoking change is a motivating factor highlighted by scholars in the nascent field of 'Resistance Studies' (Baaz, et al., 2017). Even though their focus is on social movements of resistance, their focus sometimes centres around technological innovations. Baaz et al. (2017) describe the resistance they study as:

> ...anything from violent to non-violent, confrontational to circumventing, deconstructing to reconstructing, productive to hindering, individual to collective, accommodating to enforcing, and materialistic to virtual.

They highlight that resistance does not have to 'just' be against something; it also suggests other alternatives. The focus of these studies is social movements of resistance, including civil disobedience.[113] Sometimes, the resistance they study is targeting technology that is perceived to have undesirable effects. They study resistance to technology that leads to a fossil fuel lock-in as well as threatens ingenuous cultures and food supply (Vinthagen, 2020), and civil disobedience targeting innovation of mass destruction and other innovations of war (Strindlund & Vinthagen, 2011, pp. 29-30). According to Strindlund and Vinthagen (2011), the motivation for civil disobedience differs between

[112] The movement has gained ground (Rosa-Aquino, 2020; The Repair Association, 2020) and The European Commission has issued a sustainable product legislative initiative, which according to them will function as a barrier to technological development that includes 'prevention of repairs' (European Commission, 2020).

[113] Defined as not including violence or threat of violence, directed towards people and by the activist not hiding their identity while going through with their disobedient behaviour (Strindlund & Vinthagen, 2011, p. 45). Coined by David Henry Thoureau in 1846 and made popular by Gandhi.

the global north and the Global North. People in the Global North can enter it voluntarily due to ideological reasons. In contrast, people in the Global South might be forced into a resistance movement to defend their traditions and livelihood. The risks are also much higher. For example, there is a slight risk of being subjected to violent retributions for civil disobedience in Sweden, and the prisons are comparably nice. In the Global South, the resisting people risk paying for their resistance with their lives (Strindlund & Vinthagen, 2011, pp. 32-35; Butt et al., 2019). This kind of innovation resistance has an ethical and political purpose and aims towards societal change or societal preservation.

Inspired by the research brought forward by historians and Resistance Scholars, this thesis attempts to take more of a birds-eye perspective than traditional STI studies. It seeks to avoid a one-sided focus on fast-paced economic relationships and a linear view of innovation leading to progress. It views innovation processes as multi-directional and the outcome of an innovation process as undecided and uncertain. It seeks to include non-economic perspectives and rationales for imposing change in the world, and it seeks to avoid promoting speedy processes.

## 4.5 Summary of the chapter

This chapter has elaborated on innovation resistance in a way not commonly put forward by mainstream innovation scholars dealing with innovation resistance. This has served as a third building block in the exploration of the relationship between innovation and innovation resistance.

Resistance to defend employment has been described as coming from workers whose livelihood or work quality was threatened by technological innovation. The debate around technological unemployment is open again, and a number of scholars see it as harming the workers. The machine breaking and Luddite resistance of the 17th Century Britain have been briefly discussed, as has scholarly work on contemporary workplace resistance to innovation.

Resistance to defend investments has been described and put in connection with technological paradigms, large socio-technical systems, socio-technical regimes, technological trajectory and lock-in effects. All these are well-known concepts within innovation literature. Yet, they are seldom described as resistance even though elements of resistance are implicit and clear in these theories.

Resistance as part of a power struggle has been put forward by historians. They see technological innovation development as a struggle in which one social group wins and the other group(s) loses. The winning group successfully develops a technology that represents their values and vested interests.

A lack of resistance was put forward as leading to an opportunity cost as valuable objections might be missed, leading to destructive events. Bauer's (1995b) idea of innovation resistance as a sign that something has gone wrong was connected to this.

Resistance to enable societal change or societal preservation was elaborated on in this chapter. Rogers' (1983, p. 191) word 'forced discontinuance' was put forward as policy resistance aimed towards the withdrawal of innovations previously promoted and seen as beneficial. Drawing on the work by resistance scholars who focus on civil disobedience, it was highlighted that resistance is not just con-innovation, referring to a certain innovation process in a particular time and place, it is also 'pro' something else. These insights will be kept in mind in the next chapter, where the thesis analytical framework will be laid out.

# 5. Theoretical framework: Innovation resistance viewed with an ANT lens.

Up until now, this thesis has occupied itself with exploring innovation and innovation resistance using previous scholarly work. Starting with this chapter, an effort will be made to suggest an alternative understanding of the innovation resistance process and its relationship with the innovation process. In line with Thomas et al. (2017), the chapter attempts to elevate the 'innovation resistance process' to an analytical tool of its own. The starting point for this is the theoretical framework of actor-network theory (ANT). ANT is laid out as the thesis' theoretical lens and will be used to make sense of innovation resistance in three empirical chapters (Ch. 6-8). This theory has been invoked for four main reasons:

(1) Although not entirely acknowledged as part of the STI tradition (Fagerberg, et al., 2013), Actor-Network Theory [114] is commonly used when studying innovation processes. In previous studies of innovation resistance, it has enabled scholars to stay clear of the pro-innovation bias (e.g. Harrisson & Laberge, 2002; Harrisson et al., 2001).

(2) The theory's inclusion of non-humans makes it possible to combine the two streams of research around mainly human resistance and mostly non-human barriers. Thereby, it recognises the *agency* in human, and most importantly, non-human resistance, which has largely been missing from dominant framings.

(3) The inclusion of non-humans highlights that humans are interconnected with non-humans of all sorts and supports an analysis of empirical narratives where non-humans in general and animals, in particular, have agency.

(4) ANT allows for viewing 'innovation' as a force among others, as unfolding *alongside* alternative articulations on how to shape socio-technical reality. The Innovation process under study can then be viewed as merely making out one of the different processes that strive to shape the social and material world.

[114] Actor-network theory is one theory within the field of science and technology studies (STS).

ANT does not demand that innovation process be considered superior compared to the other processes; instead, there is possibility for symmetry between the various processes.

The chapter begins with a brief account of previous uses of ANT in the study of innovation. This is followed by an account of classical actor-network theory. Thereafter, follows an account of more recent work that aid the understanding of resistance processes. The chapter ends with a narration of how innovation resistance can be understood using ANT.

## 5.1 Actor-network theory and the study of innovation

The benefits of Actor-Network Theory in understanding innovation have perhaps most famously been described by Akrich, Callon and Latour (2002a,b). ANT is suitable for rendering visible an innovation process, as perceived by interviewees, articles, reports, etc. One difference compared to the mainstream study of innovation is that the theory makes it harder for a researcher to make a value judgment on an innovation process' outcome. The focus is on the process itself, which leaves the account in a state of uncertainty. Therefore, the theory is suited for leaving behind the 'discourse of faith'/ 'pro-innovation bias' (Rogers, 1962/2003; Segercrantz, et al., 2017) as well as the tendency to assume inherent goodness in economic growth and firm perseverance. In ANT, the values put forward never pretend to be objective. Instead, ANT describes the perceived value as seen by an actor, in so doing, emphasising that an account of the value of an 'innovation processes' is never neutral but always perceived from a particular vantage point at a specific point in time. The process described by ANT is local and qualitative; thus, it does not attempt to make statements about the longitudinal faith of an innovation process, rather it describes the resistance processes and the innovation process during a certain period of time.

ANT is part of the research field, Science and Technology Studies. That field has had an unmistakable resemblance to innovation studies ever since its focus turned to technology; it was only the wording that differed (technology instead of technological innovation). ANT, in particular, has been invoked to highlight several different aspects of innovation. Latour (1996) has used it to describe a failed innovation project. Micó et al. (2013 ) use it to illustrate that innovation processes are unpredictable and shaped by the various groups that participate in decision-making and implementation. It has been used by Hoholm and Araujo (2011) to describe the messy and non-linear innovation process revealed through ethnographies. Thrane et al. (2010) invoke ANT to understand the path dependence in a firm's innovation processes. Schneider et al. (2012) use it to describe the spread of innovation that specifically includes the decline of another practice. Hoholm and Olsen (2012) have used ANT to

study frictions in innovation processes. ANT has also, on occasion, been used when specifically studying innovation resistance. It has been used to explain resistance from workers in an organisation subjected to an organisational innovation (Harrisson & Laberge, 2002; Harrisson, et al., 2001) and resistance towards a dominant social group engaged in technological innovation structures (Thomas, et al., 2017).

## 5.2 Actor-network theory – an overview of the core concepts

ANT is essentially a model that can be used to understand the world – not just innovation processes. This section will present an overview of actor-network theory's basics components and convey how they relate to each other. The presentation begins with the actors.

### 5.2.1 Actors and Programmes

Actors can be anything (humans, machines, 'our culture', 'our hiring process', 'lack of financing', laws and regulations, internal strategies and so on) that performs some sort of action that influences the world in some way (Feldman & Pentland, 2020). Latour (2007/2005) describes an actor as follows:

> anything that does modify a state of affairs by making a difference is an actor - or if it has no figuration yet an actant. Thus, the question to ask about any agent is simply the following: Does it make a difference in the course of some other agent's action or not? Is there some trial that allows someone to detect this difference? (2007/2005, p. 71).

The actor has *agency*. Agency can be described as the capacity to act to reach a specific outcome. Actors have projects, something it tries to achieve (Feldman & Pentland, 2020). These projects are called programmes in ANT. A programme is a series of goals, intentions and steps that form a story (Latour, 1999, pp. 176-190). In ANT, an actor is seen as consisting of a network of other actors. An actor-network can be constructed by a particular actor called the *primum movens.*

### 5.2.2 Primum movens and Obligatory Passage Point

The primum movens is an actor that initiates the construction of an actor-network. An actor-network is a network of relationships where human and non-human actors mutually control what they want and who they are (Callon, 1984/2007). Following Callon (2007), Harrisson and Laberge (2002) describe the creation of an actor-network as beginning with an actor formulating a

question.[115] This actor becomes *the primum movens* – the actor that the researchers follow in their narrative. The question becomes an *obligatory passage point (OPP)*. The obligatory passage point is, according to Callon, something that joins all identified actors into one goal.

In Callon's example of scallops, the obligatory passage point is: Do the scallops attach themselves to a shelter that will protect them? The primum movens are three researchers in Callon's example. The primum movens identify three other actors (fishermen, scientific colleagues and the scallops). The primum movens describe these other actors in a way that makes all of them dependent on knowing the answer to the question (OPP). To do this, the primum movens need to interpret the other actors' identities, problems and goals. In the words of Harrisson and Laberge (2002), the primum movens both formulate the question and give the response. The different actors might have other goals, and the primum movens have to convince them that their goal can only be achieved if they subscribe to the primum movens' goal and realise that an alliance around this goal would benefit them all. The robustness of this problematisation is later tested through a series of trials (Callon, 1984/2007). The primum movens are the ones formulating the problem and bringing actors into the network. The way the primum movens formulate the question and which relevant social groups they identify is affected by their associations. Therefore, the primum movens are, from the start, not 'pure'; they are *assemblages* of humans, ideologies, ideas, positions, degrees, etc.

### 5.2.3 Assemblage

An assemblage refers to no actor 'purely' consisting of one entity or being only human. In ANT, there is no distinction between 'material' and 'social' ties; instead, they are so close as to make it bizarre to distinguish between them. Latour compares the absurdity of the distinction to striping a bunch of soldiers naked and placing them next to a pile of tanks, rifles, uniforms, boots, and documents, and then claiming that the relationship between them is dialectic (2007/2005, p. 75). He argues that any course of human action will, within a minute, weave together with some material object. He gives the example of a shouted order to lay a brick involving both humans, the brick and possibly several other non-human things. Any actor is an assemblage; this becomes especially apparent when considering how actors are constructed – through interessement and enrolment.

[115] This is the construction of a network that Gherardi and Nicolini (2020) call the entrepreneurial ANT rhetoric.

### 5.2.4 Interessement

An actor's programme is the intentionality, the series of evolving goals of the actor (Latour, 1999, pp. 176-190). Constructing the actor-network using OPP is a way to construct this actor as well as its programme, i.e. the primum movens construct a new actor through the use of OPP. What was described earlier, in relation to OPP using the example of Callon's scallops, was only the first step in constructing this actor – that was the *problematisation*. After that follows the task of making the identified actors (in Callon's case, fishermen, scientific colleagues and scallops) join the network. The first step in that is called interessement. Let us exemplify using Callon's scallops.

Interessement is achieved by building a device between the identified actor – the scallops – and other competing actors (currents, predators, etc) that (like the primum movens) want to impose their constructed identity and problematisation on the scallops. A competing actor could be a predator wanting to eat the scallops in Callon's case, thereby making them unable to partake in the actor-network. By weakening the link between the scallops and the predators and the currents, the primum movens interest the scallops. If the interessement is successful, it confirms and stabilises the validity of the description of the scallop's problem and the identity imposed on them by the primum movens (Callon, 1984/2007).

### 5.2.5 Anti-programmes

When considering interessement, resistance becomes visible. The resistance originates from the competing actors, for instance, predator and current. The scallops may choose to resist the subscription to the programme (of the actor-network) by defining its goals, project, motivation or interests in another manner than the primum movens (Callon, 1984/2007). These opposing programmes are called *anti-programmes* (Latour, 1991). Several multifaceted negotiations, tricks and trials of strength accompany the interessement; these can be called interessement schemes. Among these, Callon (1984/2007) finds physical violence against the anti-programme, seduction and transaction. In figure 3, the anti-programmes resist the programme's effort to sever the association between the scallops and the predator and current.

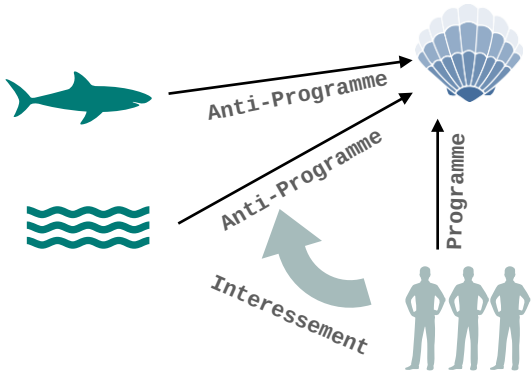


*Figure 3: Illustration of anti-programmes (predator and current) resisting the programme's effort to sever the association between them and the scallops.*

Star and Griesemer (1989) propose that interessement might also be achieved by making the targeted actor a *boundary object*. Such an object is simultaneously enrolled by, for instance, both actor A and C. This boundary object has interpretative flexibility, enabling it to simultaneously be perceived in one way in one programme and in another way in the other programme.

It might also be the case that the scallop-actor does not recognise the identity, wishes and alliances prescribed to it by the primum movens. Instead of cutting the links to the predator or the current, the scallop might interest itself with the current and sever the connection to the primum movens and the predator. In the study of resistance, the predator then becomes interesting. The predator is an actor and thus has agency and a programme – the anti-programme (seen from the primum movens' point of view). Just like any actor, this one also has goals, problems and an identity of its own.

### 5.2.6 Enrolment and Spokespersons

A successful interessement leads to enrolment. When an actor is enrolled in a programme, it becomes a part of the actor who has the programme (Feldman & Pentland, 2020). Being enrolled in the programme means that the actor agrees to do what the programme tells it to do (the prescription) and agrees that the identity the primum movens gave it is correct (the ascription) (Harrisson & Laberge, 2002). This agreement might take the form of either authentic commitment or conformity with rules (Kerfoot & Knight, 1995). All individuals belonging to an identified actor does not have a say in this.[116] Instead, the primum movens use *spokespersons* that represent the bigger group (Callon,

[116] Callon (1984/2007, p. 70) points out that 'to speak for others is to silence those in whose name we speak'.

1984/2007). In Callon's example of the scallops, the union representatives represent all fishermen, and the scallops caught and used in the initial trials represent all scallops. The spokespersons are domesticated, through enrolment, into letting the primum movens of the programme become the spokesperson for them as well as all other actors enrolled.

### 5.2.7 Adding a load to the argument

Enrolment can also be used as a countermove when actor C resists the interessement from B. Actor B can then enrol another actor to strengthen its argument and convince C to be interested and enrolled. Latour sees the resistance to a programme from an anti-programme as something that generates a response. Latour (1991) specifies the response as adding a *load* to the argument used to succeed with the interessement.

Latour states that every time a programme B encounters another programme that wants to interest the same actor as B, that other programme becomes B's anti-programme. To explain this, Latour (1991) uses a hotel manager as the primum movens. The manager is eager to have his or her guests leave their keys at the front desk when leaving the hotel: this is the programme's goal. To achieve this and enrol as many hotel guests as possible, the manager first does nothing, then uses a verbal appeal, 'please bring back the keys', after that he used a polite note with the same message as the verbal one. Finally, he attaches heavy weights to the keys, making them uncomfortable and annoying to carry around. Each of these schemes is called 'loads' to the argument. Each load is added because of a necessity to outcompete different anti-programmes, preventing the guests from getting interested and enrolled. Each load is an actor enrolled in the programme and part of the assemblage that constitutes the actor. Thus, each load changes the programme and the actor. The number of loads needed depends on the guests' resistance, according to Latour. Each additional association/enrolment of new actors (guests) is paid for by altering the programme; this is illustrated in figure 4.

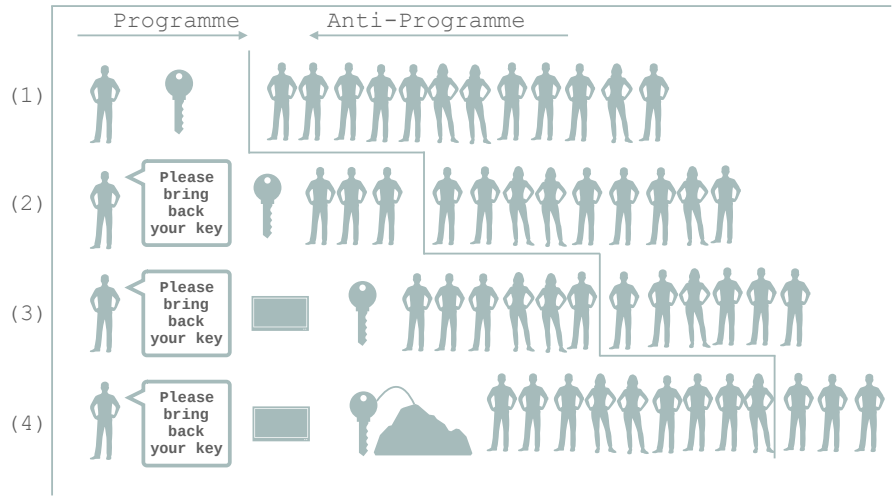


*Figure 4: Manager enrols more actors to meet the resistance from the anti-programme. Picture based on Latour (1991).*

When the hotel manager associates the key with the heavy weight, he or she delegates or *inscribe* his or her intentions on the material actor (Latour, 1991). The programme has to change its composition by associating itself with more actors to enable more guests to enrol. In this manner, the Primum movens' innovation programme gets more complicated as it responds to the targeted actors' anti-programmes (the guests). Helgesson and Kjellberg (2005/2020) point out that in early ANT texts (such as Latour 1999), the possible ways in which a programme can counteract an anti-programme lie in either making programmatic behaviour rewarding or anti-programmatic behaviour costly (as was the case with the heavy weight on the key). The third available option is to annul the anti-programme, making it irrelevant. That could, for instance, be done by using disposable keys. In either case, the assumption is that the problem is faced by either ridding the actor of any anti-programmatic behaviour or annulling its effect (Helgesson & Kjellberg, 2005/2020). The act of adding loads to counter anti-programmes changes the programme; this is called *translation.*

## 5.2.8 Translation

Latour says that a programme '*is a syntagmatic line*[117] *and contain just as many humans and non-humans required to counter the anti-programmes'* (1991, p. 115). The primum movens (say actor A) of the innovation programme has an intention, a goal. Then suddenly, access to this/these goal(s) is interrupted, and the primum movens responds by getting a new actor interested and enrolled. The decision as to which actor to enrol can be made

[117] Here, he borrows a linguistics term, meaning a series of words perceived as a unity.

through trial and error, from a eureka moment or something else. This new actor could be anything, an electrical current, a stick, a new team member, etc. In the example with the hotel key, it was a verbal request, a note and a heavy weight. The enrolment of a new actor into the original actor A forms a new actor, let us call it A*, and this actor continues to pursue either the initial goal(s) of actor A or some new purpose. Latour calls A* a sub-programme and state that this programme is constructed when actor A is interrupted by an anti-programme. Often, a sub-programme follows upon a sub-programme, so we might wait until we get actor A** before the goal is achieved (Latour, 2007/2005).

The process through which an actor's programme changes is referred to as translation. Since all the entities within the programmes are put together through associations, it is possible to move them. As the actor A gets translated, it gains in reality, according to Latour (1991). The actor, in the end, does not just consist of the primum movens but a chain of human (H) and non-human (NH) actors: H-NH-NH-NH-H-H-H-NH-H. The study of an actor-network is the study of how this chain changes. In the end, guests no longer leave their room key; they get rid of a heavy object that deforms their pockets. In relation to the study of innovation, Latour argues that this translation makes it very hard to use the diffusion scholars' classical idea that innovation remains the same as it diffuses in a market (Latour, 1991, p. 115). It also makes it hard to argue that the market remains the same as the innovation enters it. Instead, the actors who encounter an innovation are transformed by the encounter (Latour, 1991, p. 116).

Akrich et al. (2002) emphasise that an actor 'moves via the reactions it provokes, from negotiation to negotiation and from redefinition to redefinition'. The composition of an actor and its programme depends on which actors are enrolled. To enrol one specific actor has consequences for subsequent enrolment. For example, if an innovation programme enrols the engineer Claudius, this influences which machinery to enrol, as Claudius is part of that negotiation.

Sometimes, the word *mobilisation* is used to describe an actor being interested and enrolled in a network – to mobilise is to make entities that were once fixed, mobile. Upon this, mobilisation follows a series of *displacements*. In Callon's (1984/2007, p. 71) example, 'the scallops are transformed into larvae, the larvae into numbers, the numbers into tables and curves'. This is the series of transformation that displaces the scallops; they are moved from the ocean to the conference room. In the conference room, they are silent and spoken for by the three researchers who are the primum movens in Callon's story. When the mobilisation of allies is stabilised, then their association becomes black-boxed (Latour, 1999).

### 5.2.9 Black-boxing

Black boxing means that the associations between the actors are taken for granted, and their inner complexities are made invisible (Latour, 1999, p. 304). This happens after the actor has been enrolled in the programme and is the stage in which order is transferred. It is sometimes referred to as the formation of alliances (Harrisson & Laberge, 2002). Both the actor as a whole and the actors within them are subjected to this black-boxing. The network actors are caught in a position with links to other actors that limit their ability to manoeuvre. The primum movens take care of their interests and speak for all network actors (Harrisson & Laberge, 2002). When technology is black-boxed, it means that the technical work behind and inside it is made invisible. The focus is then only on its input and output, instead of its internal complexities (Latour, 1999, p. 204). An attempt to close a black box only occurs when a spokesperson is beyond doubt and beyond being questioned (Callon, 1984/2007).

Even then, the black box does not remain completely closed; it is leaking. To keep it as shut as possible is something that engages the actors who depend on it (Latour, 1998). Latour (1998) points out that a macro-actor is an actor who sits on a large number of black boxes. When a project runs smoothly or innovation works effortlessly, one only needs to focus on the input and output rather than internal complexity. Thus, the more 'successful' an innovation programme, the more invisible and opaque they become (Latour, 1999, p. 304). Helgesson and Kjellberg emphasis that within a macro-actor, there is a centre and a periphery. Sometimes connected to the centre (but also in parts of the network) are *centres of calculation.*

### 5.2.10 Centre of calculation

A centre of calculation combines *inscriptions* to make calculations. An inscription refers to all kinds of transformation through which an entity is materialised into a document, a piece of paper, an archive, a sign, etc. (Latour, 1999, pp. 304-307). An inscription can be translated. Thus, it allows new articulations and translations while keeping some of its old associations. An intention can, for instance, be translated into a text. The text then becomes an inscription of the intention. A centre of calculation can be a laboratory, a database or anything that has the ability to calculate, which otherwise is often placed in the human brain (Latour, 1999, pp. 304-307). Helgesson and Kjellberg (2005/2020) connects this to a macro-actors' *metrological apparatus* by which they refer to how the centre of calculation keeps track of and controls the periphery of the network. This metrological system selectively amplifies some behaviour (by being set up to notice it), while muting others. Latour (2001) calls this selective sensing, *oligopticon*. A centre of calculation can be

situated at the centre of a network, but it does not necessarily have to be located there. A network can have several centres of calculation with different functions. In this thesis, the emphasis is on the centres ability to detect non-programmatic behaviour (Helgesson & Kjellberg, 2005/2020).

A centre of calculation is also where inscriptions return after being inscribed in the periphery (Latour, 1987, pp. 215-257). An inscription can, for example, be a document describing scallops in a bay. This inscription can be sent to the centre of calculation and used there to produce a research report, i.e. a translation of the inscribed bay can be made by the centre and circulated to other actors in the periphery, which, in turn, translates the bay into an understanding of what the bay is, by reading the text. So, the centre uses the inscriptions gained from the periphery to make inscriptions of its own in the shape of reports, maps, diagrams, etc. (Latour, 1987; Jöns, 2011). Gherardi and Nicolini (2020) see an inscription as an intermediary and say that an intermediary is:

> the visible effect of the work of assembling heterogeneous materials performed by any actor that seeks to impose its own version of reality on others. It represents that actor in the double sense of" standing for" and " acting on behalf of" it because the actor who/that has constituted the intermediary uses it to achieve an effect from a distance (Gherardi & Nicolini, 2020, p. 4).

These inscriptions or intermediaries are considered stabilised or black-boxed and only need to be reconsidered if problems occur (Latour, 1987). In an actor-network, problems can, indeed, occur – it happens when the black-boxed actors commit treason.

### 5.2.11 Treason

The consensus of the alliances is never permanent; according to Callon (1984/2007), they can be contested at any minute – the black boxes can be opened. The pertinent question being: is the spokesperson a representative of the actor it presents? If not, then the translation in Callon's words can turn into treason – into resistance. In his example of the scallops, this is manifested through scallops - after the first experiment - refusing to enter the collectors. The first scallops – the spokesperson of scallops everywhere – were interested (collected), while subsequent scallops were carried away by competing anti-programmes, such as unexpected currents in the sea or predators. A controversy such as this can cause several re-evaluations. The following can be put into question: the translations, the spokesperson, the obligatory passage point, and the identity and role of the network actors. From translation to treason, there is only a short step. When an actor, previously enrolled, goes against the programme and follows an anti-programme, this is an act of treason in Callon's wording. The silent mutiny made by the scallops neatly placed in the

black box 'Scallops', through the primum movens' translations, opened the black box and made the entire network wobble.

### 5.2.12 Social construction

Following the reasoning above, an innovation process can be seen as an actor with a programme. This actor is viewed as being *socially constructed*. Social here refers to *'constituted by and through associations'* (Latour, 2007/2005, p. 92). These associations are made between human and non-human actors. The association, as well as the interactions between the actors, construct a socio-technical innovation process. The fact it is constructed means that it is not a mystery that could have popped up anywhere; instead, it is much like a construction site (Latour, 2007/2005, p. 88). It is possible to see multiple people working at a construction site, and this work is connected to material objects like cement mixers, helmets, and building cranes. When you look upon the area, it is relatively easy to imagine multiple different directions the building could take. However, when you see the ready-made house, it is harder to imagine any other construction outcome than the one you are faced with (p. 88). In the same sense, the development of technology is a process that includes a myriad of possible variations and selections (Latour, 2007/2005, p. 28), and the construction of the technology is a process in which humans and non-humans are fused (Latour, 2007/2005, p. 91). In the linear model of technology development,[118] the innovation process is often described in hindsight and risks giving the illusion that the innovation process' outcome is straightforward and that only one outcome was possible (Pinch & Bijker, 1993/1987). In contrast to this, ANT is a *multidirectional model.*

With that, the account of the core building blocks of actor-network theory has come to an end. The chapter will now move on to discuss how ANT can be used to study innovation resistance.

## 5.3. ANT concepts relevant for the study of resistance

The anti-programme can be used as an analytical tool, informing studies on innovation resistance since it is described as a movement against the intentions and direction of a programme of action (Latour, 2007/2005; Latour, 1991; Latour, 1998; Callon, 1984/2007). It does, however, focus on one process, and the anti-programmes are seen as anti from the point of view of this one programme. Miettinen (1999) and Mattila (2015) have pointed out that even though ANT emphasises the symmetry between humans and non-humans,

[118]Where basic research leads to applied research, which leads to technological development, which leads to product development, which leads to production, which leads to usage.

ANT studies on innovation often have an asymmetrical focus on the spokesperson or primum movens of the innovation process, which leads to a heavy focus on managers and a Machiavellian analysis[119] of the innovation process (Miettinen, 1999). This managerial-bias in ANT has also been noted by Star and Griesemer (1989). Miettinen (1999) puts it like this:

> It seems as if in the empirical accounts of innovation, the most prominent actors, those speaking most loudly, tend to be selected: innovators, managers, and politicians, *the princes* of network construction.

This one-sided managerial focus is precisely what this study seeks to avoid. When attempting to avoid the cause for Miettinen's (1999) critique, some theoretical work that concerns these missing perspectives can be invoked to explain innovation resistance processes. Helgesson and Kjellberg have investigated deviations from a programme of action from the periphery's viewpoint (Helgesson & Kjellberg, 2005/2020; Kjellberg & Helgesson, 2010). Moreover, Galis and Lee (2014) have explicitly focused on the anti-programme in parallel with a programme of action. This section will begin with relating Galis and Lee's work and end by presenting Helgesson and Kjellberg's ideas.

Galis and Lee (2014) do not only study the construction of one actor-network; they also emphasise a parallel process of resistance. Galis and Lee argue that when attempting to understand a series of events, focusing on more than one process enables the conceptualisation of politics, marginalisation and contestation. They place a story of treason and powerlessness alongside the tale of translations and power. They focus on layers of differences that befall the actors excluded from the actor-network – this, they call the sociology of treason. Galis and Lee describe the creation of powerlessness as a process with layers of moments of translation. They call these distortion, estrangement, rejection and disruption.

### 5.3.1 Distortion

Galis and Lee (2014) highlight that the moment of problematisation (Callon, 1984/2007) is where powerlessness becomes salient. The primum movens construct an obligatory passage point and identify relevant social groups that they want to interest and enrol in the network. At the same time, they try to keep unwanted social groups away from influencing the problematisation – this is where distortion enters the scene. Galis and Lee illustrate this with a narrative where claims from disability organisations were disregarded by the Greek Governments when delineating the problematisation for construction

[119] Callon et al. (1986, p. 7) compare the spokesperson to Machiavelli's prince 'who is skillful in the art of managing variable and unexpected social forces'. Miettinen (1999) sees the notion of there being a prime mover, a spokesperson as an utterly asymmetrical entity, especially since this actor is almost always a human.

of a new Metro in Athens. Not including the disability organisations translated them into a position of anti-programme. Galis and Lee argue that:

> ...the process of problematization is accompanied by the distortion of another agenda. By distorting the problem of the Other, the problematization becomes more powerful (Galis & Lee, 2014, p. 160).

This process of *distortion* makes the Other's programme seem irrelevant or dispensable in some way. It could be through ascribing it an identity of being unsound, uneconomical, untimely or illogical. Therefore, the construction of an OPP also means that several measures are taken to hinder other programmes from partaking in defining the problem. In Galis and Lee's (2014, p. 160) example, the Greek Government used measures to 'medicalize, individualize and depoliticize disability', which enabled a distortion of the disability organisation's programme. It was translated as 'politically untimely, illogical, and irrelevant'. Therefore, the process of translation by the Greek Government was accompanied by the construction of political weakness and distortion of the agenda of the programme of the Other (Galis & Lee, 2014). A distortion of the Other actor is followed by its estrangement.

### 5.3.2 Estrangement

Galis and Lee (2014) highlight that interessement and enrolment do not only entail enrolling allies for the programme, it also includes the severing of associations to other programmes and the undoing of agendas in (anti)programmes to which the enrolled actor previously subscribed. They complement Callon's story by adding the notion of estrangement. When an actor, B, is enrolled in a programme, this also means that its associations to actors C, D and E are severed. The actors C, D and E are then phased out and lose power. They are estranged from B, which imposes and stabilises the distortion brought upon the Other programme (i.e. the anti-programme) by the problematisation. To estrange is to disassociate an actor from a programme. This is achieved through a *device of estrangement* – a device used to lockout enemies (Galis & Lee, 2014, p. 162) from the programme. It is a device used to confound other actors.

> To estrange means to disassociate from others—to create a chain of differences. Estrangement devices impose and stabilize the distortion of a problematization. A successful estrangement falsifies a problematization, substantiates a distortion, and continues the severance of associations (Galis & Lee, 2014, p. 162).

As in Galis and Lee's example, the device can be rhetorical, where the device's estrangement was to construct the Other as uneconomic, careless. It was also done by weakening the department for Research on People with Special

Needs and referring to earlier failures of similar social groups to contribute to large organisations.

The estrangement devices both create stability and order in the programme, while at the same time imposing *estrangement* of the Other programme and power asymmetries between them. When interessement is successful, it leads to enrolment. Mirroring this, Galis and Lee claim that when estrangement is successful, the association between the programme and the Other is severed, which leads to *rejection*. Galis and Lee highlight that the sociology of treason happens in parallel to the sociology of translation. While power is created in one network, powerlessness is created in the Other. Galis and Lee (2014, p. 156) shed light on another dimension of the translation, *'the processes of undoing a network, defeating an opponent, and disrupting a group of actors'*. To interest an actor, according to Callon (2006), is also to build devices between it and other actors who want to define it in another manner. These devices would be what Galis and Lee call estrangement devices.

The parallel workings of interessement and estrangement are illustrated in figure 5, building on Latour's example with the hotel keys. Latour (1999) humorously mentions that one of the odd actors that in the end does not enrol in the hotel manager's programme is 'exceptionally distracted professors', hinting at this professor being so tightly enrolled in another programme (supposedly research related to ANT) that interessement in the manager's programme is close to impossible. Given Latour's preoccupied professor, the estrangement device could be an attempt to falsify the hotel manager's problematisation and substantiate the distortion of the hotel key programme as being unimportant due to its lack of connection to the professor's very important research endeavour. In the picture below, the interessement device (verbal requests) is successful and the estrangement device (hotels keys are unimportant) fails, leading to enrolment of P in programme A. P still exists, but now it is compliant and aligned with A*.

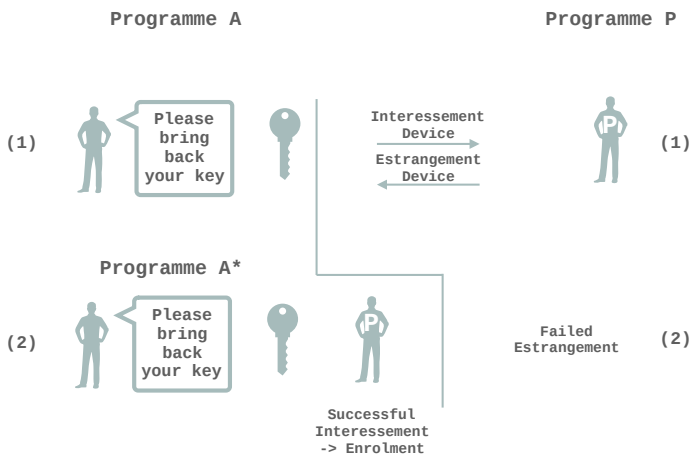


*Figure 5: The interessement device (verbal requests) is successful and the estrangement device (hotels keys are unimportant) fails, leading to enrolment of P in programme A*

Once P is enrolled, A* uses its own estrangement devices to keep any programmes competing over P at bay.

Another option is that the estrangement device is successful, leading to the rejection of programme A. In this second example, powerlessness is created in A, the manager is rejected from the programme P. A wants to enrol P in its programme or rather to create a new programme A* with P in it. P resists this through an estrangement device (the establishment of the hotel manager's wishes as unimportant). Thus, for every failed interessement, there is an estrangement device that proved to be more successful. This is illustrated in figure 6.

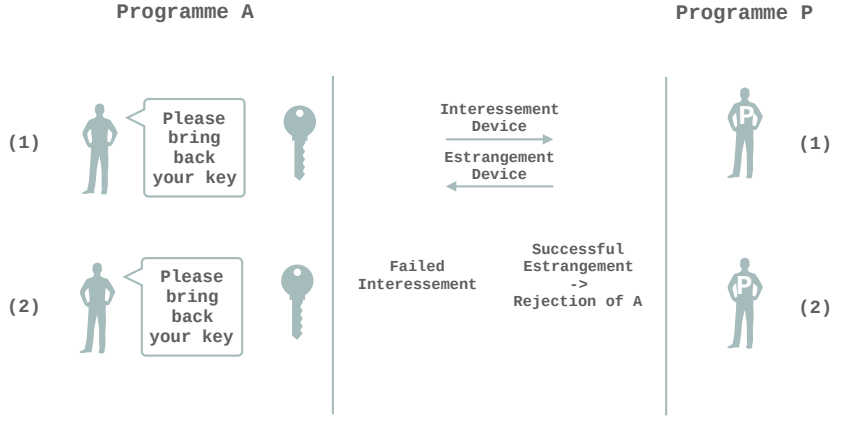


*Figure 6: The manager (in programme A) is rejected from the programme P*

### 5.3.3 Rejection and Disruption of power

When the estrangement devices were successful, this leads to a rejection of the Other. When rejection is reached, this means that a series of obstructions has been transformed into an 'insurmountable barrier' (p. 165). When an actor has been rejected, this means that this actor is not part of the problematisation and therefore cannot pass the OPP and be enrolled in the network. In Galis and Lee's example, this meant the rejection of the disability organisation's agenda. The disability programme was locked out from the socio-technical development, which can be seen as the fourth moment of translation in the sociology of treason – the *disruption* of power. When an actor has been subjected to the disruption, this means being made into the invisible Other. The excluded actor is not part of the construction of the network. At the same time, as strong actors mobilise and stabilise the network, becoming the only representatives, weak actors become inactivated. Galis and Lee assert that this is how powerlessness is constructed.

### 5.3.4 Dissidence and Controversy

Suppose the Other does not quietly accept being made irrelevant by the actor. In that case, it can become dissident and attempt to revitalise its problematisation, subsequently, attempting to alter the actor's OPP to encompass the Other as well – not just the groups initially identified by the actor. In that way, dissidence and creating controversy are ways for a previously rejected programme to regain power (Galis & Lee, 2014). In Galis and Lee's example, the disability organisation attempted a number of new strategies to enrol in the Athens Metro programme. One of them included a call to cancelling the programme until the accessibility requirement had been included.

Galis and Lee have cast light on the Other programme that is excluded from an actor-network. In their account, the centre of the programme is aware of the movement of this Other programme, and it might be interpreted as an anti-programme. This interpretation can be made even though the Other does not specifically target an actor that the primum movens wants to enrol in its programme. What Galis and Lee referred to is an Other programme that *wants* to be enrolled in the programme but is not permitted to do so. In contrast to this *loud* resistance that the centre of the network is aware of, Helgesson and Kjellberg (2005/2020) have highlighted dissident behaviours conducted in silence, unnoticed by the centre of the network. They have emphasised that there is also a possibility for *silent* resistance within the programme, resistance outside of the Primum movens' and the network centres' view.

### 5.3.5 Non-programmatic behaviour

Classical ANT theory has been criticised for its preoccupation with the centres (see Star, 1991), and Helgesson and Kjellberg propose that what happens in the periphery is worth consideration. Leaving behind the dichotomy between programme and anti-programme, they consider 'not programmatic behaviour', which they define as neither programmatic, nor anti-programmatic. Helgesson and Kjellberg (2005/2020) highlight that it is possible to go against a programme of action in more ways than engaging in anti-programmatic behaviour. The other two possibilities laid out by them are to be *compliant* while not being aligned as well as being *aligned* and not compliant. When something is compliant with the programme, it subscribes to the centre's direct *prescriptions,* meaning that it does what the programme dictates that it should do. *When* it is aligned, it subscribes to the *ascription,* meaning that it accepts the identity that the centre has formulated for it (Akrich & Latour, 1992). Helgesson and Kjellberg summarise their ideas in table 9.

| | Compliant | Non-compliant |
|---|---|---|
| Aligned | Programmatic | Aligned and Non-compliant |
| Non-aligned | Non-aligned and Compliant | Anti-programmatic |

*Table 9: Table from Helgesson and Kjellber (2005/2020, p. 160)*

Helgesson and Kjellberg (2005/2020) use the example of a loyalty card to illustrate this. A *compliant behaviour is* to: register as a member and show the card when making a purchase. An *aligned behaviour* is to be 'loyal to the store', i.e. not make the majority of the purchases in another store. So, the docile act of registering and showing the card might make the actor appear to be enrolled. However, silent resistance might still be prevalent in a non-aligned behaviour of often visiting a competing store. The point here is that an actor can be compliant with a programme and still not be aligned with its goal. For misalignment to be destructive for the network, it has to be detected. This is in line with Mattila's (2015) observation that misalignment does not necessarily lead to the breakdown of the formed network; it can also enable its continuous revitalisation. Moreover, an actor could abstain from registering as a member but still be loyal to the store. According to Helgesson and Kjellberg (2005/2020), this means resisting enrolment in the programme but still being aligned with it. A programme can then go in parallel with another and help it fulfil its goals without enrolling. Thus, there are instances of *silent resistance* within a programme as well as quiet support from outside of the programme.

### 5.3.6 Anti-programmatic only if detected

Using the metaphor of sound, Helgesson and Kjellberg (2005/2020) say that the metrological apparatus of a macro-actor selectively amplifies some sounds while muting others. The macro-actor depends on not registering all instances of resistance. Not registering it can keep it contained. Seen from the centre's perspective, a backside to the metrological apparatus is that even though it may be necessary for domesticating the enrolled actors, it also amplifies any registered anti-programmes. Helgesson and Kjellberg use the example of a physician in a clinical trial who could smell which drug was active and which was placebo – a silent non-programmatic behaviour. Still, it was not registered as such, and no effort from the centre was made to capture actions such as this.

When this form of resistance is performed in silence, it does not altogether constitute an anti-programme. When no-one, and especially not the centre, knows about the deviant behaviour, its ability to break down the network diminishes. The centre refrains from a systematic registration of actions that could be interpreted as non-compliant or non-aligned. The power and growth of the macro-actor might well depend on this selective ignorance, according to Helgesson and Kjellberg. They mean that a macro-actor relies not only on the distribution of knowledge accumulated at the centre but also on *centralised ignorance* of local resistance. Therefore, a non-aligned and non-compliant behaviour is only an anti-programme, according to Helgesson and Kjellberg, if the metrological apparatus is configured in a way that detects it. Resistance can be muted by the metrological apparatus and thus not detected, or it can be performed in relative silence and therefore not detected. Non-aligned and non-compliant behaviour might be performed silently by an actor and registered as enrolled and aligned by the centre of calculation in a macro-actor.

As Star (1991) has pointed out, actors are simultaneously enrolled in many programmes. They have associations with other social worlds besides the innovation programme.[120] If an actor is seamlessly enrolled in two programmes simultaneously, it becomes a *boundary object* (Star & Griesemer, 1989). If an actor is enrolled in two programmes within a macro-programme without being a boundary object, this creates what Helgesson and Kjellberg (2005/2020) call *dissonance*. If this happens, the actor is enrolled but not wholly domesticated. As a macro programme grows, the peripheral elements will become increasingly associated with each other, and centralising the associations will be more difficult. An actor in the network might therefore receive conflicting prescriptions from different associations within the network.

A macro-actor might also postpone the classification of what is programmatic or not, according to Helgesson and Kjellberg (2005/2020). This can be useful

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when attempting to keep the network stable when countering potential anti-programmes. The example they use is the British police force that refrained from settling the ambiguity around its association with chemical incapacitant sprays. Instead, they decided to determine if a particular behaviour was anti-programmatic or not by which effect it had in each case, delegating the responsibility to the individual officer. In this way, they were able to quickly detach themselves from any, in hindsight determined, anti-programmatic behaviour that would undermine its power and threaten to break down the network. This opens up for an actor within a macro actor being non-programmatic without knowing it.

## 5.4 ANT concepts relevant for this study of innovation resistance

Both human and non-human actors have agency. An actor can *modify a state of affairs by making a difference.* If the actor is detected when *it makes a difference in the course of some other agent's action* (Latour, 2007/2005, p. 71), this means that in ANT, innovation resistance is imposed by an actor, not from a passive actant. The resisting actor's agency stands in contrast to the mainstream's metaphor of the static and stagnant 'barrier'. Following ANT, it can be said that resistance occurs when an actor perceives it, and it can be viewed as a previously silent actor (human or non-human) starting to speak. Someone identifies the resistance as 'making a difference,' i.e. interfering with the innovation project. Following Thomas et al. (2017), this section will attempt to present a few instances of innovation resistance rendered visible through ANT.

### 5.4.1 Anti-programmes

When an innovation process is described as a programme of action, then the resistance it encounters can be described as an anti-programme (Thomas, et al., 2017). This anti-programme is then enrolling human and non-human actors to pursue an alternative course of action than the one anticipated by the programme of action around the innovation (Latour, 1999, p. 309). Gherardi and Nicolini (2020, pp. 13-14) claim that in the Entrepreneurial ANT rhetoric (which is used here), a condition for becoming a macro-actor is for its programme to defeat 'the resistance of the anti-programme'. The anti-programme's resistance prompts the programme to add loads to it, and every load is a translation of the innovation programme and the actor that pursues it. Deviant behaviour is, therefore, part of shaping an innovation process. This is also what Mattila (2017) found in her study of friction in a commercialisation process using ANT. She saw that a peripheral actor viewed its non-aligned behaviour as simultaneously destructive and constructive for the macro-actor.

The deviant behaviour broke down associations and changed the macro-actors' (e.g. a business network and an innovation process) configurations.

Recall again, Latour's (1999) 'exceptionally distracted professor', so tightly enrolled in another programme related to research. This other programme does not have the specific purpose of malice vis-a-vis the hotel managers programme; it merely had another goal. The manager faces resistance from his or her *point of view,* and this is also from which view the anti-programme is *anti*. It is only anti because it prevents interessement in the manager's programme, not because the professor has a desperate need to at all times keep the hotel key in his or her pocket. In figure 3, the anti-programmes were illustrated using pictures to highlight that these programmes are pursued by actors as well. In figure 7, the Other programme is made even more visible.

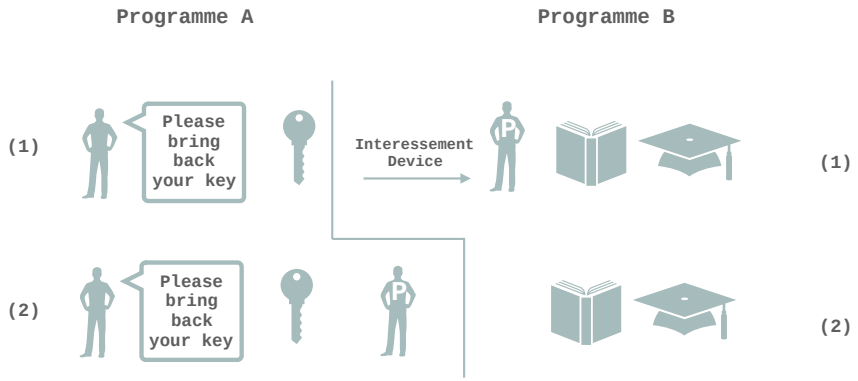


*Figure 7: The Other programme (programme B) is made visible using symbols.*

In figure 7, programme A could be depicted as an anti-programme to B as it tries to disassociate it from the actor P. Programme A could also be depicted as another programme with another goal; then the resistance to programme B centres in on the interessement device. The entire programme is not designed to resist B; the interessement device is. Another possibility of describing resistance with a basis in the idea of anti-programmes lies in the battle for successful enrolment (Thomas, et al., 2017). Two programmes, A and C, might both be interested in actor P. When programme A is successful in its interessement and enrols actor P, both programmes B and C are deprived of it. C's failed interessement can be viewed as both B and A resisting C (Harrisson & Laberge, 2002). This is illustrated in figure 8.

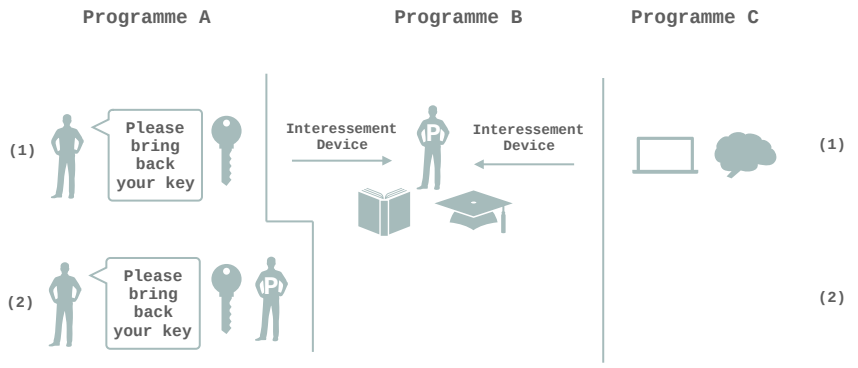


*Figure 8: Two programmes, A and C, both attempt to interest actor P that is already enrolled in programme B.*

### 5.4.2 The neglected actors – the wallflowers

The problematisation separates what is to be part of the network and what is to be excluded (Callon, 1980). Following Winner (1980), it can be said that the primum movens of the problem has a power position that has a bearing on its ability to influence socio-technological development. Winner points out that the power positions are set in place long before the actual development occurs. The primum movens have socially constructed ideas, assumptions, blind spots and biases that play into how it formulates the problem (see Winner, 1980, p. 125). Latour cautions to not view inequalities and power structures as *'a reservoir, a stock, or a capital that will automatically provide an explanation'* rather they are themselves socially constructed and the result of a process (Latour, 2007/2005, p. 64). But he does acknowledge their effect on networks. The primum movens are affected by their associations. For example, Callon's (2007) three researchers were associated with scientific methods, career system, research praxis, ideologies etc.

When ANT is used, it is limited to the actors that engage in the process. Actors not salient in the empirical material are therefore excluded from the process. Winner has argued that one obvious challenge for a researcher using ANT would be to select the relevant social groups to study and which ones to silence. Winner (1993, p. 369) puts it like this:

> Who says what are relevant social groups and social interests? What about groups that have no voice but that, nevertheless, will be affected by the results of technological change? What of groups that have been suppressed or deliberately excluded? How does one account for potentially essential choices that never surfaces as matters for debate and choice?...[]... it is important to notice not only which decisions are made and how, but also which decisions never land on the agenda at all; which possibilities are relegated to the sphere of non-decisions

Pickering (1993) draws on ANT to describe how different human and non-human actors shape reality. He connects this to movements of resistance and accommodation. In the language of ANT, it can be depicted as an anti-programme posing resistance that prompts an accommodation (a load) from the programme. Programme and anti-programme caught in an interplay of resistance and accommodation can, following Pickering, be understood using the metaphor of dancing – the dance of agencies.

Drawing on Winner (1993), it can be said that not all actors are invited into the interplay of resistance and accommodation. Based on Pickering's metaphor, this thesis will refer to these excluded actors as *wallflowers* in the dance of agencies. In that sense, ANT does not entirely solve the problem with narrow system boundaries discussed in chapter two. The span of the boundaries still depends on the researcher's choice of focus and actors in the periphery having (socially constructed) power relations that enable them to be heard. Unless an actor from outside the system boundaries starts to speak and makes its resistance heard, it will be left outside of the network. What ANT can render visible is when actors, who were wallflowers in the early stages of the innovation programme's development, force their way into the dance in later stages.

### 5.4.3 The Other programme(s)

Galis and Lee (2014) describe the process of the creation of powerlessness and how the Other programme is excluded from the programme. The other programme is not a wallflower – as it is being heard – but still, it is not allowed into the programme. Thus, it is not excluded from the dance of agencies and is part of the interplay of resistance and accommodation. However, the Other programme is at a power disadvantage, and the programme is able to use distortion followed by devices of estrangement to attempt to block it out from the network. When an actor-network starts to take shape, the primum movens identify relevant social groups, and in so doing, it can also actively decide which groups to exclude. At the same time, as the primum movens describe the relevant groups' identities, the identity of the Other, which is to be excluded, is ignored . The Other's identity is either distorted and made irrelevant (Galis & Lee, 2014) or neglected (Winner, 1993). The 'relevant' social groups are targeted with interessement devices, to get enrolled in the network. In Latour's example with the hotel key, the hotel guests were interested and enrolled. The Other is not interested and enrolled; rather, it is met with an estrangement device that, if successful, does not bring it into the network but rejects it. In the hotel example, this could, for instance, be a company wanting to persuade the manager to buy their card-key system to diminish the problem with lost keys. The manager could distort that actor's identity and call it ex-

pensive and ineffective. Declining to buy the system would then be an estrangement device that estrange the card-key programme from the hotel manager's programme. When the estrangement device is successful, the programme ends up rejected. This is illustrated in figure 9.

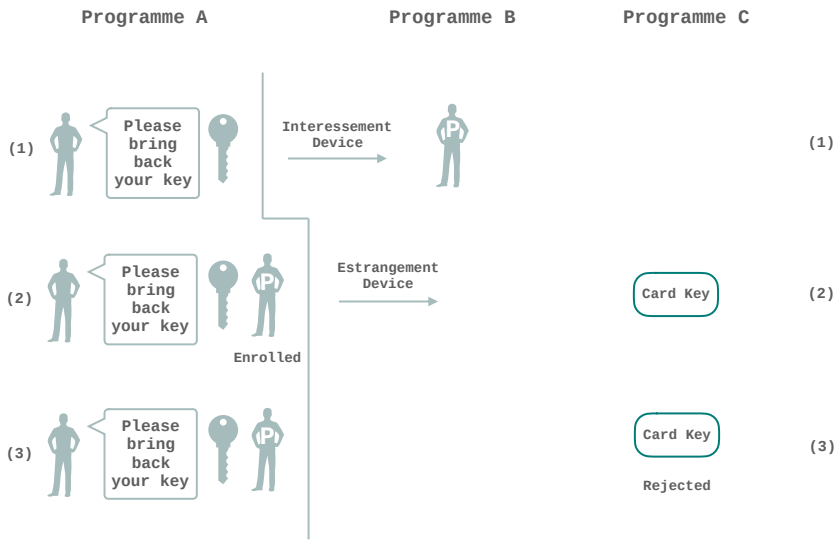


*Figure 9: The manager declining to buy the Card-Key system is an estrangement device that successfully estranges the card-key programme from the hotel manager's programme, which leads to rejection of programme C.*

A programme can, in this manner, decide which actors to enrol and which ones to reject. In Galis and Lee's description of the Other programme, this programme wants to enrol and shape the configuration of the programme and is prevented from doing so. Programme A, in the example above, in this way, resists the attempt by programme C to partake in the actor-network. This is how the process of powerlessness unfolds, according to Galis and Lee. The power relation between programme A and C was tilted in A's favour, and A was able to create distortion and estrangement devices to make C even less influential. Resistance from C can, in this light, be seen as an attempt to unbalance this uneven power structure. Building on Galis and Lee's theorising, it is also possible to say that A's rejection constrains C's agency and enables A's agency. Galis and Lee talk about a sociology of treason, including antonyms to Callon's sociology of translation. Both these sociologies are described as including non-chronological moments or phases (such as distortion, estrangement, rejection and disruption). Each phase invokes a slight gradual change in the composition of the actor-network, i.e. gradual changes in the actors' positions in the network. These incremental changes are dynamic and will hereafter be referred to as movements, as in movements in the actors' network positions.

Both Winner (1980) and Galis and Lee (2014) have taken organised disabled people as an example of resistance making the political shape of technology visible. Just as the innovation programme, as it stabilises, brings about a power-relation in its favour (Galis & Lee, 2014), the resistance programme can unbalance this existing power structure (Harrisson, et al., 2001; Harrisson & Laberge, 2002). Suppose arrangements of power and authority are being embedded in technology. In that case, resistance to its development and diffusion could be understood as an argument in the power struggle that shapes and directs technology. Resistance could then be seen as an attempt to disrupt or manifest power relations. Another way to put it would be that resistance opens up the black box that constitutes the innovation programme, making what was once regarded as a settled matter contested again.

### 5.4.4 Silent resistance

An actor-network is a macro-actor, meaning that it consists of several actors enrolled in the programme, and to the outside world, they are all perceived as one. Helgesson and Kjellberg's (2005/2020) work on non-programmatic behaviour, therefore, casts light on the instances when actors within a macro-actor go against the programme. An enrolled actor can engage in anti-programmatic behaviour and, if detected by the centre, this behaviour threatens to break down the network or at least make it unstable or wobbly. In other words, the black-boxed network begins to leak, and an effort is needed to make it stable again. When this happens, the dissident actor abandons the prescription and ascription given to it by the primum movens and follows another programme. This can be seen as resistance to the programme. Helgesson and Kjellberg's (2005/2020) notion of misaligned and non-compliant behaviour can, however, also be seen as movements of resistance (here, again, the word movement refers to gradual changes in the actors' positions in the network). The centre does not detect this resistance, but it might nevertheless be apparent in the periphery. When an actor in the macro-actor does not subscribe to the ascription, made of them in the problematisation phase by the primum movens, it resists this ascription. Their identity then differs from what was dictated by the primum movens. When an actor in the macro-actor discontinues its subscription to the prescription, it no longer agrees that it needs to pass the OPP to achieve its own goal.

In summation, six instances have been presented in this chapter regarding when movements of resistances become salient. They draw on classical ANT theory (Latour, 1991; Callon, 1984/2007), Galis and Lee's (2014) sociology of treason, and Helgesson and Kjellberg's (2005/2020) elaboration of misaligned and non-compliant behaviour. The first four represent resistance noticed by the centre and these prompt accommodation, while the last two might go unnoticed. These are presented in table 10.

| | **Resistance from programme R**<br>*-from the point of view of programme P* | **Accommodation from programme P**<br>*-from the point of view of programme P* |
|---|---|---|
| **Resistance from outside the programme P** | **Battle for interessement of actor A**<br>Programme R uses an interessement device on actor A that programme P is also trying to interest. | Programme P attempts to distort R's identity and place estrangement devices between A and R. |
| | **Failed interessement**<br>Programme R enrols actor A (through distorting P's identity and successfully setting up estrangement devices between A and P) that programme P was trying to interest. This leads to failed interessement. | *P enrols new actor/ loads the argument to strengthen the programme vis-a-vis programme R (make it costly to follow the programme R or beneficial to follow the programme P) or<br>* Enrols new actor/ loads the argument to annul the programme R |
| | **Rejection**<br>When programme P interests actor R, programme R distorts the identity of actor P and uses an estrangement device to reject it, thus preventing it from enrolling actor R. | P enrols new actor(s) to invalidate the distortion of its identity and annuls R's estrangement device. |
| **Resistance from inside the programme P** | **Treason from actor R seemingly enrolled in programme P.**<br>R disassociates itself from P by distorting P's identity and successfully putting up estrangement devices between R and P. | New problematisation of P's actor-network, i.e. a new chain of translation. |
| | **Non-compliant behaviour from actor R seemingly enrolled in programme P.**<br>Actor R engages in behaviour non-compliant with programme P.<br>R does not act according to the prescription of programme P. It does not do what it is supposed to do, i.e. it does not contribute to the programme's goal. | No accommodation since the behaviour is not detected by the centre. |
| | **Non-aligned behaviour from actor R seemingly enrolled in programme P.**<br>Actor R engages in behaviour non-aligned with programme P.<br>R does not have the identity ascribed to it by programme P. It is not what it is supposed to be. | No accommodation since the behaviour is not detected by the centre. |

*Table 10: Instances when movements of resistance become salient*

### 5.4.5 Mega-actors

Before ending this chapter a few word are needed about very large actor-networks. In principle, all actors studied by ANT scholars are macro-actors. A macro-actor is a network of actors that from the outside appears as one actor (Latour, 1998). All the actors in a macro-actor, A, consist of several actors A1, A2 and so on. These second-level actors, in turn, consist of actors, i.e. A1 is a macro actor that consists of A1.1, A1.2 and so on. It is not possible to say how many layers of actors exist in a macro-actor. ANT scholars are often content with studying two levels A and A1. Thus, ANT studies are usually conducted on micro- or meso-level, and the macro-actor under study often corre-

sponds to that. Therefore, macro-actors are often put forward as an organisation or a research or innovation project. However, ANT presents a sociology and, as such, makes claims to be applicable to understand the world. Therefore, it can be employed on large actor-networks on a macro-level as well, i.e. ANT could be used to understand society at large and programmes that have spread across an entire country or the entire world. The macro-actor, A, exists in a context and is part of other bigger macro-actors. For instance, the macro-actor A can be part of the larger macro-actor Alpha that in turn is part of the even larger macro-actor Omega and so on. In that way, A is part of macro-actors on a macro-level. In this thesis, large macro-actors on a macro level will be referred to as *mega-actors*.

On a final note, some critique against ANT can be mentioned. According to Whittle and Spicer (2008), actor-network theory is not well suited to offer a critical account of an organisation. They also say that it tends to stay within the boundaries of means-end rationality that reinforces existing power structures, making it politically conservative. What it is suited for, according to them, is to contribute to an understanding of *processes*, how power relations are constructed, and how a network of human and non-human actors is stabilised. Whittle and Spicer (2008) consider it hard for ANT to consider possibilities for new forms of social order. It does, however, move away from the mainstream assumption that firm-based innovations are of higher value than other processes in the world. In that way, the valorisation of a certain process is made by the actor, and the researchers' standpoint is downplayed. Therefore, it is deemed an adequate tool for fulfilling the thesis aim and casting new light on innovation resistance.

## 5.5 Summary of the chapter

This chapter has described actor-network theory predominantly using Callon's (1984/2007) sociology of translation, Latour's (1991) anti-programmes, Galis and Lee's (2014) sociology of treason as well as Helgesson and Kjellberg's (2005/2020) elaboration on non-compliant and non-aligned behaviour. From this reasoning, six instances of when movements of resistance and accommodation occur have been deduced. These are *battle for interessement, failed interessement, rejection, treason, non-compliant behaviour, non-aligned behaviour,* and they are described in the Table 10. Moreover, very large mega actors have been described and suggested as an analytical tool for actor-network theorising on macro level.

Throughout this chapter, a theoretical backbone of the thesis has been laid out. This will be used in the following chapters to make sense of three empirical stories around innovation programmes that encounter resistance from Other programmes.

# 6. Innovation resistance in the healthcare market

This is the first of three chapters that seeks to unravel where human and non-human resistance originates, explores how it operates, and what it does to a series of innovation programmes. The three chapters concern two different yet similar markets: the energy and healthcare market. Both these markets cater to societal needs and mainly have public sector clients; they are also characterised by clients who are reluctant to risk introducing something new and prefer to stick with old, well-tried, technology. The rationale behind their scepticism is that the cost of failure is perceived to be high. In the electrical market, changes might lead to a blackout in the electrical grid. In the healthcare sector, people's life and welfare are potentially at risk (this sentiment is illustrated in figure 10).

In parallel to this, actors in both sectors believe innovation can solve severe societal problems. In the electrical market, there is an urgent need to shift to more environmentally-friendly generation and more flexible and smart distribution, while at the same time handling an increasing energy consumption (following the transition from fossil fuels to electricity) (e.g. U.S Energy Information Administration, 2019; Öhrlund, 2020). In the healthcare sector, there is a growing number of patients, higher cost of care (due to an increasing number of possible treatments), higher demands from patients and so on (e.g. Ekholm, 2010). These sectors have also been influenced by a programme of action that is here called the Neoliberal programme; this programme plays an important background role in all chapters. Both the healthcare sector and the electrical market are seen as enrolled in the neoliberal programme, which has given rise to deregulation/ restructure and reform (Ch. 7 and Ch. 8) and public procurement (this chapter) (Steger & Roy, 2010, pp. 11-15) which are essential elements of the empirical narratives.


*Figure 10: Illustration of two interviewees who express reluctance to introduce something new. To the left is a purchasing manager at a State Utility and to the right a surgeon and department head at a county hospital. Illustration: Rickard Fornstedt. Idea: Helena Fornstedt.*

The data in this chapter[121] and the following two (7 and 8) were collected through a qualitative approach. The study related in this chapter (Ch. 6) is drawn from 30 interviews[122] and 30 secondary sources.[123] The interviewees are referenced in the texts using the Harvard system. In this chapter and chapter

[121] The empirical material used in this chapter has also been utilised in an article by Askfors and Fornstedt (2018).
[122] The interviews lasted between 1 and 2 hours and was conducted during 2014. The interviewees were medical doctors, nurses and procurers representing nine different counties. They were also sales representatives at the innovating firm, project managers and the vice VP at the branch organisation for medical technology in Sweden and the head of the department of a medical technology incubator.
[123] The secondary sources were public documents, scientific articles, news articles, company documents and documents from other organisations.

eight, the interviewees are anonymised, and pseudonyms are used instead of their real names. The empirical chapters are presented and analysed[124] together, as is common in narrations of empirics in ANT research. In chapter nine, the main findings from these three chapters are summarised. There, it is also outlined how these findings expand the knowledge about innovation resistance. The reader interested in methodology is advised to, before reading this and subsequent chapters, look through Appendix 1, where more information about the data collection and ethical considerations are available.

In the analysis in this chapter, three main programmes of action were identified, and within them, sublevel-programmes were noted. The programmes were: (1) The Swedish Healthcare programme – a macro-actor consisting of, among other actors, 21 counties[125] and an initiative to reduce surgical site infections. (2) An Innovation programme with the innovating firm MedTech, as primum movens, enrolling two counties - BigCountySouth and SmallCountyEast. (3) An Aquatic Organisms programme that enrolled a Phase Out initiative with the goal to diminish the use of additives in medical products in general, including a substance called triclosan. With that introduction, we are ready to dive into the story.

## 6.1 A surgical low-tech innovation

This chapter presents a narration of a low-tech medical device used during surgery. Specifically, an antibacterial suture, i.e. a thread used to stitch together wounds. Sutures have been used for a long time; what was new was the antibacterial properties brought about by the substance triclosan. While it was being diffused in the Swedish counties, it was at the same time an object of academic discussion. In Latour's words, it was an object of scientific controversy. At the time of the study, it was not established if the medical device did what it was intended to do, namely diminish the risk of post-surgical infections. Despite this, there was already a programme of action that attempted to diffuse it.

Many ANT studies focus on one programme of action. When Galis and Lee (2014) bring up the parallel story of 'the sociology of treason', they see a big programme of action opposed by a smaller resistance programme. In contrast

[124] The material in this chapter and chapters 7 and 8 were analysed in the same manner. First, the empirical material was analysed through iterations of writing down the account and discussing it with peers. After that, the narrative was rewritten in a structure inspired by Callon (1984/2007), drawing up the networks and the obligatory passage point. It was then iterated numerous times through discussion with colleagues and expanding and elaborating the theoretical framework.

[125] At the time of interviewing. At the time of writing they were 20 since two of them had merged.

to that, this narration accounts for several programmes caught in interplays of resistance and accommodation. The Innovation programme is pursued by the actor MedTech, a large multinational company. Central in this programme was the new antibacterial suture. The Swedish counties were enrolled in another big programme – the Swedish Healthcare programme. The innovation programme could be understood as a programme that wished to enrol the Swedish counties.

## 6.2 The Swedish Healthcare programme

The Swedish Healthcare programme was a macro-actor and as such a construction of several black-boxed actors. This macro-actor had a goal to 'prevent, investigate and treat diseases and wounds' (Socialstyrelsen, 2020). The Innovation programme did not address the entire macro actor at once. Instead, it targeted the surgeons and the procurement process around Staples and Sutures in each county or cluster of counties. These counties were enrolled in the macro actor 'The Swedish Healthcare system', but their respective translation of what it meant to be enrolled and aligned with this macro actor differed. Four of the actors within the macro-actor will be discussed in this chapter; BigCountySouth, BigCountyNorth, SmallCountyEast and SmallCountyWest. Each of these actors had their own healthcare programme and was simultaneously enrolled in the overarching Swedish Healthcare programme. The Swedish Healthcare programme had the overarching goal to 'prevent, investigate and treat diseases and wounds' (Socialstyrelsen, 2020).

The Innovation programme attempted to enrol each county actor individually. In so doing, it would form a new slightly changed programme, innovation programme* with an enrolled county client. To enrol the counties, the Innovation programme first had to enrol a sublevel-programme in the Swedish Healthcare programme, namely the programme to reduce surgical site infections (SSI).

## 6.3 The Innovation programme

The development of post-surgical infections has long been a known problem for surgeons around the world. Wound infections can impede normal healing and in some cases, create life-threatening situations (Justinger, et al., 2008). One factor that can decrease the probability of developing surgical site infections (SSI) is identifying strategies for reducing wound contamination (Edmiston, 2001). The role of the suture in the development of SSI has been debated among surgeons since the 1960s (Justinger, et al., 2008).

In 1946, MedTech was incorporated as a subsidiary to BigMedTech – a multinational company with around 130,000 employees – to expand and diversify the product line with surgical low-tech devices (BigMedTech, 2012a). MedTech was thus a subsidiary of BigMedTech and employed 11,000 people. MedTech was also the primum movens of the programme, which is here called the Innovation programme. When constructing this network, MedTech can be said to have used the following problem formulation: *'how can sutures reduce surgical site infections?'* and their answer to the questions was *'by making them antibacterial'.* Given the firm's goal of making a profit, a parallel question can also be perceived, namely, *'how can we gain a competitive advantage and increase our market share?'* The answer being: '*By improving our offering and making the sutures antibacterial'.*

When this study began, they had already developed the antibacterial sutures. In 2004, they launched the Alpha Antibacterial Suture in the US, and in 2008 they launched its sister product the Beta Antibacterial Suture (BigMedTech, 2012b). The antibacterial suture was launched in 2005 in Sweden. The relevant actors that MedTech needed to enrol in their programme were the surgeons and the public procurement process. The end-users – the patients, were believed to trust their physician and have little say in choosing which suture to use during surgery. To use antibacterial sutures, argued MedTech, would diminish the suffering for patients (who did not get SSI). Additionally, not having to treat as many SSI would lower the total cost for the healthcare system, all of which were in the medical doctors' interest. The hope was that by enrolling the surgeons, they would, in turn, enrol the public procurement process (Armstrong, 2014; Jenkins, 2014). The obligatory passage point can therefore be said to have been: *Do antibacterial sutures diminish SSI?* (see figure 11).

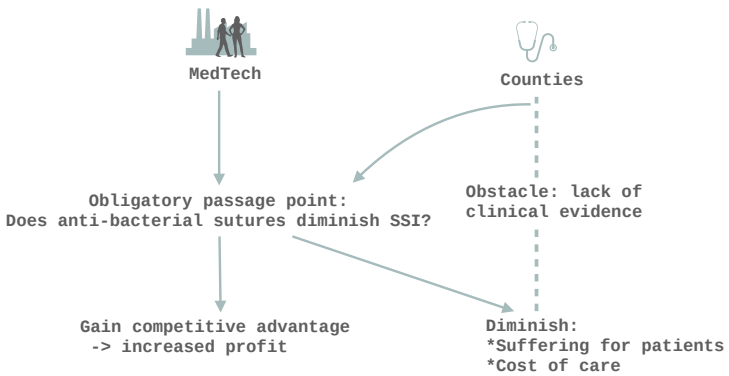


*Figure 11: An actor network with MedTech as primum movens and the Swedish counties as identified relevant actors. The actors are illustrated using symbols typical for their operations as well as a number of black boxes. The boxes illustrate that these actors consist of several other black boxed actors.*

For a long time after the product launch, this obligatory passage point could not be passed. There was no clinical study that supported the claim that the new suture diminished SSI. There was only logical reasoning that led to the conclusion that it most likely would decrease SSI.

> We knew then [in 2005] that we diminish bacterial growth substantially using a substance known as triclosan. Theoretically, we know that this, in turn, decreases the infections. What we did not know seven years ago was… do we have a study? …is there clinical evidence for this? No, only theoretical evidence.
>
> Armstrong, Commercial Manager, MedTech (2014).

This situation created a problem when trying to enrol opinion leaders to advocate the benefits of the new product. A marketing manager at MedTech put it as follows:

> We considered the option to locate key opinion leaders who could speak for the product, but the problem was that from the start we did not have real clinical evidence; hence, we could not really show that we could diminish the risk for infections with this product. Consequently, no surgeon wanted to stand up and say I believe in this product.
>
> Jenkins, Marketing Manager, Medtech (2014).

The interessement device needed was clinical evidence; without it, it proved impossible for MedTech to disassociate the surgeons from the old sutures. In 2005, there was no clinical evidence supporting the claim that the product reduced SSI (Armstrong, 2014). The surgeons were resisting interessement from the Innovation programme and remained loyal to the old sutures. The need for clinical evidence was somewhat surprising for MedTech since there is no strict demand for clinical trials prior to launching a MedTech product (in contrast to pharmaceutical products). For medical technology, it is enough being classified as a CE product which ensures, among other things, that it fulfils the demands of the regulations for safety (Jenkins, 2014; Armstrong, 2014) within the European Economic Arena.

Another way to see this story is by viewing the surgeons as enrolled in the Healthcare programme, in which clinical evidence is crucial, and evidence-based care is seen as a virtue. The Innovation programme strived to be enrolled in this programme, but its identity was *distorted* as 'not good healthcare practise'. This distortion was stabilised through ascertaining the lack of studies (this became the estrangement device), and the Innovation programme was translated into something 'not clinically tested and approved'. Subsequently it was rejected from the Healthcare programme and its agency restricted.

As a result, it was hard to interest and enrol surgeons in the innovation process in Sweden (Jenkins, 2014). Thus, instead of actors accepting the problemati-

sation, MedTech was subjected to distortion, estrangement and rejection resulting in a disruption of the innovation network. The Healthcare programme's alliances remained intact, its agency was enabled and MedTech's agency restricted.

However, MedTech renewed its efforts to partake in the Healthcare programme, and in 2013 it relaunched the product (Armstrong, 2014). MedTech's tactic was to load its argument through interesting surgeons in conducting clinical trials. Clinical trials in favour of the suture would possibly be able to dissolve the old distortion. Funding for the trials served as an interessement device, and the interessement was successful (Thimour-Bergström, et al., 2013). After a while, several studies had been conducted. Despite this, the evidence was not clear to all relevant actors in 2014 when this empirical study was conducted. The undecidedness was due to the clinical studies' conflicting results on the effects of triclosan coated sutures. Some supported their positive impact on infection rates (Daoud et al. 2014; Edmiston, 2013; Edmiston et al. 2014; Fleck et al. 2007; Wright et al. 2014;[126] Justinger, 2013; Nakamura, 2013; Thimour-Bergström et al. 2013; Wang et al. 2013), while others claimed that there was no evidence of their beneficial effect (Deliaert, 2007; Diener et al. 2014; J. Turtiainen et al. 2013; Turtiainen, 2013; Wai et al. 2012). Thus, there was an ongoing academic controversy around the issue. For example, Turtiainen and Hakala (2014) wrote a piece titled, "*Does the use of triclosan-coated sutures really reduce surgical site infection after open vein bypass grafting patients?*" to which Wright et al. (2014) wrote a reply.

This scientific controversy meant that an important actor in the Innovation programme had not been black-boxed yet; it was still an object of scientific debate. The conflicting results made the matter of evidence a question of which study to believe. How to evaluate the different studies became a matter of which communities of researchers to rely on and contingent on a personal opinion on which level of evidence is needed.

A surgeon named John Wright was subjected to an *interessement scheme* through the Innovation programme involving him as a clinical trial leader. He was a professor in cardiovascular surgery at the department of thoracic surgery in BigCountyNorth. The study he led showed a decrease in surgical site infections by 34%. These results were enough to claim clinical evidence, thereby dissolving the distortion and enableing the passing of the obligatory passage point (antibacterial sutures reduce SSI). Thus, both Wright and the department of thoracic surgery in BigCountyNorth were interested and enrolled. This department became enrolled in the Innovation programme and started to use the antibacterial sutures. Wright went to adjacent departments in the hospital and loaded the argument for the Innovation programme with (a) the result from

[126] Anonymised due to this name also occurring in the narrative.

his study, (b) the relatively small difference in price between the antibacterial sutures and the old ones and (c) the substantial savings in money and suffering that just one less infection would bring. These loads were used to interest other departments. In some cases, he was successful, and the interessement led to enrolment (Denham, 2014).

The sales personnel at MedTech used this study's result to try to black box the scientific claims. Drawing on the results from this clinical study, they argued passionately for it reducing SSI. A commercial manager at MedTech described it as follows:

> ...and then you start to realise the more you discuss it, that there is nothing negative [with the innovation] more or less. Given today's situation [with the first clinical evidence], I want to talk to everyone in Sweden about this! I want to take the discussion anywhere because I am so passionate about it! What if a patient on the street knew that there is a small thread, a suture that reduces the chances of getting a post-operative wound infection with 30%. Then, of course, everyone would want to use it!
>
> Armstrong, Commercial Manager, MedTech (2014).

Another surgeon Atkinson, who was head of surgery at a Hospital in SmallCountyEast, was also subjected to MedTech's interessement devices. In the past, he had worked with MedTech and therefore regularly talked on the phone with the sales personnel. The interessement failed a number of times, leading MedTech to load the argument in different ways. The study from BigCountyNorth did not convince. Still, a few German studies contained enough evidence to avoid the distortion of 'not clinical based health care', pass the obligatory passage point and enrol Atkinson (Atkinson, 2014). In turn, he called his colleagues who were heads of surgery in the other hospitals in the region of SmallCountyEast to interest and enrol them using the results from the German studies and his legitimacy. They, in turn, did not try to interest and enrol the procurement process. Instead, they interpreted the current agreements, which included MedTech's products, to include the new antibacterial sutures. Moreover, they did not make any effort to enrol the ordinary surgeons on the floor.

> Nobody knows about this; among the surgeons, nobody knows what they have in their hand.
>
> Atkinson, Chief Surgeon, SmallCountyEast (2014).

These surgeons and the procurement process unknowingly subscribed to the prescription (used/allowed the use of the antibacterial suture); thus, they were compliant with the Innovation programme. But they did not subscribe to the

ascription (believer in the antibacterial suture's ability to diminish SSI[127]) and were not aligned with the programme. To aim for compliance without alignment can be seen as a way to forestall resistance, as this enabled interessement without discussion. The surgeons and the procurement process did not know about the new actor (triclosan) tied to the suture. Therefore, they did not resist the interessement (through distortion and estrangement devices). Consequently the only interessement device needed was to make sure that the antibacterial sutures were available in the surgery rooms.

For both BigCountyNorth and SmallCountyEast, the enrolment in the Innovation programme also meant a severing of the association with the old sutures and a chain of differences that led to rejection. However, the old sutures were not entirely blocked out from the Healthcare programme as the play of interessement and enrolment did not fall out in the same way in other counties.

## 6.4 The BigCountyNorth Healthcare programme

Some medical doctors were *not* convinced that the suture was good healthcare practise, and the obligatory passage point passed. They still saw the sutures as a wide-open black box. In BigCountyNorth, the surgeons did not think that the interessement scheme using the clinical trial results from BigCountyNorth was enough. Hence, the interessement failed, and the BigCountyNorth Healthcare programme did not enrol in the Innovation programme. Seen from the BigCountyNorth Healthcare programmes perspective, BigCountyNorth decided to meet this attempt at interessement and enrolment in the Innovation programme with a health technology assessment (HTA). The outcome of this analysis would determine if they would enrol in the Innovation programme or if they would subject the Innovation programme to distortion and estrangement. The HTA had the goal to determine the current collective scientific stand. If the evidence was not judged to clearly point towards the sutures being beneficial, then the HTA would distort the identity as 'not good healthcare' and stabilise the distortion through an estrangement device (in shape of a HTA report). One of the medical doctors in this study, Bengt Gray, was not convinced of the innovation's positive effect:

> Now, there have been studies conducted that we are pushed to accept. Most of these studies are so-called zero-result. The majority of these show that triclosan sutures in a study is a little bit better and in the next a little bit better and then there is some odd study that shows the opposite.
>
> Gray, Surgeon, BigCountyNorth (2014).

[127] They were unable to form an opinion since they did not know what they used. Thus, they neither believed nor disbelieved that the medical device reduced SSI.

By this statement, he refers to the effect being so small that it will vanish when moving from a sample of relatively homogenous patients to the whole populations of heterogeneous patients. He continues:

> It is then the question of whether we protect or limit the patients, which means that with a relative risk of 0.7, then the patients similar to [the ones in the study] benefit from it [the new suture]. We can never prove that that is the case, but on the other side, no one can prove that we harm the patients by not using the sutures.
>
> Gray, Surgeon, BigCountyNorth (2014).

To add to this, there was also the matter of the conflicting results from the different studies.

> To exemplify how this kind of studies work, two large (over 1000 patients) German studies were published: one this year and one last year. One study showed a halving of the number of infections, and the other showed absolutely nothing... []... these kinds of results make me very reflective.
>
> Gray, Surgeon, BigCountyNorth (2014).

The BigCountyNorth HTA assessment group was not convinced that the SSI diminished when the antibacterial sutures were used (Metodrådet BigCountyNorth, 2014); thus, the black box remained open. The HTA group did not deem it appropriate to procure it, and this was what they told the procurement personnel. This can be seen as distortion and estrangement, leading to rejection and a restriction of the Innovation programme's agency. Moreover, the Innovation programme did not pass the obligatory passage point since the cost for it was slightly higher than the price for a traditional suture.

The procurement personnel in BigCountyNorth were already prone to reject the innovation since they were also following a Phase Out programme, with the goal to diminish the use of additives on medical products in general (Gibbson & Loughty, 2014), and the decision by the HTA group in the BigCountyNorth Healthcare programme was in line with that programme. Thus, they were easily enrolled in the HTA group's programme and stopped the innovation diffusion into BigCountyNorth (Gibbson & Loughty, 2014).

> Then, we usually say that additives avoid that. The principle of caution is part of the Environmental Code [part of the Swedish environmental law]. If we should buy a washcloth and there is one with an additive, then it is good to write that it is with a reservation for; if it is on the list of things to be phased out, they will not have it.
>
> Gibbson, Purchaser, BigCountyNorth (2014).

Following the quote, the Innovation programme was distorted as 'device with an undesirable additive'. This led the Innovation programme to employ an accommodation strategy of avoidance, and they withdrew from these geographical areas for the time being.

MedTech translated this rejection as having more to do with price than with evidence. They saw a potential future, where this form of resistance would affect not only the innovation diffusion but also their future innovation development. Jenkins put it like this:

> Today, we have the [business]model that we are the best supplier on the market. Our products are well-thought through; the packaging is the best, the needle in the suture is the best, the suture itself is the best, our deliveries are the best. That is our business model today. But if the price becomes the only factor, then we must change that model...[]... If we see that we cannot sell our high-quality products, then we must probably lower the quality. We have not done that so far. But if that should happen, then we would be stupid not to try to make cheaper products.
>
> Jenkins, Marketing Manager, Medtech (2014).

The procurement personnel of BigCountyNorth did not see it this way; they did not see price as the issue. To them, the problem was the failure to produce convincing clinical evidence together with a cautionary principle that considered the environmental effect of using a substance toxic for aquatic organisms (Gibbson & Loughty, 2014). Despite this, MedTech's translation of the situation would guide future development as they translated the events as concerning price. This translation could shape their accommodation, directing future development into incremental cost-reducing innovation processes.

This mentioning of the Environmental code brings us into the next section, where we will consider the objections to the substance triclosan as harmful to aquatic organisms.

## 6.5 The Aquatic Organisms programme

At the same time as the academic debate around the antibacterial sutures was ongoing, another programme of action around the antibacterial substance triclosan was salient in Swedish media. Triclosan is not caught in wastewater treatment plants (Naturskyddsföreningen, 2001; Sveriges Natur, 2001). It was classified as very dangerous for Aquatic Organisms and was a possible cause of long-time harmful effects in the water environment (Kemikalieinspektionen, 2005). These Aquatic Organisms managed to enrol several actors into a programme of action with the goal to protect their livelihood through diminishing/stopping the use of triclosan.

When the Innovation programme attempted to enrol in the Swedish county actors, the Aquatic Organisms programme was already up and running. One important actor in this programme was 'the Society for the Conservation of Nature'[128] (Nilsson, 2013; Axås, 2013; Zwahlen, 2014), which had been concerned about triclosan well before 2003 and was mainly concerned with triclosan in toothpaste (Naturskyddsföreningen, u.d.). Another important actor was, according to Axås (2013), the water service companies' branch organisation 'Swedish water'[129] that released a report called *Toxfree Taxfree* (Svensk Vatten, 2013). In this report, they identified several deodorants that include this substance (Axås, 2013). The report from the Swedish Chemicals Agency (Kemikalieinspektionen, 2005), a report from the Swedish Environmental Research Institute (Remberger, et al., 2002) and several news articles were enrolled. After a while, the Minister for the Environment, Lena Ek, was also enrolled in the programme of action (TV4, 2013). This programme began to enrol actors in the Swedish Healthcare programme. The triclosan critique started in the 70s when the substance was banned at Swedish Hospitals (Adolfsson-Erici, 2014). However, in 2014, it was still an approved substance according to EU regulations (Adolfsson-Erici, 2014; Scientific Committee on Consumer Safety, 2010).

In the earlier section, it was hinted that the BigCountyNorth had dual membership in both the Swedish Healthcare programme and the Phase Out programme with the goal to phase out substances that posed a risk for the environment. The Aquatic Organisms programme had enrolled this Phase Out initiative and had inscribed its intentions on an actor within the programme, namely, the 'list of things to be phased out' (Gibbson & Loughty, 2014). The procurement personnel at BigCountyNorth followed the inscription. This list was a very influential agent in SmallCountyWest as well. MedTech had not anticipated Aquatic Organisms when authoring the problem formulation and its response. The actors' identities had been assumed to be heavily connected with the Healthcare programmes in the different counties, and MedTech was sceptical and disappointed to find out that SmallCountyWest (through its enrolment in the Phase Out programme) was enrolled in the Aquatic Organisms programme.

> The problem is that ...there have been many articles about triclosan in the news and magazines and stuff during these last ten years. And every one of them has been negative, saying that the triclosan is bad and you want it removed. It started already ten years ago when the environmental movement focused on triclosan, and they started to say that there is triclosan in toothpaste. It is unnecessary to have it there when all 9 million Swedes use it. ... [] ... But it [the strategy] did not work, not enough people noticed it. My analysis is that it [the

[128] Natursskyddsföreningen in Swedish
[129] Svensk vatten in Swedish

> environmental movement led by the Society for the Conservation of Nature] thought, 'ok our message did not work we must change the message'. And what they did was that they began using a scare strategy and then we could read headlines that said: "You brush your teeth with environmental toxins". And that strategy began to work. People started listening and said, “ok, we shouldn't have that”. But they threw out the baby with the bathwater.
>
> Jenkins, Marketing Manager, Medtech (2014).

Nevertheless, Triclosan was on the 'list of things to be phased out', and this inscription influenced both BigCountyNorth and SmallCountyWest (Jenkins, 2014).

The procurement personnel in SmallCountyWest strived to increase the amount of environmentally friendly pharmaceuticals, chemicals, products and services (County Court in SmallCountyWest, 2009). Therefore, the procurement personnel in SmallCountyWest wanted to estrange and reject MedTech from the Aquatic Organisms programme. It loaded the Aquatic Organisms programme with a statement from the inspection of chemicals that said that triclosan was a substance harmful to the environment with long-term effect and thus a prioritised substance for risk-minimising (County Court in SmallCountyWest, 2009). To ensure exclusion from the Innovation programme, the procurement personnel put up an additional requirement in the requirement specification that said that the goods to be purchased should not include triclosan (County Court in SmallCountyWest, 2009), which can be seen as an estrangement device.

SmallCountyWest did not care about the obligatory passage point set up by the primum movens of the Innovation programme. To MedTech’s astonishment, SmallCountyWest’s enrolment in the Aquatic Organisms programme seemed to be more dominant than its enrolment in the Healthcare programme at this point in time. MedTech was trying to make SmallCountyWest enrol in their Innovation programme using their ability to diminish SSI as interessement device. They did not anticipate a distortion and estrangement concerning the environment. Aquatic Organisms had not been identified as a relevant social group in the problem formulation, and the OPP was not directed towards that actor. Now, MedTech found SmallCountyWest engaged in the pursuit of another goal than the anticipated Swedish Healthcare programme goal of reducing SSI. While they had been prepared to align and comply with the Swedish Healthcare programme, their programme did not address the goal of saving aquatic organisms and diminishing triclosan. On the contrary, they had little concern for Aquatic Organisms; instead, they had a lot of respect for patients, surgeons, the potential cost savings of the surgical departments, and of course, their own profits. If we go back in time to the problematisation phase when the OPP was set up, there were no Aquatic Organisms present.

The Aquatic Organisms had been invisible during that phase of the construction of the Innovation programme. They had not even been subjected to a process of distortion; they were simply not allowed into the interplay of resistance and accommodation at that point.

The Innovation programme did not appreciate the resistance that came later (when the OPP was already set up) from this programme. They would have preferred a dance of agencies between the different Healthcare programmes and the Innovation programme. The learning and resistance that came from that was expected, and to some degree appreciated since it provided the opportunity to learn, which was considered useful. MedTech, to some degree, wanted resistance and learning from the actor they saw as their main client and for whom they had designed the product. Jenkins (2014) puts it like this:

> When it comes to ethics, these are difficult matters. We have faith in our product, but we must also think that surgeons make the right decision. We cannot force them to use anything that they do not believe in, that would not be right. And then, we need to be careful in how we market the product. We have to market the product towards surgeons. It is the surgeon who decides if he wants to use it or not... []... We [MedTech] and I personally think that it is the surgeons that should own the decision. They should decide how they conduct surgery and which products to use.
>
> Jenkins, Marketing Manager, Medtech (2014).

To look beyond the system boundaries to the environment and Aquatic Organisms was not on their agenda. The Innovation programme did not appreciate the resistance from the Aquatic Organisms programme. They did not think that these issues were relevant when innovating to diminish SSI.

Reluctantly, MedTech did, however, learn from their encounter with the Aquatic Organisms programme as well. To accommodate the resistance from the Aquatic Organisms programme proved difficult. It was hard for the Innovation programme to grasp which actor to target when attempting to invalidate the distortion made by the 'list of substances to be phased out'. Jenkins (2014) states as follows:

> Part of the problem is that the ban on certain substances is often a political decision. It is not so easy to change it. There is no person, no individual responsible for the decision that we, for example, should not have the triclosan in this county council. It is usually a larger apparatus behind the decision. For instance, in [BigCountyNorth], we have a long blacklist of certain chemicals. And we have tried to fight that because the list contains many different chemical substances used all the time in medical care. But the list always says that there is an exception, that it is allowed to use this product in healthcare, but there is no exception for triclosan, which is our problem. We would like an exception that it is possible to use triclosan in healthcare.

To counter the Aquatic Organisms programme's resistance, MedTech attempted to further load its programme by enrolling a ruling from the County Court. The interessement device used was an attempt to interest and enrol 'the proportionality principle' in public procurement law. MedTech claimed that SmallCountyWest had violated this principle when excluding triclosan products since this made it impossible for them to make their best offer. Thus, they lost their chance to win the contract (County Court in SmallCountyWest, 2009). This process of interessement failed, the county court ruled in favour of SmallCountyWest, arguing that MedTech had sutures without triclosan that they could offer; thus, they had not been shut out from the procurement process. The county court ruling was interested and enrolled in the Aquatic Organisms programme, illustrated in figure 12. This can be described as MedTech being subjected to the sociology of treason and rejected from the SmallCountyWest programme yet again, while at the same time getting a learning experience.

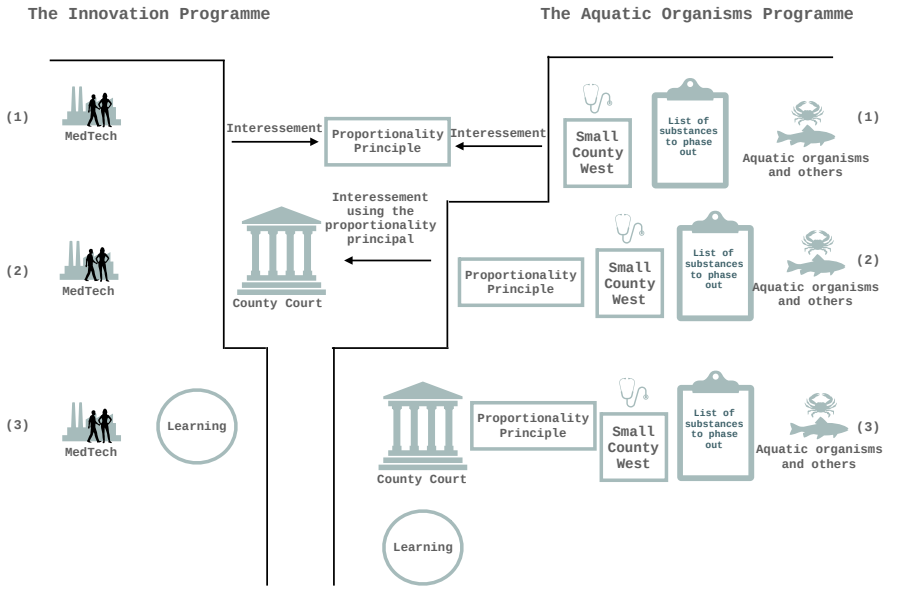


*Figure 12: Illustration of the attempt from both the Innovation programme and the Aquatic Organisms programme to enrol the county court ruling.*

MedTech countered this failed interessement by loading its programme again and interesting and enrolling a toxicologist investigating the actual ecological impact from triclosan that had passed through a human body (Jenkins, 2014). They still kept their obligatory passage point: '*Do Antibacterial sutures reduce SSI?'*, but they added a new relevant actor: The Aquatic Organisms Programme. They said that if the antibacterial-suture reduces SSI, it would also diminish the environment's impact. The reasoning being that (1) triclosan is

neutralised in the body and leaves the body in a harmless form and (2) the triclosan used was considerably less than the antibiotic that would have to be used and unleashed into the environment if the patient ended up with an SSI; this is illustrated in figure 13.

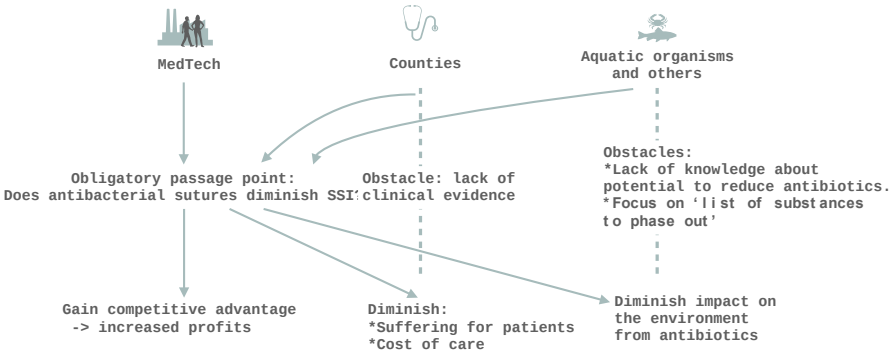


*Figure 13: New problematisation and OPP that include Aquatic Organisms*

Thus, MedTech tried the strategy of annulling the Aquatic Organisms Programme's status as anti-programmatic. They used this strategy when attempting to enrol the Administrative Courts of Appeal. They argued that the county of SmallCountyWest had evaluated the effect of triclosan's use in the wrong way:

> The county is content with establishing that the substance is harmful to the environment. According to the model developed by, among others, the Medical Products Agency[130], it is not enough to consider, as the county has done, only the substance environmental classification. Instead, the probability for possible danger, i.e. the environmental risk, should be evaluated. What is important here is the quantities of the substance that reached the environment. Suppose the substance's concentration in the environment falls below the concentration that is considered harmful for the environment. In that case, the substance, according to the model, does not pose an environmental risk. (Administrative Court of Appeal in SmallCountyEast, 2009)

The toxicologist helped MedTech show that even though the product includes triclosan, this substance would not reach the environment. This is because it is neutralised in the body and leaves the body in a harmless form (Jenkins, 2014). The unused part of the suture is burned with other hospital waste and digested into harmless substances (Administrative Court of Appeal in SmallCountyEast, 2009). Therefore, the Aquatic Organisms programme had no reason to be an anti-programme to the Innovation programme, according to MedTech.

[130] Läkemedelsverket in Swedish

MedTech wanted to promote the idea that the triclosan coated sutures were just as harmless as the traditional ones and did not clash with the Aquatic Organisms programme. In court, they also attempted to close the black box of the scientific debate around the effect on SSI. Claiming that the positive impact was proven and that it was thus the best available technology. They used several other interessement devices to attempt an enrolment of a court ruling, namely:

- The BAT principle (best available technology). Claiming that their antibacterial suture was the best available technology.
- The proportionality and equal treatment principles. Stating that SmallCountyWest had breached their agreement. To show that they were in breach of their agreement, MedTech interested another non-human actor, namely 'The Law of Public Procurement, chapter 16, paragraphs one and two' and referred to the two principles as they were understood in the law (Administrative Court of Appeal in SmallCountyEast, 2009).
- The outcome of a court hearing in the Court of Justice of the European Communities[131] (C-489/06), which can be understood as a non-human actor (a document) consisting of several other actors. The document states that procuring authorities that have begun a procurement process of CE marked medical products cannot disregard from an offer without considering the councils directive 93/42 EEC (European economic community) made on the 14th of June 1993 – another non-human actor. This document includes articles eight and 18 that stipulates that the products need to be considered a threat to the patients or the medical personnel's safety to be excluded. And if that is found to be the case, the commission needs to be notified thereof.
- The 'Law of Public Procurement, chapter six, paragraph six' which also consists of another non-human actor, namely article 23, point five in the directive 2004/18 EEC.

Based on the (loose) association with these non-humans, the Innovation programme claimed that MedTech had suffered due to SmallCountyWest being in violation of the Public Procurement law (Administrative Court of Appeal in SmallCountyEast, 2009). If successful, these interessement devices would lead to interessement and enrolment of a ruling from the Administrative Court of Appeal.

SmallCountyWest tried to partly interest the same actors in their programme. They too tried to interest the BAT-principle, saying that this principle had been followed when the antibacterial substance was excluded. The rationale behind this was to prevent harmful effects on the environment and primarily

[131] That changed name to 'Court of Justice of the European Union' on the 1st of Dec 2009 through the Treaty of Lisbon.

aquatic organism. It also tried to detach MedTech from the actor LOU by stating that the firm had other sutures available and had not been excluded from making an offer. Therefore, they tried to sever the association between MedTech and the proportionality and equality principles by claiming that they had not been violated. They also used an already enrolled actor, namely the county's internal environmental goals and tried to interest the Environmental Code[132]. This regulation states that the rule for product choice makes it clear that if it is possible to replace an environmentally hazardous product, that should be done (Administrative Court of Appeal in SmallCountyEast, 2009). This time MedTech's interessement devices were successful, and SmallCountyWests interessement failed. Therefore, the Administrative Court of Appeal's ruling became interested and enrolled in the Innovation programme. An illustration of this can be found in figure 14.

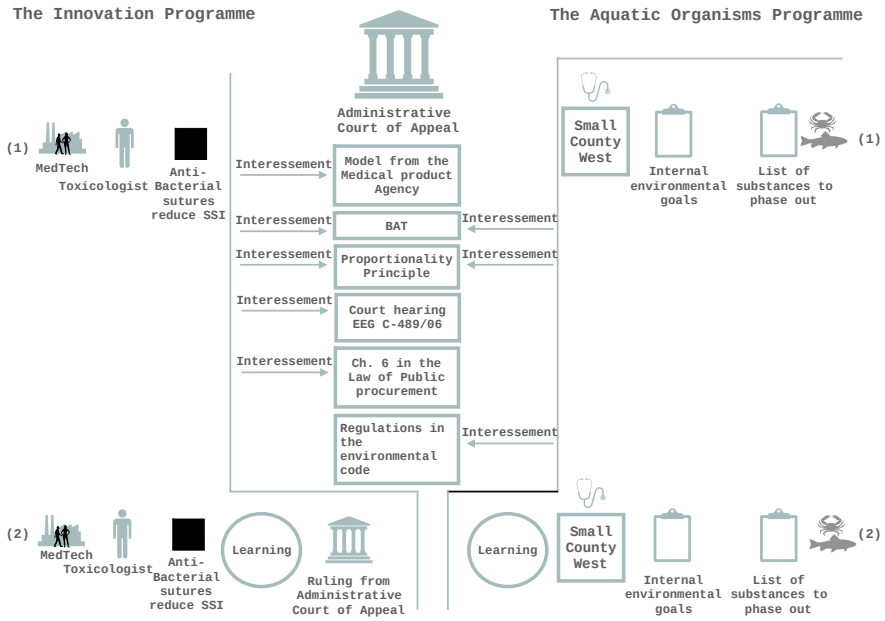


*Figure 14:Illustration of the Innovation programme and the Aquatic Organisms programme attempting to interest and enrol actors that they can use as interessement devices to enrol the Administrative Court of Appeal.*

SmallCountyWest continued to resist the Innovation programme's interessement device, by appealing to the Supreme Administrative Court. When arguing in the Supreme Administrative Court, MedTech once again enrolled the documentation stating that triclosan in this form and quantity was not harmful to the environment. They enrolled the proportionality principle in the Law of Public Procurement. SmallCountyWest followed a similar route as in

[132] Miljöbalken in Swedish

the Administrative Court of Appeal and enrolled their own environmental goals, the national environmental goals 'toxic-free environment', and the Environmental Code rules.

The Supreme Administrative Court disassociated both MedTech and SmallCountyWest from any non-human actors connected to the environment. Instead, they focused on a fourth programme, 'The Public Procurement programme'. This programme aimed to:

> ensure that public procurement is open for competition and that public funds are used as efficiently as possible (Swedish Competition Authority, 2020).

Two documents in this programme were enrolled by the Supreme Administrative Court, namely the Law of Public Procurement, chapter one, paragraph nine (2007:1091) and the description of the Law of Public Procurement, chapter six paragraphs 1-3. Based on these two non-humans, the Supreme Administrative Court ruled in SmallCountyWest's favour, subsequently making the verdict a boundary object simultaneously enrolled in both the Public Procurement programme and the Aquatic Organisms programme. This led to the distortion of MedTech's identity being confirmed by the estrangement device of the court ruling, and MedTech was rejected from the Healthcare programme in SmallCountyWest.

## 6.6 Summary of the chapter and the findings

Many studies about innovation start with the idea that the innovation under study is objectively beneficial for the adopting party. This chapter has narrated a story about an innovating process where the technology's ontological status was not determined during the time of the study, i.e. it was not black-boxed yet by the science of medicine. The chapter has described three main programmes and, within them, a number of sublevel-programmes. This summary first briefly describes those programmes and then elaborates on the findings of this chapter.

*The Swedish Healthcare programme* – was a macro-actor consisting of, among other actors, 21 counties and an actor with a programme to reduce surgical site infections. The Swedish Healthcare programme had a goal to 'prevent, investigate and treat diseases and wounds' (Socialstyrelsen, 2020). The focus of this study was four of the 21 counties, namely, BigCountySouth, BigCountyNorth, SmallCountyEast and SmallCountyWest. Each of these actors had their own healthcare programme, while they at the same time were enrolled in the overarching Swedish Healthcare programme.

*The Innovation programme*, the innovating firm, here called MedTech, was the primum movens in this innovation network. The programme of action had the goal of increasing profits and gaining a competitive advantage by selling an antibacterial suture to counties in Sweden. BigCountySouth and SmallCountyEast were, after a few failed interessement attempts, enrolled in this programme, thus simultaneously becoming enrolled in both the Innovation and the Swedish Healthcare programmes. The Innovation programme's identity was distorted on a few occasions. It was seen as not being evidence-based and thus not (yet) good enough healthcare practice. The Healthcare programme set up several estrangement devices that stabilised these distortions and kept the healthcare programme on course towards its goal. In some counties, the innovation programme was able to accommodate this resistance. They did that by adding loads to their argument, i.e. enroling a surgeon who conducted a clinical trial with favourable results and enroling German scholars who conducted favourable clinical trials there. In BigCountyNorth, this load was not enough to pass the obligatory passage point; instead, MedTech's identity remained distorted.

*The Aquatic Organisms programme* strived to ensure a good life for aquatic organisms and thus get rid of a particular substance called triclosan that threatened their livelihood. This programme had enrolled the *Phase Out initiative* that had the goal of diminishing the use of additives in medical products in general. The Primum movens of the Innovation programme did not identify the Aquatic Organisms as a relevant actor in their problematisation. Therefore, they were surprised to find that the county of SmallCountyWest was enrolled in both the Swedish Healthcare programme and (through its enrolment in the Phase Out programme) the Aquatic Organisms programme.

This chapter made six findings of innovation resistance salient.

(1) The chapter described distortion, estrangement/failed interessement and rejection as movements of resistance. These movements of resistance restricted the agency of the innovation actor. The innovating firm wanted to sell goods or services to clients (the counties). This can be described as an attempt to interest and enrol a macro-actor as a client. When this failed, that can be described as failed interessement. It can also be seen as the macro-actor, say a county in the healthcare system, placing estrangement devices between itself and the Innovation programme to disassociate itself from it. One example of this was when MedTech used theoretical evidence to interest a county in the healthcare sector. The county distorted MedTech product's identity and categorised it as 'not evidence-based healthcare'. This distortion was verified by an estrangement device, in the shape of rhetoric, constructing it as not evidence-based, which led to its rejection. A successful estrangement device leads to rejection and disruption of power, according to Galis and Lee (2014). This can also be framed in terms of agency. A successful estrangement device

and rejection from the innovation actor-network leads to the Other actor's agency being restricted. Another example was when the Aquatic Organisms programme enrolled the county of SmallCountyWest, forming a slightly changed actor, Aquatic Organisms*. This actor distorted the identity of the MedTech product, calling it hazardous, and constructed estrangement devices between itself and the innovation actor (through the way it wrote the requirement specification). This estrangement device was successful and rejected the innovation actor from the Aquatic Organisms* programme in which SmallCountyWest now was a part. These movements of resistance restricted the agency of the Innovation programme.

(2) Innovation resistance is a process between programmes – not a programme in itself. The Aquatic Organisms programme and the other programmes posing resistance to the Innovation programme were not described as 'resistance programmes'; instead, they was emphasised as being 'for' something else. They strived for different goals, and at the moment of interception with the Innovation programme, these two goals did not align. Anti-programmes are seldom constructed as a reaction to a programme. The Aquatic programme did not enrol SmallCountyWest by accident or as a counter-reaction to MedTech's Innovation programme. No, they did it to ensure the continued life of the aquatic organisms. The Aquatic Organisms programme was not constructed as a reaction to the Innovation programme; it was simply headed in another direction. The Innovation programme interfered with its goal (to reduce substances hazardous for the organisms). Thus, the interviewees experienced a conflict between the programmes. The engagement with which the Aquatic Organism programme fought for their right to stop the innovation diffusion showed a dedication to being part of constructing society and nature. Their goal was a better environment for aquatic organisms. In their view, the Innovation programme was actively working against this, acting against their programme. Thus, the Aquatic Organisms programme fought against it, and to it, the Innovation programme appeared as a resistance programme. The Aquatic Organism programme's resistance was neither accidental nor reactionary. Hence, the resistance was aligned with the Aquatic Organism programme's strive to reach its goal. Neither the Innovation nor the Aquatic Organisms programme was constructed as a reaction to the other. Instead, they met in the web of programmes of action, travelling around our human and non-human world.

(3) The Innovation programme is not necessarily important for the Other programme. There was a difference in the robustness of the programmes. The Aquatic Organisms programme was bigger than the Innovation programme. This also led to the Innovation programme not being particularly important for the Aquatic Organisms programme. The resistance from the Aquatic Organisms programme was a considerable disturbance for the relatively small Innovation programme. In contrast, the Innovation programme was merely an

annoyance for the big Aquatic Organisms programme. The Aquatic Organism programme's focus was predominantly elsewhere – namely, on its goal to ensure a good environment for aquatic organisms. It mainly focused its activities on reducing the hazardous substance found in shoes and toothpaste, where it was used in much larger quantities. On the other hand, the Innovation programme was kept outside of the healthcare system due to the interference of the Aquatic Organisms, so to them, the resistance was more important.

(4) The chapter illustrated how movements of resistance from Other programmes shape the Innovation programme. When the Innovation programme strived to interest and enrol the counties as clients, they first used theoretical evidence as an interessement device. The Healthcare programme was not interested and enrolled through this; hence, the interessement failed. Instead of being interested, the healthcare system distorted the Innovation programme's identity and saw it as inadequate healthcare practice (since there was no clinical evidence of its benefits). The Healthcare programme substantiated the distortion by deciding not to buy the product. Thus, it used an estrangement device to disassociate itself from the innovation process, thus restricting its agency. The distortion followed by estrangement and rejection here came forward as movements of resistance. It was a translation that did not unite and tie together a network. Instead, it was a series of translation that excluded an actor from a network thus constraining its agency. This resistance was accommodated by loading the Innovation programme with more actors – clinical trials. These clinical trials became the interessement device in a second try to enrol the healthcare system. Thus, the resistance (distortion: not good healthcare, estrangement device: decision not to buy) prompted enrolment of new actors (clinical trials). Therefore, the resistance was vital in the evolution of the innovation process; without it, these new actors would not have been enrolled, and the chain of actors would not have taken the shape it did. Resistance here comes forward as a key in shaping innovation. Innovation and innovation resistance are not separate phenomena; they are entangled. The innovation actor and the other actor are caught up in an interplay of resistance and accommodation. Resistance, therefore, comes forward as a process between two actors.

(5) The resistance to the innovation process provoked reflection and adjustments. The MedTech interviewees in this chapter viewed resistance from clients as somewhat desirable, and they, to some extent, expected and anticipated resistance from them. MedTech, to some extent, sought and anticipated an interplay of resistance and accommodation with the surgeons – as they saw them as their primary client. The medical doctors did not accept theoretical evidence, which pressured MedTech to see if it was possible to get clinical evidence. According to some medical doctors, the clinical evidence was not clear enough, and consequently, more trials had to be made. By the time of writing this, the evidence is leaning in favour of there being clinical evidence for the effect. However, in 2014, when the empirical study was done, this was

an open scientific debate; yet, MedTech rushed to close it. Their rationale was that they could not continue producing something that they could not sell, and if black-boxed, they would gain a competitive advantage. The surgeons were actors identified in the problematisation made by the primum movens of the Innovation programme, and resistance from these actors was to some degree desired. MedTech saw the objections from these actors as a learning opportunity that could help them mould the innovation process and make it better suited for their intended clients. They anticipated and desired resistance from the users based on technical criteria that could enhance the product. They did not appreciate resistance based on price, as they saw this as directing future innovation development to a focus on price rather than quality. Here, a hierarchy between different kinds of innovation processes can be discerned. Cost-cutting innovations were valued lower than innovations with a focus on enhanced quality.

(6) Resistance from wallflowers – i.e. actors excluded in the problematisation – was not as appreciated as the resistance from the identified relevant groups (i.e. prospective clients). The clients were already part of the problematisation and the actor-network, so resistance from them did not require a new network configuration. But when wallflowers entered from outside the network, the network broke down, and the problematisation had to be reconfigured. The Aquatic Organisms actor was a wallflower in the problematisation phase at the beginning of the chapter but appeared later as a resisting macro-actor. When it appeared as a stakeholder, it posed resistance to the Innovation programme and prompted MedTech to consider its product's environmental effect. This resistance was unexpected and unwelcome as the Aquatic Organisms had not been part of the problematisation and were beyond the system boundaries of the Innovation programme (see chapter two). When they entered the scene, they forced their way into the network, which required MedTech to re-construct the network with the aquatic organisms as a relevant actor. Each time the Innovation programme was interrupted, the opposition made the innovation process halt and reconsider. Thus, it added precisely what Hasu et al. (2012) think is mostly missing from the innovation discourse – reflectivity.

With that we leave this part of the Swedish Healthcare system and move on to another part of it, namely the new medication dosage system that provides pharmaceuticals for people with multiple diseases.

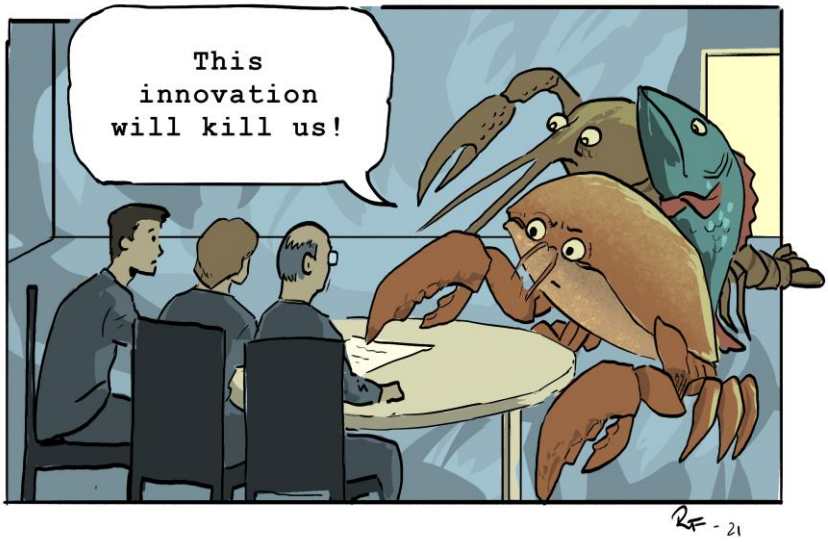


*Figure 15: Humoristic illustration of what did NOT happen when the Innovation programme was in the problematisation phase. Illustration: Rickard Fornstedt. Idea: Helena Fornstedt*

# 7. Innovation resistance in the dose market

When the general practitioner Anna Holst returned from her summer vacation in 2013, she was horrified to find some of her patients in a miserable state. Many of them had not gotten their medication in her absence, and many were so ill that they had not been able to recognise the error and ask for appropriate help in remedying it.

> She [a patient] took perhaps 5 mg Stesolid three times a day for many years, which is quite a high sedative dosage. She is dependent on it and gets ill if she does not get it [the sedative]. But she has not been receiving it for three weeks, and she is demented, so she has not been able to say anything about it.
>
> Holst, Medical doctor, General Practitioner, Västra Götaland (2014).

The cause of this situation was a change of medication dosage system initiated by the deregulation of the dos-market in 2013. This chapter describes what led up to this situation.[133] It also contains an analysis that identified a number of programmes. (1) *The Neoliberal programme* that enrolled the Swedish Government. (2) *The Systemic Innovation programme* of which the Swedish Government was the primum movens. This programme enrolled a number of actors, each with its own programme. The most important of these were the new state authority Apoteket Service, the dose suppliers – Apoteket AB, Apotekstjänst and Svensk Dos – the IT systems and databases, two Swedish counties and the municipalities within them (all Swedish counties were in fact enrolled, but this story only covers two of them), the prescribing doctors, the patients and their next of kin. (3) *the Swedish Healthcare programme* that we know from the previous chapter and with which the Systemic Innovation programme merged. It also includes an account where two laws are important; they are part of one programme each: (4) The *Personal Integrity programme*

[133] The study is drawn from 68 secondary sources and seven interviews lasting between one and two hours conducted during 2014 and 2019. The secondary sources consisted of public documents, news articles, company documents and documents from other organisations. The interviewees were a senior advisor and international coordinator at the public authority Apoteket Service, the CEO of the company Apotekstjänst, the Chair of the Board of the company Svensk Dos, two pharmaceutical managers in Västra Götaland and Halland, and one medical doctor who was interviewed twice. The interviewees agreed to be cited using their real names. The secondary sources were public documents, scientific articles, news articles, company documents and documents from other organisations (more information about the data collection is available in the appendix A1.1.1).

and the (5) *Prescription Control programme*. The programmes will be presented in a chronological story about the restructure and reform of the dose market. Thus, in contrast to chapter six when the presentation of programmes guided the narration, this chapter is guided by the chronology of the events. But before the narration begins, a description of the dose dispensing system is in order.

A *dose dispensing system* is an industrialised version of the Dosett that can be seen in figure 16. The Dosett is a box where people who need many pharmaceuticals can place each day's pills in an individual container to remember to take them more easily. Instead of getting the pills in a Dosett, the patient receives them in a plastic bag.

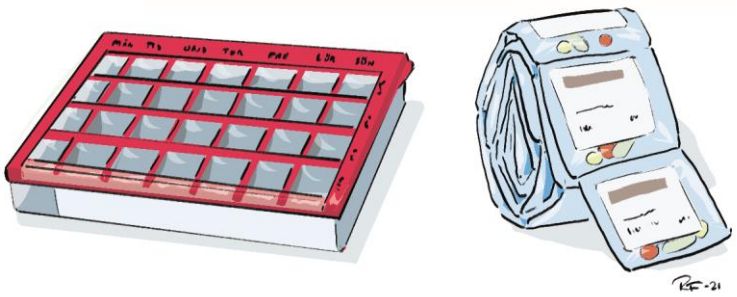

*Figure 16: To the left, a dosett and to the right, a dose roll. Illustration: Rickard Fornstedt.*

They get one bag for each day and time of the day. In each delivery, the patient gets his/her medication in dos packages that cover their required medicine for 1–2 weeks. Every bag is labelled with name, content, time and date when it should be consumed. The primary benefit is that the patient does not have to keep track of which medicine to take when and what time (morning, lunch, night) or which medicines should be taken together (Apotekstjänst, u.d.). The dose dispensing system was developed by the State-owned Apoteket in the 1970s (Manell, 2019) and handled by them until summer 2013. This change was brought about by the Swedish Government. The change was influenced by the intellectual and political movement called Neoliberalism (Davies, 2014, p. 1; Steger & Roy, 2010). In ANT terms, this can be described as a mega programme – the Neoliberal programme. It enrolled the Swedish Government who brought about a change that in this chapter will be referred to as a 'systemic innovation'. The word 'systemic' is used, as it was not only one component in the system that changed, but several, and they influenced each

other.[134] This Systemic Innovation will here be described as an actor with a programme – the Systemic Innovation programme.

## 7.1 The Systemic Innovation programme

In 2006, Sweden got a new conservative government; they would become the primum movens of the Systemic Innovation programme. Shortly after taking power, they began to work to restructure and reform (they preferred not to use the word deregulation as the market would remain heavily regulated) the Swedish Pharmacy monopoly. They did this by ordering a special investigation into the pharmacy market's possible deregulation. In summation (based on the report from Statskontoret, 2013), the first question they posed was:

> How can we increase the availability of pharmaceuticals, improve the variety of services, lower the cost of medications, preserve the competence and security in the pharmaceutical provision and leverage the pharmacies contribution to achieve better pharmaceutical usage?

The answer they gave themselves to this question was, by opening up the market for private firms (Statskontoret, 2013). There could have been other available answers to this question, but the primum movens was associated with the Neoliberal programme and did not evaluate other options. In addition to this question, they simultaneously needed to answer a second question central to Neoliberalism: *How can we increase the competition to promote economic growth and improve the consumer value* (Regeringen, 2009, p. 75), and the answer to that question was the same as the previous one. Thus, the special investigation had a specific task, namely, to give propositions that would enable more actors to enter the pharmacy market (Statskontoret, 2013). So, there was one question related to health and one to economy. The Social Minister combined the two in 2014 when he described the goal of the programme as:

> A well-functioning market where small and large actors can establish themselves, where there is competition on equal terms and a secure and sustainable pharmaceutical delivery and utilisation[135] where the consumers have good availability and service.
>
> Hägglund, Minister of Social Affairs (2014).

[134] This view is tied to a sociotechnical system perspective on transitions of industries that Karltorp et al. (2019, p. 19) describe as follows: '...technical change is seen in a larger context, where technical systems, actor structures and institutions develop together in an iterative process that is characterized by learning and experimentation but also significant inertia'.
[135] Läkemedelsförsörjning in Swedish.

The second question around a well-functioning market is, however, absent in the following documentation issued by actors enrolled in the Healthcare programme – there, only the first question lingers. The primum movens' wish was unprecedented in the OECD area since never before had a national all-covering publicly owned pharmacy chain been transformed into a market with a balanced structure of actors (Statens Offentliga Utredningar, 2008, p. 24). This transformation was to be conducted with *speed*, and the special investigation noted that:

> The investigation has a tight schedule and a complex mission. This relationship has greatly shaped the overarching and general setup of the investigation (Statens Offentliga Utredningar, 2008, p. 24).

On the 29th of April 2009, the Swedish Parliament voted through the proposition called 'restructure and reform of the pharmacy market' (prop. 2008/09:145). This proposition was one of three that together were called the restructure and reform of the pharmacy market.[136] The primum movens made commitments to closely follow the restructuring of the State Pharmacy actor, Apoteket (Regeringen, 2009, p. 294) and perceived itself as a centre of calculation for the transformation of the Dos market:

> The Government is continuously monitoring the development in this area. It actively develops improvements based on the signals from reports, investigations and other actors on the Pharmacy market
>
> Hägglund, Minister of Social Affairs (2014).

Despite this, the primum movens of the programme became quite invisible after having made these inscriptions. It imposed its will on the evolving network through the inscription in the proposition 2007/08:87, which became a guiding document for the Systemic Innovation.

Consequently, the pharmacy state monopoly was discontinued on the 1st of July 2009 (Statskontoret, 2013), and the dose dispensing system was restructured on the 1st of January 2013.[137] The Systemic Innovation programme's goal can be viewed as the obligatory passage point (OPP) of the network: *Does every patient get a secure high-quality Pharmaceutical delivery, where the lowest price is ensured through competitive tendering?* Now, actors needed to be enrolled in a network around this OPP before the 1st of January 2013.

[136] The others concerned allowing some pharmaceuticals to be available on other places than pharmacies and enabling caregivers to organize their hospitals own pharmacy supply (Statskontoret, 2013).

[137] There are some indications of the Dos market not being as much in focus as the other parts of the former state Pharmacy. In the report from the Swedish competition agency, it is for instance not mentioned when the different parts of Swedish pharmacy are mentioned (Konkurrensverket, 2010, p. 18)

## 7.2 The actors within the network

The Systemic Innovation programme set out to change a part of a macro-actor, namely the Swedish Healthcare system. The Swedish Healthcare system can be described as having a programme with a goal defined by the Swedish Health and Medical Services Act[138]. Therefore, the Systemic Innovation programme is seen as a programme merging with the Swedish Healthcare programme, working actively to add new black boxes and change several previously black-boxed actors within it. It was not enrolled nor authored by the Healthcare programme; instead, it was authored by an actor sitting on top of all the boxes containing Swedish public affairs – i.e. the Government. The Systemic Innovation's ascription and prescription (as described in Statskontoret, 2013) included alinement and compliance with the Swedish Healthcare programme, and many of its goals could be said to correspond to the goals outlined for the Swedish Healthcare system (as described in Socialstyrelsen, 2020).

A macro-actor is an actor sitting on a large number of black boxes. Many black boxes on which the actor can sit are needed to create a macro actor. Each box can be seen as an actor with a programme. The section provides an overview of a few of these more or less leaking black boxes.

### 7.2.1 Apoteket AB and Apoteket Service

The inscription in position 2007/08:87, voted through Parliament in May 2008, was a very effective interessement device. The document defined the changing roles and tasks for several actors within the Healthcare system. When Parliament accepted the proposition, many actors were, without argument, interested and enrolled in the Systemic Innovation programme. The proposition interested and enrolled the actors in the State Pharmacy Apoteket and severed any association with its former programme of action – the State pharmacy programme. The proposition commanded the creation of a mother firm to Apoteket, *Apoteket Restructuring AB*[139] charged with overseeing Apoteket's dismantlement. Actors such as: IT infrastructure, registers, databases and national statistics were disassociated with the State Pharmacy and instead enrolled in a new authority *Apoteket Service*. The result was two entities: one publicly owned company *Apoteket AB* that would compete with any new firms entering the market, and one state-owned authority, Apoteket Service, which would handle the national IT systems needed on the new market (Regeringen, 2009). As a result, all associations with a state monopoly were severed. Thus, the State Pharmacy programme was abandoned. This, as well

[138] Hälso och sjukvårdslagen in Swedish
[139] Apoteket Omstrukturering AB in Swedish

as the black boxes, mentioned explicitly by the proposition, is illustrated in figure 17.

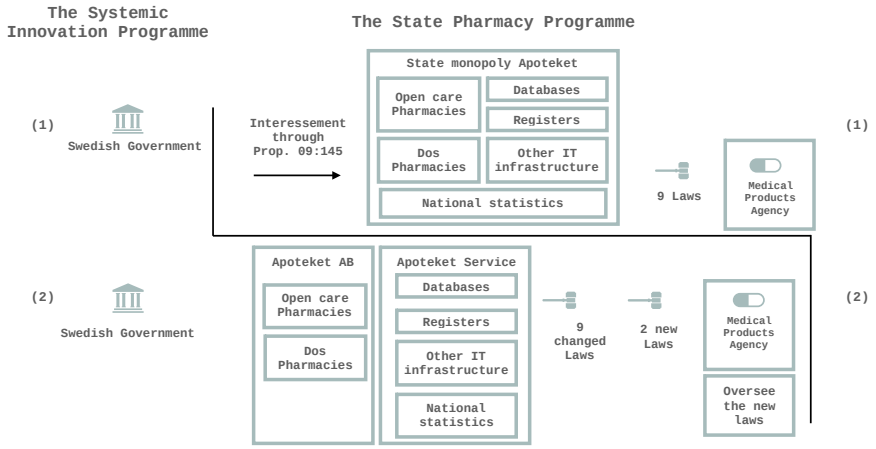


*Figure 17: The Swedish Government interested and enrolled the state monopoly, 9 laws and the Medical Products Agency in the Systemic Innovation programme. They severed old associations and created new ones, thus creating new actors and breaking down one old one.*

In addition, an estrangement device was set up by the primum movens. This device was set up to judge if an actor prevented competition. If it was perceived to do this, then its identity would be distorted, and it would be estranged and rejected. This is an elaboration on Galis and Lee's (2014) example of estrangement. For them, distortion and estrangement devices were set up as a response to a parallel Other programme; here, it appeared as a response to anticipated resistance that had not yet materialised itself.

### 7.2.2 Pascal

Apoteket had a web-interface and prescription tool called *E-dos*. Apoteket built E-dos, and they had no incentive to provide this for their future competitors. E-dos was not part of the primum movens' inscription (i.e. proposition), and Apoteket AB was thus not obligated to make it available for their new competitors. Therefore, a new system had to be built. Such a system was ordered by the Centre for E-health in Collaboration (CeHic).[140] The new IT system was called *Pascal*. It was supported by the Association of Municipalities and Counties of Sweden (SKL)[141] and carried through by the publicly-owned IT company Inera, Apoteket Ab and Apoteket Service (Öz & Dimitriadou, 2012). After some delay, it was rolled out during spring 2012 (Västra Götalands regionen, 2012; Öz & Dimitriadou, 2012; Inera AB, 2012). Pascal then

[140] A centre created by the counties and regions to enable collaboration around development of e-health services.
[141] In Swedish, Sveriges Kommuner och Landsting (SKL)

became a national prescription system that enabled the prescribing party to overview patients' prescribed drugs.

### 7.2.3 E-prescription Repository

There was another project going on partly in parallel with the development of Pascal. The Proposition stated that the prescription information in the seven databases used in Apoteket AB's seven dose pharmacies was to be consolidated into one single database owned by Apoteket Service. The IT project built a new database called *E-prescription Repository* with several services connected to it (Hassel, 2019). The project was connected to the Pascal project and initiated in 2009. In addition, the task of keeping national statistics was also interested and enrolled in Apoteket Services by the propositions. This is illustrated in Figure 18.

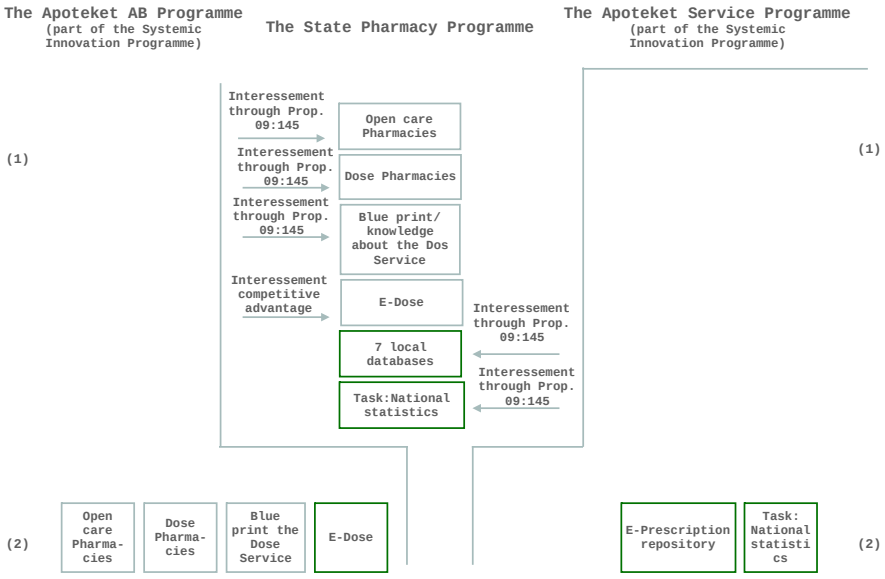


*Figure 18: The Proposition became an estrangement device that severed the association between the State Pharmacy programme and all actors within it. The actors were interested and enrolled in either the Apoteket AB programme or the Apoteket Service programme.*

### 7.2.4 The Counties

When the public procurement started in 2012, the 21 *counties* in Sweden were interested without argument in the proposition and consequently enrolled in the Systemic Innovation programme. These counties were at the same time enrolled in the Swedish Healthcare programme. One of the goals of the Swedish Healthcare programme was cost-effective care. Since the counties were

eager to cut costs from the service (Manell, 2019; Lendenius, 2019) and the proposition stipulating lower costs as a priority (Regeringen, 2009), this goal was prioritised when the Dose market was deregulated. When it was clear that there would be a restructure and reform, almost all of the counties formed alliances in the *public procurement of Dose* (Manzoor, 2012). Thus, instead of 21 prospective clients, there were only six. Moreover, each contract had a relatively short duration of two years, which meant a fluctuating and rapidly changing market when one of these large clients changed supplier[142] (Hilmo, 2019; Hilmo & Versteegh, 2015).

To engage in public procurement was nothing new for the counties, but to do it for the Dose service was a new experience. They had to write a requirement specification for a service they did not have full insight into (Lendenius, 2019). Apoteket's dose service had evolved over many years. The people on the floor had adapted the service to compensate for deficiency and shortcomings without specifying this in the documentation describing the service (Hassel, 2019; Olsson, 2019). To write the requirement specification, the programme needed to enrol the blueprints from Apoteket AB, which had gotten the task of providing the blueprints through the proposition. The proposition stated that the knowledge about the service needed to be shared; thus, it once again worked as an interessement device. However, when the public procurement process attempted to enrol the old dose service, it could not capture the entire service (Manzoor, 2013b). The knowledge of how the service was performed in practise was left outside of the programme. Consequently, the requirement specification was viewed by many as unclear (Hilmo, 2019; Manell, 2019; Hassel, 2019; Lendenius, 2019; Olsson, 2019; Ejd, 2013; Holst, 2014; Österberg, 2013a).[143]

The requirement specification in public procurement is a description of what should be fulfilled by a prospective supplier. If all requirements are fulfilled by a firm making an offering, then the different bids are compared based on price, and the lowest bidder wins the tender. A well-written requirement specification guarantees that the desired quality and functionality are reached (Askfors & Fornstedt, 2018).

After this specification was written, it was the matter of reading, understanding and building up a business from scratch based on it. However, the specification was not sufficient to understand the business, according to Maria Hassel at Apoteket Service:

[142] These problems have remained in later years (Lagercrantz, 2018).
[143] At Apoteket Service, they were a bit surprised that the counties had not asked them for help, and the senior advisor at Apoteket Service, Maria Hassel, afterwards regretted not having been more clear in letting them know they could ask for help (Hassel, 2019).

> It is not enough, you need to think about the operations, and you have to think about the operations on both sides...[]... It is similar to working here [e-Health Authority[144]] as a pharmacist; you must know Pharmacy and the processes. You have to know the processes in the healthcare sector, and you have to know some IT and quite a lot of jurisprudence...[]... it is the same at the counties, you have to understand the entire flow, your tiny part is not enough.
>
> Hassel, Senior Advisor and International Coordinator, ApoteketService (e-Health Authority) (2019).

Even though the specification was unclear, it was used to found two companies. This can be understood as a process of translation (Czarniawska, 2000) taking place. The service was first translated into text, and then this text was interpreted and translated into two different Dose suppler companies.

### 7.2.5 The Dose suppliers

When it was clear that there would be a public procurement of dose, that knowledge interested the actors that would form the two new dose suppliers in the Systemic Innovation programme. This chapter's focus is on one of them, Apotekstjänst since this actor encountered more difficulty than the other new actor. The other actor Svensk Dos will, therefore, be described in less detail.

One evening, four friends shared a few beers. They were all entrepreneurs and pharmacists, and their names were Per Manell, Joakim Söderberg, Martin Svensson[145] and Kristoffer Klerfalk. They talked about the upcoming restructure and reform and agreed that dose was overpriced. They thought it would be possible to offer the service for free and profit based on the margin on pharmaceuticals (Manell, 2019). That evening, they became interested in the Systemic Innovation programme. They, in turn, enrolled Anders Wall and Beijerinvset and the financial capacity there. All of this led to the registration of the new company *Svensk Dos* in 2011 (Manell, 2019), which is a company owned by the four founders and Beijerinvest (Nilsson & af Klercker, 2013). The founders of Svensk Dos were pharmacists who could 'read between the lines' in the requirement specification, and the Chair of the Board (Per Manell) had followed the development of dose since it started in the 70s (Manell, 2019). Thus, they could reasonably well anticipate what was required by them as a Dose supplier.

The other actor who became enrolled in the Systemic Innovation programme was an already established company called Bonvier, which previously had distributed video films (Apotekstjänst, u.d.). Business went well until around

[144] Apoteket Service later change name to ehälsomyndigheten in Swedish, e-Health Authority in English
[145] He later changed his last name to Melin.

2010, when piracy[146] became an increasing problem for the company (Hilmo, 2019). It led to a substantial diminishing of the market, forcing the company to reconsider its core business (Bonver, u.d.). Tomas Hilmo describes the company's interessement in the Systemic Innovation programme as follows:

> Then we sat down [the board and Tomas, who was the CEO] and thought about our core competence, and we concluded that we really are a logistic company...[]...we are good at security and high quality. If a DVD gets lost, you will have an armada of lawyers from Disney, and they have to have action plans for everything. Then we thought, who can afford to pay for this? Then [2011], we had hired a consultant who thought that pharmaceuticals might be something for us...[]... then, suddenly we ended up considering that they were preparing an upcoming public procurement for dose dispensing pharmaceuticals. It wasn't really anyone who... I used to joke and say that I remembered that my parents use Dose; thus, I became the company's dose expert. So I said that 'this sounds exciting. I would like to concentrate on that part of the business group'...
>
> Hilmo, CEO, Apotekstjänst (2019).

As related by Hilmo, the Bonvier group interested (through hiring) and enrolled a consultant in their programme of action. This enrolment changed their programme slightly and made them more susceptible to the interessement device of the Systemic Innovation programme.

The Bonvier group was interested in the Systemic Innovation programme by the knowledge of the upcoming restructuring of the market and, consequently, several upcoming public procurements. Consequently, the Bonvier group founded Apotekstjänst in 2012, believing that their significant experience in logistics and secure solutions would enable them to be successful in this market (Apotekstjänst, u.d.). Apotekstjänst became a programme within the Bonvier group programme.

Just as the Innovation programme in chapter six, the two supplier programmes aimed to get enrolled in the Systemic Innovation programme and consequently the Swedish Healthcare programme. Before they knew if they would be granted access to the Healthcare system or not, the dose suppliers had to prepare rigorously for the public procurement; they had to make investments, form alliances, start new firms and so on. This preparation before knowing if they would be allowed to enrol or not is similar to Helgessons and Kjelberg's example of the Police force determining in hindsight whether or not a behaviour was anti-programmatic. In retrospect, when it is known that the dose actors became enrolled in the Systemic Innovation programme, all their actions until winning the bid can be seen as them already having been enrolled in the Systemic Innovation programme. Whether their actions were aligned and compliant with the programme was determined later in the public procurement

[146] Illegal downloading of film and series online.

process. Upon passage, all prior actions were in hindsight valued as programmatic behaviour.

When Apotekstjänst was founded, it was very much based on the details in the requirement specificities. This specification was the foundation of their understanding of their clients' identity, needs, etc. To gain in reality (Latour, 1999) and become enrolled in the Systemic Innovation programme, Apotekstjänst had to interest and enrol several actors. Hilmo describes more actors becoming associated with the programme in the quote below.

> ... we had to learn about public procurement. We knew nothing about it and had to bring in expertise on that. We had to recruit the best pharmacists we could possibly find. None of us knew pharmaceuticals and pharmacy, so as our chief pharmacist, we brought in a girl who had been part of the management team of AstraZeneca in Sweden for many years.
>
> Hilmo, CEO, Apotekstjänst (2019).

Both Svensk Dos and Apotekstjänst needed large investments to start this kind of business. Advanced, large, medication dosage machines[147] had to be interested (through purchase) and enrolled. The machine was a computerised dispenser with room for 400 medicines in different containers (Ejd, 2013). The machinery was modern, and the pharmaceutical manager in the region Västra Götaland thought that the production facility was superior to that of Apoteket AB (Lendenius, 2019). Furthermore, personnel had to be interested (through hiring, followed by training) and enrolled in the programme. A new business model was also enrolled. This model emphasised the margin on pharmaceuticals more than Apoteket had before (when charging the counties for the service) (Manell, 2019). The construction of Apotekstjänst so far in the story is illustrated in figure 19.

[147] The cost of a machine could be around 40–50 million SEK (Fors, et al., 2016). Apotekstjänst and Svensk Dos enrolled the same machine supplier (Manell, 2019).

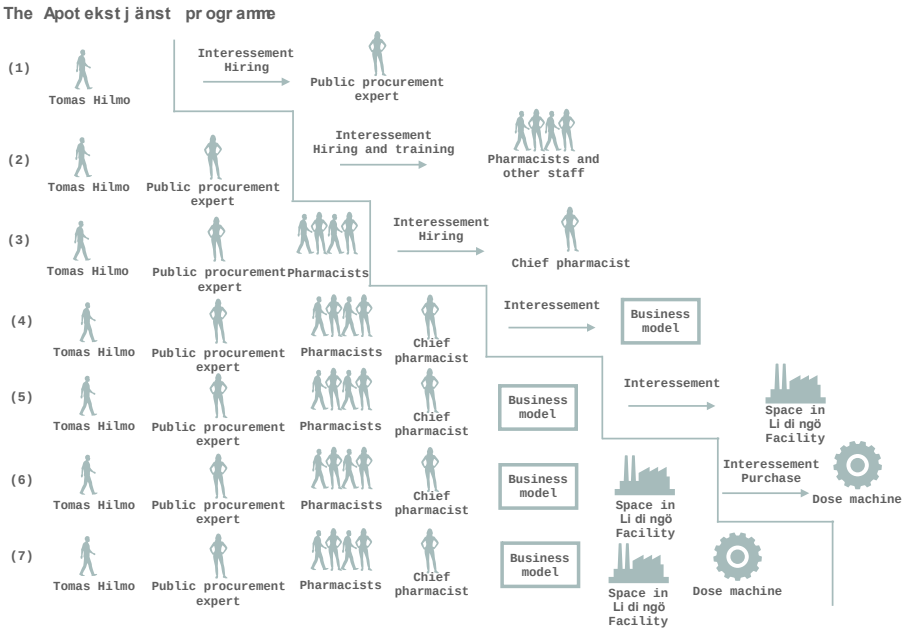


*Figure 19: Enrolment of actors in the Apotekstjänst programme (part one)*

Furthermore, the new players had to consider their chain of logistic when entering this market. The logistics were slightly changed compared to Apotekets' old logistics chain. Apart from the new market situation, the service would now include whole-packages of pharmaceuticals and an increasing number of direct deliveries to nursing homes (Hilmo, 2019). Svensk Dos began using local grocery stores and gasoline stations as delivery points (Manell, 2019). Apotekstjänst, on the other hand, made deals with local pharmacies. Hilmo emphasised that their logistic and delivery processes were new, and that they saw this as their most accentuated strength and one of the reasons why they considered entering this market (Hilmo, 2019).

The new players also needed a dose-receipt-expediting IT system to handle production of dose packages. To do this, Apotekstjänst enrolled the software developing company *Visma* which had developed PharmaSuit for the Swedish pharmacy chain Apoteket Hjärtat. They developed *PharmaDos* – a warehouse management system, especially developed for handling dose production (Visma, 2013; Visma, 2012). Svensk Dos also needed a new IT system. They enrolled the small IT delivery company called Canella IT Solutions that created Candose for them (Hedlund, 2013). Both systems were approved for use by Apoteket Service just a few weeks before they were to be put to use (Manzoor, 2013a; Hedlund, 2013). This is illustrated in figure 20.

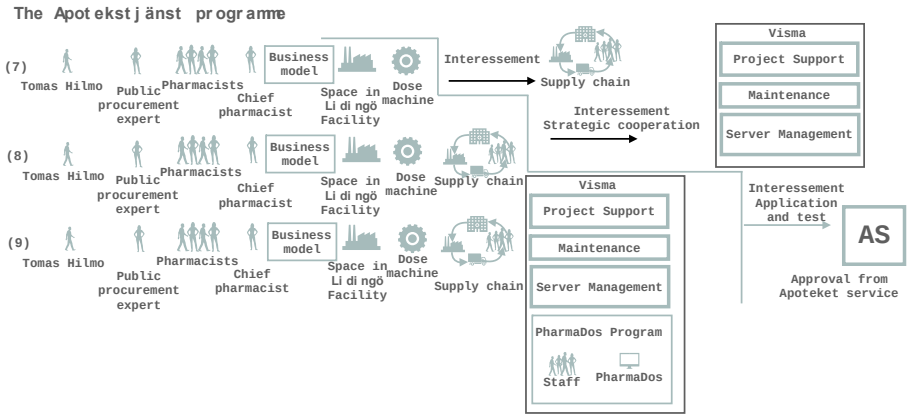


*Figure 20: Enrolment of actors in the Apotekstjänst programme (part two)*

Per Manell, at Svensk Dos, saw this as an occasion when 'someone' should have halted the new Dose dispensing service's introduction.

> ...the [IT] solutions that were supposed to be used by Apotekstjänst, and us were just about ready. Everything was a close call. And it was the same case there [as with a database called SOL]; they should have interfered there as well. And they should have had greater control there as well... []... some sort of follow up anyway, 'is the dose actors really ready?' To ensure that this was going to work. Then there was, of course, a pressure on a dose actor, the same pressure that was put on the counties. We wanted to start so that we could earn back the money because we had investments lying there, ticking. So, it was essential to start this.
>
> Manell, Chair of the Board, Svensk Dos (2019).

This can be interpreted as a call for distortion of the IT systems identity. It should have been deemed unfit for dose dispensing, according to Manell. Manell thought that the test should have been harder to pass, which can be seen as the test *not* serving as an effective estrangement device which, when successful, rejects the IT system from the programme. That kind of resistance from the Systemic Innovation programme could have prompted an accommodation that altered the IT systems to fit the Healthcare System better.

Relative to the primum movens in the programme, the Dose actors were in the periphery. Several regulations were in place, as well as different public authorities to oversee various aspects of the programme. However, from the perspective of the periphery, there was no centre of calculation in this programme. The overarching responsibility was delegated to a non-human, a powerful piece of text – the proposition. From the periphery's point of view, this was not enough. The metrological apparatus did not amplify the sounds of the things that mattered to the periphery.

Taken together, Apotekstjänst set up a network of actors when constructing their firm. Each actor's identity was interpreted based on the requirement specification and Bonviers experience in logistics, etc. Many of these actors were partly black-boxed for the management team that set up the firm. For instance, they did not know in detail what the goal was of the database 'E-prescription Repository'. Nevertheless, they knew that the database was supposed to be enrolled in the Systemic Innovation programme and connected to Apotekstjänst's IT system PharmaDos. Therefore, if it passed the obligatory passage point, it would ensure that the database's behaviour was programmatic, both regarding its own programme as well as the Systemic Innovation programme.

### 7.2.6 SOL

However, when the Primum movens identified the relevant actors, there was one wallflower. One actor that they neither included in their regulation letter to Apoteket Service, nor the proposition. The missing actor was the 'Range of Products and Delivery information' (SOL). Tomas Hilmo, the CEO of one of the new Dose suppliers Apotekstjänst, describes it as follows:

> I remember when we were down in [the county] Västra Götaland in Gothenburg and were about to sign the deal after winning the procurement [late spring/early summer 2012]. The night before, a consultant called me and said, "Tomas, do you know that it isn't possible to start this business because there is no national IT support for a deregulated market". Ok, we went to Gothenburg and told them this. And then they said, "let's take a pause in this meeting with the deal signing", and then they went out and made a few calls, and then they came back and said "no, this is not possible; it does not exist..." Apoteket Service [now e-Health Authority], as it was called then, had not... the system was not prepared for a market exposed to competition. Everything was in the systems of Apoteket AB.
>
> Hilmo, CEO, Apotekstjänst (2019).

All the information that previously was in Apoteket's seven databases had not been transferred to a database owned by Apoteket Service. The missing data concerned the patients' addresses, the patients' contact persons, the responsible nurse, etc. The data and the possibility to access it were called the SOL-services,[148] which included the 'Range of Products and Delivery information'. Maria Hassel at Apoteket Service explained it as follows:

> In our regulation letter, our instruction, there isn't anything written about that [the SOL-services]. Thus, we could have said, "no, we do not care about that,

[148] Short for 'sortiment och leveransinformation' in Swedish.

> that is the healthcare sector, that is sort of a deal between the health care organisation and the pharmacy, it has nothing to do with us". But then the healthcare sector, through SKL and Inera, thought that it would be better to centralise this. Otherwise, every Dose company would have to have its own directory that they connect to every county...[]...They [SKL] said, “we believe that you should take care of this”. We answered, “Yes, but then we need to get paid. And then they said, “Well.. we'll see”. Then, we went to the Ministry of Health and Social Affairs and said, “if we are to do this, we need to get paid for it”. They answered, “Yes, then we'll take some of the government funding that would otherwise have been sent to SKL and give it to you instead”. That was the way it had to be because we do not have the task of taking care of that [SOL] for free.
>
> Hassel, Senior advisor and international coordinator, ApoteketService (e-Health Authority) (2019).

The project to enrol the data set into the Systemic Innovation programme started in 2012, three years later than the Pascal and the E-prescription repository project. It was a project done in haste; thus, due to the limited time, there was no time to clean up the database, so a lot of unnecessary data became included that they had to spend the coming years cleaning up. The system was barely ready for the first roll-out of dose in Västra Götaland and Halland in May 2013. At this point, it was nothing more than a blue copy, according to both Hassel (2009) and Hilmo (2019), and it had to be continuously worked on after the roll-out (Hassel, 2019). The network had to be re-configured now that the SOL database was included. The most important actors in this narration of this the actor-network are presented in figure 21.

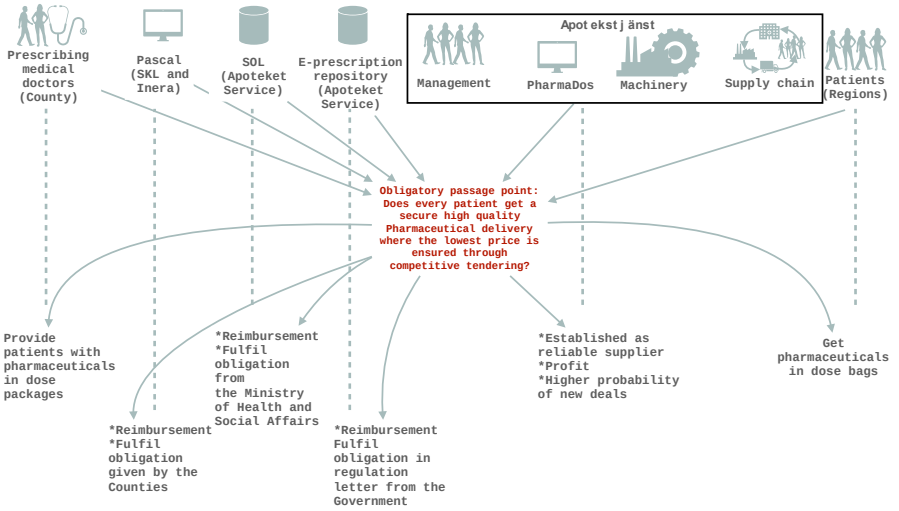


*Figure 21: The actor-network of the Systemic Innovation actor.*

The actors in the periphery thought that 'someone' should have stepped in to halt the systemic innovation process when it became clear that the SOL database project had been launched too late and would end up being a shadow of what it ought to have been. Per Manell, the Chair of the Board of Svensk Dos expressed it as follows:

> Then we would have needed someone who put down their foot and said if I can express myself bluntly, "No way in hell! This is how it will be, and this cannot be launched until then, or until this, and that is fulfilled". It should not have been dependent on local deals... and on top of that, the health authority was floating...[]...[There should have been a nation coordinator] who could keep track of everything and stopped the counties, stopped the e-Health Authority [then Apoteket Service] and the dose companies. Said, "now we have to wait here; we have to postpone". If the public procurement was done with a caveat, stating that estimated starting time is the date x, but this can be postponed due to... And then you would make a list of things that could go wrong. It is always like this; they should have realised that IT project has a marvellous way of always being delayed, especially in the public sector. And this is a critical application; it is not like selling candy; on the contrary, if this goes wrong, then it might lead to someone's death. When some detail is missed that no one has thought about and that is discovered when someone is not getting their pharmaceuticals... []...there was no point getting started if the e-Health Authority was not ready because everything was to be transferred from Apoteket since all the patient information was there. And if that had not worked, then this would have been worthless. And because this is about patient safety, you have to be absolutely sure that everything works. ...[]... That is why someone needed to say that "now it is not secure enough to run". This was managed in a way... when you look at it in hindsight, this was managed based on a guess; if it works, it works.
>
> Manell, Chair of the Board, Svensk Dos (2019).

The owner and founder of Apotekstjänst, Gerard Versteegh, had a similar sentiment:

> We are missing a responsible person on a national level, who could point firmly and tell us how this will go about. Both, the counties and we have had too little knowledge about this. Instead, Apoteket AB, which is our biggest competitor, has had more information than us. In the end, it is patients and the healthcare sector that has suffered from this.
>
> Versteegh, owner of Apotekstjänst as quoted in Manzoor (2013b).

Versteegh suggests that the process would have gone better if this final step of privatising the state pharmacy monopoly had reassembled the first part.

> This entire phase of the deregulation of the pharmacy monopoly has gone too fast. There should have been a governmental authority that supervised the whole thing, as it was in the first phase, when the pharmacies went private.
>
> Versteegh, owner of Apotekstjänst as quoted in Huntington (2013).

The counties were obligated by law to carry on with the public procurement regardless of the IT systems' state (Hildingsson, 2013c). Tomas Hilmo at Apotekstjänst reflected on it like this:

> They [the counties] were very pressed since they had to procure the service due to public procurement law. But that was the problem; someone with a national responsibility should have said, "Stop, we need to do this in an orderly manner. We have to have some sort of general that steers this, a transition company that steers this". Instead, they forced the counties; they had no choice but to procure...[]... I believe that if we had had someone with an overarching responsibility that would have said, "stop here, we need to bide our time a bit now". Then, we would never have gotten this forced time plan, public procurement, remaking the IT systems ...[].... There should have been a legal expert involved that surveyed the legal rules to ensure that it actually was possible to do this...[]... The dose market was more like; suddenly, there was a public procurement. And then no one had thought about if some constitutions and regulations supported the deregulation or not.
>
> Hilmo, CEO, Apotekstjänst (2019).

This can be understood as the actors calling for more resistance in the system, expressively asking for someone to halt the new dose service solutions' launch in the immature IT landscape. There were decentralised centres of calculation designed to work once the Systemic Innovation programme had merged with the Healthcare programme, the alliances were set, and the black boxes fairly closed. But the Systemic Innovation programme had no centre of calculation able to closely monitor and oversee the work in the periphery when this programme embanked on its journey into the Swedish Healthcare programme, disrupting and invoking change as it went along. There was no actor with the ability to set itself up as a centre of calculation or centre of authority for the entire programme. There was no centre of calculation with the ability to set up estrangement devices to reject immature actors or detect the dissidence and non-programmatic behaviour that should have prompted re-construction of the network.

This lack of overarching perspective was apparent not only in 2012–2013 but also in 2019 when the interviews were conducted. The Civil Contingencies Agency (MSB) [149] highlighted the need for continuity in the system in case a factory would burn down or similar. The price model for pharmaceuticals was adjusted for open care pharmacies, and the IT systems had continued need for improvements. While being tough competitors in public procurement, Hilmo describes the three suppliers as agreeing on these issues. They even tried to push for the Health Authority to institute a centre of calculation:

[149] In Swedish Myndigheten för samhällsskydd och beredskap (MSB)

> We have fought a lot to give the e-Health Authority a bigger mandate. They have this small scope. I have been to the National Board of Health and Welfare[150] myself 3–4 times and talked to them. And we have even formed a branch council together, Apoteket, Svensk Dos and us, for these kinds of issues, where we have stood up and said that there has to be someone who takes the overarching responsibility. This is a chain, everything from Inera's ordering systems, medical records system through the e-Health Authority, through us, dose pharmacies, and then via the healthcare, the municipalities. A chain such as this includes many actors; there has to be a comprehensive view of it. Now, every authority is acting on their tiny assignment.
>
> Hilmo, CEO, Apotekstjänst (2019).

By now, the Systemic Innovation programme's complexity is laid out, and it is time to give a brief elaboration on its systemic character. The Systemic Innovation actor constructed through this narrative is not only engaging in one innovation but in several. Together, these multiple innovation processes composed a new service which, from the outside, appeared to be very similar to the one offered before by the State Pharmacy. The IT systems, the logistic chain and the production facilities were new. So was much of Apoteket service's and Inera's IT infrastructure around it. Markard and Truffer's (2006) illustration of vertical and horizontal novelty is used to understand this innovation. Figure 22 shows how many different parts of the system had changed and continued to change as the innovation process went along (the development had far from stopped after the service started to be used. It was still evolving when the interviews were conducted in 2019).

[150] In Swedish Socialstyrelsen

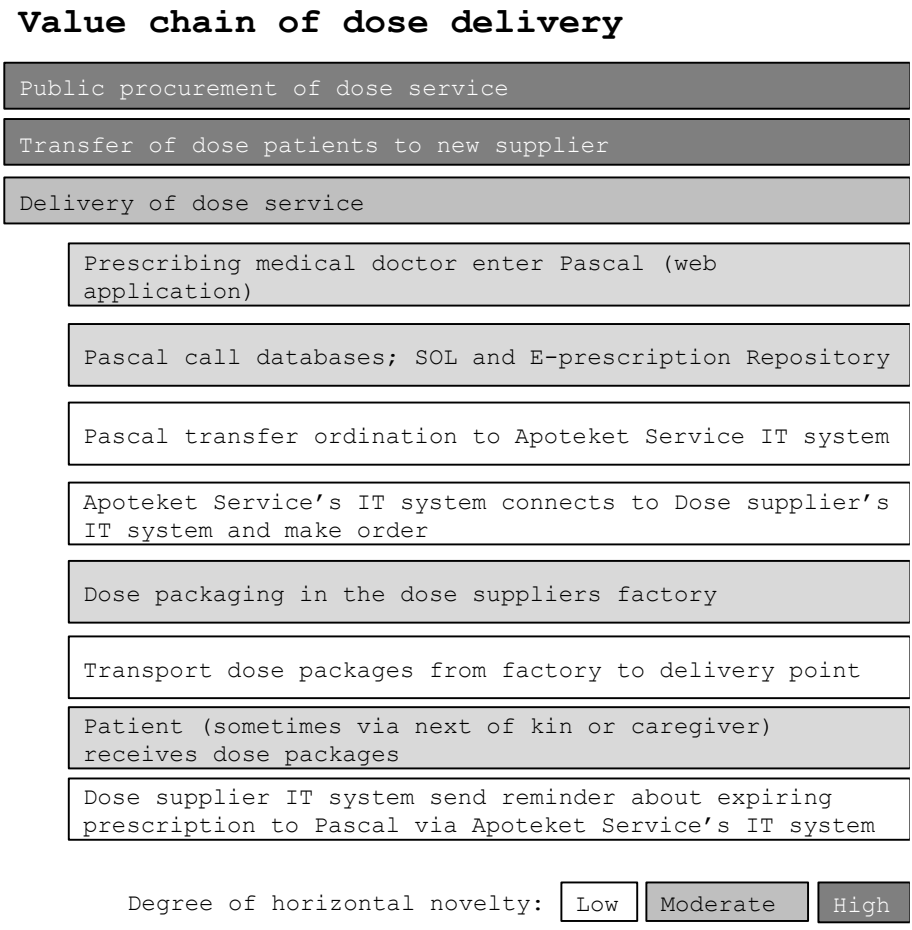


*Figure 22:* The Value chain of dose. Inspired by Markard and Truffer's (2006) illustration of vertical and horizontal novelty.

## 7.3 Resistance and accommodation during the roll-out of the new Dose system

The Dose-market was deregulated on the 1st of January 2013; by then, the public procurement processes were done. Apotekstjänst became the new dose supplier in the regions Halland and Västra Götaland (VGR). On the 17th of May 2013, the dose machine at Apotekstjänst was started, and deliveries began to be sent to the counties Halland, with around 6,000 patients (Gustafsson, 2013) and Västra Götaland with approximately 40,000 patients (Hildingsson, 2013a; Gustafsson, 2013). When Apotekstjänst took over, they did not take over after one single dose pharmacy; they took over from three different

Apoteket AB owned pharmacies. This meant that several new actors became interested and enrolled in the Systemic Innovation programme. The new actors were patients, the patients' next of kin, the prescribing medical doctors, the medical doctors' computers, etc.

The Systemic Innovation was an actor that was black-boxed for many of the actors now enrolling in it. Many believed it to be very similar, if not identical, to the old service offered by Apoteket. The black box of the Systemic Innovation, however, soon begun to leak from several holes. This narrative will focus on the network constructed by Apotekstjänst, based mostly on the requirement specification. That network would soon start to wobble and break down due to actors in the network engaging in non-compliant behaviour.

### 7.3.1 The SOL database engages in non-programmatic behaviour

The roll-out went very well the first week, according to Tomas Hilmo. Then, someone internally said to him:

> Tomas, the packages have started to come back ...we did not have the right addresses.
>
> Hilmo, CEO, Apotekstjänst (2019).

Some package did not arrive, and some came at the wrong time. This disrupted the network, and the black box of the Dose service started to leak. At first, neither the counties nor Apotekstjänst knew what had caused this, and the municipalities were unhappy about it (Olsson, 2019). Gerard Versteegh at Apotekstjänst and the Pharmaceutical Manager in Halland, Patrik Olsson, agreed that this was due to Apoteket AB having handed over an incomplete patient registry with the wrong addresses (Huntington, 2013; Wolters, 2013; Olsson, 2019). Maria Hassel, at Apoteket Service, disagreed with Olsson and Versteegh on this. She instead saw the trouble as connected to the SOL database and the new delivery addresses. When Apotekstjänst investigated the matter further, they realised that Apoteket AB's distribution was managed through different centrals all across Sweden. These centrals had their own address registries, hence the wrong information in SOL.

The wrong addresses were not part of SOL's identity when Apotekstjänst translated its identity from the requirement specification and the information from Apoteket AB and Apoteket Service. SOL was compliant with the programme as subscribed to the *prescription*: deliver information to Pascal and PharmaDos upon their request. Still, it did not subscribe to the *ascription* based on that prescription: 'a database that sends patients' addresses is a database with updated and relevant patient addresses' and was therefore non-aligned. The non-programmatic behaviour of SOL was silent the first week,

then it was noticed by the centre at Apotekstjänst and in the Healthcare system. SOL – was an actor that until this moment had been silent. When the parcels started to come back, the patients did not get their dose packages. The non-programmatic behaviour became a topic in the daily news. It was discovered that the information in SOL had been non-programmatic when enrolled in the State Pharmacy programme. The SOL information had not had the identity ascribed to it by the State Pharmacy. Correct addresses were assumed but wrong addresses were the case. This non-aligned behaviour had been accommodated by the delivery company Schenker, who used their own lists instead. In that way, the non-alignment became silent and invisible for the centres at the State Pharmacy. Schenker's strategy had worked as a provisional reparation of the black box that hid the dissidence within. When Apotekstjänst opened the black box and discovered the treason, they hastily decided to employ the same accommodation strategy as Schenker. They started to build up their own register (Hildingsson, 2013b). Svensk Dos also encountered this problem, and they had to put time and effort into rectifying the lists as well. (Manzoor, 2013b). Thus, when SOL prevented the Systemic Innovation from delivering to the patients, this non-programmatic behaviour restricted the agency of the Systemic Innovation programme.

### 7.3.2 PharmaDos engages in non-programmatic behaviour

The second leakage appeared on the 27th of May, ten days after the production began. It then became apparent that the IT system PharmaDos was engaging in non-programmatic behaviour. It contained a few severe bugs that created medication delivery errors (Gustafsson, 2013; Hildingsson, 2013c). Some dose bags simply had the wrong date printed on them. For example, they could be labelled Wednesday, when it should have been Tuesday (Hildingsson, 2013b; Huntington, 2013). It was non-compliant behaviour, as it did not subscribe to the programme's prescription 'print intake date on the dose bag'. It was also non-aligned, as it did not subscribe to the ascription 'a system with a functioning print intake date feature'.

This was registered by the meteorological apparatus of one of the decentralised centres of calculation in the Healthcare programme. But this did not reach a centre of calculation in the Systemic Innovation programme. On 27th of May, reports of 70 patients receiving the wrong medication came in (Gustafsson, 2013). These reports can be seen as resistance from the Healthcare programme, highlighting that the Systemic Innovation programme was not compliant with the Healthcare programme with which it attempted to merge. The reports can be seen as part of a distortion of the Systemic Innovation programme's identity, marking it as non-functioning and harmful for patients.

This interplay can be seen as a process of resistance and accommodation. First, PharmaDos starts to resist the Systemic Innovation programme by printing the

wrong dates. This actor was then operating in accordance with its own programme (following the script it was programmed to follow rather than the script intended by the Systemic Innovation programme). At first, the health programme did not see the actor (Pharma Dose) in the black-boxed Systemic Innovation but perceived the resistance as coming from the Systemic Innovation. When PharmaDos started to resist through it non-programmatic behaviour, it became salient, and thus the black box of the Systemic Innovation started to leak. PharmaDos's actions were also perceived as resistance to the Healthcare programme and prompted an accommodation strategy of writing deviation reports, i.e. accounts of when non-programmatic behaviour is registered. This can also be seen as movements of distortion of PharmaDos's and the Systemic Innovation's identity. It can also be interpreted as the Swedish Healthcare system restricting the agency of the Systemic Innovation programme as it attempted to prevent the current versions of the Systemic innovation (with the bug) to continue its operations.

Patrik Olsson, the Operational Manager for the Pharmaceutical unit in Halland (which, among other things, was responsible for the distribution of pharmaceuticals), was sceptical of the way in which PharmaDos was launched into the healthcare system (Hildingsson, 2013c).

> The deficiencies are many, and they are complex. In some aspects, especially around IT solutions, there has been too much optimism. We should have had more time to test everything before we let in new suppliers.
>
> Olsson, Pharmaceutical Manager in Halland
> as quoted in Hildingsson (2013c).

We can understand this as a call for more resistance (in the shape of movements of distortion and estrangement devices) to the Systemic Innovation programme. It was not resistance aimed to reject PharmaDos, but resistance aimed to prompt new enrolments and disassociations that would make PharmaDos fit better in the Swedish Healthcare actor-network. There was an investigation into if Apotekstjänst could have had a soft start, trying the system and their processes on a smaller group of patients while Apoteket AB kept a large bulk of patients. That was, however, not approved (Hildingsson, 2013c); a dose actor could postpone the roll-out with a week or so but nothing more (Manell, 2019).

Apotekstjänst's issue with the computer bug was, however, soon resolved. (Gustafsson, 2013). The accommodation strategy was to change the IT system (through new enrolments and disassociations) so that the errors no longer occurred, and the hopes were that this would be the end of the troubles with the new dose dispensing system (Gustafsson, 2013).

### 7.3.3 More non-programmatic behaviour form the SOL database

After a few weeks in full operation, Apotekstjänst could see that the real sales volume was about half of what was given in the public procurement's technical specifications. The SOL database was resisting its inscribed identity again; it did not contain as many patients as estimated in the requirement specification.

The technical specifications from 2012 did not guarantee the volume of pharmaceuticals, and the number 600 million SEK was an estimation of the value in 2012 when the technical specification was written (Eriksson, 2013). Apotekstjänst had assumed that these numbers were of a robust quality and had made dimensions for a larger sales volume and said that they would not have tied so much capital into this if they had known the real circumstances (Eriksson, 2013).

> We got lower volumes [55% of the number of patients that had been stated in the tender (Eriksson, 2013)]. Our financing was based on borrowing against invoices, and when we were unable to do this, it became difficult. We had to argue quite a lot with VGR and say that the volumes you promised were not correct, and we have built our financing on them. And it is not about dealing in court for a year; it is now we have trouble.
>
> Hilmo, CEO, Apotekstjänst (2019).

SOL had been assumed to be a registry of dose patients of a value of 600 million SEK. Now it rebelled against this description, and it contained fewer patients. The dissidence from SOL broke down Apotekstjänst's position in the network. Apotekstjänst did not want to associate itself with the network unless they could make a profit.

From the point of view of Apotekstjänst, SOL resisted the ascription made by the centre and became non-aligned. This is a matter of interpretation; Apotekstjänst had interpreted the ascription as a database containing 600 Million SEK worth of patients, while the ascription had been vague and stated as an estimate. An aligned behaviour in Apotekstjänst's view was for SOL to contain the required number of patients, i.e. not to only 55% of the number estimated in the requirement specification.

The non-compliance did not stop there; next came the production facility.

### 7.3.4 The production facility engages in non-programmatic behaviour

Apotekstjänst had understood the technical specification as requiring a capacity of handling 400 pharmaceuticals. Therefore, Apotekstjänst dimensioned their production according to that number. It turned out that the counties ordered more drugs than the 400 that fit into the containers in Apotekstjänst's machines (Österberg, 2013a). Consequently, when something was ordered that was not loaded into the machine, then that pharmaceutical was simply not included in the bag (Hildingsson, 2013b). Tomas Hilmo described it as follows.

> The contract stated that "you should have a capacity to handle a minimum of 400 pharmaceuticals". Then we dimensioned our factory to be sure to live up to that requirement, the requirement made in the public procurement. Then it turns out that the range of products consists of 7–800; thus, we had to go back and say "Yes, but stop here, that is what you should have written in the requirement specification". And then, there are no machines on the world market that can handle so much.
>
> Hilmo, CEO, Apotekstjänst (2019).

As an accommodation strategy for this resistance, Apotekstjänst hired 30 extra employees (Österberg, 2013a) to manually package the additional pharmaceuticals using trays (Hildingsson, 2013b). According to Per Manell, the other actor Svensk Dos had anticipated an extensive use of trays when they read the requirement specification (Manell, 2019), so they did not experience the same troubles. According to the Administrative Court of Appeals, the technical specification was quite clear about there being a possibility of more than 400 medications being needed. The requirement said that the supplier should be able to:

> Keep a capacity that enables dose dispensing of at least 400 medical preparations, through machines or in exceptional cases through conveyor-bricks….[]… to dose dispense the volumes that the client demands (Förvaltningsrätten, 2014).

The Court also believed that it was apparent that the requirement should cover the entirety of the Counties' pharmaceutical needs, whatever it turned out to be (Förvaltningsrätten, 2014). Apotekstjänst interpreted the specification to mean that 400 was a minimum that would enable them to run the required operations.

This can be seen as programmatic behaviour being determined in hindsight when the operation was up and running and the need for more than 400 pharmaceuticals became clear. The production facility at Apotekstjänst resisted

this newly determined prescription and therefore its behaviour was non-programmatic. It did not subscribe to the prescription 'enables dose dispensing for at least 800 pharmaceuticals'. In order to become compliant, Apotekstjänst had do change its production facility (by enrolling employees and a system of trays) so that it no longer subscribed to the ascription it had set up when constructing the Apotekstjänst actor-network. The original ascription had been 'mostly automatized process' but that was only possible when the prescription was 'enables dose dispensing for at least 400 pharmaceuticals'. In order to subscribe to the new prescription of 800 pharmaceuticals, the ascription had to change to 'semi-automatized process' as 30 humans and a system of trays was needed to reach the need for a higher capacity.

This non-programmatic behaviour, combined with the previously mentioned non-alignment of the SOL database (containing fewer patients than approximated in the requirement specification) made Apotekstjänst's association to the network break down. When the identity of SOL and the production facility were different than anticipated, Apotekstjänst no longer profited from passing the OPP: *Does every patient get a secure, high-quality pharmaceutical delivery where the lowest price is ensured through competitive tendering?* The economics of scale was no longer possible due to the dissidence of SOL and the production facility. This non-programmatic behaviour was not silent as Apotekstjänst had to accommodate it, the sound of this was loud and louder still when amplified by the media. The primum movens, however, did not show any sign of hearing this noise in the periphery.

Consequently, the agency of Apotekstjänst was restricted, and they got into financial troubles. Several invoices from pharmaceutical wholesalers were due to be paid on the 30th of July. If they were not paid on that date, those wholesalers would cancel their deliveries at once. According to the Pharmaceutical Manager in Västra Götaland, Karin Lendenius, cancelled deliveries from the wholesales would have meant a rapid termination of the county's deliveries, because Apotektstjänst did not have their own stock of pharmaceuticals (Hildingsson, 2013e). SOL's and the production facility's non-programmatic behaviour broke down the network and threatened to make Apotekstjänst non-compliant (not deliver medications in dose packages) and non-aligned (no longer a supplier with a business model for dose delivery that ensures sustainable returns) with both the Systemic Innovation and the Swedish Healthcare programmes.

The accommodation strategy from Apotekstjänst was to ask the counties to account for the extra costs that had emerged due to this (Hildingsson, 2013a). The CEO, Tomas Hilmo, called Karin Lendenius regarding their liquidity problems, and in the middle of June, the first emergency meeting was set up (Hildingsson, 2013e). From the counties' perspective, this request can be seen

as resistance to the Systemic Innovation programme. Karin Lendenius remembers a very turbulent time when this happened. Lendenius remembers the negotiations as:

> ...really agitated conversations, there was a lot of threats and stuff about terminating the deliveries if they did not get a certain number of millions and it was sort of Wild West negotiations.
>
> Lendenius, Pharmaceutical Manager, Västra Götaland (2019).

Apotekstjänst enrolled the Stockholm-based law firm Grönberg to help them enrol a pre-payment (Hildingsson, 2013a) from the Västra Götaland and Halland and avoid bankruptcy (Hallandsposten, 2013). When Apotekstjänst asked for more money, this can be interpreted as resistance to the Health programme as the price was no longer as low as initially stated. Therefore, it was doubtful if it was programmatic with the Swedish Healthcare and the Systemic Innovation programme's shared goal of providing adequate care cost-effectively. This could be doubted because comparing with other firms ability to deliver, given the lower number of patients and higher demand for pharmaceuticals, was no longer possible.

The region solicitor Göran Forss told the local newspaper Hallandsposten about the different accommodation strategies considered by the county faced with the interessement device: request for a pre-payment.

> We considered the possibility of contacting another supplier. Or to package the medical dose packages ourselves as well as taking over the distribution. But the timeframe was too short for any of these actions. To not put the patients' health in jeopardy, then there was no other alternative than go in with money.
>
> Forss, Region Solicitor, as quoted in Hildingsson (2013e).

And so they did. The regions' money from Halland and Västra Götaland were interested and enrolled in the Apotekstjänst programme when Apotekstjänst was granted a pre-payment of 3.5 and 21.5 million SEK, respectively.[151]

### 7.3.5 The prescribing medical doctors engage in non-programmatic behaviour

The trouble, however, did not end with the pre-payment from the two regions. The summer continued to be characterised by problems with the delivery of pharmaceuticals. The introductory quote was a taste of this story. Patients

[151] In addition, Apotekstjänst also got a retroactive compensation of 6.79 million SEK in November 2013. This retroactive payment was later declared invalid by the Administrative Court of Appeals (Förvaltningsrätten, 2014; Kammarrätten, 2014; Konkurrensverket, 2014).

were not getting their medication. This made them suffer (Genborg, 2013a) and sometimes risk their lives (Holst, 2014).

In August, it became apparent in Halland county that the reminder function in PharmaDos did not work (Thedin, 2013). Or rather, from the Apotekstjänst programme's perspective, the medical doctor did not keep track of when to renew their patient's prescriptions. In other words, the medical doctors were resisting their prescription (as Apotekstjänst understood it) and were non-compliant with the Systemic Innovation programme. On the other hand, the medical doctors thought that Apotekstjänst was non-compliant with both the Systemic Innovation programme and the Healthcare programme. From the prescribing doctors' perspective, Apotekstjänst did not subscribe to the prescription of sending out reminders to the medical doctors when a patient's prescription had to be renewed. Apotekstjänst was black-boxed for the medical staff. If they had been able to look inside the box, they would have known that the actor with, what they thought was, the wrong prescription was the IT system PharmaDos.

All deviations and patient threats in Halland were reported to one of the centres of calculation in the Healthcare programme, the Medical Products Agency (Genborg, 2013a). In the end, the responsible nurses in all six municipalities in Halland reported Apotekstjänst to this centre, and they thought that the quality of care was going down (Wolters, 2013). The Systemic Innovation programme was no longer compliant (sending out reminders) nor aligned (a system that included a reminder-system) with the Healthcare programme. The centre of calculation that noticed was the Medical Products Agency. The primum movens was still absent. In the requirement specification, the following was written as a demand:

> The supplier shall inform the Ordinator and the patient/patient contact person before (between two and three months earlier) the ordination expires as well as in connection with the last delivery, that no further deliveries will be made of the pharmaceuticals with a validity that expires if the Ordinator does not renew the ordination (Västra Götalandsregionen, 2012).

Even though this could be perceived as straightforward, the Pharmaceutical Manager in Halland, Patrik Olsson, thought that it had not been clear enough since the supplier misunderstood and did not supply this kind of functionality (Olsson, 2019). Olson later reflected that this could have been avoided if they had employed:

> ...some kind of straightforward checklist during the implementation where we in dialogue with Apotekstjänst would have said, "we have something here called reminder function, can you describe for us how you plan to implement it". And then have them check it off "ok, you have correctly understood how we want it to work".

Thus, Olsson suggests that more resistance would have been good. Here, in the shape of an estrangement device for the new IT system.

From the Systemic Innovation programme's perspective, the actor engaged in non-programmatic behaviour could be said to be an actor within Apotekstjänst – PharmaDos. The non-programmatic behaviour was not only a matter of misalignment or non-compliance, but it was both, and therefore, it became an anti-programme. This non-programmatic behaviour brought with it less control and overview over the pharmaceutical demand of the sick and elderly patients that needed the dose service, and it restricted the agency of the Healthcare System.

Halland is a relatively small region in Sweden. However, on the 16th of August, it became apparent that the reminder function in the dose system was failing in the much bigger region of Västra Götaland as well. This became apparent because a general practitioner Anna Holst (who was also mentioned at the beginning of this chapter) contacted the prominent local newspaper Göteborgsposten, which meant that she was not going to a centre of calculation but an actor outside the programme. This was not compliant behaviour; compliant behaviour would have been to make deviation reports to the centre of calculation – the Medical Products Agency. She was still aligned with the programme, however, as she was still a medical doctor working to help patients. She resisted the prescription but not the ascription of the programme. Which programme? From her perspective, she was only enrolled in the Healthcare programme; for her, the systemic Innovation programme was just one actor, the new dose supplier, enrolled in the Swedish Healthcare programme. She detected the anti-programmatic behaviour of PharmaDos (from her perspective Apotekstjänst). Her accommodation strategy was non-compliance with the Healthcare System, judging the centre of calculation inept at handling the anti-programme quickly enough. The general practitioner now appeared as an actor whose dissidence opened up the black box of the dose dispensing system, enabling people to read her worrying accounts in the newspaper:

> It is the worst failure I have experienced in my career. If people have not already died, then it is only a matter of time until they do so...[]... I have had between ten and fifteen patients during the summer who have suffered due to this.
>
> Holst, Medical Doctor, General Practitioner, Västra Götaland
> as quoted in Genborg (2013a).

The article in the Göteborgsposten turned out to be a wakeup call for many at the administrate side of the healthcare system in Västra Götaland (Genborg,

2013b). Anna Holst reflected upon the ignorance at the administrative side one year after in an interview, stating:

> It helped a lot [to reach out to the media]. It turned out that since we had so much to do when extinguishing all the fires, no one had time or energy to write deviation reports. So, the Medical Products Agency had no idea that it was this bad. They thought that this was going well...[]... then they got in a hurry, they were here with me a lot and looked at different examples of what had gone wrong because they cannot access Pascal [IT software that PharmaDos is connected to]. The Pharmaceutical unit cannot see into the system.
>
> Holst, Medical Doctor, General Practitioner, Västra Götaland (2014).

Thus, the non-compliance of contacting the media alerted the meteorological apparatus to the anti-programme of PharmaDos.

When Apotekstjänst gave a statement to the Health and Social Care Inspectorate (IVO)[152], they said their responsibility was to enclose a reminder with the dose delivery when there was 2–3 months left on the prescription. Subsequently, this reminder was received directly by the patient or the patient's contact person but not by the general practitioner. Apotekstjänst said that the patient/contact person was responsible for reminding the one prescribing the pharmaceutical that this prescription needed to be prolonged (Inspektionen för Vård och Omsorg, 2014a).

The resistance from the Healthcare system restricted the agency of Apotekstjänst, and as an accommodation they changed PharmaDos after a while to include reminders. They loaded the actor with another actor (the reminder function) to make PharmaDos and subsequently Apotekstjänst compliant and aligned with the Healthcare programme. To resolve the various IT problems, Apotekstjänst perceived that they needed to 'build the plane while flying' (Hilmo, 2019) and develop their IT solutions to a far more advanced level than they originally intended.

> Our system was developed from a principle that it actually did not contain so much intelligence; instead, it was a web interface towards the e-Health Authority [then Apoteket Service]. But we have been forced to build very much intelligence into our system and a few databases of our own, which really was not the intention from the start.
>
> Hilmo, CEO, Apotekstjänst (2019).

[152] In Swedish: Inspektionen för Vård och Omsorg (IVO).

## 7.4 Non-compliance detected by the centres in the Swedish Healthcare system

During the summer of 2013, the Swedish Medical Products Agency received several reports of deficiencies within the Apotekstjänst operations (Hildingsson, 2013d). When they made a planned inspection of the company at the end of the summer of 2013, these reports were considered. During that inspection, it became clear that there were several deficiencies in Apotekstjänst's operations (Hildningsson, 2013f). The centre distorted Apotekstjänst's identity and concluded that it was non-compliant with the Healthcare programme. Thus, the centre of calculation in the Healthcare programme detected resistance from the Apotekstjänst programme. The company then had roughly one month to develop an accommodation strategy, as well as enrol and disassociate actors to become compliant. In April 2014, Hallandsposten could report that the Medical Products Agency had approved Apotekstjänst's interventions (Hildingsson, 2014); thus, Apotekstjänst was once again viewed as being compliant by the centre.

In September 2013, another centre of calculation in the Swedish Healthcare system, namely the Health and Social Care Inspectorate opened a supervision case against Apotekstjänst, and in January 2014, they gave a verdict. They had asked Apotekstjänst for a statement concerning cooperation, self-monitoring and deviation handling (Inspektionen för Vård och Omsorg, 2014a). After reading through this statement, the inspection distorted Apotekstjänst's identity. It did not think that Apotekstjänst had understood its law-given responsibility (Inspektionen för Vård och Omsorg, 2014a). Thus, they did not see them as aligned in the Health programme since it had not subscribed to the ascription of 'caregiver'. IVO pointed out that the Dose delivery is defined as a healthcare service and therefore needs to follow the healthcare regulations. The company's responsibility is to handle deviations that make them fail to follow these regulations (Inspektionen för Vård och Omsorg, 2014a). IVO did not think that the company had worked according to a management system, that considers that it practised health and social care. In addition, they thought that Apotekstjänst had not ensured self-monitoring, focusing on patient safety. In short, they were bound by the law to have a management system for the systematic quality work regarding a safe dose service. IVO stressed that these obligations put on a caregiver could not be neglected. The duties had to be carried out even if it has not been clearly stated in a deal or because the caregiver thought that the monetary compensation was insufficient if they are expected to handle specific tasks (Inspektionen för Vård och Omsorg, 2014a). IVO found that Apotekstjänst had not subscribed to the prescription of the Healthcare programme. Therefore, it was seen as both misaligned and non-compliant. This anti-programmatic behaviour was detected by one of the centres of calculation (IVO) in the Healthcare system but not by the primum movens of the Systemic Innovation network.

Thus, IVO distorted Apotekstjänst's identity and said that it did not act as a caregiver. It gave Apotekstjänst a chance to avoid estrangement if it loaded its programme with new operations. This was evaluated later on, and in May the same year, IVO judged that the quality was now high enough to ensure patients' safety, and that the company now lived up to the responsibilty prescribed by the law (Inspektionen för Vård och Omsorg, 2014b). Therefore Apotekstjänst could remain in the Healthcare programme, now as a compliant and aligned actor.

## 7.5 Non-programmatic behaviour by SOL yet again

When the contract period ended for the dose actors, it was time to move the Dose patients from one supplier to another (after new procurement processes had finished). At this moment, the counties realised that they did not know which patients to move, i.e. which patients in the database should be updated with a new supplier. It then became apparent that they should have included in the requirement specification that the dose supplier should tell the county which patients they were paying for upon request. This information was not included in SOL (it was added long after the story in this chapter ended).

If they had been asked to help in the first public procurement, Apoteket Service could have told the counties about these circumstances. It was stipulated in the contract between the county and their dose supplier that the dose actor should give the county information about which patients to move. But they were only required to do this one time (Hassel, 2019).

Apoteket Service, however, had the information that was needed, but they were prevented from extracting it. The national registration address was available in the database E-prescription Repository. If they had run the register from SOL together with the register from the E-prescription repository, they would have obtained the information. However, Swedish law did not allow registers to be run together like that (Hassel, 2019). Furthermore, the E-prescription repository was regulated under the law of Prescription control; thus, it could only be used to control prescription. The law of personnel information registry regulated the SOL database; therefore, Apoteket Service was not at liberty to make searches in it.

The association to these respective laws (which are part of programmes themselves) was more robust than the Systemic Innovation programme's association. Thus, the databases resisted the interessement devices from the systemic Innovation programme. It would have been illegal to follow the Systemic Innovation programme's prescription and use the databases' information to move dose-patients, hence the databases' resistance. When SOL resisted the

Systemic Innovation programme in the previous section, it was done from an insider's position. It was resistance from an actor within the programme. This time, SOL's (and E-prescription repository's) dual memberships made them resist from outside of the programme. They resisted as members of other programmes – the Personal Integrity programme and the Prescription Control programme, see figure 23.

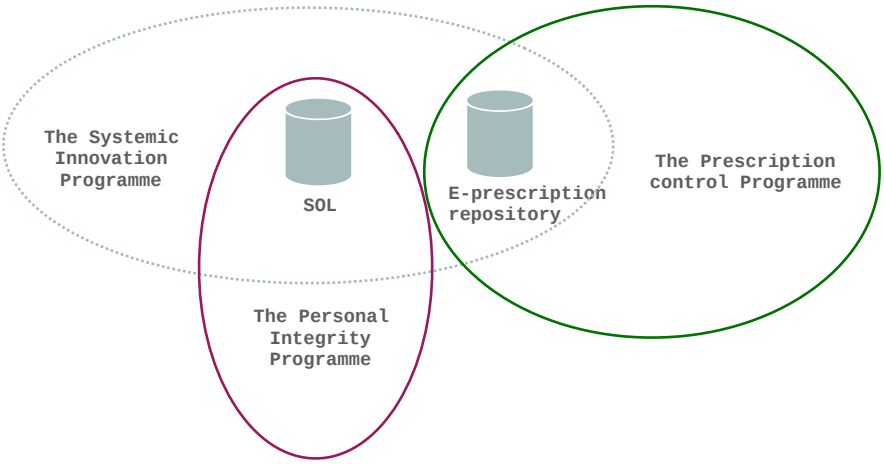


*Figure 23: Illustration of the multiple memberships of SOL and E-prescription Repository.*

To accommodate this resistance, the databases had to become a boundary object which enabled them to, once again, be fully enrolled in the Systemic Innovation programme. Maria Hassel remembers it as follows:

> What we did, as far as I remember and I could remember it wrong, is that the Counties had to ask for extracts from these registers while referring to a special paragraph. I do not remember which one. Our legal experts could then say, "ok; then we will overstep this law of public confidentiality because that law is mixed into this". Superb to be a public authority. Then, we can make an exception for this purpose and extract the information on that occasion, but ONLY on that occasion.
>
> Hassel, Senior Advisor and International Coordinator, ApoteketService (e-Health Authority) (2019).

The solution with a boundary object was only temporary. In the following years, the solution for this has been built into the system. The SOL database was loaded with the national registration addresses. The counties decided that they pay for people who are registered in their county. The requirement specifications also began to stipulate that the dose actors must provide the required information if the dose supplier is changed after the contract period had ended. (Hassel, 2019).

## 7.6 Summary of chapter and the findings

This chapter has elaborated on five main programmes and, within them, a number of sublevel-programmes. This summary briefly presents them and then describe the findings of this chapter.

*The Neoliberal programme* was the programme that enrolled the Swedish Government. This programme is described as a mega-programme, i.e. a very large programme that includes a vast number of actors across the world. The enrolment in this programme prompted the Swedish Government to become the primum movens of a new actor-network; here called the Systemic Innovation.

*The Systemic Innovation programme* had the goal to transform the former public Dose service into a well-functioning market with new actors, competition on equal terms, and secure and safe pharmaceutical delivery where consumers receive good service and availability. The Systemic Innovation programme enrolled a number of actors, each with its own programme. Some of the most relevant actors in this were: the new dose suppliers (Apoteket AB, Apotekstjänst and Svensk Dos), the state authority Apoteket Service, IT systems and databases, the Swedish counties, and the prescribing doctors. This chapter has focused on the actors associated with Apotekstjänst's roll-out in the counties Västra Götaland and Halland. Just as MedTech was enrolled in county-networks in chapter six, the actor Apotekstjänst simultaneously got enrolled in the Systemic innovation network *and* county-networks. The supplier was aligned and compliant as long as it contributed to fulfilling the counties goal in the manner prescribed by its programme. Their programmatic behaviour was contingent on them simultaneously fulfilling their own goal of generating revenue and the client's goal. Thus, they were simultaneously enrolled in their firm's programme, the Systemic Innovation programme, and (through its enrolment in the county programmes) the Swedish Healthcare programme.

*The Swedish Healthcare programme* was the programme of the actor called the Swedish Healthcare System, and it had a goal defined by the Swedish healthcare law. The primum movens wrote a proposition, which was the interessement device that made the Swedish Healthcare system enrol in the Systemic Innovation programme. The Systemic Innovation programme merged with the Healthcare system, and added and rejected actors in it.

The Systemic Innovation moved in a context with many programmes, and it intercepted two of these that had enrolled the SOL database, namely *the Personal Integrity programme* and *the Prescription Control programme*.

This chapter supported the six findings of innovation resistance in chapter six. In accordance with chapter six, it illustrated that movements of resistance shape the Innovation programme by restricting its agency and prompting accommodation. It also showed that the Innovation programme is not necessarily important for the Other programme (it was not crucial for the Personal Integrity programme and Pharmaceutical Prescription programme). In similarity with the Aquatic Organisms programme in chapter six, the Personal Integrity programme and the Pharmaceutical Prescription programme, had another goal than the Systemic Innovation programme. The laws enrolled in these programmes were written with the outspoken intention to direct activities in society (including firm-based innovation activity) in a certain way, consequently hindering something perceived as less desirable or outright harmful. This chapter identified a wallflower in the problematisation phase (the SOL-services) that appeared later and broke down the network. Just as the resistance from the Aquatic Organisms (wallflower in Ch. 6), the resistance from this wallflower prompted reflection and reconsideration. Moreover, the chapter made eight new findings.

(1) Resistance within the actor-network is not necessarily visible from the outside. When a resisting actor is enrolled in an innovation programme and engages in behaviour *non-aligned* with the Innovation programme, it resists the ascription made on it by the innovation actor. One example of this was the SOL database. It did not subscribe to the ascription: 'a database with updated and relevant patient addresses' and was therefore non-aligned. A resisting actor engages in *non-compliant* behaviour when it resists the prescription given by the Innovation programme. The centre does not necessarily notice this kind of resistance. The resisting actor is not entirely disassociated from the innovation actor. To the outside world, the resisting actor might still appear as fully enrolled and domesticated.

(2) Behaviour can be labelled as resistance in hindsight. What constituted misaligned and non-compliant behaviour for the different actors was not clear cut in this chapter. The macro-actor often postponed the classification of what was programmatic or not (in line with Helgesson and Kjellberg, 2005/2020). When the Systemic Innovation met the Swedish Healthcare programme and other programmes such as the Personal Integrity programme, it faced resistance or objections that prompted it to judge certain behaviours as non-programmatic. One example of this is when it was discovered that the database SOL did not contain 'patients county information'. This was not part of SOL's ascription. Still, it was in hindsight judged as non-aligned behaviour as other actors within the macro-actor had counted on it being there. This was discovered about two years after the first procurement of Dose when it was time to change the Svensk Dos suppliers.

(3) When an Innovation programme changes, an enrolled actor's memberships in multiple programmes can prompt it to resist the Innovation programme and restrict its agency. When it was discovered that the 'patients' county information' was a neglected actor in the Systemic Innovation programme (not part of SOL), the Systemic Innovation tried to interest and enrol SOL and the database E-prescription repository. If these two actors were enrolled, they would have been able to interest the 'patients' county information' (if the two registers were run together, that info could be found). SOL was simultaneously enrolled in the Systemic Innovation programme and the Personal Integrity programme. E-prescription repository was simultaneously enrolled in the Systemic Innovation programme and the Prescription Control programme. These two programmes had enrolled a law each. Laws carry associations to the government and the violence monopoly of the state; therefore, they were more robust than the Systemic Innovation programme. The Laws stated that these registers could not be run together and that the information could not be used in this way. Therefore, both SOL and E-prescription Repository resisted the Systemic Innovation when it strived to enrol them and use them to enrol the 'patients' county information'. They used estrangement devices to disassociate themselves from the Systemic Innovation. The Systemic Innovation's identity was distorted and called illegal, and the legal expertise of Apoteket service became the estrangement device. In this manner, the agency of the Systemic Innovation was restricted by the movements of resistance from the Prescription Control programme and the Personal Integrity programme. However, the Systemic Innovation did not succeed in its attempt to restrict the agency of the Prescription Control programme and the Personal Integrity programme.

Thus, when SOL engaged in non-programmatic behaviour (did not contain 'patients' county information' and was, in hindsight, considered misaligned with the programme), it became apparent that simultaneous participation in more than one programme included prioritisation of the most robust programme. The power relations became important when the goals of the different programmes misaligned. The association with the laws was more robust than the association with the Systemic Innovation programme. Therefore, the actors resisted the attempt to enrol the 'patients' county information', not because it was non-programmatic with the Systemic Innovation but because it was non-programmatic with the Prescription Control programme and the Personal Integrity programme. Therefore, the Systemic Innovation had to enrol a special paragraph to interest and enrol SOL and E-prescription Repository. They could then be used to enrol 'patients' county information'. The special paragraph's enrolment enabled SOL and E-prescription Repository to once again be boundary objects and enrolled in both the Systemic Innovation and their respective Other programme.

(4) Movements of resistance within the network restrict or enable actors' agency, shaping the innovation actor. For instance, the Systemic Innovation

started to leak when the actor PharmaDos engaged in non-programmatic behaviour. This actor started to print the wrong addresses on the packages of dose rolls. Thus, it did not subscribe to the programme's prescription and was non-compliant with it. It resisted the prescription and ascription from the Systemic Innovation programme. The reason behind this was a piece of code. The piece of code became the estrangement device placed between the PharmaDos and the Systemic Innovation. This non-programmatic behaviour was noticed by actors outside of the network, i.e. the media. Thus, the black box was leaking. From the perspective of the media, the leakage made Apotekstjänst visible. PharmaDos remained largely invisible. Resources were enrolled to replace the treacherous piece of code; this became the accommodation to the resistance from PharmaDos. The piece of code was distorted and called 'a bug', and thus an estrangement device (in the shape of a programmer deleting the code) was put up to protect the Systemic Innovation from the unwanted actor (the rows of code called 'the bug'). When the programmer was enrolled, (s)he became the interessement device that enabled the new code's enrolment.

The Systemic Innovation started to leak on numerous occasions. The non-programmatic behaviour of the rows of code in PharmaDos was the second leakage. Before that, the SOL database had engaged in non-programmatic behaviour, and it was still leaking when PharmaDos's non-programmatic behaviour became apparent. When PharmaDos was once again black-boxed, the SOL database engaged in non-programmatic behaviour again. This prompted new loads to be added to the Systemic Innovation to close the leaking boxes. Therefore, the innovation process can be understood as a series of movements of resistances (non-programmatic behaviour) – making a hole in the black box, followed by an accommodation process (a series of enrolments and rejections) to once again black box the actor. This example illustrates how actors' agency alternately being restricted or enabled influences the shaping of an innovation programme.

(5) Centres of calculation can resist an actor in an innovation network, restricting its agency in one direction and directing it in another one. The Healthcare System used centres of calculation to oversee and manage its network. The deviation reports sent to the centres (the Inspection for Health and Social Care and the Medical Products Agency) were used to detect non-programmatic behaviour. These centres discovered non-programmatic behaviour and distorted the identity of the actor who engaged in it. However, the distortion of the actor's identity did not automatically lead to rejection; the goal was domestication. Distortion was, in that case, due to a centre of calculation discovering that the actor did not follow the programme's ascription and/or prescription. When IVO distorted the identity of Apotekstjänst, this distortion was not immediately followed by an estrangement. IVO gave Apotekstjänst time to load more actors to its programme to once again be compliant and aligned with the

Healthcare programme. In this way, the centre of calculation could detect resistance within the programme and use distortion to prompt the dissident actor to load its argument to once again be deemed aligned and compliant. The centre could, in that manner, detect resistance and domesticise a traitorous actor by pushing back (resisting) the behaviour through a distortion of the actor's identity.

(6) Movements of resistance can be used by other actors in the network (not just centres of calculation) to identify the seemingly domesticated but resisting actor. When the meteorological apparatus of the centre of calculation in the Swedish Healthcare system failed, another seemingly enrolled actor engaged in dissident behaviour to help the centre detect and domesticise the non-programmatic behaviour. In this chapter, a medical doctor noticed that her patients were not getting their medication before the Medical Product Agency had captured the deviance through deviation reports. The medical doctor alerted the press. The centre of calculation learnt about the non-compliance through that channel, instead of the, at the time, non-functioning meteorological apparatus.

(7) Resistance can be used by the Other to safeguard it from unwanted enrolment of an innovation actor. When Apotekstjänst became enrolled in the Systemic Innovation programme, this translated the Systemic Innovation programme. It was no longer the same as before the enrolment. Apotekstjänst became an actor inside the macro-actor. The interessement device (the invitation to make bids in the public procurement) of the Systemic Innovation programme would have failed if Apotekstjänst had not seen that its goal of making a profit was achievable in the Systemic Innovation programme. Suppose the Systemic Innovation programme had not judged that Apotekstjänst could be aligned and compliant with the Systemic Innovation programme. In that case, it would have distorted Apotekstjänst's identity and used an estrangement device (not letting them win the bid and sign the contract) to keep it out of the programme. Thus, an estrangement device can be used to protect a programme against unwanted enrolment. It is a device that an actor places between itself and an actor with which it does not aspire to be associated. Galis and Lee (2014) call it a device to lock out enemies.

(8) Resistance can be desired, and the absence of it regretted by the actors in the innovation network. The actors can crave resistance that restricts their agency in one direction and at the same time enable their agency in other directions. In this chapter, there was a call for "someone" to step in and halt the Systemic Innovation process on at least two occasions (when the SOL database was not ready and when the IT systems were approved late). The new system's speedy implementation was forced upon most actors in the system, and there was little room for actors in the periphery to resist. Viewed from the

periphery of the Systemic Innovation network, the centre seemed absent. Several actors talked about the absence of a coordinator with overacting responsibility for the Systemic Innovation. The suppliers, the county representatives and the authority personnel all called for "someone" with an overarching responsibility to step in and pose resistance to the innovation process to improve it in a way the peripheral actors were unable to. The peripheral actors thought a centre could pose resistance that would make the Systemic Innovation compliant and aligned with what they saw as good for society. The actors wanted an overarching centre to ensure that the market was adapted to Dose and that consistency issues were handled. The CEO of Apotekstjänst worried about what would happen to the patients' safety if a dose factor burned down. None of the suppliers had the capacity to swiftly take over in case of such an event. The organisational form of profit-generating firm put constraints on them, making it hard to self-impose this resistance. They could not make their operations as secure as the Swedish Civil Contingencies Agency (MSB), thought necessary, unless the counties paid for it. If they would try to reach this societal goal without getting paid for it, they would most likely lose their business as their competitors would win because they were offering a lower price. So, they pushed the National Board of Health and Welfare to give more mandate to the e-Health Authority to make it a centre of calculation. This wish for the centre to manage and overview the programme lingered for six years after the market had been restructured and reformed. The Swedish Civil Contingencies Agency, the three suppliers and the e-Health Authority highlighted the increasing need for the centre to establish some kind of overarching centre of calculation to ensure a safe pharmaceutical delivery.[153]

With that, the narrative leaves the healthcare system and moves on to the energy market.

[153] This bears a resemblance to the call for regulation from energy companies to the Bush Administration to reduce global warming (Seattle Times news services, 2007; The U.S. Climate Action Partnership, 2007) and the recent call from the VP of Volvo to ban gasoline cars by 2030 (Campbell, 2020).


*Figure 24: Humoristic illustration of an innovation process that could not be stopped. Illustration: Rickard Fornstedt. Idea: Helena Fornstedt*

# 8. Innovation resistance in the energy market

When entering a dark room and pressing the button directly beside the door, almost everyone takes for granted that the room will be lit. That assumption can be referred to as black boxing and includes a complex system of socio-technical artefacts working seamlessly together. The electricity system is seen as a black box, and few pay much attention to what is inside. It does not warrant attention until that day when the bottom is pressed, and the room remains in darkness. After changing the light bulb and the safety fuse to no avail, attention might shift to the myriad of associations that enable electricity use. When an actor starts to ponder where the error might be, the black box starts to leak, and the actors and the associations inside it become visible to us. To keep this black box closed is one of the goals of a programme of action here called the Grid programme. This chapter[154] begins by briefly describing this programme and how it was changed by the restructuring and reform inspired by Neoliberalism. After that, a few conflicting programmes of actions within a developing firm operating in this market will be examined. The identified programmes in this chapter are (1) the Grid programme, (2) the Innovation Development programme within which were sublevel-programmes such as the System programme, the Core programme, the Linthaven Factory Implementation programme and the Greenhill Factory programme and (3) the Innovation Diffusion programme.

## 8.1 The Grid programme

A Grid programme can be found in various forms in any country with an electrical grid. Its goal is a safe and cost-effective electrical grid. The word safe here means that it is safe for the people handling it and that it provides a secure

[154] The study related in this chapter is based on 47 interviews conducted during 2009, 2014 and 2015. The interviewees were construction managers, engineers, project managers, procurement managers, sales managers, specialists, technology executives and technology managers. They were employed at the supplier of high voltage product, here called BigE, consultancy firms, Utilities and Engineering, Procurement, and Construction (EPC) companies (more information about the data collection is available in appendix A1.1.1). References to the interviewees are made in the text using the Harvard system. The company BigE agreed to participate in this study on the premise of anonymisation. Therefore, all interviewees and the name of the technology are anonymised. BigE is a multinational company focusing on high voltage products employing around 140,000 people.

supply of electricity with as few blackouts as possible.[155] Utilities are often described as prioritising a secure electrical grid that can work for 40 years, at least over active technology development (Evans, 2014; Stevens, 2015; Brown, 2014). The programmes of action for a Utility are not primarily to facilitate innovation activities. They want a secure grid and technology that can work for at least 40 years (Brown, 2014); thus, there is an extremely high focus on reliability. Traditionally, it has also been path-dependent with a preference for incremental innovations (Hughes, 1987).

Before the 1990s, a big (often state-owned) Utility handled generation, transmission and distribution in a country. Due to the neoliberal trend of restructuring and reforming markets, this changed in the 90s. The restructuring of the market led to a vertical fragmentation of the value chain downstream (Sköld, et al., 2018). In addition, there was a horizontal fragmentation when the control and management of the construction of new high voltage stations and power grids moved from the often state-owned Utilities to consultants and contractors (Berggren, et al., 2001). The market now consists of a flora of clients, consultants and contractors constituting the customer-side for suppliers of high voltage products. Thus, this has replaced the close dyadic collaboration between supplier and utility (Fridlund, 1999); instead, the suppliers have to handle a client network. An illustration of the fragmentations can be found in figure 25. Each separated entity in the picture represents a firm following its own programme of action.

[155] For the agents in Sweden, the goal is also claimed to be that the transmission should be environmentally sound (Svenska kraftnät, u.d.; Vattenfall, u.d.), but there has been little evidence of this in the empirical material. So, here the goal is described as the grid needing to be safe and cost-effective, with the priorities in that order.

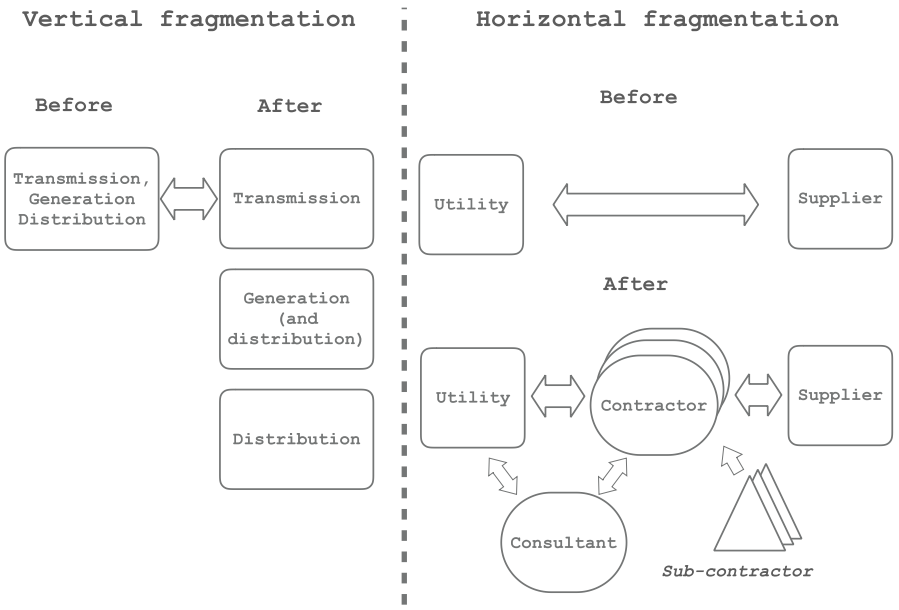


*Figure 25: Vertical and horizontal fragmentation of the value chain after the deregulation (Picture made by David Sköld).*

Figure 25 illustrates that the market change made actors divide, and new actors enrol. The new actors were firms that the Utilities hired to do work they previously did themselves. *Engineering, Procurement, and Construction* (*EPC) companies* primarily built new substations, and *Consultancy firms* aided the Utilities with project management and writing requirement specification for public procurement (Roberts, 2016). These companies had their own programmes with the goal to make a profit by delivering according to the clients' demands (Roberts, 2016). The market change also opened up new markets and introduced increased competition on existing ones (Simon, 2014; Simon, 2015).

This chapter will follow actors within the macro-actor BigE, a multinational company so large that one interviewee compared it to a state (Jackson, 2013). BigE, among other things, produces high voltage products and mostly caters to publicly owned clients. They perceived resistance to new technology as a normal part of the market (Brown, 2014). Following the change in the energy market, the Utilities on BigE's home-market started to interpret the Grid programme somewhat differently than in pre-deregulation times. They no longer saw development in close collaboration with a supplier as a prerequisite for a safe electrical grid.

BigE develops numerous kinds of technology used in the electricity system. This chapter will focus on a certain kind of technology, namely high voltage products and circuit breakers in particular. A breaker can be found in a power substation. A substation primarily does three things: (1) it has transformers that step down the transmission voltage to distribution voltage. After electricity has been transported through the national grid to a city grid, the voltage must be lower to work in the city grid, (2) It has circuit breakers that can be described as an on and off switch. The breakers make it possible for the substation to disconnect from the transmission grid or a specific part of the grid, and (3) it has a 'bus' that makes it possible to split power distribution into multiple directions (Brain & Roos, u.d.). A very simplified picture of this can be found in figure 26.

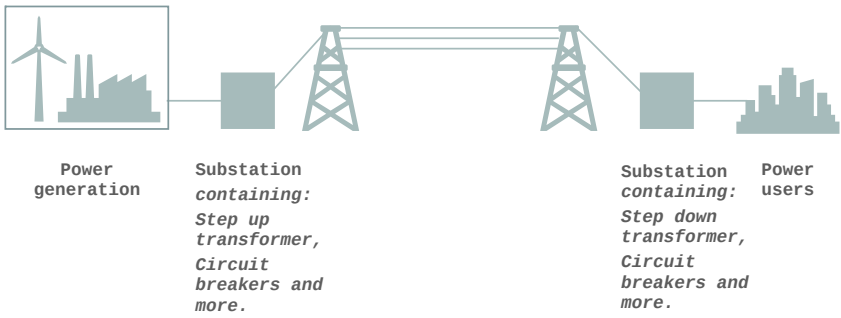


*Figure 26: Very simplified picture of the power grid in which breakers and transformers are a part.*

The new neoliberal market structure led BigE to focus on reaching the newly opened markets and on lowering prices to match the low-cost competitors emerging.

## 8.2 The Grid programme in low-cost countries

At the beginning of 2000, a BigE factory in SouthAsianCountry was practically standing still. The reason for this was that the branch office in SouthAsianCountry was not able to sell breakers. In that region, the Grid programme was distorting the identity of BigE's breakers, calling it too expensive, and the estrangement device used was to refuse to buy the breakers, leading to a rejection of the costly high-quality technology offered by BigE (Turner, 2015; Turner, 2009). BigE was not aligned with the SouthAsianCountry's Gird programme's goal of being cost-effective, and the identity of the technology did not fit with the Grid programme. BigE saw similar resistance from the Grid programmes in EastAsianCountry and countries in central Europe. Thus, they were losing market shares in all those regions where it otherwise would have been possible to sell significant volumes. These

regions were often referred to as, low-cost countries, and BigE wished to be enrolled in their programmes as a supplier, or to put it differently, they wanted to enrol the low-cost countries as clients. As an accommodation strategy to the resistance, BigE decided to load their programme with a new actor – a low-cost breaker, which is illustrated in figure 27.

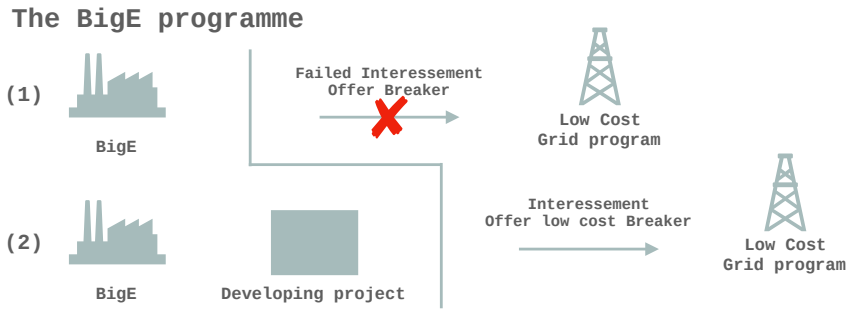


*Figure 27: BigE's attempt to interest and enrol the Grid programmes in Low cost countries.*

This actor had to be developed, which led to an Innovation Development programme for a low-cost product that would hopefully be interested and enrolled in the Grid programmes in the low-cost countries (Turner, 2015; Turner, 2009).

## 8.3 The Innovation Development programme[156]

The Innovation Development programme needed to avoid the distortion and estrangement device used by the low-cost Grid programmes. Its primum movens was a group of sales managers at BigE who saw this as a vital area of development that could lead to increased sales. The programme aimed to develop a new breaker that would meet the demand for a low-cost version of one of the BigE breakers. The relevant actors in this programme were identified as: (a) the Steering committee, (b) the stage-gate model, (c) The Gate Reviewer (d) the System project, (e) The Linthaven Factory implementation project, (f) the Core project and (g) The Greenhill Factory implementation project. Each of these had their own programme, supposedly compliant and aligned with the Innovation Development programme.

[156] It should be noted that the story told here in parts has been presented before in Palm and Lindahl (2015), with focus on the project as a work place and the conflicting agendas from line and project organisation as well as Hällgren and Lindahl (2017) with focus on coping strategies in relation to weak governance structures. This chapter does not draw on those findings but presents a different perspective on the story and uses a larger set of interviews to do so.

### 8.3.1 The Steering Committee and the Gate Reviewer

The Innovation Development project was managed by a Steering Committee that consisted of people from different departments such as procurement, quality and management (Edwards, 2009). Developing firms operate with limited resources, and they need to make sure that the available resources are used efficiently and strategically. One way in which firms often institutionalise this is through the usage of the stage-gate model. It is a tool for project portfolio managers to use when deciding which projects to continue developing and which ones to drop (Smith, 2007, pp. 52-53). It is also used to monitor and manage innovation projects. In this project, it was used by the Steering committee and the project teams to plan and structure the project. The stage-gate model was designed to evaluate the project's development continuously, and in each gate, a go-no-go decision was made by a steering committee. The committee based these decisions on the development of the actual project by assessing the environment around it. For instance, they could discover changing conditions in the market, technically or internally, which influence the project's likely success (Smith, 2007; Turner, 2015). Thus, each gate was set up to guard against immature projects progressing, meaning that the purpose of each one of them was to function as a filter, only letting projects proceed when they had met the required goals (Edwards, 2009). A simplified version of the one used at BigE is presented in figure 28.

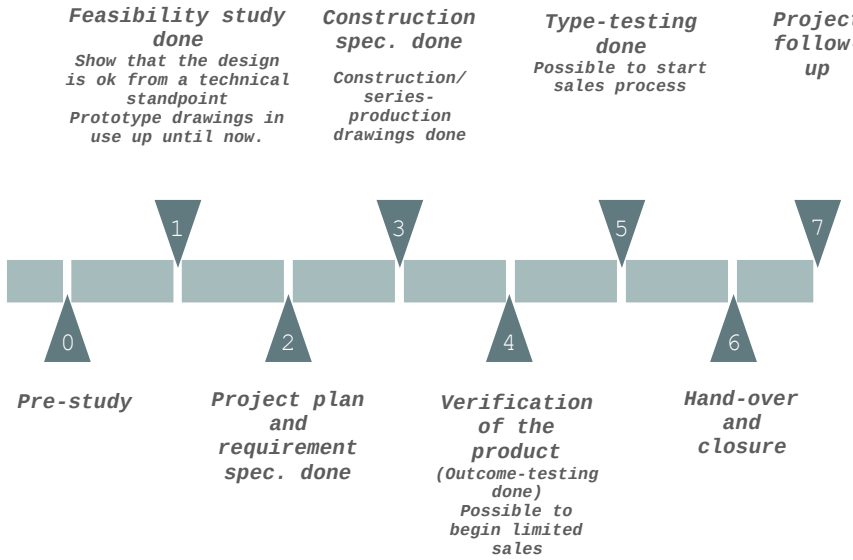


*Figure 28: The stage-gate model used for the Breaker development project*

Before each stage gate meeting, an assessor called Edwards prepared a report where he wrote down the results from his investigation of the project. He checked if the project had fulfilled all previously decided requirements for passing a gate. He highlighted the things that had not been finished for the

steering committee, and he also made a recommendation at each gate stipulating if he thought the gate should be passed or not and with what considerations (Edwards, 2009).

The stage-gate model was a non-human actor, enrolled in the Innovation Development programme to offer resistance. In each gate, there was an estrangement device that could be used when needed. After input from the gate reviewer, the Project manager and the steering committee would discuss the project's progress. The steering committee would evaluate if the project had unfulfilled requirements. If the requirement were not reached, the project would not pass the gate and remain in the previous stage. The Innovation project would then be non-compliant with the BigE Programme (due to not fulfilling the requirements on time). But it would still be aligned with the overacting BigE goal (since it would still be seen as an innovation programme likely to bring profits for the firm). Therefore, the accommodation would be to fix the required requirements to escape the status of non-compliance. This detected non-compliance could break down the network, but it could also prompt enrolment of more actors (for instance, more resources of some sort to accommodate the extra time needed) that could stabilise the network. The gate-meetings were also designed to evaluate if the project was nonviable. The discussions could distort the project's identity and portray it as 'unviable'. If the committee would make a decision based on this, then the decision would become the estrangement device that estranges and rejects the project from the BigE programme, i.e. the project would be discontinued.

### 8.3.2 The Core programme and the Greenhill Factory programme

One team developed the core of the breaker in the town Swem (Turner, 2015; Thompson, 2015). To lower the costs, BigE had to enrol a technological solution design they previously had considered too complex to reach high-performance levels. According to Peters (2015), they worked according to the principle 'keep it simple' and now reluctantly had adopted the principle of 'keep it complicated'. The initial plan was for this breaker to be 20% cheaper than the current offering. The lower quality was deemed tolerable since they would only sell to countries where the weather conditions did not demand higher performance levels. The relevant actors enrolled were the project manager Nichols, the R&D manager and resource owner Brooks, the specialist and deputy project manager Walker, the staff manager Foster, the breaker designer Pearson, and the development facility in Swem.

Swem's core project was designed to end at gate four when an application project was supposed to take over (Nichols, 2009). Thus, their goal was to develop a core for the system project and ensure their technology was ready

for type test[157] after passing gate four (Walker, 2009); they did not care much about how it would later be produced (Edwards, 2009).

The factory that was going to produce the core was situated in Greenhill in northern Europe, while the Core programme was in Swem in central Europe (Turner, 2015; Simon, 2015). The Greenhill factory was supposed to help the Development programme find suitable suppliers for the material needed to produce the core. Some relevant actors were Taylor (who was responsible for tools and the workshop) and the factory.

### 8.3.3 The System programme and the Linthaven Factory implementation programme

In its entirety, the breaker was developed in Linthaven, incorporating the core developed in Swem to the overall system design (Turner, 2015; Simon, 2015). This programme had predefined goals that the actor followed, namely developing a new breaker that could pass all required tests and cost at least 20% less than current offerings. The System programme consisted of the actors developing and implementing the entire breaker system. The relevant actors enrolled were the project manager Turner, the R&D manager and resource owner/project portfolio manager Wilson, the construction engineers: Fletcher and Griffiths, as well as the development facility in Linthaven.

The factory that would produce the system was in Linthaven, the same town as the System Development programme (Turner, 2015; Simon, 2015). An implementation programme involving the Linthaven factory ran in parallel with the System Development Programme, and this begun when the system project was in gate three. Some relevant actors were: The project manager Zacharias for the implementations, the project manager Thompson for tools and the workshop, and the factory in Linthaven.

In summation, the following prescriptions were made for the relevant actors. The core project should develop a breaker core using the 'keep it complicated' technical solution. The core factory had the task of implementing a product line for the new core and find suppliers for the materials needed. The system project should develop a 20% cheaper breaker and manage the project. The system factory should implement a product line for the new breaker system and find suppliers for the materials needed. The steering committee should ensure that the project(s) went according to the project plan and assess it according to the stage-gate model. The obligatory passage point (OPP) for this project was: *Is the new Breaker 20% cheaper and of acceptable quality?* The network, as described in this section, is illustrated in figure 29.

[157] Test to ensure that the technology meets standard requirements for operating in an electrical grid.

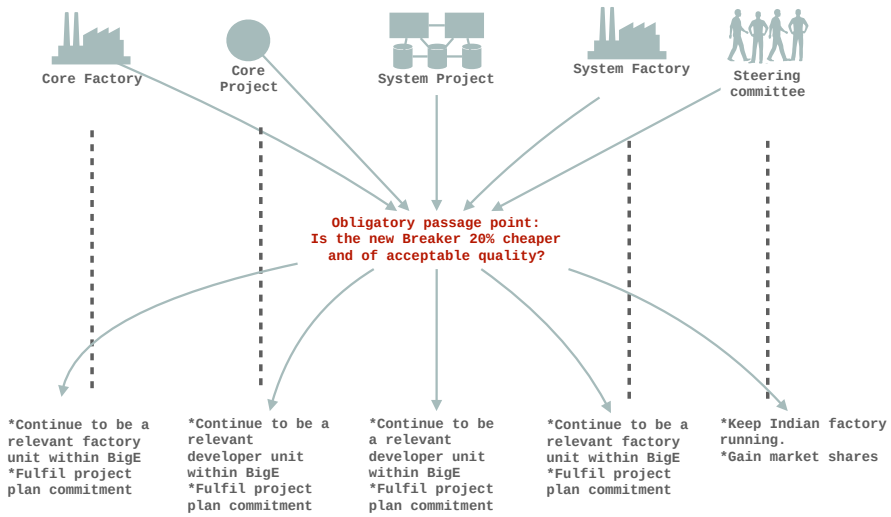


*Figure 29: The actor-network of the innovation development actor*

However, this network eventually broke down.

## 8.4 The Steering Committee engages in non-programmatic behaviour

In the fall of 2007, the grid operator in an African country interested the steering committee of the Innovation Development programme in its Grid programme. The interessement device was the news that the grid operator would buy a large breaker order the following year. Many managers at BigE saw this as a great and rare opportunity. The African Grid programme's pull at the steering committee changed it. Once interested in the African country deal, it no longer focused on developing the new breaker according to the project plan. Instead, it started to mostly focus on using actors in the Innovation Development programme to win the African bid. From the perspective of the network, the steering committee was engaged in non-programmatic behaviour. The steering committee and other seniors at BigE now formed another programme of action, the Innovation Diffusion programme. The steering committee was still officially a part of the Innovation Development programme, but its priorities were with the Innovation Diffusion programme and, thus, it became non-programmatic with the Innovation Development programme.

The Innovation Diffusion programme strived to win the African country bid. In contrast, the Innovation Development programme wished to continue the technology development by fulfilling the predefined goals set in the stage-gate

model. Both programmes of actions were sympathetic to each other and understood the value and importance of the other goal. However, they prioritised them slightly differently, and they did not share the goals. The Development programme did not have the goal of selling breakers, only to develop one. The Innovation Diffusion programme did have the goal of developing a breaker but not necessarily in a way that was compliant and aligned with the Innovation Development programme. The Innovation Diffusion programme strived to develop the breaker quickly and get marketing material so that it could be sold. In contrast, the Innovation Development programme wanted it to be a 20% cheaper breaker and follow the original plan.

When the steering committee enrolled in the Innovation Diffusion programme, the network built up around the Innovation Development began to wobble. The Innovation Diffusion programme started to enrol the actors initially enrolled in the Innovation Development programme. It imposed a new goal on the actors in the Innovation Development programme, namely, to get proper material and testing done in time to make a bid for the large African country deal. Instead of a stable Innovation Development network, a wobbly network struggled to accommodate the Other programme of Innovation Diffusion; this had an apparent effect on the network actors.

### 8.4.1 The System programme's agency in restricted

The System programme was originally one of the Innovation Development programme's sublevel programmes. The Innovation Diffusion programme managed to enrol most actors in the System programme, shifting the project's focus from development to sales (i.e. diffusion). One of the reasons for the Innovation Diffusion programme's successful interessement and enrolment was that the programme's actors were senior and the project manager in the Innovation Development programme relatively inexperienced. Turner (2009), the project manager leading his first project, felt the imbalance in the power relations keenly. Even though the project was later seen as successful, Turner felt exhausted and said, *'Last year, I was actually about to quit'.* When looking back, Turner expressed a sentiment that in ANT terms can be interpreted as him thinking that he should have put up more resistance against the interessement device from the Innovation Diffusion programme but that he failed to do so due to his inexperience. He elaborated on the matter as follows:

> Just because I couldn't handle it ... it was the first project I was running, and I wasn't prepared for the press from the top. Instead of making demands, I tried to fix it. Then you dig into the problem, so I basically drowned. Now I'm starting to come back to the surface during the last six months. Because I've got more distance to it all. I have lost respect for the manager; they are not always right, etc. You should be able to put pressure on them too. It should not be just one way [decided by the manager] to do something

If Turner had resisted the interessement device from the Innovation Diffusion programme by making demands, it would have prompted them to load their argument (with more time or more resources). Then Turner would have been able to control the process to a larger extent and ensure that the extended scope was matched by either more resources or more time. The Innovation Diffusion programme did not want the Innovation Development programme to be abandoned. Rather, it wanted the resources in it to become boundary objects enrolled in both the Innovation Development and the Diffusion programmes. The original Development network was not constructed to accomplish this, and after the steering committee's deviant behaviour, there was no effort to construct a new one. More resistance from the Innovation Development programme might have prompted a complete reorganisation merging the dividing programmes into one again, leading to the construction of a new network fit for the new purposes. As this did not happen, the actors had to make do with their wobbly Development network and enrolment in the competing Innovation Diffusion network. Thus, the Innovation Diffusion programme's agency became enabled at the expense of the agency of the Innovation Development programme.

### 8.4.2 The Core programme's agency is restricted

When the steering committee began to pledge allegiance to the Innovation Diffusion programme, they also interested and enrolled the stage-gate model. The steering group transformed the model's ascribed identity from 'assessment tool' to 'legitimisation tool'. They no longer used the gates as a possible estrangement device. Instead, they used their positions in the power relations to make the project pass the gates. This in order to gain legitimacy for the technology. To anyone else in the organisation, a passed gate would be interpreted as a sign that the project had met the criteria set at the gate. They would see the technology as having reached a particular stage of maturity. Moreover, and most importantly, if the steering committee could speed up the process by skipping some criteria and reach type testing earlier, it would be possible to show the client that they would be able to sell a good product (Walker, 2009).

Consequently, Swem's Core programme was pressured to rush through the gates, starting the type testing as early as possible. Subsequently, they jumped gates two and three to, on paper, pass gate four. The assessor of the gates described this as follows:

> If you take an overview of this project, you see that they had to deviate from the gate model. They did not do these things right from the start. For example, they merged gates two and three. But it was mainly due to the [African country sales] project. It messed things up during the development phase...[]... If they

> had followed the gate model in the way I believe they should have, they would not have passed gate four before the construction was complete and frozen. Which it was not, in this case...[]...some parts [of the construction] were not finished, and in principle, they finished [the project] a little too early. They thought that everything was done even though not all problems had been solved
>
> Edwards, Assessor, BigE (2009).

To be programmatic with the Innovation Diffusion programme, they had to use prototype drawings and prototype material throughout the project (Turner, 2009). The core programme's hasty enrolment in the Diffusion programme made them non-programmatic with the Innovation Development programme. This restricted the agency of the Innovation Development programme; thus, it shaped the innovation process of the new low-cost breaker.

The gate reviewer, Edwards, described the relationship between the Core programme (which was a sublevel-programme in the Innovation Development programme) and the Innovation Diffusion programme as leading up to political pressure to pass the gate at a specific date, not to lose prestige. At the gate, the steering committee was able to disregard the long list of remaining items highlighted by the assessor and allowed the project to pass gates with long lists of residual matters (Edwards, 2009). The non-compliant behaviour detected at the gate was consequently not domesticated, allowing for continued non-compliance. Eventually, these 'remaining items' had to be handled in a new smaller project, managed by Walker (Walker, 2009). But on paper, a ready-made core could be incorporated into the system project, and the rest of the organisation then started to perceive the gate as being 'done' (Lindahl, 2009). This was all compliant and aligned with the Innovation Diffusion programme, although as it would turn out, it was neither compliant nor aligned with the Innovation Development programme.

One reason for the Core programme only being able to be compliant with one of the two programmes (Development and Diffusion) was that it was pressured by the Innovation Diffusion programme and partly due to it having too few people in the team to be able to free up time to think of an alternative route (Turner, 2009; Nichols, 2009). Walker (2009) describes it as follows:

> The reason behind this [that the procurement of material for the series-production did not go well] is partly due to us being understaffed, obviously. They [the steering committee] have partially put pressure: "do the type testing now. Meaning, focus on the prototype material, do not think about ordering moulded material that takes a long time to get delivered. Ensure that we get the material for the type testing, so that we can show the client that we are ready to sell a good product". You clearly see that it is the market that runs the show there.
>
> Walker, Project Manager, Core project after gate four, BigE (2009).

Walker later contemplated that they could have resisted the interessement from the Diffusion programme and put up an estrangement device in the shape of a refusal to skip gates in this manner:

> Yes, when we have demands put upon us, then we work according to that. But now, afterwards, I wonder if we should have allowed it. I mean, it was a massive workload for some of us. Right away, when you do not follow a process, it becomes chaotic and stressful.
>
> Walker, Project Manager, Core project after gate four, BigE (2009).

Turner was of a similar sentiment. He thought that the Core programme could have resisted the interessement from the Innovation Diffusion programme. It could have conditioned their enrolment on it, also entailing the enrolment of more resources. He put it like this:

> ...they should have said that "if I am going to do this, I demand three additional people who work with those drawings; one who works with production... Then, it is possible to work in parallel, so that it does not interfere [with the work in the Diffusion programme]. So, really when decisions are made that make you do things you shouldn't do but want to do in parallel, that's when you have to have the experience to see that this affects me six months away and say stop. We can do it, but we have to do it in this way.
>
> Turner Project Manager, System project, BigE (2009).

In short, Turner was asking for the construction of a new network suited for the new situation. Instead, he had gotten an Innovation Diffusion programme putting up estrangement devices between actors in the Innovation Development programme and Innovation Development programme itself. When the steering committee engaged in non-programmatic behaviour, and formed a new programme, they slowly enrolled the actor previously enrolled only in the Innovation Development programme. Even though the Steering Committee strived for a dual membership for the actors, the power relations were tilted in favour of the Innovation Diffusion programme, leading the actors to become non-compliant with the Innovation Development programme.

Unlike the System programme, the Core programme had not enrolled an implementation project in the factory in Greenhill, consequently making it hard to ensure a seamless implementation of the core into the producing factory. This disentanglement would prove to be yet another source of resistance.

## 8.5 The Greenhill factory engages in non-programmatic behaviour

To get material for the core, the Core programme needed to interest and enrol strategic sales at their dedicated factory in Greenhill. The factory in Greenhill was not as stable and predictable as had been anticipated when constructing the Innovation Development network. This facility resisted the identity ascribed to it by the Innovation Development programme. It was a factory in times of fluctuation. Many people had recently quit their jobs or gone on parental leave, so they were short on experienced people (Turner, 2009; Nichols, 2009; Taylor, 2009). From the perspective of the Development network, the Greenhill Factory engaged in non-programmatic behaviour. The Interessement device from the Core programme therefore failed. The device took the shape of requests to get strategic sales at the Factory site to find suitable suppliers for the series-production. From the Core programme's perspective, very little happened in terms of finding suppliers (Turner, 2009; Nichols, 2009). The Greenhill Factory programme was instead focused on upholding its line activity, leaving few available resources that could be enrolled in the Core programme (Taylor, 2009; Turner, 2009). The Greenhill Factory was not only non-compliant with the Innovation Development programmes, its refusal to become interested and enrolled in the Core programme also made it anti-programmatic. Thus, the Greenhill Factory programme and the Core programme competed for the same resources and became each other's anti-programmes. Taylor put it like this:

> I would have preferred that we were more people in Greenhill. Because when you are involved in these kinds of projects, you don't want to be disturbed with something else, for example, things that break in the engineering workshop.
>
> Taylor, Production Specialist, Core project, BigE (2009).

When it became apparent that the factory was not enrolled, Turner was enrolled in the Core programme. According to his account, he was not compliant with the Core programme due to simply not having time to conduct the required tasks. Consequently, the cooperation between the Core and System programme's got worse (Turner, 2009). When this happened, the Core Project had passed gate two. It was behind schedule and was supposed to have been in gate three or four, according to Turner (2009).

> That's when we decided that we would use prototype material for the type-tests, and then they wanted to ensure that we would get that material and start ordering outcome samples and getting drawings and so on. Then they sent me in, and I extorted the material needed for type-tests. Then I did not have the energy to push it further... And then they had gate three / gate four completed in the [Swem] project before they were really done.
>
> Turner, Project Manager, System project, BigE (2009).

The use of prototype material was partly due to an accommodation strategy used by the Core programme when failing to interest and enrol strategical sales in Greenhill. The accommodation strategy was to enrol their own suppliers with help from Turner. Both Turner and the Core Project team had limited time and simultaneously had memberships in both the Development and the Diffusion programmes. The Innovation Diffusion programme was more robust, leading both the project team and Project Manager (Turner) to be compliant with that programme while being non-compliant with the Innovation Development programme. To manage the type test before gate four, they had to use the prototype's suppliers (with correspondingly high price) and the prototype drawings.[158]

Later, Turner (2009) contemplated this and in ANT-terms his pondering can be described as follows. The Core programme could have loaded their programme with people higher up in the organisation through an interessement device where they demanded that these senior people solved the problem. If they had done so, they would have met the Greenhill Factory programme's resistance by loading their argument with senior management. But this did not happen; the tenders (that Turner helped the Core programme extort material for) ended up with something that to Turner seemed like the wrong focus. The focus was on material and not on price, which had been the Innovation Development programme's original focus. In short, Turner (2009) thought that:

> the pressure to develop a breaking chamber that worked for pre-tests and type-tests gave Swem the wrong focus.
>
> Turner, Project Manager, System project, BigE (2009).

This wrong focus would be the focus of the Innovation Diffusion programme. What happened was that the Core programme in Swem started to design and test a prototype based on material bought for a prototype. Thus, the material became quite expensive, leading to a situation where 'they buy in hundreds but for prices that you would normally pay when you buy ten' (Turner, 2009). This increased the unit price for a breaker by 30% compared to the plan. The price reduction fell from the planned 20% cut (compared to current breakers available) to 9% (Turner, 2009). A cost cut this small would not have been enough to initiate the project in the first place (Peters, 2015). The project was

[158] Making prototype drawing for a prototype in gate 1 fit for use as production drawings as well, was a habit of the Linthaven branch of BigE in which the System programme operated. But it was not a habit of the Swem branch, in which the Core programme operated. Consequently, the prototype drawings for Swem were not originally made to enable usage in type-testing. So, when Linthaven only had to change numbers on their drawings, Swem went through the process of making new drawings which took them about 3 months (Turner, 2009; Walker, 2009). This time expenditure was underestimated by the people in the System programme who assumed similar procedures as in their branch office.

therefore prolonged for six months to cut costs for the final breaker. The failure to interest and enrol the Greenhill Factory prompted senior management to, after the project termination, load that facility with a new organisation of strategical sales. The development of the Core programme is illustrated in figure 30.

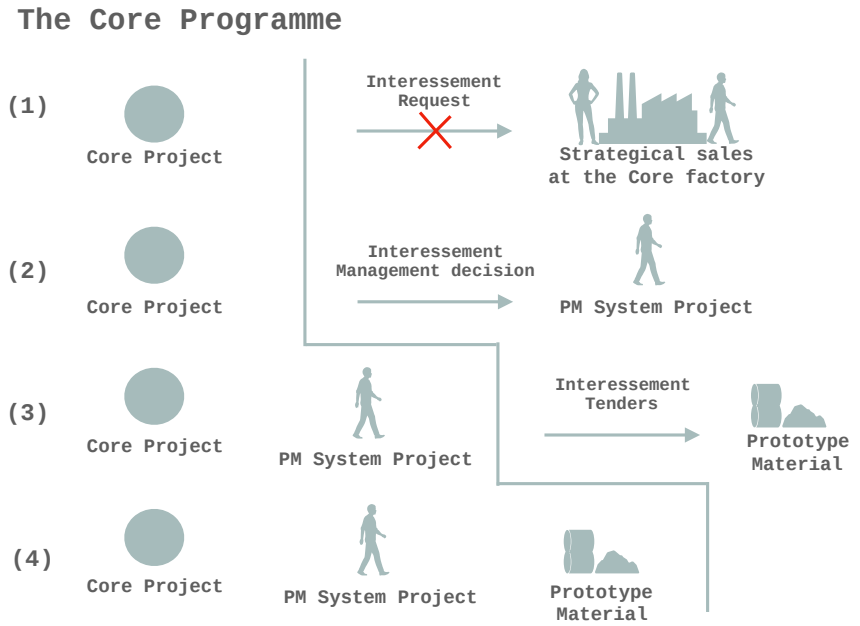


*Figure 30: The Core programme is unable to enrol strategical sales at the core factory. As accommodation, it enrols the PM of the system project and a management decision is used as interessement device.*

## 8.6 Summary of the chapter and the findings

This chapter has elaborated on three main programmes and a number of sublevel-programmes within some of them. This summary briefly presents them and then elaborates on the findings of the chapter.

*A Grid programme* can be found in any country with an electrical grid. The goal of such a programme is a safe and cost-effective electrical grid. Important actors in these programmes are Utilities and various high voltage artefacts. Utilities prioritise a secure electrical grid and technology that can work for 40 years at least. The Grid programmes in a number of countries in the Global South were resisting the current technology offered by BigE and thus restricted their agency.

As an accommodation to the movements of resistance from the Grid programmes in the Global South, managers at BigE initiated the *Innovation Development programme*. This programme had the goal of developing a new low-cost breaker. Relevant programmes within this macro-actor were: *the System programme, the Core programme, the Greenhill Factory programme*, and *the Linthaven Factory Implementation programme*. When a sales opportunity appeared in an African country Grid, this programme enrolled the steering committee of the Innovation Development project. They became the primum movens of a new programme, the *Innovation Diffusion programme*, with the goal to use the not yet developed low-cost breaker to win the large African country bid. This programme interested and enrolled many actors previously enrolled in the Innovation Development programme causing its actor-network to break down.

This chapter supported three of the findings of innovation resistance in chapter six, three of the findings in chapter seven, and made four new ones. The seven findings from chapters 6 and 7 that were not supported was due to the narrative not covering similar aspects, i.e. none of the findings challenged the findings in previous chapters. The chapter supported the findings from chapters 6 and 7 when it showed that (a) movements of resistance restricted the agency of the innovation actor, (b) movements of resistance shaped the Innovation programme, (c) innovation resistance was a process between programmes, and (d) the Other programme had a goal of its own. It also supported some of the findings only found in chapter seven. Namely, the observation that (e) resistance within the actor-network is not necessarily visible from the outside, (f) movements of resistance *within* the network restrict or enable actors' agency, shaping the innovation actor, and (g) resistance can be desired and the absence of it regretted by the actors in the innovation network. The new findings were the following:

(1) An actor can have inbuilt resistance in the shape of an actor geared towards resisting and rejecting unwanted actors. The stage-gate model is designed as a tool that should pose resistance to a development project to protect the organisation from developing artefacts with low market potential. Thus, each gate is set up to guard against immature projects progressing and the progression of projects that are deemed unviable.

(2) Inbuilt resistance is not static. Its agency can change with a change of associations to other actors. The Steering Committee did not use the Stage-gate model according to its prescription (Go/No-Go decision in each gate determined by a requirement list that the project had to fulfil in order to proceed through the gate). Instead, it was enrolled in the Innovation Diffusion programme and given a new prescription (pass gate when the steering committee judges that it should pass) and ascription (legitimisation tool). This made it seem like - from a perspective outside the network - the stage-gate model was

enrolled in the Innovation Development programme and following the standard stage-gate model prescription and ascription, while it was actually enrolled in the Innovation Diffusion programme. Actors outside these networks (development and diffusion) perceived the Stage-gate Model as associated with the Innovation Development programme and the standard way of using this model (which in turn had several associations with project management education, etc.), while these associations were, in fact, severed. The inability of the outside world to detect this made the Diffusion programme more robust as it could operate as if it had these associations.

(3) The Other programme engaged in movements of innovation resistance can be an Innovation programme. An Innovation programme is a process where several internal actors meet in movements of resistance and accommodation, which shape the socio-material contours of the process. The steering committee formed the Innovation Diffusion programme. The committee was a robust actor since the steering committee members were senior and had more experience operating at BigE and controlled the Innovation Development programme through the stage-gate model. When the Innovation Diffusion programme interested and enrolled the actors in the Innovation Development project, the project members were unable to simultaneously be enrolled in the Innovation Development programme and the Innovation Diffusion programme. Since the Diffusion programme was more robust, the actors prioritised being aligned and compliant with the Diffusion programme, leaving them less focused on programmatic behaviour prescribed and ascribed by the Development programme. Thus, the Innovation Diffusion programme engaged in movements of resistance in relation to the Innovation Development programme, which enabled the agency of the former and restricted the agency of the latter. This influenced the material and social contours of the Innovation Development programme (for example, the material of the technology and the project manager's exhaustion).

(4) The interviewees perceived that too weak resistance had a cost. The weak resistance from the gates in this model was noted. The actors in the innovation development process regretted not having resisted the interessement device of the Innovation Diffusion programme. The absence of opposition from the development project enabled the steering committees to sidestep the project plan and speed through the gates, leaving the people in the project exhausted and the technology more expensive than intended. This is similar to what Bauer (2005) refers to when he talks about too little resistance having an opportunity cost.

Now, several instances of resistance around the firm BigE have been described and before that, numerous cases of resistance were described in the healthcare market. In the next chapter, the findings from these three chapters will be summarised and the thesis' contributions drawn out.


*Figure 31: Humoristic illustration of the Steering Committee overcoming the inbuilt resistance in the Stage-gate model. Illustration: Rickard Fornstedt. Idea: Helena Fornstedt*

# 9. Theorising about innovation resistance

This chapter first theorises about innovation resistance and its relationship to innovation based on actor-network theory. After that, it explains how these findings expand the knowledge in innovation research and actor-network theory. Taken together, it answers research question one and two, leaving the remaining question three for the next chapter.

The first section (9.1) summarises the findings in chapters 6-8 and takes them to a higher analytical level. The section begins by presenting the answer to research question one:

> (RQ1): How does the innovation resistance process manifest itself when viewed with an ANT-inflected lens?

and the first part of research question two

> (RQ2): How can the dynamics of the entanglement between an innovation actor and a resisting actor be conceptualised, and complement dominant outlooks on how the two relate to one another?

These two questions are then elaborated on a bit further in section 9.2, where the findings are also put in relation to previous research (i.e. second part of RQ 2). Finally the study's contributions to ANT studies are presented in section 9.3.

## 9.1 Movements of innovation resistance

This thesis has unstitched how innovation and innovation resistance are trapped in capitalist ideas centred on the well-being of firms and economic growth. It has noted that, from that viewpoint, innovation and innovation resistance are not neutral; instead, they are connected to power-structures. It has examined previous innovation resistance studies and the suppressed dimensions in them as well as actor-network theory applied in three empirical settings. All in order to gather pieces that now, as patches in a patchwork, will be reassembled in a way that presents a new understanding of the concept. The proposed understanding of innovation resistance describes it as a process with

layers of movements of resistance. Important to note is that the word 'movement' neither refers to a loose organisation sometimes called a 'resistance movement' nor a physical movement of an object. Instead, the word movement refers to gradual changes in the relational positions of the actors in a network. These movements together form an innovation resistance process. They manifest in between an innovation programme and (a) an Other programme, (b) a seemingly domesticated Other actor within the innovation programme, or (c) an Other macro-actor in which the innovation actor has enrolled. The first form is here called external, and the remaining two are called internal innovation resistance, and they are all entangled with the innovation programme. The section will first present external resistance and then go on to elaborate on internal resistance.

### 9.1.1 External innovation resistance and accommodation

The world has incalculable amounts of programmes. As long as these programmes do not meet, they do not resist each other; this is illustrated in figure 32. In figure 32 the Innovation programme interest actor A3 and the Other programme [for instance, the Aquatic Organism programme from Ch. 6] interest actor 7. However, movements of resistance emerge when they both use interessement devices to interest actor A4 [for instance, a ruling from the County Court]. The interessement from the Other then manifests itself as a movement of resistance to the Innovation programme.

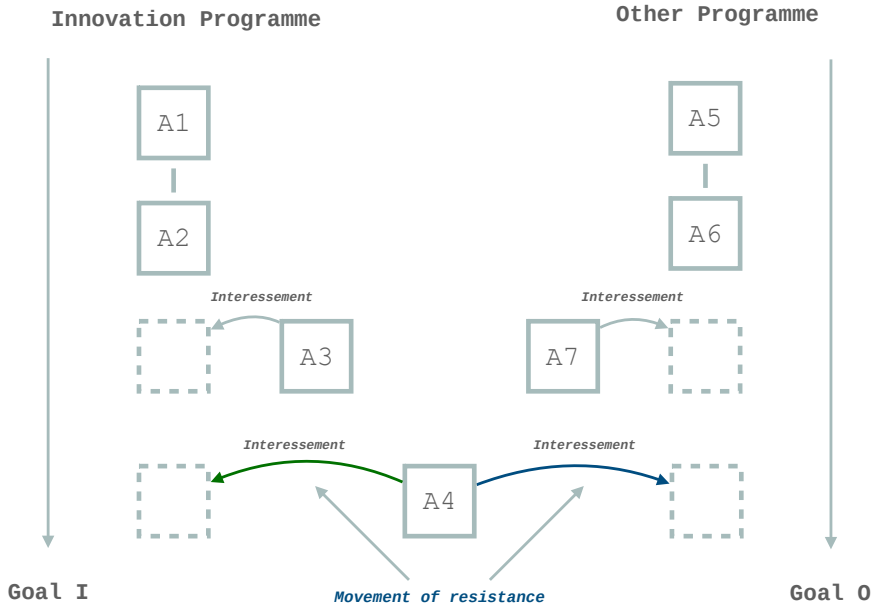


*Figure 32: Both the Innovation programme and the Other programme interest actor A4.*

To ensure successful interessement leading to enrolment, the Other engages in two additional movements. It distorts the Innovation programme's identity and places an estrangement device between the Innovation actor and actor A4 (see figure 33). These movements are layered (as opposed to chronological events) and, if successful, they sever the attempted association between the Innovation actor and actor A4.

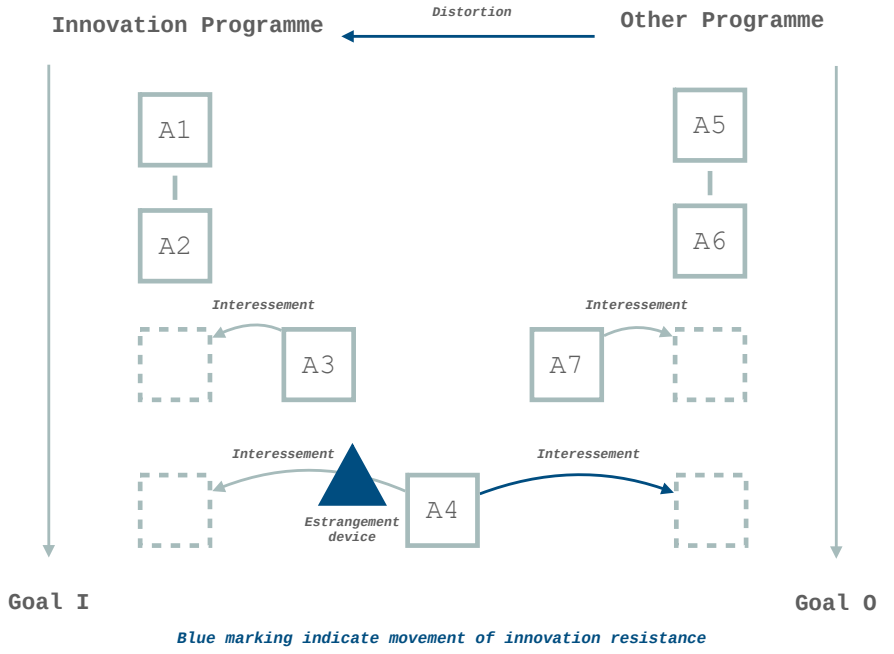


*Figure 33: The other programme distorts the Innovation programme's identity and places an estrangement device between the Innovation actor and actor A4.*

If these movements are successful, they are followed by a movement of rejection when the attempted associations between the Innovation actor and actor A4 are severed (see figure 34). Actor A4 is then enrolled in the Other programme (given that the Other's interessement device succeeds), and this enrolment constitutes a movement of resistance to the Innovation programme. All of these layered movements of resistance form a process that contributes to restricting the Innovation programme's agency.

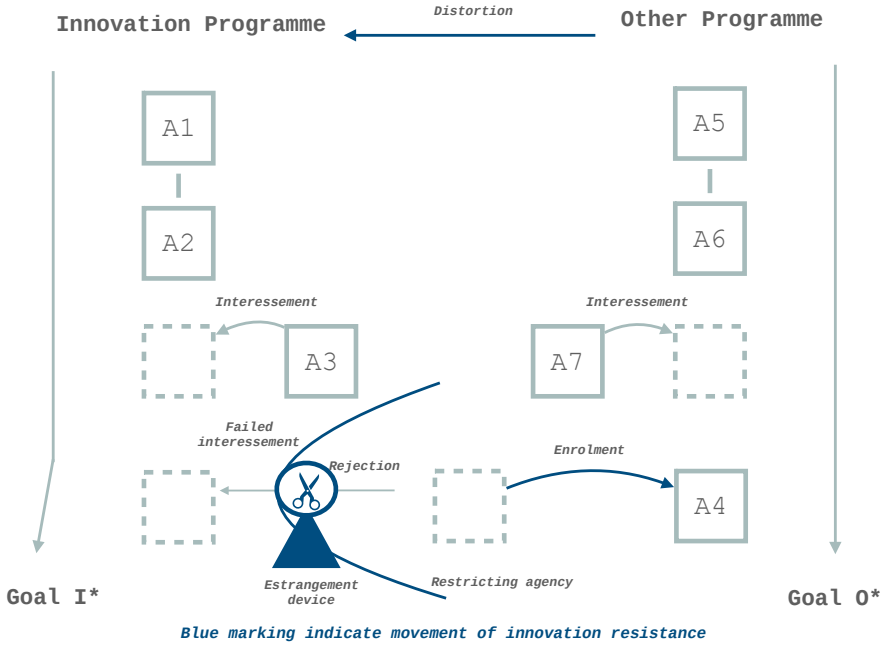


*Figure 34: The estrangement is successful, the Innovation programme's interessement fails, actor A4 is enrolled in the other programme, the other programme's agency is enabled, and the innovation programme's agency is constrained.*

Restricting agency has a directional dimension. The Innovation programme could not enrol Actor A4; thus, its agency was constrained in that direction. But when one area is temporarily closed, a programme can move to other areas. Accommodation to the movements of resistance from the Other programme can be to interest and enrol actor A8 [for instance, a statement from a toxicologist] (see figure 35). Actor A8 can then be used to invalidate the distortion or estrangement device from the Other. It can be used as an estrangement device to sever the associations between the Other and actor A4* [or as in the case in Ch. 6 to enrol a ruling from another actor, namely the Administrative Court of Appeals], or it can be used in some way unrelated to the Other programme, consequently abandoning actor A4 and pursuing other opportunities. These movements of resistance and accommodation shape the Innovation actor and its programme, and it also shapes the Other actor. However, this does not necessitate that the Innovation programme is important for the Other programme. The Other programme might easily enrol actor A4, reject the Innovation programme and quickly move on, while the Innovation programme might attempt several movements of accommodations to interest and enrol A4. The resistance prompts accommodations that shape the Innovation programme; thus, the Innovation programme is entangled with the movements of innovation resistance.

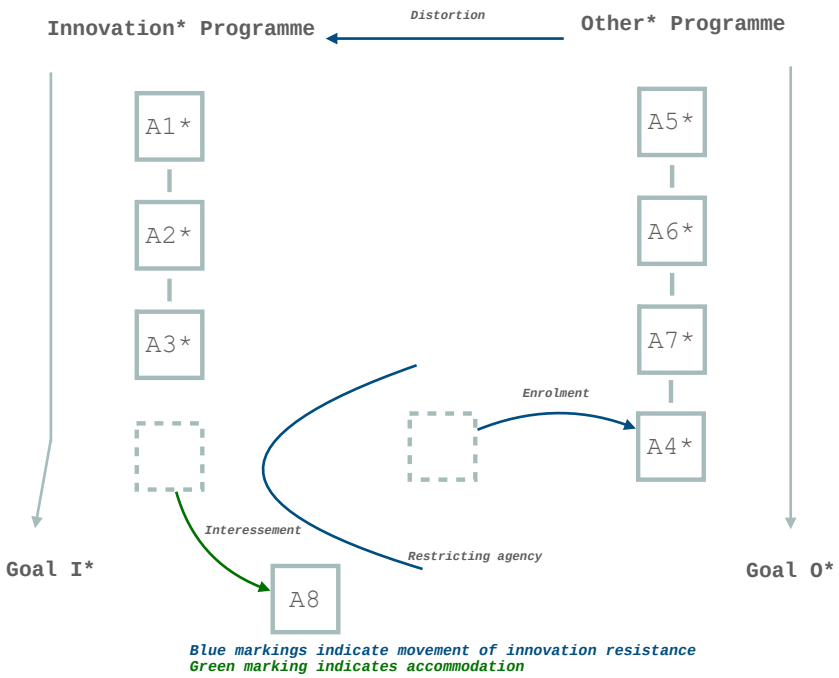


*Figure 35:The Innovation* programme engages in a movement of accommodation by interesting actor A8.*

Suppose the Innovation programme attempts to enrol actor A4* again after enrolment of actor A8, this time severing its associations with the Other* programme (which A4* by then would be enrolled in). In that case, the Other* could engage in these movements of resistance to keep its association with A4*. These movements of resistance can be used by the Other to safeguard it from both losing associations with actors in its network and unwanted enrolment in an innovation actor-network. The process of layered movements of innovation resistance between separate programmes restricts the agency of the Innovation programme and enables the agency of the Other programme, consequently shaping both actors.

Moreover, the Innovation programme might attempt to enrol the Other actor, not just an actor within it [for instance, the BigCountyNorth], and face resistance in the shape of an estrangement device [for instance, a Health Technology Assessment], see figure 36.

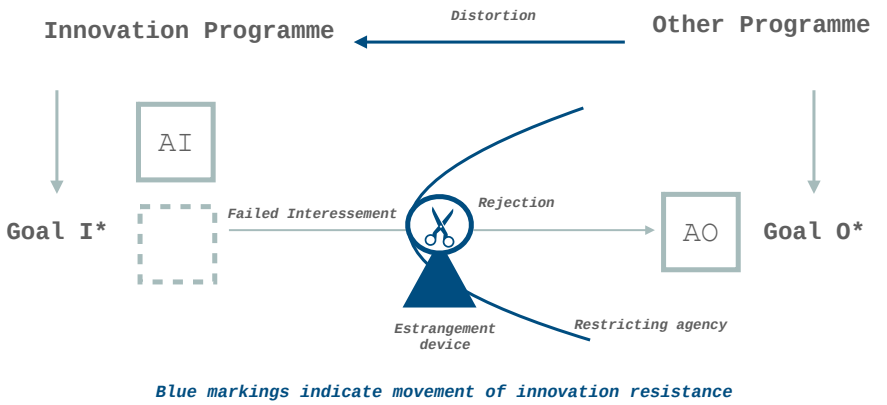


*Figure 36: The Innovation programme can try to enrol an Other actor, and this actor resists the enrolment through distortion and estrangement.*

Innovation programmes [such as the one pursued by the MedTech actor in Ch. 6] identify relevant actors [for instance, the counties in Sweden] when the primum movens initiate the programme and begin constructing the actor-network. They, to some degree, anticipate and desire resistance from the actors identified in the problematisation phase. This is what is expected when constructing an actor-network. An interessement device might be resisted, prompting a load to the programme, which can lead to a new attempt at interessement. The design of the actor-network (especially its obligatory passage point) is set up to attract the actors identified in the problematisation. Thus, resistance from these actors is anticipated, and accommodation accordingly might be seen as a way to finetune and improve the original network.

If resistance comes from a programme not identified in the problematisation phase [such as Aquatic Organisms or a SOL database], the resistance will not be anticipated and desired. If the Other programme, according to the Innovation programme, was supposed to be a wallflower, the threat to the original network is greater. In figure 37, the primum movens in the Innovation programme had identified four relevant actors in the problematisation phase: A1, A2, A3 and A4. It managed to interest and enrol A1, A2 and A3, but A4 did not have the anticipated ascription and prescription because it was enrolled in the Other programme, which was a wallflower with a goal and identity that was not compatible with the Innovation programme and to which the obligatory passage point of the Innovation programme was irrelevant. This kind of resistance can break down the network and make the primum movens go back to the beginning, re-problematise and identify the relevant actors again – this time including the former wallflower.

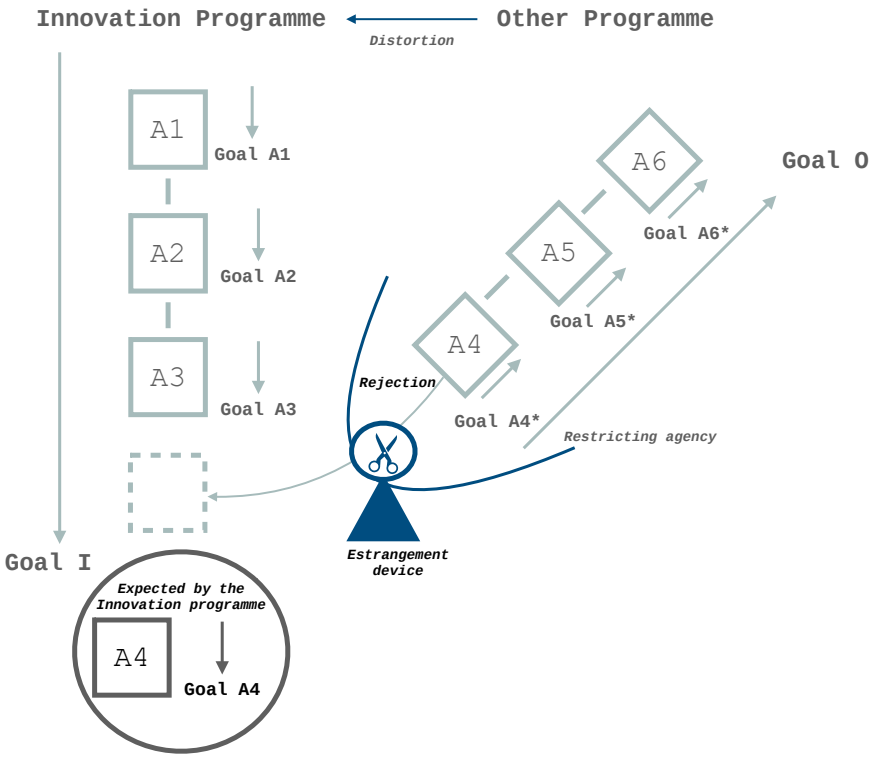


*Figure 37: A4 did not have the anticipated ascription and prescription. This was because it was enrolled in the other programme, which was a wallflower. Thus, the obligatory passage point of the Innovation programme was irrelevant for the wallflower actor.*

## 9.1.2 Internal innovation resistance and accommodation

So far, the account has dealt with movements of resistance from an Other programme that is separate from the Innovation programme, i.e. none of them is enrolled in the other. However, this thesis has also elaborated on movements of resistance from within the Innovation programme. An innovation actor is a macro-actor that contains several actors that in turn is comprised of actors and so on. All of these actors have programmes of their own that are compliant and aligned with the macro-actor. A seemingly enrolled actor can engage in non-programmatic movements without being detected. Thus, movements of resistance within the innovation actor-network are not necessarily visible from the outside. An actor engages in non-compliant movements when it does not subscribe to the programme's prescription, i.e. it does not do what it is supposed to do to reach the programme's goal. An actor engages in non-aligned movements when it does not subscribe to the programme's ascription, i.e. it

does not have the identity that the programme intended. When an actor is simultaneously engaging in non-compliant and non-aligned movements, its movements are non-programmatic. This is illustrated in figure 38.

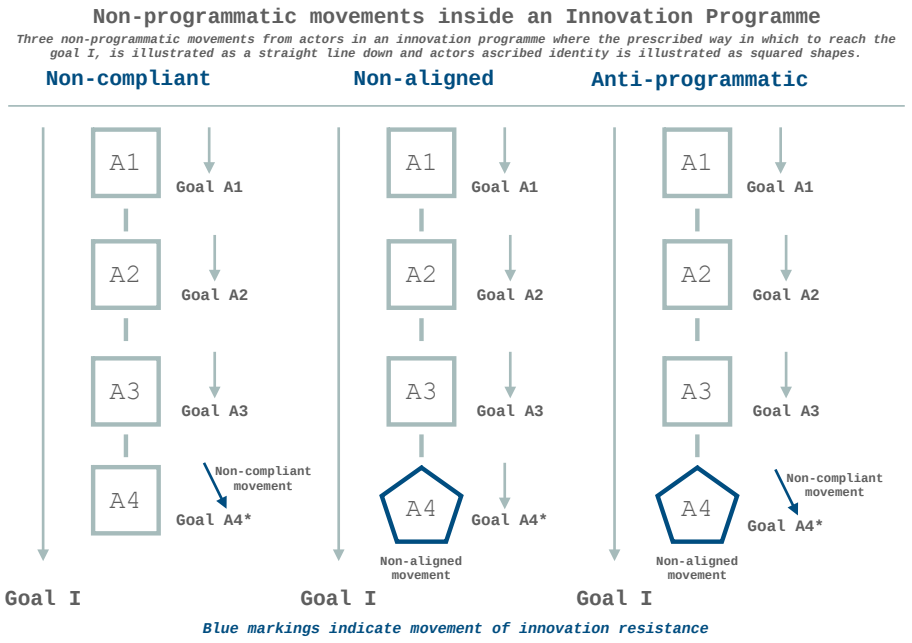


*Figure 38: Illustration of non-compliant, non-aligned and anti-programmatic movements.*

A seemingly enrolled actor in an innovation programme [for instance, a steering committee as in Ch. 8] can engage in movements of resistance – such as distortion, estrangement and rejection – in a similar manner as described earlier, but with the difference that the Other programme is not a separate programme, but an actor seemingly enrolled in the Innovation programme [an Innovation Diffusion programme, for instance]. This is illustrated figure 39. In figure 39, actors 1–3 have their own programmes that are compliant and aligned with the Innovation programme. Actor 4 engages in movements of resistance when it distorts the Innovation programme's identity and places estrangement devices between itself and the Innovation actor-network. These movements begin to translate its ascription and prescription. When the associations are successfully severed, actor 4 ends up with a new ascription, prescription and goal. It is not only actor 4 that is shaped through this; the Innovation actor is also altered. Thus, movements of innovation resistance within an Innovation programme restrict the agency of the Innovation actor and enable the agency of the Other (previously enrolled) actor, therefore shaping both actors. When noticed, this resistance may provoke accommodation from the Innovation programme (played out as in section 9.1.1 since the Innovation

programme* and A4** after the rejection would be separate programmes). Thus, in an innovation process several actors meet in movements of resistance and accommodation, which shape the socio-material contours of all actors. This also illustrates that the Other actor (A4*) engaged in movements of innovation resistance can be just as much an 'innovation project' as the Innovation actor.

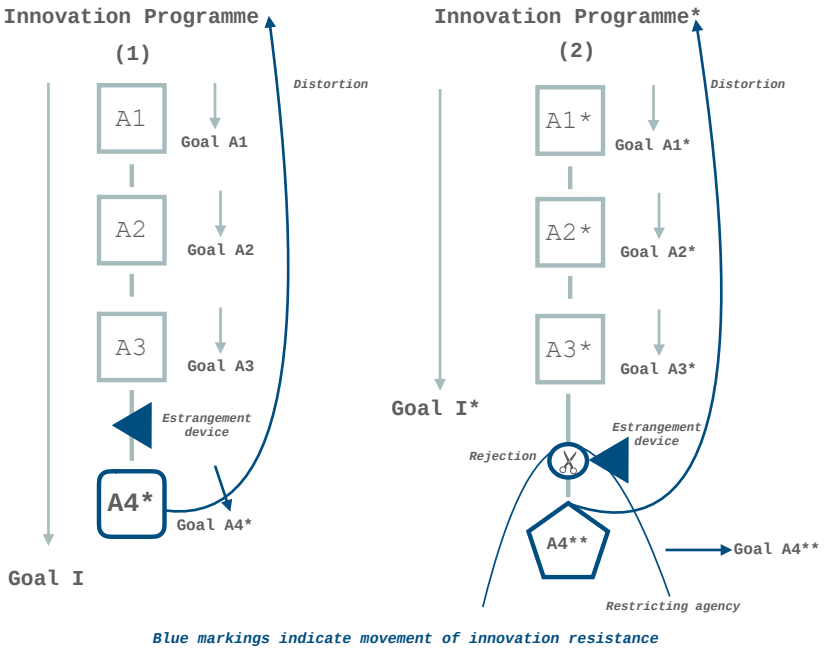


*Figure 39: Actor A4 previously domesticated in the Innovation programme begins to engage in non-programmatic behaviour.*

A second possibility is that the Innovation actor [for instance, Apotektstjänst within the Systemic Innovation actor] is enrolled in the Other programme [for example, the Swedish Healthcare programme], and the Other determines that the Innovation programme is non-programmatic. This can be due to the Innovation programme not subscribing to an ascription and prescription that it is 'aware' of. It can also be due to what constitutes subscription to the ascription and prescription, being determined in hindsight. The non-programmatic movements are detected by a robust actor (A1 in figure 40) in the Other actor network, such as a centre of calculation [for instance, the Medical Products Agency]. A1 has the prescription to evaluate if seemingly domesticated actors' behaviours are programmatic and distort (and possibly reject) non-programmatic actors. A1's prescription and ascription are, however, not static; it can change with a change of associations to other actors within the Other macro-actor. The centre distorts the Innovation actor's (AIn in figure 40) iden-

tity as non-programmatic. This distortion is a movement of innovation resistance. The Innovation programme can then accommodate the resistance by interesting and enrolling more actors (for example A4 in figure 40) that change the Innovation programme to invalidate the distortion. If successful, actor A1 accepts the Innovation actor as compliant and aligned again. This can also be understood as closing the leaking black box that is actor AIn [e.g. Apotekstjänst enrols new operations to close the black box of the Systemic Innovation]. Thus, movements of resistance can be used by actors in the network to identify seemingly domesticated but resisting actors and distort their identity to prompt accommodation and domestication, consequently shaping both actors (illustrated in figure 40). This is a common way for innovation programmes to adjust to the context in which it is used. Centres of calculation can resist an actor in an innovation network, restricting its agency in one direction and enabling it in another. Actors within the Innovation programme can see this kind of resistance as desirable and connect the absence of it to opportunity costs [as was the case for Apotekstjänst].

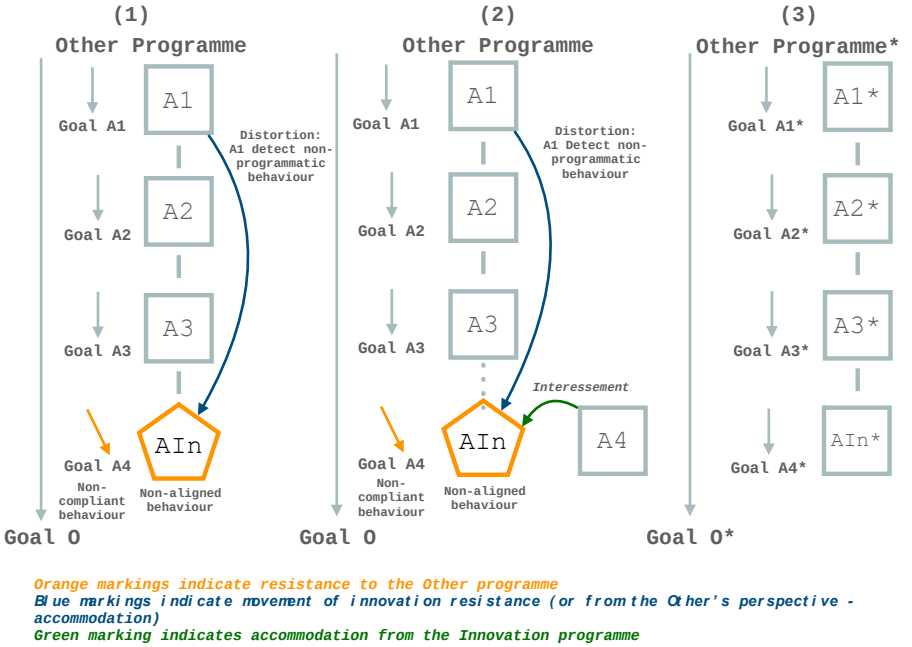


*Figure 40: The Innovation actor is enrolled in the Other programme and starts to engage in non-programmatic behaviour. The actor A1 (that is a center of calculation) detects the behaviour and distort I's identity (this becomes innovation resistance). Actor I interests and enrols actor A4 to accommodate the resistance. This changes I, so it is once again domesticated in the Other programme.*

When the centre of calculation does not detect the Innovation programme's movements of resistance, other more peripheral actors can temporarily engage

in non-compliant behaviour (not using the meteorological apparatus). They can do this to compensate for the blindness of the centre and make it aware of the dissidence through apparatuses belonging to programmes outside of both the Innovation and the Other actor-networks [for instance, contacting the media instead of filing reports].

Actors can simultaneously be enrolled in multiple programmes. A change in the Innovation programme can change the goals in the programme in a manner that makes it impossible for an actor to be a boundary object, simultaneously enrolled in the Innovation programme and an Other programme. In figure 41 actor A3 [for instance, the E-prescription Repository] is enrolled in both the Innovation programme and an Other programme [for example, the Prescription control programme]. When the [Systemic] Innovation programme enrols actor A6 [for instance, a plan to get a new dose supplier], the programme changes[159] in a way that interferes with the Other programme's goal [ensures that the data are used according to the law of prescription control]. Since A3 can no longer be enrolled in both programmes [Prescription Control and Systemic Innovation programmes], the question is, in which programme will it remain? This is determined, as in section 9.1 (figures 32-35), where two programmes attempt to interest and enrol the same actor. Which programme A3 will remain enrolled in is determined through the robustness of the associations with the Innovation programme and the Other programme. Thus, when an innovation programme changes, an enrolled actor's memberships in multiple programmes can prompt it to resist the Innovation programme and (if the Other programme is successful) restrict its agency. Thus, within an actor's membership in multiple programs (likely not visible for the Innovation programme) lie a latent threat or potential for resistance.

[159] In the figure, the change is due to interessement and enrolment of actor A3, but it could also be due to distortion, estrangement and rejection of, say, actor A2.

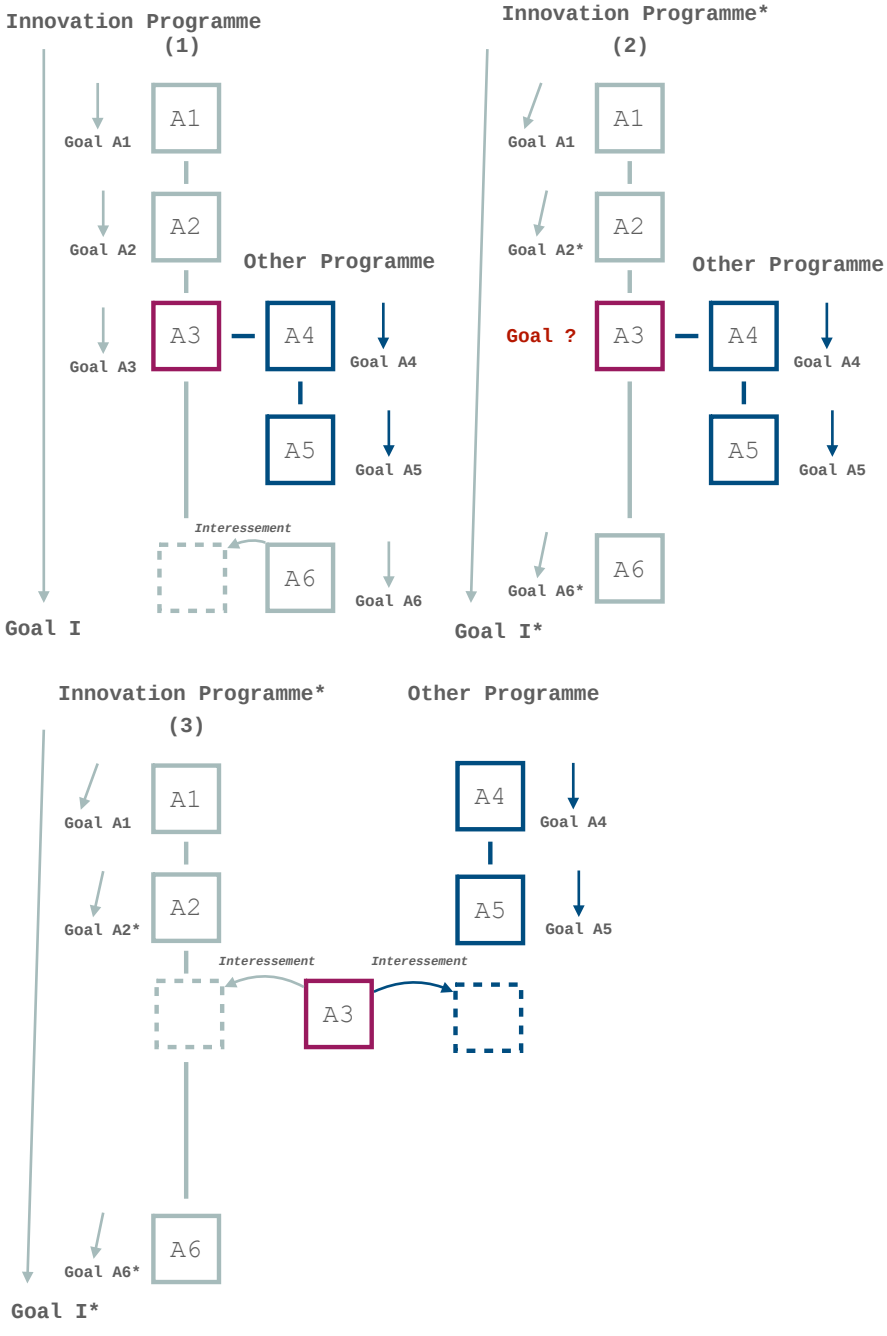


*Figure 41: The Innovation programme changes so that actor A3 can no longer be enrolled in both the Innovation programme and the Other programme. Both programmes then have to interest A3 and put estrangement devices between A3 and the competing programme to ensure continued enrolment of A3.*

## 9.2 Expansion and advancement of previous Innovation research

This thesis has expanded the knowledge about innovation resistance and its relationship with innovation. In this section, the contribution and answers to the research questions one and two will be summarised and put in relation to previous studies.

### 9.2.1 Innovation resistance is a sign that someone else has another story

This section further elaborates on the answer to research question one: *How does the innovation resistance process manifest itself when viewed with an ANT-inflected lens?* The section puts the answer to this question in relation to previous studies and describes how this thesis has expanded the knowledge through answering this question.

When innovation resistance is seen as coming from *actors*, consisting of an assemblage of humans and non-humans who have *programmes*, the agency of resistance becomes highlighted. Since actors have agency, then so does innovation resistance. We thus move away from the static view implicitly conveyed by the STI scholars who use the words 'barrier to innovation' and advocate that these should be overcome (e.g. Juma, 2016, pp. 28-29). We also move away from the common distinction in innovation research that resistance comes from either humans (e.g. Ram, 1987; Heidenreich & Handrich, 2015; Szmigin & Foxall, 1998) or non-humans (e.g. Mani & Chouk, 2018; Kim et al., 2018; Dougherty, 1992; Hölzl & Janger, 2014). As illustrated in chapter three, many scholars describe the innovation resistance (albeit sometimes using a different word) process in a derogatory manner and view innovation processes as desirable. Making sense of innovation resistance in that way is contingent upon choosing one actor's perspective and ignoring others. Using actor-network theory instead illuminates a web of different programmes of actions. The innovation programme is but one of these. It is not clear if any of the programmes are more desirable than the other. That is in the eyes of the actor. Innovation resistance processes become salient when an Other programme intercepts an innovation programme. This study has emphasised the agency behind the programmes that engage in innovation resistance processes. This emphasis can change the perception of previous scholarly work on innovation resistance. Consider, for instance, the lists of innovation barriers presented by Sandberg and Aarikka-Stenroos (2014). In light of this study's result, these kinds of lists could be interpreted as glimpses of other programmes of action into which the innovation programme smashes.

For innovation scholars, the innovation process has predominantly been the favoured analytical object, which has implicitly ascribed a higher value to the innovation process compared to other processes. In contrast, this study has shown that the way the process is interpreted depends on the observer's identity and its interpretation of surrounding phenomena (such as the innovation programme, the innovating actor, the adopting actor, etc.) (see also Pinch & Bijker, 1993/1987). In addition, the point in time from which the process is viewed influences the perception of it. Thus, the interpretative flexibility of the innovation (resistance) process depends both on the observer and the time of observation. How innovation and innovation resistance are interpreted is contingent upon the beholder. In chapter three, it was shown that the beholder in innovation literature has often been the innovating firm.[160] This can lead an analyst to believe that the innovation process is more important for the resistance process than it actually is. In most research around innovation resistance, the focus on innovating firms has contributed to the studies having a pro-innovation starting point. This often colours their perception of innovation resistance.

In the STI fields, innovation is predominantly portrayed as progressive; therefore, resistance is either seen as a reaction against progress or as a bump on the road towards progress. This is connected to a linear view on innovation where there is one and not several possible ways in which a series of events could have played out. This thesis has used actor-network theory to move away from this linear view and gain a more wholesome understanding of innovation resistance. In this thesis, the firm-based innovations are neither assumed to always lead to progress,[161] nor (if someone argues that progress is reached) as the *only road* to it. Here, it has been emphasised that an innovation programme is one of many programmes. The resistance is often portrayed in a static way by innovation scholars; they appear to be without history or goal and only become salient when intercepting the innovation process (e.g. Huang & Chi, 2013; Baldwin & Lin, 2002). In STI research, the focus has often been on the interception and suggested countermove from the innovation programme (e.g. Staudt, 1994; Hadjimanolis,1999). This study has instead looked wider than just this point of interception. It has focused on the dynamics between the innovation programme and the Other programme, and it has shown that any perceived resistance process gains from being (re)connected to its network and programme. So, when Bauer (2015) says that resistance is a sign that something has gone wrong, and Juma (2016, p. 5) argues that resistance

[160] This assessment of the mainstream innovation literature is based on a small sample of papers; its understanding of how 'innovation' is talked about is however aligned with the discourse analysis by Segercrantz et al. (2017). The dominating focus on the firm's perspective is perhaps not surprising, given that the field 'Innovation studies' from the beginning, according to Fagerberg et al. (2013), was driven by external cooperate and political demand or funded by mission-oriented agencies.

[161] What constitutes progress is, of course, also interpretatively flexible.

arises from the tension of novelty and stability, this study shows that resistance is a sign that someone else has another story, another goal, another way in which it strives to influence and shape the world and that the innovation programme is standing in its path. The resistance processes accounted for in this thesis do not necessarily come from desires to linger with the status quo or stability (as Juma 2016 argue) – it comes from movements of other programmes going in other directions and attempting to shape the world in another way.

This thesis' ANT analysis clarifies that an innovation programme is not the only change process out and about. Several programmes are simultaneously moving around, and firm-based innovation programmes are not the only ones claiming to change the world. In that sense, it is similar to the critical innovation scholars Thomas et al. (2017), that view resistance as coming from an attempt to *'generate a socio-material basis adequate to their [the resisting actors'] view of the world or to prevent the stabilisation of technological systems averse to their visions'* (p. 198). Only this thesis puts more emphasis on the non-human agency and highlights that an actor's goal need not be framed in a homocentric wording. The thesis has continued the critical innovation scholars' inquiry into innovation resistance (e.g. Thomas et al. 2017) by denaturalising the view on the innovation process as a linear and progressive force and reconnecting it to structures of power and domination. While Thomas et al. (2017) focus on *how* actors resist, defining different types of socio-technical resistance, this thesis has concentrated on elaborating on resistance and accommodation as an interaction between an Other programme and an innovation programme. It also differs from Thomas et al.'s study, by viewing movements of resistance as occurring *between* the innovation programme and the other – not as a programme of action in itself. It also stands in contrast to Thomas et al.'s study, in the sense that it does not consider resistance to only be 'designed to face the hegemony of some dominant social group' (p.198), as it sees all actors (even the dominant ones) as being engaged in interplays of resistance and accommodation.

### 9.2.2 Innovation resistance is entangled with and shapes the innovation programme

This section and the next (9.2.3) elaborate on the answer to research question two: *How can the dynamics of the entanglement between an innovation actor and a resisting actor be conceptualised, and complement dominant outlooks on how the two relate to one another?* It provides the answer in relation to previous research and describes how the thesis' answers expand the knowledge of innovation resistance.

Innovation scholars have previously noted that innovation resistance from prospective clients or users can lead to a learning opportunity for an innovating organisation (see Ch. 3). Learning implies that resistance shapes the innovation process or future innovation processes. But the identified resisting actors, by previous (STI) studies, are limited to clients or users; the resistance from other actors are not put forward as contributing to learning. This ties into the STI tendency to focus on the perspective of innovating economic growth generating firms. This study has highlighted that other actors outside of the system boundary firm-client can contribute to the learning of the innovation firm and to shaping the innovation process.

The innovation resistance process restricts the innovation programme's agency. This restriction forces the programme into new paths. In that sense, there is also some directionality in the resistance. While resistance from knowledgeable clients might be somewhat desirable for the innovation firm, resistance from excluded actors outside of the system boundary is less so. The value ascribed to the resistance by the innovating firm has often coloured previous studies of innovation resistance. Resistance from clients has received the most attention (e.g. Talke & Heidenreich, 2014; Ram, 1987), while resistance from workers has received some (e.g. Harrisson & Laberge, 2002; Harrisson et al., 2001) and resistance from animals, to my knowledge, none – up until this study.

Innovation processes shape the world (Winner, 1993). This study has, in contrast to much previous work (see chapter three), shown that movements of resistance are part of the struggle to participate in this social shaping. Additionally, it has – again in contrast to the majority of previous innovation studies – not attempted to aid innovating firms in dominating the social shaping of the world. Instead, it has shown that innovation resistance is a way for other actors, sometimes outside of the economic system firm-client, to partake in shaping the world. Resistance from actors outside of the system boundary, or for that matter from inside it when deriving from workers, is rarely put forwards as a learning opportunity by STI research. However, in accordance with historians such as Bauer (2015) and more critical innovation scholars such as Harrisson et al. (2001), it has in this study been shown that resistance can give cause for including more stakeholders affected by the innovation programme and give cause for reflection.

Moreover, in previous studies, the learning effect of resistance has often been treated as a silver lining (Oreg & Goldenberg, 2015, pp. 198-199) to an otherwise negative phenomenon, and it has rarely been elaborated. In contrast, this study shows that resistance is crucial in shaping the socio-material evolvement of an innovation process (this is something Pickering, 1993, has also previ-

ously noted in the context of science). This is very different from the antagonistic standpoint, where resistance was seen as 'an enemy' (Juma, 2016) of innovation.

Innovation is famously portrayed as invoking change in the context where it is introduced. Even though many scholars have noted that innovation does not remain the same after it has begun to diffuse and note users' influence over the process, they limit their focus to these users and rarely accentuate the reciprocity between the innovation process and the other processes it meets. When they study the interaction between the innovation process and the Other, the innovation process is treated as superior to the Other. This study illustrates that these processes benefit from being analysed on more equal ground. It also shows that all interacting processes (including the innovation process) influence each other, which is key to their evolution. The actors' engagement in movements of resistance and accommodation are entangled. The actors' movements of resistance and accommodation influence each other – they are dynamic. One cannot exist without the other. To connect resistance so strongly to the innovation process is aligned with Pickering's (1993) idea of materiality, being shaped in a dialectic of resistance and accommodation. But it stands in contrast to the STI scholars' description of the dysfunctional effects of human and non-human innovation resistance.

### 9.2.3 Innovation resistance can protect from undesired innovation programmes

Just as the Thames Barrier has protected London from flooding 193 times since 1982 (UK Environment Agency, 2020/2014), innovation resistance can have the effect of safeguarding something perceived as valuable. While most previous studies have framed innovation resistance as something dysfunctional which, at best, can lead to some learning for an innovating firm, this study has shown that resistance can be desirable for innovators, users and other actors in the world. Schumpeter (1934/2012) describes innovation as creative destruction; thus, something is destroyed when innovation is spread. This decline or destruction is often overlooked in innovation research (Canibano, et al., 2017). Resistance can be seen as an effort to preserve this 'something'.

That innovation resistance can serve to protect is often an implied but suppressed dimension in studies of human innovation resistance (e.g. Nijssena et al., 2005 or Landau, 1993). When the study of innovation is made from the perspective of the innovating firm – which is often the case even when clients are surveyed or interviewed – the desirable effect of innovation resistance for the resisting actor becomes downplayed. Innovation scholars have predominantly tried to understand the resistance that protects in order to explicitly or implicitly help firms learn how to make better offerings for these resisting

actors. In contrast, this study has left behind both the pro-innovation starting point and the objective of promoting innovation. This has opened up the possibility to see innovation resistance processes as a deliberate attempt for an actor to guard against unwanted innovation processes. It also makes it possible to see innovation resistance as enabling more stakeholders' participation in the social shaping of innovation processes. Participation could contribute to moulding innovation processes into something that is deemed 'better' or more suited for the context, from the perspective of the resisting actor. This is also in line with the rationale behind resistance put forward by historians and critical innovation scholars (e.g. Bauer, 2015; Thomas et al., 2017).

## 9.3 Expansion and advancement of previous actor-network theorising

In addition to the contributions to innovation theory on innovation resistance, a few elaborations and extensions to actor-network theory has been made. This was not the primary aim of this thesis, but sometimes the tools need to be developed in order to enable fulfilment of the aim. So too in this thesis. Section 9.1 in this chapter presents a new way to understand innovation resistance and a novel understanding of resistance within a programme of action. When Harrisson et al. (2001), Harrisson and Laberge (2002) and Thomas et al.'s (2017) focus on human resistance, this thesis has put more emphasis on resistance as an assemblage of humans and non-humans. It primarily builds on expanding and combining the theorising made by Callon (2007), Latour (1991), Galis and Lee (2014) and Helgesson and Kjellberg (2005/2020). Based on that theory applied in three empirical settings, here follows four areas of theorising relevant for actor-network theory.

### 9.3.1 Resistance as enabling and constraining agency

This study has shown that the movements of resistance, if successful, constrain the agency of the resisted programme and enable the agency of the resisting one. This is an elaboration of Galis and Lee's (2014) theorising, as they do not elaborate on what rejection means in terms of agency. Instead, they are content with stating that rejection leads to a disruption of the network and an establishment of the estrangement device, turning it into an 'insurmountable barrier'. An unfortunate choice of words, as this study has shown that there are hardly any 'unsurmountable barriers' involved in the movements of resistance; rather, the movements temporarily restrict the agency of the resisted actor, which might very well be countered with accommodation. There is, however, some directionality involved in the temporary restriction of the agency. As the resisting actor temporarily prevents the resisted actor from moving in one trajectory, it directs it away from that. But this does not mean that the resisting

actor is able to decide which one of the myriad of other possible alternative roads the resisted actor will embark upon.

Galis and Lee (2014) frame the outcome of the movements of dissidence as leading to disruption of the actor-network. They do not elaborate on what happens when the translations do *not* lead to disruption. This study has shown that the actor-network need not break down due to the movements of resistance. Distortion need not be followed by or invoked in parallel to estrangement. Distortion might be enough to domesticate a resisting actor within the network, prompting it to enrol a new actor to counteract the distortion.

### 9.3.2 Social shaping through interaction between two programmes

When Callon (2007) and Latour (1991) describe the perspective of one programme and Galis and Lee take the view of one anti-programme being locked out from a bigger programme, this study has focused on a number of interactions between *two* programmes, which means that in each interaction both programmes have been considered. This has rendered visible the mutual shaping through the interactions. When Galis and Lee describe one robust (antagonist) programme and a smaller marginalised (protagonist) programme, the robustness of the programmes has in this thesis been shifting – highlighting that a programme's agency can be constrained in one interaction and enabled in another. It has also elaborated on the social shaping of reality as taking place through a myriad of programmes intercepting and influencing each other. When Thomas et al. (2017) describe resistance as an alternative network and Harrisson et al. (2001) and Harrisson and Laberge (2002) describe it as failed interessement, this thesis has shown that these notions are part, but not a complete, understanding of innovation resistance. The thesis has put forward the resistance process as layers of movements, of which failed interessement or estrangement is one (out of several). It has shifted the focus of Thomas et al. and said that resistance is not the network or the programme; rather, it is the movements in-between programmes set in motion when they become associated or disassociated.

In ANT studies, the focus has often been on just one process (not unlike the innovation scholars' focus on just the innovation process). Everything that prevents this process from enrolling desired actors has predominantly been described as 'anti'. Just as women traditionally have been depicted only in relation to men, as daughter, mother or lover, the Other programme has in ANT commonly been depicted only in relationship to *the* programme of action (as an anti-programme). A focus on resistance and accommodation *between programmes* can ensure that each programme is depicted as a programme in its own right. The study has shown that these other programmes might appear to be anti from the perspective of one programme of action, but this is hardly its

most important characteristic. Even though it is a present but suppressed dimension in Galis and Lee's (2014) and most other ANT narratives, this thesis has put renewed emphasis on the social shaping being a *mutual or reciprocal* process, i.e. both the resisted and the resisting actor are shaped by the interaction.

This study has also illustrated that even though it is mostly Pickering (1993) who discusses resistance and accommodation, this is actually central to the entire construct of actor-network theory. When Latour (1991) describes a programme's translation, each translation is prompted by resistance from an anti-programme. The resistance from the anti-programme prompts an accommodation in the shape of enrolment of a new actor – through dressing the argument with a load. Therefore, the language of actor-network theory has an inbuilt antagonism; the programme under study becomes the protagonist and the other programmes, standing in its way, become the anti-programmes, i.e. the antagonists. As this study has shown, the construction of a programme of action is a struggle between programmes. The inbuilt antagonism in the actor-network theory risks nudging the analyst to choose a side in the struggle, consequently rendering other relevant perspectives invisible. This partly ties into the critique about ANT's focus on managers and 'princes' of the network, put forward by Miettinen (1999) and Mattila (2015). Seeing resistance and accommodation as an interaction between two programmes that mutually shape both programmes shifts the focus in a way that serves to remedy some of Miettinen's (1999) and Mattila's (2015) critique.

### 9.3.3 Actor's simultaneous enrolment in multiple programmes influences the interplay of resistance and accommodation

Galis and Lee's (2014) focus on the interplay between two separate programmes, and their theory does not cover dissidence within the macro-actor. This study has brought their notions of distortion, estrangement and rejection inside the actor to theorise about resistance and accommodation within a macro-actor. Helgesson and Kjellberg (2005/2020) do not elaborate on the movements that give rise to non-programmatic behaviour. This thesis has expanded their work in that regard using Galis and Lee's (2014) sociology of treason to more elaborately describe the movements of resistance that lead to non-programmatic behaviour. The combination of the two has rendered visible that associations and disassociations to multiple programmes impact the interplay of resistance and accommodation within an actor-network.

Macro-actors, who have programmes, consist of actors who also have programmes. When the actor's programme is compliant and aligned with the macro-actor, the actor is domesticated. But the macro-actor is also part of bigger macro-actors, which are part of even bigger macro-actors and so on. The number of levels of actors, macro-actors and so on cannot be determined. ANT

has often been content with elaborating on two levels (e.g. Latour, 1998). This study has shown that the actors' enrolment in big mega programmes (sometimes encompassing the entire nation or the world) influences the interactions on meso- and micro-level. Smaller programmes depend on being enrolled in or enrolling in these robust and stable mega programmes. The association with the bigger programmes makes the smaller ones more robust and vice versa. The association also gives the smaller programmes associations to other actors within the mega programme. Suppose the smaller programme enrols an actor B that is also enrolled in the mega actor, making it a boundary object. In that case, B's prescription and ascription are likely (but not necessarily) similar in both the smaller programme and the mega programme.

This ordering of programmes within bigger programmes makes smaller programmes move in collectives on meso- and micro-level. This has implications for our understanding of movements of resistance and accommodation that expands the work of Helgesson and Kjellberg, and Galis and Lee. When Galis and Lee (2014) focus on one big and robust programme and a smaller, less robust one, they do not pay attention to these two programmes being enrolled in other programmes. In contrast, this study has illustrated that a slightly wider perspective renders visible that the influence from other social worlds impacts the interplay of resistance and accommodation between two programmes.

The thesis has suggested that Helgesson and Kjellberg's reasoning can be connected to the layers of programmes within programmes. Consider a macro-actor, B [could be the Systemic Innovation in Ch. 7], consisting of, among others, the peripheral actor C [Apotekstjänst, for instance]. When this peripheral actors' behaviour is not captured by a centre of calculation in B [for example, the Ministry of Health and Social Affairs], and its prescription and ascription are not clearly set by the primum movens of B [ for instance, the Swedish Government], this can lead to C engaging in non-programmatic behaviour. C is then not necessarily aware of this behaviour being non-programmatic, and the centre of B might not yet be aware of it, or not yet have labelled it non-programmatic (as this, following Helgesson and Kjellberg's reasoning, can be done retroactively). The non-programmatic behaviour can then be due to actor C being enrolled in other programmes, for instance, its own programme C or a mega programme D [could be the Swedish Healthcare System] in which B is enrolled. If D seeks to domesticate C and B is silent (i.e. B's centres of calculation do not monitor and manage C's behaviour), this might threaten C's actor-network since it was enrolled in B and set up to be compliant and aligned with B [the Systemic Innovation] and not necessarily with D [the Swedish Healthcare System]. Another possibility also connected to multiple programmes is when a translation of a programme B (through enrolling a new actor E) [for instance, the Systemic Innovation enrols a need to move dose patients] makes it impossible for an actor F [for example, the SOL database] to be simultaneously enrolled in both programme B* and a mega

programme, G [the Personal Integrity programme]. This would make G resist B* when attempting to disassociate F from B*. The association between F and G might have been invisible to B up until the enrolment of E.

### 9.3.4 Acknowledging the Wallflowers

The invisible stakeholders are something for which actor-network theory has been criticised. Who decides which actors to include in the problematisation phase? asks Winner (1993). As Harrisson and Laberge (2002) noted, in their ANT study of innovation resistance, resistance is a way to ensure the inclusion of more stakeholders. In the same sense, focusing on resistance and accommodation between programmes enables the inclusion of more stakeholders. But these stakeholders need spokespersons in order to be visible in an ANT analysis. This study has used the word *wallflower* to highlight all these neglected actors. The word is a play on Pickering's 'dance of agencies' occurring in the interplay of resistance and accommodation and shaping science projects. It is also a response to Winner's (1993) critique of actor-network theory (where he points out that ANT, in the problematisation phase, include some social groups and exclude others).

Even though it is not possible within the ANT framework to include all relevant actors (this is limited to them having a spokesperson), this is a way to acknowledge that these other marginal actors exist. These are the actors in the corners, not included in the problematisation; thus, the obligatory passage point is not relevant for them. In the context of innovation research using ANT, the wallflowers are often the ones outside of the traditional system boundaries (innovator-user). By excluding them from the problematisation, their agency becomes restricted. In this study, it has been shown that when the programme of action has begun to interest more actors, the wallflowers can enter the interplay of resistance and accommodation. If the resistance is successful, this can break down the actor-network and force the primum movens to re-construct it, this time including the previous wallflower. As movements of resistance are a natural part of the evolution of an actor-network, the resistance from actors identified in the problematisation phase is not necessarily a big threat to the network. Simply adding a load to the argument might suffice to accommodate such resistance (even though it might break down the network). However, movements of resistance from wallflowers come from outside the network of identified relevant actors and therefore pose a bigger threat. If successful in their resistance, wallflowers invalidate the obligatory passage point and cause the network to break down. The accommodation required is then a complete reconfiguration of the network.

## 9.4 Summary of the chapter

This chapter has theorised about innovation and innovation resistance. It has laid bare the layers of movements that form the resistance process. These have been described as movements of distortion/problematisation, estrangement/interessement, enrolment/rejection, and constraining/enabling agency. The movements of resistance have been described as coming from an actor that has agency. This actor has been called the Other actor, following another programme. The innovation has also been described as an actor with a programme, i.e. the innovation actor following the innovation programme.

When successful, the movements of resistance restrict the agency of the innovation programme and enable the agency of the other programme. The Other actor can be an actor outside of the innovation actor-network whose programme intercepts the innovation programme, or it can be an actor seemingly enrolled in the innovation programme engaging in misaligned and/or non-compliant behaviour.

The restriction of agency affects the directionality of the innovation programme, in the sense that it blocks one of the possible ways forward. This might prompt movements of accommodation in the innovation programme, and the accommodation includes (1) enrolling new actors, (2) domesticating enrolled actors to old or new ascriptions and/or prescriptions or (3) rejecting previously enrolled actors. Thus, the movements of resistance shape both the innovation programme and the other programme. Innovation resistance is put forward as a sign that someone else has another way in which it seeks to shape the world that goes against the intentions of the innovation programme. It favours neither of these programmes, nor does it claim that it is possible or advisable to generalise that innovation programmes should be promoted at the expense of other programmes.

The chapter expands previous knowledge on innovation resistance in the sense that it, contrary to most previous studies, sees the movements of resistance as (1) shaping the innovation process, (2) as part of a struggle when multiple programmes attempt to shape the world (3) as a way for an actor to protect itself from unwanted influence from an innovation programme. It extends ANT, in the sense that it emphasises (a) that successful resistance enables the Other programme's agency and constrains the innovation programme's agency, (b) the social shaping occurs through interaction between two (or more) programmes and the analysis gain from studying both, (c) actors' simultaneous enrolment in multiple programmes influences the interplay of resistance and accommodation, and (d) the neglected actors are put forward as

wallflowers in the dance of agency, and denied access to the interplay of resistance and accommodation. If they are able to resist the network later, it threatens its stability.

This chapter has offered an alternative to the dominant scholarly view on innovation resistance. The next chapter will move on to contemplate the dominant knowledge production of innovation and innovation resistance.

# 10. The scholarly knowledge production around innovation and innovation resistance

By now, an alternative view on innovation resistance based on actor-network theory has been presented. This chapter will analyse and discuss knowledge production concerning innovation and innovation resistance based on that theorising. The discussion seeks to answer research question three:

> (RQ 3): How can the expanded knowledge of the dynamics of the innovation resistance process be leveraged to understand the dominant scholarly knowledge production of how innovation relates to resistance?

The question will be answered using the theorising presented in chapter nine. The notion of programmes of actions and rejected programmes will be utilised to understand why the research community has constructed innovation as an inherently good protagonist and resistance as its antagonist. This thesis has shown that a one-sidedly positive view on innovation feeds the antagonistic view on innovation resistance, and this is also emphasised in this chapter. The chapter begins with a discussion around the dominant mega programmes connected to the scientific community. Upon that follows a discussion around the programmes locked out from these dominant mega programmes. These dominant programmes as well as the programmes locked out from them, are used to explain the production of the dominant ideas of 'innovation' as inherently good and resistance as an antagonist to this 'positive' force.

## 10.1 The large allies of innovation

Godin paraphrases Koselleck's (1979/2004) account of 'revolution' and says that it almost seems like the word innovation, in itself, possesses such innovative power that it continuously extends itself to include every last element on our globe. In ANT terms, this means that the concept 'innovation' has been enrolled in a myriad of different programmes – some of them very large mega programmes.

In chapter nine, programmes were portrayed as moving in collectives on a micro-level. In chapter seven, smaller programmes such as the Systemic Innovation programme depended on being enrolled in /or enrolling robust and

stable mega programmes, such as the Prescription Control programme (which included a law). The mega programme had enrolled several such smaller programme's that were dependent on it. A mega programme (the neoliberal one) was also portrayed as enrolling actors (the Swedish Government) that became the primum movens of a Systemic Innovation programme that changed yet another mega programme (the Swedish Healthcare programme). Through that discussion, a picture came forward of programmes within programmes. If that insight, together with Galis and Lee's sociology of treason, is applied on a macro level, the construction of innovation described in chapter two can be put in a new light. It also gives a language to understand how and why innovation scholars have constructed innovation as beneficial and resistance as dysfunctional.

The account in chapter two can now be seen as a mega programme of industrial capitalism, enrolling more and more actors. The following sections will relate some of the mega programmes within the industrial capitalist one that has enrolled the actor 'innovation', ascribing an identity to it that fits its programme. The 'innovation' actor here refers to the conceptualisations and ideas about the phenomenon. This 'innovation' actor can be used to make ascriptions and prescriptions on processes or programmes, ascribing to them the identity 'innovation' and a corresponding - mega programme specific - prescription. Since every programme is free to make its own ascription and prescription, the identity and prescription of the actor 'innovation' differs slightly between the programmes in which the 'innovation' actor is enrolled. Therefore, each programme also makes slightly different ascription and prescription on the notion 'innovation process'. All mega programmes that have enrolled the actor 'innovation' see it as a domesticated actor in its network. The processes a mega programme enrols and gives the ascription 'innovation' are also compliant and aligned with that particular mega programme. In that manner, the construction of the innovation process as inherently good can be understood as a construction of a domesticated actor which, given the mega programme's ascription and prescription, is 'good' or engaging in behaviour aligned and compliant with that particular mega programme. Viewing the construction of the 'innovation' actor in this manner also illustrates how some perspectives became marginalised in innovation research – explaining some of the shortcomings identified in chapter two. When actors were rejected from the industrial capitalist endeavour, this also meant rejecting programmes with different world views and ideas. The influence from these marginalised programmes has been noted as largely lacking in the industrial capitalist programme and, subsequently, the innovation research within it.

When enrolled in a large mega programme, the magnitude of that programme and the ascription given to the 'innovation process' contributes to constructing a positive view of the actor. When innovation is a domesticated actor within a programme, it tends to, from the insider perspective, be viewed in a positive

light. This is not unique for these particular actors; all domesticated actors tend to be seen in a positive light from within the network. Therefore, being part of a large network with an advantageous power position empowers the 'Innovation' actor– it gets robust allies with advantageous power-positions. Compare this to pre-1850, when no programme strived to enrol the 'Innovation' actor. Then, it was used as an estrangement device used to lockout enemies. Remember the expression 'You are the innovateur!' from chapter two. Then 'innovation' was used as a distortion of someone's identity and, if effective, it led to estrangement that locked it out from a programme. In ANT terms, the change in connotation observed by Godin during the 1800s can be seen as a translation of 'innovation' from being an estrangement device used to lockout enemies to becoming an enrolled and domesticated actor, in not just one but several mega programmes.

These mega-programmes that became the allies of 'innovation' encompass many actors in the world. The most significant of these being the industrial (neoliberal) capitalist programme.[162] As Alvesson et al. (2017, p. 52) note, the institutions of academia are trapped within the frames of (neoliberal) industrial capitalism. This has been the backdrop against which much innovation research has been conducted. Within this large programme, there are other big programmes such as the economic growth programme (see Godin, 2019, p. 72), the poverty reduction programme (see Pansera & Owen, 2018) and the sustainability programme[163] (see Godin, 2019, p. 232; Schiederig et al., 2012). All of these power-producing mega programmes have enrolled 'innovation' as an actor necessary to achieve its goal. Therefore, even mega programmes that can be said to have conflicting goals – for instance, the neoliberal and the poverty reduction ones – can still agree that innovation is an essential part of achieving their divergent goals.

Now, the narrative will elaborate on some of these allies and their influence on the research process. First, the Industrial Capitalist programme, including some of its sublevel-programmes, will be presented. Thereafter, programmes that are closer to the research environment will be described, namely the Neoliberal University programme, the Top Ties Journal programme and the Innovation Studies Tribe programme.

### 10.1.1 The Industrial Capitalist Programme

The Industrial Capitalist programme started to gain momentum in 18th century Britain and is said to have enabled the industrial revolution (Fulcher, 2004, p.

[162] However, the Bolshevik socialist programme probably enrolled the 'innovation' actor too, as it was part of the USSR's economic growth race and space race with the US.
[163] Both poverty reduction (Pansera & Owen, 2018) and sustainability (Feola, 2020) are predominantly portrayed as being achieved through market functions.

19). One important programme within this mega programme is *the Corporate programme*, which is the programme of an actor using the organisational form of corporation. The overarching goals of these programmes are things like securing sustainable returns, getting a certain market share, and reaching a particular level of profitability. If innovation scholars study innovation processes from within the Corporate programme, this has implications for their view on the ascription and prescription of an innovation process. In order to be called 'an innovation process', a process then needs to subscribe to the programme-specific ascription of what an innovation process is, and it also needs to subscribe to the prescription of what an innovation process does. The ascription of an innovation process would be that it is commercialised and new in a particular context, while the prescription would be that it brings (monetary) value for the firm. From the Corporate programme's perspective, an innovation process actor is domesticated and well-behaved as soon as it is commercialised and brings (monetary) value to the innovating firm. Given the firm-centred perspective apparent in both chapter three and the discourse analysis by Segercrantz et al. (2017), it would appear that innovation scholars tend to be enrolled in the Corporate programme. This can also, in Van Maanen's words (1988/2011), be referred to them 'going native' and adopting the views on innovation held by their interviewees who tend to more often represent the innovator than the adopter (Rogers and Agarwala-Rogers, 1976, p. 176 footnote 11). Several interessement devices can enrol a scholar into this programme. They can be enrolled by their academic tribe, by the journals favouring research directed towards managers or through the funders of the research. Studies within the Corporate programme might encourage an explicit or implicit value judgment contingent on the innovation processes' compliance and alignment with the Corporate programme. This nudges the scholars, standing inside the Corporate programme, into viewing innovation processes as positive forces. It also encourages research that aid managers in ensuring domesticated innovation process actors in their Corporate programmes (see Segercrantz et al., 2017).

Connected to the Corporate programme is the *Economic Growth programme.* Even though increased productivity was important in the Industrial Capitalist programme from the start, it was not until the mid 1930s that Simon Kuznet and colleagues invented a measurement[164] for economic growth (Fioramonti, 2013, p. 6). Consequently, that was when the Economic Growth programme began to build its syntagmatic line. The 'innovation' actor was enrolled into this programme somewhere in the 1950s through scholars in the first tradition of innovation research. This association became more robust through the enrolment of the second tradition – often called Innovation Studies – in the 1970s (Godin, 2012). Since then, much innovation research has demanded that in

[164] GNP - Gross national product

order to be called an 'innovation process', a process must subscribe to the prescription 'contribute to economic growth' and the ascription 'commercialised and preferably (technical) product'. Thus, much research has used the prescription and ascription given by the Economic Growth programme. The problem that innovation solves then becomes 'how can we uphold a steady economic growth?' What the innovation is or does or whom it affects is not part of the innovation's ascription or prescription. When innovation scholars operate from inside the Economic Growth programme, possible adverse effects of innovation fall outside of the prescription given by the programme. When innovation is seen from inside the Economic Growth programme – as the means to reach the goal of economic growth – anything that stands in its way might be perceived as non-programmatic behaviour. For instance, the State's prescription in the Economic Growth programme is to facilitate growth generating innovation development (Pfotenhauer & Juhl, 2017). When the State is perceived as preventing innovation (as understood from within the programme) and instead favours social values such as ensuring liveable wages, this can be interpreted as non-compliant behaviour to both the Economic Growth and the Industrial Capitalist programmes (example from Hadjimanolis, 1999, p. 565).[165] Economic growth is a robust programme whose agency was largely enabled by enrolment in two other mega programmes: the Capital Accumulation and the Working-Class Welfare programmes.[166] Economic Growth ceased to be compliant with the Working-Class Welfare programme in 1980, but this noncompliance remained silent and undetected. Much of the scholarly work that lay the ground for the heterogeneous field of innovation research was conducted in a time when it was not yet apparent that it was questionable if economic growth was compliant and aligned with the Working-Class Welfare programme. Evidence also emerged that the Economic Growth programme might be resisting two other programmes that will now briefly be presented.

In the second part of the 1900s, the awareness of human-caused biodiversity loss (Díaz, et al., 2019; Carson, 1962) and climate change (IPCC, u.d.) began to rise. Now, a *Sustainability programme* began to form within the Industrial Capitalist programme and enabled the enrolment of many robust actors such as governments. The Sustainability programme was connected to a *Poverty Reduction* programme geared at diminishing poverty and engaging actors such as the United Nations (UN). Both the Sustainability programme and the Poverty Reduction programme enrolled the 'Innovation' actor and inherited much of the prescription and ascription put on 'innovation process actors' from the

[165] It should however be noted that many scholars see more functions of the national state in relation to innovation. For instance, as an entity that can direct (Mazzucato, 2018) or aid (MacVaugh & Schiavone, 2010; Uyarra , et al., 2014) the innovation activity.

[166] Both programmes saw economic growth as an important actor, in their struggle to achieve their respective goals of increasing profits and better working and living conditions (Harvey, 2005, p. 15).

industrial capitalist programme (see, e.g. the Bruntland Report, United Nations, 1987). Both the Sustainability and Poverty Reduction programmes are robust programmes, and their agency is enabled much due to their enrolment in the Industrial Capitalist programme. It is important to note that what is discussed here is reciprocal relationships. The agency of all associated programmes are enabled through their mutual connections. The agency of the Industrial Capitalist programme is enabled due to its enrolment of the Sustainability and Poverty Reduction programmes and vice versa. All connected programmes become more robust due to their associations with other programmes, and they are reciprocal and enable each other's agency. This also holds for the 'innovation' actor. When enrolled in these mega-programmes, it contributes to making them more robust, and its own network becomes more robust through the associations with these mega-programmes. Moreover, the 'innovation' actor becomes a boundary object of sorts as it is able to be enrolled in many programmes at once (albeit with slightly different ascription and prescription). A shared trait of these ascriptions and prescriptions is their positive connotations. Positive connotations are inherent in the construct of a network. A compliant and aligned actor is by definition viewed in a positive light by the network, while non-programmatic behaviour (if noticed) receive negative connotations. Being a boundary object enables more associations and thus enables the 'innovation' actor's agency and expands its network.

The Industrial Capitalist programme has enrolled so many innovation scholars and policymakers (directly or through its sublevel-programmes) that much innovation theory is created from within or at least not directly polemic with the programme. Therefore, the agency of the research is enabled through its enrolment in the Industrial Capitalist programme and its sublevel-programmes, and vice versa. Thus, the programmatic innovation research enables the agency of the Industrial Capitalism programme and its sublevel-programmes, and the agency of the research is also enabled through this enrolment in the Industrial Capitalist programme.

### 10.1.2 The Neoliberal University programme, the Top Tier programme and the Innovation Studies Tribe programme

The Industrial Capitalist programme is constantly changing, and its incarnations in different geographies vary (Fulcher, 2004). A form of it that is widespread today is Neoliberalism, which could be referred to as a Neoliberal Capitalist programme. It is a big mega-programme that encompasses a large part of the world and numerous forms of governance and policies (Steger & Roy, 2010), including universities (Harvey, 2005, p. 61; Shore & Wright, 1999, p. 563). Focusing on the well-being of firms is programmatic behaviour according to the Neoliberal Capitalist programme, of which the researcher, through her/his enrolment in the university, is part. When the university is part of the

Neoliberal Capitalist programme, then perhaps it is not surprising that the output in terms of innovation related publications to some extent mirrors the priorities of this programme.

The universities' enrolment in the Neoliberal Capitalist programme has fuelled a focus on speed and productivity. Researchers need to publish frequently in compressed timeframes and high-ranking journals (Mountz, et al., 2015; Özkazanc-Pan, 2012) to be programmatic in the *Neoliberal University programme*. The econometric measurement of journal ranking, and publication output is transferred to centres of calculation within the university administration that ensures this programmatic behaviour. The meteorological apparatus of the neoliberal university is adept at registering output numbers and journal ranking (see Widmalm, 2016). In extreme cases, this system counts a book - no matter how extensive - as only one output with no attached quality number (journal ranking). Therefore, the meteorological apparatus is less able to register books (see Thomas, 2016). A researcher programmatic with the neoliberal university programme can thus be nudged into favouring publications in journals that demand a narrower focus due to their word limits.

Each high-ranking journal follows its own programme, but the critique of them is often put forward in more general terms; so here, they will be referred to as the *Top Tier programme.* This programme has a big impact on determining which research is considered programmatic in the Neoliberal University programme. The relationship between the two is reciprocal, and they enable each other's agency. The list of research presented in Chapter 2.8, point 2 can be understood as a list of ascriptions and prescriptions considered programmatic in the Top Tier programme. Thus, refraining from being critical and instead reproducing common assumptions and values might be perceived as programmatic behaviour and a rational choice for a researcher dependent on salary and safe employment, which would be the case for most of them (us). This can nudge researchers to conform the research, so it becomes compliant with the Top Tier programme (Lund & Tienari, 2019; Alvesson, et al., 2017). It can also push them to narrow their findings into smaller sizes to fit the journal format and boost publication numbers (see Martin, 2020, p. 12).

Sometimes a Top Tier programme is reciprocally connected to an Academic Tribe programme. This tribe then influences which research that particular Top Tier programme considers programmatic. An academic tribe can be seen as a programme of action. There are several communities of scholars studying various aspects of innovation (Nelson, 2013). It is not possible to relate all of those programmes here; instead, one of these will be presented, namely the

STI field of Innovation Studies.[167] This is because it has revived scholarly attention in its capacity of tribe (Godin, 2014), has made conscious attempts to define the boundaries of the field (Lundvall, 2013, pp. 48-49) and is, by its own proponents, said to be the largest field of innovation research (Nelson, 2013). Therefore, the academic tribe of Innovation studies can be seen as a programme of action called the *Innovation Studies Tribe programme*. Research seen as compliant and aligned with the Innovation Studies Tribe programme favour economic selection mechanisms and do not focus on the adverse effects of innovation (Lundvall, 2013). This programme has enrolled influential innovation journals (also enrolled in the top tier programme) such as Research Policy and Technovation. It could be suspected that these journals are prone to favour research that is programmatic with both the Innovation Studies Tribe programme and the Top Tier programme. For instance, Research Policy only accepts submissions with clear policy or management implication (Research Policy, u.d.), indicating that research that is compliant and aligned with that particular Top Tier journal programme favours the perspective of firms, markets and national policy. The connections between the Neoliberal University programme, the Top Tier Programme and the Innovation Studies Tribe programme are reciprocal. They are interconnected, and their networks become more robust through their associations with each other (and, of course, numerous other actors). When the selection of papers is taken from journals enrolled in the Top Tier programme and favoured by the Innovation Studies Tribe programme (as was mostly the case in chapter three), perhaps it is not surprising that most articles reflected the positivist, pragmatic view favoured by the Top Tier programme (Lund & Tienari, 2019) and the firm-centred economic view explicitly favoured by 'Innovation studies' (Lundvall, 2013). However, by reading 48 papers, it is only possible to capture what is in the texts. It is not certain that the texts' authors in other instances of life subscribe to the notions they hint at in their writing. Their views on innovation resistance might be limited to 'discursive smartness' (Alvesson & Kärreman, 2011, p. 1124), which gives an impression of free will, while it really is a manner of writing that ensures publication. On this, I can only speculate as I do not have more material than their texts.

With the enabling of the agency of robust programmes also comes a restriction of other programme's agencies. Therefore, the following section will briefly discuss some programmes that have been locked out when constructing the allies to the actor 'innovation' and considers how this has influenced the dominant view on innovation resistance.

[167] The use of the name Innovation Studies easily causes a novice to mistake it for encompassing the entirety of innovation research.

## 10.2 The enemies to be locked out

The previous section related how innovation got big allies that helped construct it as inherently good. Those large allies enabled a better understanding of why innovation scholars tend to view innovation positively and resistance as unfavourable. In this thesis, the movements that enable and restrict agency, have been put forward as essential when attempting to understand innovation resistance. Therefore, this section will complement the narrative in the previous section, with a few brief accounts of programmes locked out from the big programmes. Making visible these lines of conflict through the use of Galis and Lee's (2014) sociology of treason helps to disentangle innovation from some of its programmatic blinders. It also makes sense of some of the limitations in STI research accounted for in chapter two. First, this section will briefly examine some actors that the Industrial Capitalist programme has rejected or forcibly enrolled with distorted ascriptions and prescriptions. The reader will likely recognise these as typical examples of marginalised actors. Secondly, the section will present actors rejected from the Top Tier programme and Innovation Studies Tribe programme.

### 10.2.1 Research non-programmatic with the Industrial Capitalist programme

Qualitative innovation research is essentially very recent historical research. When it is said that "the winners write the history", this can be understood as history being written by actors enrolled in robust mega programmes. These robust mega programmes have become more and more robust through successful identification, interessement and enrolment of allies, and successful distortion, estrangement and rejection of 'enemies'. The Industrial Capitalist programme and its sublevel-programmes are examples of such mega programmes. The vast majority of innovation research is conducted from within the Industrial Capitalist programme. This programme has been known to reject several Other programmes. It has also been known to enrol actors previously enrolled in Other programmes, domesticating them through different centres with meteorological apparatuses. Four actors locked out or domesticated (so that they, at least from the point of view of the meteorological apparatuses, appeared to be engaged in programmatic behaviour) are: the non-human world (often referred to as nature), people of colour (POC), women, and workers. The list could go on,[168] but here we will only dwell very briefly on these four since they became most apparent in the literature review in chapter two.

[168] For instance, children, disabled people and people identifying themselves as HBTQ could be added to the list.

(1) The word 'progress' (which is so often connected to innovation) contributed to locking out nature programmes (even though it was not the only means used). Progress is an actor that has distorted the identity of nature as an endless source of resources open for exploitation (Nisbet, 1980). It has been used as an estrangement device placed between nature programmes (such as, for instance, Ecosystem programmes) and the Industrial Capitalist programme. The agency of non-humans such as animals, plants, ecosystems and earth systems has thus been restricted. Perhaps climate change, in that light, can be seen as a number of Earth System programmes, resisting the Industrial Capitalist one and threatening to restrict its agency. This is possibly also why innovation research seems to put little consideration to issues such as extraction and waste, despite its clear link to technological innovation. This might also be why innovation resistance from non-humans, such as animals and ecosystems, often goes unnoticed or is seen as unimportant.

(2) Other actors distorted and estranged by 'progress' are people of colour. Following Grubacic and Graeber (2020), the concept of 'progress' can be seen as part of distortion and as an estrangement device to lock out POC actors such as black people or Indigenous people. The identity of those programmes (i.e. among other things, their way of living, organising and appreciating life) was distorted as 'backwards' and 'less developed', rather than being treated as a valid suggestion on how to live on this planet. If other programmes were less evolved than the Industrial Capitalist one, those programmes would have less chance of enrolling or keeping actors targeted by the Industrial Capitalist interessement devices. The innovations in the Industrial Capitalist programme combined with a rhetoric of the benevolent intentions of the capitalist actor[169] could serve as interessement devices to enrol POC actors in the global south in the Industrial Capitalist programme (see, for instance, Gerschenkron's, 1962, book, 'Economic Backwardness in Historical Perspective'). In the early days of the Industrial Capitalist programme, it distorted the identity of black people as 'near non-human'. This, together with different violent interessement devices enabled by innovations in medicine, weaponry and ships (Headrick, 1981), facilitated their enrolment as enslaved people. In the past and today, Indigenous programmes have been continuously rejected from the Industrial Capitalist programme and its sublevel-programmes. When America was 'discovered', it was distorted as 'empty' or 'unoccupied,' distorting indigenous people as 'unimportant'. Some of this distortion lingers in the Industrial Capitalist programme today. Even when innovation is studied from within the Sustainability programme, focusing on developing sustainable technical innovations,[170] actors such as indigenous people – who are affected by the process – are either wallflowers or distorted as irrelevant. This enables 'state authorities,

[169] The rhetoric at least in the US in the 1940s was that the Global North would in this way help the Global South to become as evolved as the north (Pansera & Owen, 2018).
[170] Such as electric vehicles, wind and solar power.

private firms or social elites"' to enrol natural resources – to which indigenous people have a claim – in the Sustainable Development programme (see Sovacool, 2021). This might also be a reason why innovation research 'for the poor' is programmatic with the Capitalist programme, suggesting that a way out of relative poverty is through becoming consumers and producers embracing western ways of living (see Pansera & Owen, 2018). Innovation Resistance from these actors can then, from inside the Industrial Capitalist programme, be seen as non-programmatic behaviour in need of domestication or rejection, which in STI literature would translate as 'overcoming the resistance'.

(3) The distortion of the identity of women as 'inferior' served to either lock them out from the Industrial Capitalist programme or, when enrolled, prescribe them with an ascription of inferiority and a prescription symbolically linked to the female. Many activities symbolically linked to the female and valued by feminist programmes were thus locked out from the Industrial Capitalist programme. This exclusion from the Industrial Capitalist programme explains why innovation scholars conducting research from within that programme tend to promote male dominating industries and construct innovation as symbolically linked to men (Lindberg, 2012; Pettersson, 2007; Lindberg, 2010). It can also explain the feminist resistance to growth focused innovation research, noted by Pettersson and Lindberg (2013).

(4) Finally, the innovation resistance from Luddites and the like can be understood as resistance processes that manifest when the Industrial Capitalist programme tries to lock out worker programmes.[171] An analysis made from within the Industrial Capitalist programme could easily view worker programmes as anti-programmes. This might explain the readiness to portray things like "worker rights" as antagonists to innovation (e.g. Hadjimanolis, 1999) and the lingering insistence that 'Luddite style' worker resistance is misguided and undesirable. Interpretations such as those are compliant and aligned with the Industrial Capitalist programme.

### 10.2.2 Research non-programmatic with the Top Tier programme and the Innovation Studies Tribe programme

Research that does not fulfil the prescriptions and ascriptions seen as programmatic with the *Top Tier programme* risk being distorted as being of inferior value. Research that is non-programmatic with the Top Tier programme might be harder to be recognised for subsequently making it more difficult for a researcher who engages in it to become a recognised innovation scholar (see Özkazanc-Pan, 2012). Low publication rates in high ranking journals might

[171] Especially in the early days of capitalism and in the days after the 1970s when worker programmes lost much of their previous power.

be used to distort a researcher as non-productive and low performing (Özkazanc-Pan, 2012). Estrangement devices in the shape of assessments from evaluation committees, etc. can reject the researcher from the *Neoliberal University programme*. Alvesson et al. (2017, p. 45) argue that researchers are nudged towards making incremental contributions that contribute to an accumulation of knowledge, rather than emphasising the role of paradigmatic assumptions. Problematic assumptions might lead to problematic results; according to Alvesson et al. If so is the case, then the idea of progress automatically being reached through building on previous research, in undermined. Thus, locking out research that does not fit the Top Tier programme might lead to the research being stuck in old paradigms (Kuhn, 1962) for a longer time than necessary.

Universities are, however, not only enrolled in the Neoliberal University programme but also in the Academic Freedom programme. Alvesson et al. (2017, pp. 50-51, 55) emphasise that researchers enjoy considerable degrees of freedom and may choose what to study, where, when, and with whom. The meteorological apparatus of governments and central university administrations do not capture the actual content of the research. They argue that taking a more critical turn and challenging assumptions in a specific paradigm would not be noticed by centres of calculation in regulatory bodies or big publishing companies that own the journals.[172] Therefore, non-programmatic behaviour is, according to Alvesson and colleagues, possible without suffering detection and rejection. Thus, according to them, research compliant and aligned with the Neoliberal University programme is mainly constructed by domesticated scholars (see Alvesson et al., 2017, pp. 50-51, 55).

Like any robust actor-network, the *Innovation studies* actor distorts or ignores dissenting narratives (see Godin, 2014). This can be seen as the Innovation Studies Tribe programme distorting the identity of research that challenge its fundamental assumptions and value judgements.[173] The Innovation Studies Tribe programme has tried to place rhetorical estrangement devices between itself and theories and methods enrolled in Other programmes such as the Science and Technology Studies programme (Martin, 2012; Lundvall, 2013).[174] But there have also been attempts at enrolling STS studies (Soete, 2019) into the programme. The Innovation Studies Tribe programme (and any other tribe

[172] The journals would likely not be against a critical turn as long as it continues to boost their rankings, etc.

[173] The distortion is also extended to the economics of technical change, social innovation (Godin, 2014) and organisational innovation (Nelson, 2013).

[174] It is especially noteworthy that Martin (2012) explicitly excludes four research areas. For two of them (Energy and Environment Policy Research and Literature on Economic Development), he makes exceptions ‘where technology or innovation is a key element’ (p. 1220). For a third area, 'scientometrics or bibliometrics research', he makes an exception ‘where the research is clearly linked to ‘science policy’, ‘technology management’, etc." (p. 1220). But for STS research, there is no exception.

programme) distorts knowledge from outside of the researcher's tribe programme as "unconnected to their research". It is a distortion that eventually leads to the rejection of that knowledge from the researcher's mind, making them unable to answer questions relating to areas outside their narrow frame (Alvesson, et al., 2017, p. 72). This might be one reason behind the crisis of the STI fields noted by Soete (2019). When a scientist follows a theoretical paradigm such as the one advocated for by the Innovation Studies Tribe programme, he or she also gets a set of blinders that prevent the researcher from seeing things outside the programme. This is a likely cause of the pro-innovation bias in the innovation literature in general (Rogers, 2003, p. 106), the derogatory view on resistance, and the continued reproduction of these views in the Innovation Studies Tribe programme. Moreover, this might be why so few critical voices are heard in STI journals, and it could also partly explain the findings in chapter three.

Thus, research conducted from within the Top Tier programme, the Innovation Studies Tribe programme or both, narrow a scholar's area of expertise. Researchers and peer-reviewers, compliant and aligned with the Neoliberal University programme, favours research that is compliant with the Top Tier programme and subsequently specialisation, publications in journals and narrowing of research questions (see Hornborg, 2016, p. 8; Widman, 2016; Thomas, 2016). This risks distorting research that is less delineated and does not easily fit into a short journal paper or Academic Tribe programmes. Research connected to overarching questions about 'the prospects of humankind' (Hornborg, 2016, p. 8; Laestadius, 2013) can be distorted as 'too broad', 'information overload' or 'stepmotherly treated' (Laestadius, 2013, p. 10) by researchers who are used to behaviour programmatic with the Top Tier programme or an Academic tribe programme.

The distortion, estrangement, rejection and agency constriction of programmes locked out from the Industrial Capitalist programme as well as programmes locked out from the Top Tier programme and the Innovation Studies Tribe programme provide a deeper understanding of the tendency to apply narrow system boundaries to the study of innovation. These narrow system boundaries are narrow enough to allow researchers to discern a positive sum-game for the consequences of innovation processes, in turn allowing for resistance to take the role of antagonist. A narrow focus in a research study could be seen as a reasonable way of handling the difficulty of considering a larger picture. Still, it also risks making the research less suited to advise policymakers. When Orr critiqued business schools for being responsible for teaching the very people who have led the world to its current state of impending climate catastrophe and growing inequality, he said that:

> By what is included or excluded, we teach students that they are part of or apart from the natural world. To teach economics, for example, without reference to

> the laws of thermodynamics or those of ecology is to teach a fundamentally important ecological lesson: that physics and ecology have nothing to do with the economy. That just happens to be dead wrong (Orr, 1991).

In the same sense, to linger with an idea about innovation as something inherently good and resistance as a pejorative phenomenon is for an academic writer to spread and reproduce these ideas; because what is academic writing, if not a way to teach others about discoveries and insights. Narrow system boundaries can lead to the false impression of the innovation being a neutral phenomenon, with effects leading to a positive sum-game. This, in turn, feeds into the idea of innovation as a protagonist and resistance as its antagonist.

## 10.3 Summary of the chapter

In this chapter, some large allies of 'innovation' were identified and discussed. The Industrial Capitalist programme (including the Economic Growth programme, the Corporate programme, the Sustainability programme and the Poverty Reduction programme), the Neoliberal University programme, the Top Tier programme and the Innovation Studies Tribe programme were put forward as important. It was argued that the agency of the actor 'innovation' is enabled through these associations, and that innovation research is often conducted from within these robust programmes. The allies of innovation, and the continued enabling of their agency, were put forward as reasons why the concept has shifted from being something people only called their opponents (in post-1850 times) to be something people only call phenomena they perceive as positive.

In ANT terms, some actors are called enemies. The 'enemies' identified were actors locked out from the Industrial Capitalist programme (non-humans such as animals and ecosystems, people of colour, women and workers) and research non-programmatic with the Top Tier programme and the Innovation Studies Tribe programme. It was illustrated that locking out these 'enemy' actors from the mega programmes – from within which much innovation research is conducted – has led to these perspectives being downplayed, marginalised or absent in innovation literature. It has also led to neglect or downplay of the resistance from these rejected actors. Innovation resistance when interpreted from within the Industrial Capitalist, Top Tier or Innovation Studies Tribe programmes becomes non-programmatic behaviour that should be handled through domestication or rejection, or in the words of STI, through being 'overcome'.

# 11. Conclusions

The time has now come to summarise the conclusions and contributions made through answering the three research questions posed in the very first chapter of the thesis. Throughout the book, it has been shown that the field of Science, Technology and Innovation (STI) research is haunted by certain limitations that restrict the analysis of innovation resistance. Some of these limitations have also been noted by the STI scholar Soete (2019), who argues that STI research and policy are trapped in a consumerist and industrial effectivity mode that has led the field into a fundamental and existential crisis. He suggests that Science and Technology Studies (of which ANT is a part) could be a way out of this crisis, and this thesis has illustrated how this could be done for the analysis of innovation resistance. In that sense, the thesis has not only positioned itself as a contribution to the field of Critical Innovation Studies but also, following Soete's call, as a contribution relevant to the larger field of Science, Technology and Innovation studies. Therefore, this chapter is structured in a way that first highlights the findings made through an actor-network analysis and then presents how this contributes to both STI and Critical Innovation research.

## 11.1 Research findings and contributions to ANT

This section will summarise the findings and point out the contributions made to actor-network theory. The three questions posed were:

> RQ1: How does the innovation resistance process manifest itself when viewed with an ANT-inflected lens?
>
> RQ2: How can the dynamics of the entanglement between an innovation actor and a resisting actor be conceptualised, and complement dominant outlooks on how the two relate to one another?
>
> RQ3: How can the expanded knowledge of the dynamics of the innovation resistance process be leveraged to understand the dominant scholarly knowledge production of how innovation relates to resistance?

The answers to these three research questions are given a sub-section each in this section, only saving the last part of RQ2 for section 11.2.

### 11.1.1 The manifestation of innovation resistance

Viewed with an ANT-inflected lens, the world consists of incalculable amounts of programmes of action. Some of these programmes are given the ascription *innovation programme*, and those have been of interest for the fields of STI and Critical Innovation studies. Important to note is that the innovation process is not the only process out and about. An innovation programme moves in a web of programmes, and when it intercepts an Other programme, that meeting affects both programmes. It is through that meeting that innovation resistance gets manifested.

The Other is an *actor* - consisting of an assemblage of humans and non-humans – who have a *programme*. That the Other has a programme means that it attempts to reach some kind of goal and somehow shape the world. The Other can be an actor that, up until the moment they meet, has been separate from the innovation actor. It can be a previously seemingly domesticated actor enrolled in the innovation programme, engaging in non-programmatic behaviour. The Other can also be a macro-actor, in which the Innovation actor has enrolled, which attempts to domesticate the innovation actor in a way that goes against the innovation programme.

So, to understand innovation resistance, it is important to at least consider two programmes and their respective perspectives. From the point of view of the innovation programme, innovation resistance emerges when the Other attempts to restrict or interfere with the movements of the Innovation programme. This interference can restrict the innovation programme's agency and prevent it from engaging in behaviour programmatic with the Innovation programme. On the other hand, from the perspective of the Other, the innovation programme engages in resistance when it somehow attempts to prevent the Other from behaving in accordance with the Other programme. This can, simply put, be described as the innovation programme preventing the Other from reaching its goal(s). Put somewhat differently, when faced with interference from the innovation programme, the Other's attempt to remain programmatic with its programme can be interpreted as resistance to the innovation programme. When this happens, the Other programme invokes a change noticeable for actors within the innovation programme. Thus, the innovation resistance process is a process *between* programmes, not a programme in itself.

### 11.1.2 Conceptualisation of the dynamics of the entanglement between an innovation actor and a resisting actor

This study has identified five manners in which an innovation actor and an Other actor can intercept. These are when (1) an innovation programme and an Other programme attempt to enrol the same actor, (2) an innovation programme attempts to enrol an Other actor, while the Other programme tries to

prevent the enrolment, (3) an Other programme attempts to enrol an actor enrolled in the innovation programme, with this actor being incapable of simultaneously be enrolled in both (i.e. becoming a boundary object), (4) an actor enrolled in an innovation programme engages in non-programmatic behaviour, and (5) a macro-actor – in which the innovation actor is enrolled – registers the behaviour of the innovation programme as non-programmatic and attempts to domesticise it.

The meeting between two programmes makes for a dynamic process, and it can be conceptualised in the language of ANT as layered movements of resistance. When seen from the perspective of the innovation programme, these movements of resistance become *movements of innovation resistance*. These movements refer to gradual changes in the relationships between actors, i.e. gradual changes in the positions in the actor-networks. Nothing dictates that the movements play out in chronological order; instead, they are layered, meaning that they can occur partly or fully in parallel. The movements that emerged in the meeting between the innovation programme and the Other programme led to the two programmes becoming entangled with one another. When they meet, they interweave and give rise to reactions in both programmes. Thus, the interaction between the two programmes is dynamic and reciprocal. Based on ANT, the movements of resistance were described as distortion, interessement/estrangement, rejection (that lead to non-programmatic behaviour) and restriction of the Innovation actor's agency. *Distortion* of the innovation programme's identity could occur when a macro-actor – in which the Innovation actor is enrolled – registers the innovation programme's behaviour as non-programmatic and attempts to domesticise it. It could also be part of an attempt to lock out an innovation actor from an actor it attempts to enrol. *Interessement* would be when the Other target the same actor as an innovation programme with its interessement device. The movement of interessement is paired with the placement of *estrangement device(s)* between the Innovation actor and an actor with which it strived to associate. The result of an effective estrangement device would be a movement of *rejection* when the attempted associations between the innovation actor and the targeted actor are severed. The rejection would *restrict the agency* of the Innovation actor and *enable the agency* of the Other actor. The layered process of innovation resistance thus restricts the agency of the Innovation actor and enables the agency of the Other actor. This might prompt an accommodation from the Innovation actor that includes enrolment of a new actor. Thus, these movements of resistance and accommodation shape both the innovation actor and the Other actor.

Through this theorising, the thesis has connected the sociology of treason (Galis & Lee, 2014) to movements of resistance and accommodation. The movements have been put forward as temporarily restricting the agency of the pro-

gramme that was unsuccessful in its movements of interessement and estrangement, and enabling the agency of the programme for which those movements were successful. This might very well be countered with accommodation. Additionally, it has been illustrated that contrary to what Galis and Lee (2014) imply, distortion need not be followed by or invoked in parallel to estrangement. Instead, it can be used to domesticate a resisting actor within the network.

Moreover, the thesis contributes to actor-network theory by highlighting the benefits of using the perspective of two programmes instead of one. A programme's agency can be enabled in one interaction and restricted in another. This has rendered visible the mutual shaping through the interactions between programmes. It has also highlighted that movements of resistance and accommodation are central to actor-network theory, even though they are seldom explicitly recognised as such. It has been pointed out that the construction of a programme of action is a power struggle between programmes and that the anti-programme concept (Latour, 1991) carries an inbuilt antagonism that risks nudging an ANT analyst to choose a side in this struggle. It has been suggested that this could be avoided by simultaneously studying more than one programme. Thus, acknowledging the 'anti'-programmes as programmes in their own right instead of being content with glimpses of them during their engagement in anti-programmatic behaviour.

The thesis has also pointed out that the innovation resistance from the Other is received differently by the Innovation actor depending on whether or not the Other was identified as relevant in the problematisation phase when the innovation actor-network was set up by a primum movens. Actors ignored in the problematisation phase and therefore locked out from the interplay of resistance and accommodation have here, as a play with Pickering's dance of agencies, been called *wallflowers*. When the Other was identified as a relevant actor in the problematisation phase, resistance from it was somewhat anticipated and sometimes even desired. When the Other was a wallflower in the problematisation phase and therefore excluded from the interplay of resistance and accommodation arranged by the primum movens, then resistance from the Other became a bigger threat to the network. This is because a reconfiguration of the network, following upon resistance from the Other, would demand a new network set-up including an additional relevant actor and possibly a new obligatory passage point. This theorising has partly addressed Winner's (1993) critique of actor-network theory's tendency to include some social groups while excluding others in the problematisation phase.

This expanded knowledge on the dynamics of the innovation resistance process through actor-network theorising has been leveraged to better understand the scholarly knowledge production of innovation and innovation resistance.

### 11.1.3 The dominant scholarly knowledge production of how innovation relates to resistance

Programmes, in this thesis, have on micro-level emerged as a form of dynamic collectives assembled by yet other larger programmes. Small programmes depend on being enrolled in larger ones, and their agency is enabled through these associations. The word mega programme has been used to understand this on a macro level. The study has shown that an actors' enrolment in big mega programmes (sometimes encompassing the entire nation or the world) affects the interactions on meso- and micro level. An actor's simultaneous enrolment in multiple programmes influences the interplay of resistance and accommodation. A macro-actor's enrolment in a mega programme has a bearing on its behaviour. For instance, if a mega-actor registers a behaviour from an enrolled macro-actor as non-programmatic, this might prompt the macro-actor to, in hindsight, determine that the behaviour of an actor within it is non-programmatic and attempt to domesticate it. Thus, the thesis has elaborated on the movements within a programme that give rise to non-programmatic behaviour and has connected them to mega-programmes and simultaneous enrolments in multiple programmes, thus expanding the theorising on non-programmatic behaviour undetected by the centre of a network given by Helgesson and Kjellberg (2005/2020). The thesis has pointed out that in an actor's membership in multiple programmes lies a latent *threat of* (from the perspective of the Innovation actor) or *potential for* (from the perspective of the Other) resistance.

The use of ANT for the theorising around innovation and innovation resistance has provided a language for the dominant scholarly productions of innovation and innovation resistance. The dominant innovation research around innovation and innovation resistance can be seen as conducted from inside robust mega programmes. The study has shown that much STI research has been conducted from within the mega programme of *Industrial Capitalism* (or one of its sublevel-programmes, such as, the Corporate, the Economic Growth, the Sustainability and the Poverty Reduction programmes). Each of these programmes gives the actor 'innovation' (as in the conceptualisations and ideas around the phenomenon) a slightly different ascription and prescription. This 'innovation' actor is used to ascribe the identity 'innovation' to actors (such as processes or artefacts) within the programme. The Corporate programme, for instance, uses the ascription of 'commercialised and new in a particular context', and the prescription would be that it brings (monetary) value to the firm. The Sustainability programme would add ecological and social considerations to this ascription and prescription while remaining programmatic with the overall Industrial Capitalist programme. The Industrial Capitalist programme (and its sublevel-programmes) have thus enrolled the actor 'innovation', albeit with slightly different prescription and ascription. However, one thing these ascriptions and prescriptions have in common is that

they come with positive connotations. These positive connotations are inbuilt in the construction of an actor-network. From the perspective of the network, an enrolled, domesticated actor is viewed as an ally or a protagonist, while the non-programmatic actor is more of a dissident. Through its enrolment in the various sublevel-programmes of the mega-programme of Industrial Capitalism, the 'innovation' actor has become a boundary object of sorts, and its agency is enabled through the association with these large actors. The enrolment of the 'innovation' actor, in turn, enables the agency of the Industrial Capitalist programme (and its sublevel-programmes). Thus, it is a reciprocal relationship of actors enabling each other's agency. Moreover, when innovation is enrolled in large programmes such as these, resistance to it can be perceived as non-programmatic behaviour that threatens the network. Programmatic behaviour from research conducted from within these programmes would be to distort the identity of the resistance from the Other and aid actors within the programme to either domesticate or reject resisting 'Others'.

Furthermore, the dominant innovation research around innovation and innovation resistance is also conducted from inside the *Neoliberal University programme*, where compliant and aligned behaviour from a researcher is to frequently and in compressed timeframes publish in high ranking journals. Connected to this are several *Top Tier programmes* and different academic tribe programmes. Research that is compliant and aligned with the Top Tier programme tends to (1) approach topics that fit neatly within contemporary popular theories, (2) be pragmatic and positivist, (3) adhere to mainstream assumptions, (4) use detailed codification procedures, or statistical techniques, (5) downplay social constructionist approach and (6) smooth out contributions that would be uncomfortable, controversial or disturbing for an academic tribe. A researcher programmatic with the Neoliberal University programme can be nudged into behaviour programmatic with the Top Tier programme. This can push them to narrow down and fragment their findings to fit the very short journal format. The largest of the academic tribes related to innovation research is (according to its proponents) the STI field of Innovation Studies, here called the *Innovation Studies Tribe programme*. Research that is compliant and aligned with the Innovation Studies Tribe programme focuses on economic selections mechanisms and the perspectives of firms, markets and national policy. The Neoliberal University, Top Tier and Innovation Studies Tribe programmes are part of the Industrial Capitalist programme, and their associations to each other contribute to the performative robustness of each programme. They are in a reciprocal relationship where they enable each other's and the 'innovation' actor's agency. The continuous construction of these robust networks is contingent on locking out other actors from the network, consequently restricting their agency.

The study has highlighted some actors locked out from the Industrial Capitalist programme or enrolled with distorted identities that do not match the ascription in the actor's own programme. The actors that became salient in this study were the non-human world (often referred to as nature), people of colour (POC), women and workers. Locking out the programmes of these actors has influenced what is deemed programmatic behaviour in the Industrial Capitalist programme and the ascription and prescription on the 'innovation actor'. It has also influenced which processed are given the ascription 'innovation', subsequently earning the title Innovation actor. Consequences from innovation processes for these locked out actors become invisible or downplayed by the Industrial Capitalist programme. Resistance from them are simply anti-programmatic and threatens the network of the Industrial Capitalist programme (and its sublevel-programmes). This can explain why resistance from these locked out actors have received little attention in innovation research. To that explanation, we can add that some research is locked out from the Neoliberal University, Top Tier and Innovation Studies Tribe programmes. To be compliant and aligned with the Neoliberal University programme, a researcher is pushed to conduct research that is compliant and aligned with Top Tier programmes. However, the Top Tier programmes tend to lock out research that is non-programmatic with it; for example, research that point towards uncomfortable paradigmatic shifts, rejects mainstream assumptions, are social constructionist, use methodology that is not carefully codified or statistical, and is not pragmatic and positivist. Some Top Tier programmes are connected to the Innovation Studies Tribe programme. This programme has distorted knowledge from outside of the programme as "unconnected to their research", which risks leading to the rejection of that knowledge from a programmatic researcher's mind. This prevents a researcher programmatic with the Innovation Studies Tribe programme to look beyond the boundaries of the programme. This is a likely a cause of the field's narrow system boundaries (innovating firm-user) that has enabled researchers to discern a positive-sum game for innovation processes. This assumption of a positive sum-game has contributed to the pro-innovation bias and the antagonistic framing of human and non-human innovation resistance.

## 11.2 Contributions to innovation theory

Through the findings enabled by the ANT analysis, a few contributions were made to Innovation theory.

While STI research often portrays the resisting Other as either a static non-human (for instance, a law) or as not yet persuaded consumers, the ANT lens has rendered the agency of the resisting other visible and highlighted that the resistance is not necessarily reactionary. The Other's most important characteristic is not that it resists a particular innovation process; rather, the Other

is pursuing another goal, and the innovation programme happens to interfere with that endeavour. In STI research, the emphasis has often been on the interception and suggested countermove from the innovation programme. In contrast to STI and, to some extent Critical Innovation Studies and Resistance Studies, this thesis has refrained from valuing the innovation process' perspective over others. This study has re-connected innovation resistance to its context (or programme) and shown that innovation resistance is a sign that an Other has another story and another way in which it strives to shape the world, and that the Innovation programme is interfering with this other goal. In that light, previous STI work on innovation barriers and resistance can be seen as a glimpse of these other processes with which the innovation process intrudes.

It is widely acknowledged that innovation processes shape the world. Therefore, innovation resistance from the Other can be seen as a struggle to participate in this social shaping. The study has shown that an innovation process is shaped through an interplay of resistance and accommodation with Other actors. A successful innovation resistance process restricts the agency of the Innovation programme and prompts it to change to accommodate the resistance. In that sense, the resistance has directionality since it closes one possible route for the innovation process, forcing it to try other options. This stands in contrast to the dysfunctional effects of innovation resistance described in STI studies. Even though STI studies are not oblivious to innovation processes changing the context in which they are introduced, they rarely emphasis the reciprocity between the innovation process and the other processes it meets. This study has shown that when an innovation process meets an Other process, they become entangled in movements of resistance and accommodation that influence both processes. Innovation resistance could, therefore, be one way of adjusting an innovation process to better fit the context in which it strives to enter.

Moreover, this study has highlighted that other actors outside of the system boundary firm-client can contribute to the learning of the innovation actor and shape the innovation process. This expands the popular STI idea that resistance from prospective clients can lead to learning for an innovating firm. Resistance from outside the system boundary firm-client is (as far as the literature review in this study can tell) not put forward as a learning opportunity in STI research. However, this study has shown that resistance from outside the system boundary can give rise to the inclusion of more stakeholders, reflection and learning. Moreover, the study has shown that resistance from within or outside the system boundaries firm-client can protect something perceived as valuable for the Other and guard against unwanted innovation processes.

The study has emphasised that firm-based innovation processes are not the only kind of processes striving to change the world. However, the firm-based innovation process has been the favoured analytical object for STI scholars, and firms' continued innovation activity is often explicitly or implicitly promoted by them. Consequently, the potential value of other processes has been downplayed. This study has shown that picking a side when studying intercepting processes that strive to reach different goals is not a neutral starting point but tied to performative power structures connected to Industrial Capitalism. In the Industrial Capitalist programme, the ascription given to innovation differs slightly between sublevel-programmes but often involves a process where a firm develops and diffuses commercialised products or services that are assumed to contribute with (economic) value to the firm and economic growth for the region in which the firm dwells. ANT enabled a description of this in terms of large programmes enrolling innovation as an actor (consequently, giving it positive connotations as long as its behaviour was programmatic) and suggested that innovation research conducted from within the Industrial Capitalist programme tend to lock out other programmes such as those of ecosystems, people of colour, women and workers. This explains the tendency to, in hindsight, withdraw the ascription 'innovation' from an actor, previously seen as a domesticated and well-behaved innovation, once it starts to get caught up with negative connotations and consequences. It also explains the externalising of the effects of innovation processes on the locked-out actors. Excluding these also enables narrow system boundaries for the study of innovation and a continued belief in innovation processes, leading to a positive sum-game. It has also marked innovation resistance from these actors as non-programmatic with the Industrial Capitalist programme. When an analysis is made from within the Industrial Capitalist programme, the non-programmatic label comes with a negative connotation. This expands the inquiry into the pro-innovation bias pursued by Critical Innovation scholars and explains the lingering reproduction of the bias in STI research, despite it being a well-known phenomenon. It also explains some of the underlying factors leading up to the existential crisis in STI research, noted by Soete (2019).

The thesis has problematised the STI view on innovation as progressive, highlighting that the idea of progress in the Industrial Capitalist programme is tied to a construct of the Global North as advanced or progressive compared to other parts of the world. The study has shown that the way progress is perceived is heavily dependent on the observer's identity and the point in time the analysis is made. Thus, both the innovation process and the resistance to it are interpretatively flexible. This study has shown that innovation processes are part of a struggle between different programmes and seemingly enrolled actors within programmes. These all try to shape the world, and they strive towards different possible futures. The study has highlighted that market-driven technical innovation favoured by innovation scholars is one such process among several. It is difficult to say that one process leads to progress

(however defined[175]), and another does not, without enrolling into a mega programme. If the world is instead seen as shaped by different programmes that all struggle to reach their goal and their version of progress, then not only one – but several – suggestions on 'desirable futures' appear. An innovation programme then emerges as a programme striving to enable its own agency to reach its desired goal by restricting other (innovation) programme's agencies through a layered process of resistance. Thus, the study contrasts critical innovation scholars' inquiry into innovation resistance with stressing that the innovation resistance process is a process *between* programmes (rather than a programme in itself) and that *any innovation actor* can encounter such a process (not only those involving a social group that is dominant and hegemonic).

## 11.3 Implications

In this section, a few implications are made from the conclusions of this thesis. They are concrete suggestions for policymakers, practitioners and citizens striving for change to *act* on what became known in this thesis.

### 11.3.1 Implications for policy

The term 'innovation' can harbour a diversity of phenomena and lead to many different outcomes and trajectories. Therefore, policymakers are advised to refrain from promoting innovation in general and focus on what they see as the societal goal for which innovation is essential – in other words, treating innovation as a means to serve a purpose rather than a goal in itself.

Innovation policy often promotes innovations that generate economic growth[176] (Vinck, 2017). A greater focus on directing the innovative energies of firms could aid policymakers in refraining from promoting 'blind growth' where policy influences the speed of the economic activity but has no control over where the economy is headed. Directing the innovative energies includes but is not limited to posing resistance to actors within the economy. This thesis has illustrated that that kind of interference can be welcome and that it could enable them to act more ethically than the market economy otherwise would permit. Since resistance can be leveraged to direct the innovative energies of society, policy striving to promote change needs to be accompanied by a readiness also to promote decline. Many problems today are the result of old innovations with

[175] According to Nisbert (1980), 'there is almost no end to goals and purposes which have been declared the fulfilment or outcome of mankind's progress'.

[176] The Swedish funding agency Vinnova is one of the two primary sources of state funding to the Swedish Innovation System, according to Lindberg (2010, p. 15). Pettersson and Lindberg (2013) argue that the growth focus at Vinnova has been resisted on micro-level when administrative personnel within the agency issued calls for R&D proposals that questioned the goal of economic growth from a feminist perspective.

technological trajectories that have been sedimented in industrial/post-industrial societies, perhaps even conditioning the workings of such societal orders. Resistance can be used to enable 'forced discontinuance' of such undesirable innovations and break up lock-ins.

Furthermore, innovation policy tends to stimulate *firms* in male-dominated markets (see also Lindberg, 2010, p. 296). This limits what innovative solutions can be developed. Firms have clear constraints on what innovation processes they might engage in. They can only consider solutions to problems that also enable them to generate an economic surplus. When innovation is put forward as a solution to grand challenges such as climate change, ecologic degradation and increasing inequality, these constraints limit the possibility of finding real solutions. As firm-based 'innovations' were also the cause of many of these problems (Sveiby, et al., 2012b, p. 254), it could be wise to open the door wide for innovation processes operating without these constraints. For instance, that could be done through extending more policy support to organisations operating without profit-demand and with goals that do not include product or business development. As innovation processes shape the world for an extended period of time, favouring a set of actors with larger economic resources risks excluding other stories and other visions on how to mould reality. Thus, policymakers could extend their aid to other actors than just the growth generating ones.

Lastly, the analysis of the change in the Dose market presented in chapter seven is an important empirical contribution to the knowledge base of deregulation or restructuring and reform. Policymakers contemplating market transformations (such as moving more public activities to the private sphere) would be wise to consider the need to monitor the change process closely. This should be done by an engaged entity with overarching responsibility that is able and encouraged to stop and change the process when the need arises. The entity should also aid the actors in critical stages in the process, such as writing the procurement specification. Additionally, policymakers involved in a deregulation process are advised to consider the potential loss of overarching perspectives when a complex operation is moved away from a public actor with more resources and thus a higher ability to take societal responsibility. Policymakers would do well to ensure that this overarching long-term perspective is not lost and that ethical concerns from the actors within the deregulated system are captured and acted upon by this overarching entity.

### 11.3.2 Implications for practitioners

People engaged in innovation processes might not refer to their operations as 'innovation processes'. Sometimes the label is ascribed by managers, politicians, public servants or researchers (see also Lindberg 2010, p. 286). For instance, the people involved in what has here been called the Systemic Innovation did

not connect their work to 'innovation'. Calling some activity 'an innovation process' lends it the legitimacy and prestige that are granted the term in the robust mega programmes in which the concept is enrolled. This thesis has suggested that the label could be extended to more processes than those customarily favoured by policy and research. The question to be asked by a person engaged in some kind of change process could then be, "would your endeavour gain from being called an innovation process?"

The firm representatives at MedTech and BigE were eager to call their activities 'innovation'. They were also able to tick the popular boxes for what is commonly seen as an innovation – i.e. commercialised new products. This study has highlighted that resistance to innovation is key to the evolution of the innovation process, both in general and for these actors. It has also indicated that some resistance is viewed in a more favourable light by the innovators. Resistance from (knowledgeable) clients is anticipated and, to some degree, appreciated since it contributes to learning and finetuning the innovation process to fit the intended users better. Practitioners are, however, advised also to evaluate if there is value in resistance from other sources. The context in which an innovation enters encompasses more actors than just the clients. Resistance could aid firms in better adjusting to this setting. It could prompt the firm to take in more perspectives, reflect on the operations carried out, and help overcome the constraints set by the market.

### 11.3.3 Implications for citizens striving for change

This thesis has made a distinction between the social organising for change and the resistance process. Drawing on insights from Resistance Studies, the study has suggested that instead of focusing on the resistance, the focus of the actor engaged in social organising for change is to reach a particular goal. The resistance manifest when the road to this goal is threatened. The popular label of *resistance movement* only captures part of the social change programme's identity and embraces the perspective of the resisted (often hegemonic) actor. Following the findings in this thesis, citizens striving for change are advised to consider which ascription they prefer. Do they want to embrace and emphasise the perspective of their own change programme and its end-goals, or the perspective of the resisted (hegemonic) actor consequently subscribing to the identity of being anti, or a resistance actor.

Moreover, the study has shown that every seemingly domesticated and enrolled actor in a network carries a latent risk or potential for resistance. This is contingent on the actor being simultaneously part of many social worlds. The moment these social worlds become incompatible, a resistance process starts. Within this lies a *threat* for the actor-network and a *potential* for the Other actor (say, a social movement for change). A seemingly robust actor-network (for example,

Industrial Capitalism) is built of actors with distorted identities. The actor-network only sees the parts of the actors' identities relevant to the programme (for example, employer, employee, consumer etc.); the other identities (for example, mother, father, nature lover, gamer, etc.) are largely invisible for the mega-actor. Within these multiple identities lies opportunity, for citizens striving for change, to enrol actors previously seemingly enrolled in the robust actor. Moreover, citizens striving for change might be encouraged to know that what seems to be a large and robust mega-actor partly consist of actors with non-programmatic behaviour largely invisible from outside the mega-actor. Mega-actors are never completely stable and black-boxed; like all other actors, they are constantly in construction and always leaking.

## 11.4 Limitations

This is a fairly broad study dealing with knowledge from multiple disciplines (i.e. innovation research, sociology, economic history, history of ideas, linguistics, etc.). In the literature review, this has occasionally been at the expense of detail and depth. A person knowledgeable in economic history and history of ideas might find some of those accounts superficial. This is bound to happen when trying to cover a larger area. Hopefully, a reader experiencing parts as too shallow will be inspired to criticise this work on that account and give that particular area more depth – or attempt to prove it wrong.

The use of merely 48 articles to investigate the dominant view on innovation resistance is a rather small sample. Even when complemented with a reading of other writings (less systematically selected), it is possible to argue that the findings would have been stronger had the review included more papers. In order to avoid enforcing the view of innovation as necessarily technical, the search did not use the words 'innovation' and 'technology' interchangeably. So, it is possible that more search words[177] would have given an outcome even more focused on technological innovations. Moreover, the reading of the sample papers was done inspired by deconstruction rather than following a methodology for discourse analysis. This made the analysis more explorative in the beginning and progressively structured as the reading when on. The result is an analysis that is more robust and convincing than an unstructured literature review around the common framings of barriers and resistance offered by, for instance, Thomas et al. (2017). Still, it could gain in rigour from a more structured method similar to the one employed by Segercrantz et al. (2017).

The conclusions are contingent on actor-network theory. This is a sociology that seeks to explain the relationships between all actors in the world. Thus, the the-

[177] Now the search was made only on the word 'innovation' and not on technology.

orising around the layered resistance process *between* programmes and the dynamics of resistance and accommodation described are generalisable because they can be applied in any ANT analysis concerning programmes that interact with other programmes. If at least one of these programmes is perceived as an innovation programme, the analysis becomes connected to innovation research. In that sense, it is a generalisable theorising around innovation and innovation resistance.

Using actor-network theory has, however, brought with it some theoretical limitations. It is a useful tool for analysing a situation, but even though it stresses the continued and dynamic construction of reality, the way it is presented in text and figure can come forward as static (see Whittle & Spicer, 2008). What is presented are snapshots of reality, reconstructions of a few moments of observation that are part of a flow. Thus, the figures used to describe an actor-network analysis is but a few photos of a continuous process. These few photos do not entirely capture the translation process, and it leaves many questions unanswered on a micro-level. In this thesis, such questions are "How does an actor go from being aligned to misaligned? What happens in between those two stages?" The figures in chapter nine do not capture this, and the thesis does not provide answers to those questions. As if a few snapshots were not bad enough, the photo resolution is also poor. Only a few layers of actors are accounted for in each snapshot, and many possibly influential actors get lost in the analysis. A handful of blurry static photos of a complex, layered, process could be said to be a blunt tool for social constructivism. Complemented with an emphasis on the evolutionary properties of a network, it nevertheless becomes adequate to describe the observations.

Moreover, this thesis has highlighted that in ANT, the relationship between an actor-network and the Other is described in an antagonist-protagonist manner. The entrepreneurial ANT rhetoric with much focus on the primum movens and their network likely strengthens this (see Gherardi and Nicolini, 2020). The inbuild protagonism in the entrepreneurial ANT model raises the philosophical question of whether this way of framing the relationships reflects reality or if using ANT as a theoretical lens has reinforced the very phenomenon that this thesis set out to study. This is not elaborated upon in this thesis. Still, it could be interesting for future studies to investigate if using the ecological ANT model - where the action is in focus rather than the actors - would cast new light on innovation resistance.

Additionally, ANT is sometimes put forward as less suited for suggesting new possibilities, for asking questions like "could it be otherwise?" (Whittle & Spicer, 2008). It has here been used to analyse a series of events in three settings, but it has given little room for recommending alternatives to the ways in which these events played out. However, the use of mega programmes to describe the dominant knowledge production has been able to, if not offer an alternative,

then at least clearly show that this situation is constructed and not a natural law. It has been able to highlight that programmes such as the Corporation or Economic Growth programmes are perspectives that limit the analysis of innovation resistance, rather than a neutral landscape level of the research (see Feola, 2020). Emphasising the wallflowers of the problematisation phase has been one way of handling this. Nevertheless, the main issue remains – in ANT, only the agents able to make the researcher(s) aware of them are included in the analysis.

The empirical materials for two chapters (6 and 8) were originally collected for other purposes. However, both studies were semi-explorative, and the purpose was not far from the ones pursued in this thesis; thus, instances of resistance were captured, nevertheless. Yet, it is possible that more aspects of resistance would have been found had the studies been designed for meeting that end. For instance, the actors beyond the system boundaries could have been explored to a larger extent, and so could the issue with wallflowers excluded from entering the interplay of resistance and accommodation.

## 11.5 Future studies

This study has spanned a reasonably broad area – from the construction of the concept 'innovation' to details of how an innovation resistance process works. It has been an exploration, and as such, it has awoken more questions. The narrow system boundaries of innovation research have been pointed out as a problem, but it has not been dealt with to a greater extent. The study has only observed that previously neglected actors from outside of the boundaries might enter later and explained why the system boundaries of the research had been kept narrow. Future studies could try to address this problem and elaborate on how innovation research could take broader perspectives into account (tying into the work of Sovacool, 2021).

Even when sustainable innovation is studied – innovation research is largely disconnected from the non-human world. Issues of extraction and waste are mostly ignored. Even though alternative conceptualisations of innovation (such as frugal and responsible innovation) have gained more attention in recent years, it is still an overwhelming focus on innovation processes solving problems for people who can pay. Future studies could more elaborately and thoroughly discuss this and connect it to significant societal denials such as colonialism/racism, sexism, class, as well as species repression and extinction (see Barca, 2020). Programmes enrolling mostly non-humans (for instance, ecosystems and earth systems) have been largely lacking representatives in innovation work. Even when actor-network theory is used, the agency of non-humans is often downplayed (Miettinen, 1999). Non-human views on innovation processes could be interesting to combine with methodologies, for giving voice to the non-

human, such as the council of all beings (Macy, 2008), where a human is asked to speak on behalf of those that cannot.

This thesis has connected the study of innovation to overarching constructs of sensemaking and practice. Further theoretical work and critical discussions around innovation's entanglement with different idea traditions and ideology would be relevant to pursue. More efforts are needed to de-naturalise innovation and make the power structures within and around it visible and questioned. There is a need to connect the dots (Facer, 2019) between innovation research and what is studied in geology, biology, peace and conflict departments and so on and ask where innovation processes might be part of the problem and where they might be part of a solution. Inquiries into what 'innovation' would mean if it was disentangled from notions such as masculinity (e.g. Lindberg, 2010) and economic growth (e.g. Pansera & Owen, 2018) have already begun and ought to be continued. Innovation processes detached from the profit-demand are also a marginal but ongoing research endeavour (i.e. some of the work on social innovation) that deserve further work. To that work, it would also be interesting to add studies of innovation disentangled from extractivism and re-connected to the more than human world, such as ecosystem programmes. That kind of research could address questions such as, "is it possible for technological innovation processes to evolve, together with, rather than through exploiting the non-humans?"

Innovation literature is well aware of firms operating under resource constraints in terms of money and competencies. Future studies could investigate what would happen to the study of innovation if environmental constraints such as carbon budgets[178] were considered? How could innovators operate on a carbon budget, and how would policymakers choose to steer innovative energies if they considered the nation's or region's carbon budget? What role would innovation resistance and decline have in this? Questions such as those would be fascinating and essential to answer, given the Global North's[179] current course towards a 4–5 degrees hotter earth. Temperatures that will make the climate so different from the contemporary one, as would a shift to a new ice age (Steffen, et al., 2018; Stockholm Resilience Centre, 2018).

[178] For instance, if Sweden would live up to its commitment to the Paris Agreement, the carbon budget at the beginning of 2020 was 280 MtCO2 (Anderson, et al., 2020). The budget limits which investments can be made. Given the investment rate in 2019, Sweden's $CO_2$ budget would be emptied within 50 years, leaving no room for emission from consumption (Alfredssona & Malmaeus, 2019). Anderson (2018) advocates that the emissions left in the budget should be used to transform society to a low-carbon one, not for consumption for the 10% of the population that emits 45% of all $CO_2$ (Chancel & Piketty, 2015).

[179] It would be misleading to say 'humanity' here as it is not the entire human race that push us towards a hotter earth, it is affluent people, states and organisations (predominantly found in the Global North) who can afford to let out greenhouse gases (Barca, 2020).

## 11.6 Concluding remarks

If no one thought of calling themselves an innovator before 1850 but instead reserved the term for their political enemies (Godin, 2015), there is now a similar reluctance to refer to the opposing party as an 'innovator' or 'innovation'. But the 'enemy' might very well be defined as an innovation process too. This is even implicit in traditional innovation research, where a common source of innovation resistance comes from other innovation programmes. This is the basic idea behind the process of setting a "dominant design", and technological trajectories set out by previous innovations. A process that – based on a common definition of innovation – would reasonably earn the title 'innovation' might be distorted into *not* being one, due to it not being technical or profit-generating or an innovation from the past that new innovation processes are set out to replace. So, let us end this book with a reminder that the resistance an innovation process encounters might very well come from an other innovation process. Let us also stay with the trouble of determining which one, if any, of them leads to the betterment of conditions on this earth.

# Appendix 1: A tour of my social laboratory

Bruno Latour (1999) once went out in the Amazon forest together with four other researchers to observe how they practised their science. The four researchers' goal was to investigate the soil of the forest and determine if the desert or the forest was advancing at the other's expense. Well, in the Amazon forest, the four researchers organised the space using stakes driven into the ground to delineate geometric shapes against a myriad of forest life to permit the possibility of recognition. Reading about this activity made me ponder upon *which stakes I use to simplify the recognition in my field?* Latour (1999) believed putting stakes in the ground to be one of many actions which made that part of the forest not a forest anymore but a laboratory. He claims that for the world to become knowable, it must become a laboratory.

This chapter will take you behind the scenes into the making of this thesis and explain how I created my laboratory. This chapter seeks to describe the sometimes-complicated process of exploring the different sites (Van Maanen, 2011), the earlier writings on innovation resistance and the theoretical literature. Throughout this chapter, I chose to refer to the collection of material as exploration. This is because I believe that 'exploration' best captures what I did when I, together with my colleagues, went out to talk with people, visited the factories, offices and hospitals, discussed the material and read paper after paper, and book after book until my eyes bled. I will take you through the interior of my social laboratory with stops at: (1) the exploration of the field sites, (2) the attempt at finding a mystery, (3) the exploration of the academic fields, (4) the knowledge production and (5) the wrapping section.

## A1.1 The first stop: Exploration of the field sites

In Latour's (1999) account of the sampling soil in the Amazon forest, he thought that he was deep in the woods, but when he found the small sign "234" on a branch, he realised that he was, in fact, in a "laboratory". They were not pioneers at this site, and he was not visiting the birth of a science. The forest had been divided into squares and a grid of coordinates. The same could be said of me when I began to explore the literature and entered the field.

The field site(s) (Burrell, 2009) had already lent itself to the collection of information, and there was "a grid of coordinates" available for me from the start. This "grid" consisted of previous research done at BigE and available to me in academic journals as well as transcripts of interviews previously conducted at BigE by one of my supervisors. From the transcripts, I got a reasonably good understanding of the difficulties in the development projects related to chapter eight. My supervisors were already acquainted with the Swedish MedTech branch organisation's vice-chair, who was the first one to tell me about the story related in chapter six. I first pursued that story together with Ylva Askfors (Askfors & Fornstedt, 2018). She was acquainted with the medical doctor who first made me aware of the events narrated in chapter seven. In that sense, the stakes were not made of wood but of people with association to stories. The social laboratory was delineated through those associations.

The tentative question first guiding the empirical study was posed by supervisors in their application for funding. It read,

> How is innovation maintained as a vivid force in industrial environments where customer desire for new technology is capped by reliance and preference of established product solutions? (Lindahl & Sköld, 2013)

The idea was to study breaker development at BigE, where Lindahl and Sköld had observed instances of stealth innovation. The research was financed by the private Lars Erik Lundberg Foundation for Research and Education that is pro-innovation in its call for applications. Among other things, they want to support projects that '*focus on the role of technology in the competitiveness of enterprises'* as well as '*projects related to the conditions which are fundamental to an innovative business climate, entrepreneurship and intrapreneurship'* (Lundbergsstiftelserna, u.d.).

It is also worth mentioning the research environment in which this study took place. As Nina Fowler (2017) notes, the department in which I was employed was founded as an implicit attempt to support entrepreneurial endeavours at the Engineering and Natural Sciences faculty at Uppsala University. Much focus there was on teaching students how to connect the natural and technical sciences to commercial activities (Fowler, 2017, p. 16). Uppsala University was also part of the neoliberal attempt to commercialise research and turn it into innovations, thus, more or less, following the linear innovation model.[180] During my time there, I received mass e-mails about awarding researchers who commercialised their research and about getting a mentor from the industry that could help me commercialise my research (UU innovation, u.d.). Alongside this pro-innovation milieu, I also found, among colleagues and su-

[180] The creation of the Innovation Support Office, UU Innovation and the Holding Company, UU Holding AB, with offices close to the Natural Science buildings are a few signs of this.

pervisors, an openness for critical thinking and academic freedom, which encouraged my attempt to look at innovation from a more critical angle. From day one, I was given the freedom to explore my own interests, alongside those expressed in the application that founded my position. My supervisors have continuously emphasised that this thesis is my own and that no one would tell me what I was to write in it (apart from the mandatory reviewing that comes with PhD work). This gave me an excellent opportunity to explore something I was very interested in, aided by meticulous reviewers/supervisors that would help me better do what *I* wanted.

### A1.1.1 Setting out to find and explore the field sites

When I set out to do this study, I was not entirely in uncharted territory. I was like an explorer with a flight photo to describe the surroundings but no detailed map on which I could find the compelling cases or research questions. The term field site can be described as *'the spatial characteristics of a field-based research project, the stage on which the social processes under study take place'* (Burrell, 2009, p. 182). This stage's boundaries were not established at the beginning of the exploration and did not become established until the very end of the thesis work. Thus, my field's definition was negotiated and renegotiated numerous times as the thesis work went on. In the beginning, it was the circuit breaker division at BigE, but it soon expanded into a multi-sited study (Nadai & Maeder, 2005) where the Swedish counties in the healthcare system were also important, as well as some of the corporations attempting to do business with them. This was because the original study centred on 'Innovation in conservative markets', and the healthcare market seemed to fit that characteristic. Thus, my field could be described as a network since it transcends the boundaries surrounding a specific space (Burrell, 2009). When viewing the field as a network, it is illustrated as *'something that more closely tracks the phenomenon under study'* (p. 195). The field site, in this sense, comes to be defined by *'the physical movement, places indexed in speech and text, and social imaginings produced by research participants'* (p. 196). The openness to following participants, phenomena, etc., through space as well as language, gives the potential for new insight and empirical surprises (Burrell, 2009).

As mentioned earlier, the study at BigE had already been commenced by one of my supervisors in 2009. This material was transcribed and available for me when continuing the explorative study in spring 2014. It was initiated by a set of interviews at BigE, centring around the development of breaker1. This was followed by a batch of interviews around the Medical device and a review of court hearings and public documentation around public procurement (see table 11 and 12 for an overview of the interviewees and secondary sources). In spring 2015, a new set of interviews at BigE was conducted, this time centred around breaker2 (narrated in chapter eight) and transformers' development. In

spring 2016, several consultants and EPC employees were interviewed. At BigE, I made brief one or two-day visits to offices and factory (see table 13 for a list of interviewees). I only stayed 1-2 hours at power providers, EPC companies, consultancy companies, hospitals, procurement offices, and medical suppliers. The consequence of not staying in the field for a more extended period entailed a loss of descriptive details that could help me make sense of the context (Nadai & Maeder, 2005). Through not using ethnography as my research strategy, I lost context descriptions of everyday life in the field, but I was still able to get a good enough insight into how the events played out around the innovation processes in chapters 6 and 8.

**Interviews –Medical technology**

| | **Organisation type** | | | | |
|---|---|---|---|---|---|
| **Position** | **County** | **MedTech company** | **Medtech branch org.** | **MedTech incubator** | |
| Medical doctors | 14 | | | | |
| Procurers (administrators) | 4 | | | | |
| Nurses | 5 | | | | |
| Sales representatives | | 2 | | | |
| Project managers | | | 3 | | |
| VP | | | 1 | | |
| Head of department | | | | 1 | |
| **Grand total** | **23** | **2** | **4** | **1** | **30** |

*Table 11: Interviews – Health care sector, Medical technology (Ch. 6)*

| **Secondary sources – Medical technology** | **Number** |
|---|---|
| Public documents | 7 |
| Scientific articles | 19 |
| News articles | 6 |
| Documents from other organisations | 3 |
| Company documents | 4 |
| **Grand total** | **39** |

*Table 12*: *Secondary sources – Medical technology (Ch. 6)*

**Interviews –High voltage technology**

| | Organisation type | | | | |
|---|---|---|---|---|---|
| **Position** | **Consultant** | **EPC** | **Supplier** | **Utility** | **Grand total** |
| Construction manager | | 1 | | 1 | 2 |
| Engineer | | | 3 | | 3 |
| Project manager | 1 | | 10 | | 11 |
| Procurement manager | | | | 1 | 1 |
| Sales manager | | | 8 | | 8 |
| Specialist | | | 7 | | 7 |
| Technology executive | 1 | 3 | 8 | | 12 |
| Technology manager | | | 3 | | 3 |
| **Grand total** | 2 | 4 | 39 | 2 | **47** |

*Table 13: Interviews – Energy market, High voltage technology (Ch. 8)*

The study I was initially hired to conduct concerned how firms continue to be innovative in conservative markets where clients are reluctant to adopt anything new. Therefore, the studies narrated in chapters 6 and 8 were initially set up as semi-theory driven/ explorative studies around innovation processes in conservative markets, with which I mean markets where clients rather stick with old well-tried products than leap for the next new thing. When my focus shifted to instead attempt to study innovation resistance, I realised that the studies of innovation in conservative markets had also captured stories of resistance to innovation. We had already studied innovation processes; now, I saw that there were also several cases of innovation resistance along with them. The qualitative methodology and explorative nature of the studies enabled this shift in focus.

When the focus shifted from the original theme 'innovation in conservative markets' to 'innovation resistance', I complimented some of the original material with secondary sources. I did not see a need to conduct more interviews; instead, I had to remove parts of the narrative to avoid it being too long.[181] I also revisited one of the medical device study interviews, which also revolved around the new dose system. That led me to indulge in the story of what had happened there (presented in chapter seven). It seemed to me that this could be an example of an innovation diffusion that people in hindsight wished had been stopped or postponed. Therefore, I engaged in studying secondary sources regarding the unfolding of events before and after the restructure and reform of the dose market in 2013. I reviewed articles in the news, branch papers, public documents and internal documents (see table 14). This was later

[181] Mainly concerning the change in the energy market (which was also related in Sköld et al. 2018), and the story about diffusion of the technology (described in chapter eight).

complemented with interviews with key people identified through the journal articles (see table 15).

| Secondary sources – Dose System | Number |
|---|---|
| Public documents | 18 |
| News articles | 43 |
| Documents from other organisations | 2 |
| Company documents | 5 |
| **Grand total** | **68** |

*Table 14: Secondary sources – Dose System (Ch. 7)*

**Interviews –Dose System**

| | Organisation type | | | |
|---|---|---|---|---|
| **Position** | **Public Authority** | **Dose company** | **County** | |
| Senior advisor and international co-ordinator | 1 | | | |
| CEO | | 1 | | |
| Chair of the board | | 1 | | |
| Pharmaceutical manager | | | 2 | |
| Medical doctor | | | 2 | |
| **Grand total** | **1** | **2** | **4** | **7** |

*Table 15: Interviews – Healthcare sector, Dose System (Ch. 7)*

In figure 42 the timing[182] of the different empirical and theoretical explorations are presented:

[182] The timeline is longer than the traditional five years (four years research and one year of departmental work) due to parental leave and part-time work.

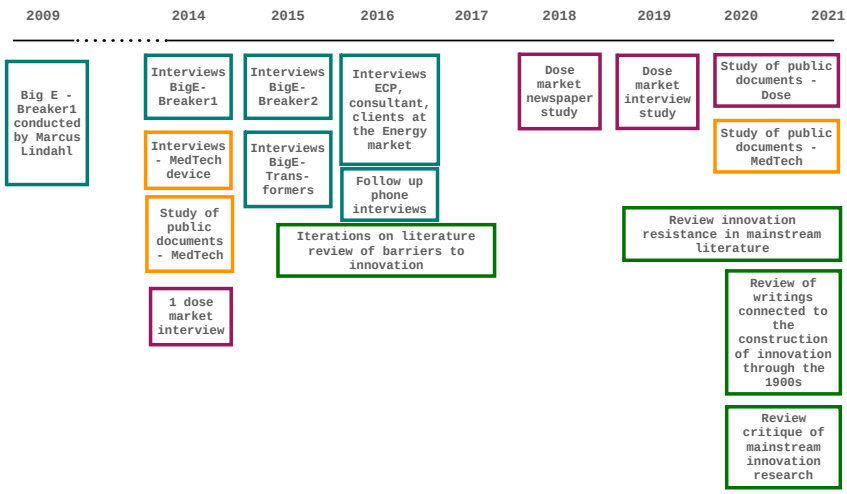


*Figure 42: Timeline of the thesis work*

## A1.1.2 Choosing interviewees and conducting interviews

The informants were initially chosen based on who would be most able to inform us on the unfolding of the different innovation processes. Then a snowball technique (Goodman, 1961; Welch, 1975) was used, asking each informant for his/her recommendation as to who could best explain the area of interest. The entire procedure involved an iterative process of concurrently collecting data, analysing it and seeking new informants based on information deemed necessary by previous respondents. This approach resulted in an evolving sample of respondents and increasingly focused data relevant to the innovation processes under study. This was continued until we were able to paint a reasonably clear picture of the phenomenon under study. However, I do not claim to have reached "theoretical saturation" (Glaser and Strauss, 1967). This is because I believe that the phenomenon under study concerns such an extensive network of humans and non-humans that the data that could describe it is endless. Yet, I think that the data collected was enough to describe the aspects of the phenomenon relevant for this thesis.

The material was collected using one-on-one or one-on-two interviews. The interviews were conducted in a manner more similar to a conversation than an interrogation. Moving away from the interview ideal of just asking questions made the respondents open up and revealed several interesting things that would otherwise have remained hidden. Czarniawska (2014) points out that most researchers are not just interested in exchanging views and opinions on a subject but want attitudes, facts, and many other things that reflect the reality behind the interview. To obtain this, conversations can be the interview model, and a dialogue can be the focus (Czarniawska, 2014). The interviews were

recorded in all three studies. In the MedTech and Dose studies, they were transcribed in their entirety. In the BigW study, they were sometimes transcribed in full and sometimes in parts.

The interviews or conversations were the primary sources of data in the breaker and MedTech study. In contrast, the documentation data served as an important supplementary source for understanding previous events, technology and market trends. In the Dose study, secondary sources were more important – they served to give an overview of all events and provided scoop for interview questions. The interviews served as a complement and gave deeper and more reflective insight than the secondary sources (predominantly newspaper articles).

Being able to reflect and discuss together with the respondents opened the door to richer and more honest data. This, to some degree, removed the asymmetrical relationship between interviewer and interviewee. To remove this asymmetry altogether, however, was not possible and not preferable. The interlocutor is a professional in the topic, while the researcher is a professional in research but not in the conversation topic. I believe with Czarniawska (2014) that a researcher may not foremost offer their views in exchange, but their respectful and interested attention. So, the power relationship was still somewhat tilted in the conversations. The interlocutors controlled what they chose to bring up in the narrative, and my fellow researchers and I steered the conversation. In most cases, we had prepared questions and asked the respondents to reveal more information than we disclosed. This approach enabled us to discover more than we set out to explore when the respondents gave an account of phenomena that we did not previously know about.

Interviews lasted between 60–120 minutes for the study in the market of high voltage systems and 30–90 minutes for the two studies in the healthcare sector. When used, the set of questions was mainly standardised across informants, with some customisation for their hierarchal level, work tasks and the particular organisation they worked in. The interviews in the study in the market of high voltage systems went from being semi-structured to more unstructured. This enabled testing of preliminary analysis made after the structured interviews. In the healthcare study, subsequent interviews became progressively more structured as themes emerged in the data. This facilitated identifying patterns and enabled a deeper understanding of the complexity and diversity in the respondents' view on the medical device. The Dose study interviews were different for each interviewee, as they were tailored according to the interviewee's part in a story with which I was already quite familiar after reading around 40 news articles.

### A1.1.3 Secondary sources

Documents were collected to (a) prepare for interviews in the study in the market of high voltage systems, (b) get an account of the debate on the medical device, and (c) get an overview of the events played out when the new dose system was introduced. The documents took the form of: (1) technical sales material concerning the two chosen products, which were used to understand what aspects BigE emphasised as well as to get knowledge about the technology before entering into conversation with informants, (2) transcripts of previous interviews done by my fellow researchers at BigE, (3) judicial decisions around the law for public procurement concerning the medical device, (4) articles in newspapers concerning the antibacterial substance used in the medical device, (5) webpages emphasising the enforcement of the new laws for collaboration in the pharmaceutical industry and the business of medical technology, (6) court rulings regarding the medical device, (7) news articles regarding the Dose system, (8) procurement documents regarding the Dose service system, (9) public documents around the restructure and reform of the Swedish pharmacy market, (10) the counties internal documents regarding the Dose system, (11) court rulings regarding the public procurement of dose, and (12) reports from IVO and the Medical Products Agency. For more details, see tables in A1.1.1.

Using secondary sources was an excellent complement to the interviews as they were translations of the immediate events that played out, while the interviews were reflections made in hindsight. Sometimes, they were not only narrations of the stories but active actors in them. Examples of this are court rulings, public procurement documentation, scientific articles concerning the scientific debate around the medical device, the proposition from the Swedish government and news articles that made the Medical Products Agency aware of the dose delivery problems.

### A1.1.4 Why use a qualitative methodology?

In this work, a qualitative methodology was used. At the centre were inquiries into three different empirical stories and a quest to find a case within them (Jensen & Sandström, 2016, p. 145). But what is a case? I view the *case* in case study research, similarly as Jensen and Sandström (2016, p. 9), who argue that:

> The case, in a case study, can, in our opinion, be a number of different phenomena: it can be a movement, a process, an object, a human, an organisation, a group, an element, an activity, a thought or picture, a decision, liquids, animals, bodies, systems, a history, a myth, a ritual, a ceremony. The list can be made longer, but the point is clear.

In this thesis, the phenomenon, *innovation resistance* – was seen as a case [183] , and the study concerned several cases of this phenomenon.
That is, each empirical study contained several instances of the case 'innovation resistance'[184]. The cases were captured through interviewees, study visits, public documentation and news articles.

Flyvbjerg (2001) argues that social science should not give an ineffectual attempt at resembling natural science by claiming that it can produce an explanatory and predictive theory. It should instead focus on the contribution that it can make that natural science falls short on, i.e. reflexive analysis and discussions of values and interests, which is at the heart of any enlightened economic, cultural and political development in any society (Flyvbjerg, 2001). One way of conducting context-dependent social science is the case study. I believe that using case studies and interviewees in this study was beneficial for two main reasons.

First, the case study reveals context-dependent knowledge; therefore, it is well suited for identifying rare or unknown phenomena (Flyvbjerg, 2001; Flyvbjerg, 2006). The case study is a suitable method to use when examining phenomena on a micro or meso level. It reveals a context-dependent knowledge and expertise that allows people to develop from beginners to virtuoso experts (Flyvbjerg, 2001). A case study can generalise when it proves that a previous generalisation is wrong, i.e. if it can falsify theories (Flyvbjerg, 2001; Flyvbjerg, 2006). If more cases can be presented, it can provide more in depth descriptions (Czarniawska, 2014). It is hard to use a survey to explain context-dependent riddles such as the ones at the centre of the inquiry into the cases of *innovation resistance.* On the contrary, as was the case with the Innovation Community Survey, discussed in chapter three, it can reinforce common assumptions held by the study designers. Therefore, intense interviews that produce narratives and sample the dominant discourse of field site (Czarniawska, 2014, p. 28) were deemed better suited for this exploration.

Second, the use of case studies in itself ensured an active work against subjective bias. The human mind tends to suppose a greater degree of order in things than it really finds there. It also has a predisposition to make things studied fit into their pre-defined ideas about how the world is constituted (Flyvbjerg, 2006). The case study is a methodology, which, to a certain degree, removes this bias, as the respondents can "talk back" and correct the researches. Researchers who have conducted in-depth case studies often see themselves having to change their assumptions, views and concepts as their study progresses (Flyvbjerg, 2006), which is also what happened in this study.

[183] Case studies have travelled from medicine (particularly from psychiatry) and law to social science, and the case was a phenomenon in both disciplines: an illness in medicine and a crime in law (Czarniawska, 2014)
[184] This is not to be confused with studies that treat an entire study as a single case in itself.

### A1.1.5 Ethical consideration

The participation by all interviewees was voluntary; they knew why they were interviewed and that they could end their participation at any time if they liked. Hence, the Swedish Science council's (Vetenskapsrådet or VR) information and consent requirements were fulfilled (Vetenskapsrådet, 2002, pp. 7, 9). When people's names are collected from publicly available records, consent is not needed, according to VR (Vetenskapsrådet, 2002, p. 9). Therefore, no permission was deemed necessary from people only appearing in news articles.

The interviewees in chapters six and eight are anonymised following requests from the innovating firms. In the study narrated in chapter six, none of the interviewees specifically asked to be anonymised during the time of the interview. Still, the company representatives later requested this via e-mail. They asked that the names of the company representatives and a particular county be anonymised, which was accommodated. For coherence reasons, all counties, the company name and the other interviewees were also anonymised. But the technology, the chemical substance and the actors, of which much information is already public, were not anonymised, making it easier to understand the case. In the study presented in chapter eight, the interviewees specifically requested anonymisation. Most interviewees in chapter seven also appear in news articles concerning the same story, and these news articles are used as sources. To anonymise all 68 sources would make it very hard to assess the credibility of the sources. It would also make the narrative lose a lot of its content and context as the story was so well known that only anonymising the people would not be enough to make it truly confidential. Therefore the interviewees were asked if they agreed to appear in the narrative with their real names, and they all gave their consent via e-mail or during the interview. VR suggests that information about people be anonymised when the information is ethically sensitive, and they say that this can be the case when it is possible to assume that 'those concerned (thus not the researcher) and their survivors may perceive the information as unpleasant or offensive' (Vetenskapsrådet, 2002, p. 12). The interviewees' accounts in chapter seven were not judged to be of this character. Thus, these interviewees were not anonymised and the study well fulfilled VR's confidentiality requirements (Vetenskapsrådet, 2002, p. 12) in a way that did not negatively impact the empirical narration, nor the readers' ability to judge the robustness of the study. Lastly, as this research was not used for commercial purposes, thus, VR's usage demand (Vetenskapsrådet, 2002, p. 14) was also deemed fulfilled.

## A1.2 The second stop: Finding the mystery or catching the eel

PhD students are often asked, 'what is your research question?' However, in semi-explorative qualitative studies, it is hard to know what the question is before the study is done and before any sense has been made of the material. Instead of guidance by a research question, I have been guided by a sense that I can best describe as trying to catch an eel. By this, I refer to the lingering feeling that you have something close by that is interesting, but this 'something' is an eel – slippery and with a will of its own. It is constantly slipping through your fingers and persistently avoid getting caught and put into writing. The feeling that the eel is there, even though you cannot yet catch it, guides you and lets you know that you are on the right path. So, knowledge production has, for me, been more like eel catching[185] than following pre-defined research questions.

When conducting the study at BigE, I first got the sense of an eel being present. Me, David Sköld and Marcus Lindahl began to suspect that the neoliberal market change had led to a decline in technological innovation (Sköld, et al., 2018). I assumed that this was a negative development as I, like many others, believed innovation to be inherently good. But then I found out that Markard and Truffer (2006) meant that the neoliberal market structure invoked a change that led to increases in radical customer-oriented innovations in the segment of stationary fuel cells. The same change led to both an increase *and* a decrease in innovation rates. Was the shift then good or bad? This left me puzzled and intrigued. I had become aware of my assumption that innovation was good and that it was desirable to have much of it. But if one market change led to both an increase and a decrease in innovation, then was it good or bad for innovation? Perhaps, innovation - just for the sake of it - could not be the goal? What was the goal?

To me, this was a breakdown in understanding. Alvesson and Kärreman (2007) assert that a breakdown in understanding is an empirical finding that cannot be accounted for by the existing theory. It should not be experienced only by the individual researcher; the scientific community has to share the puzzlement. For me, this was a *personal* breakdown in understanding in empirics and theory – I did not know if it would be shared with a broader scientific community. Now I began to wonder why I had assumed that innovation was good, what it supposedly was good for, why I thought that clients being conservative and reluctant to try the new was a negative thing, and why the literature around barriers and resistance to innovation seemed to be against

[185] Yet, eels are not very cuddly, and some of them might even give you an electric shock, so it might be that when you stand there, eel in hand, you start to wonder why you set out to catch it in the first place.

innovation? Some of it was explained by Rogers' account of the pro-innovation bias, but I had the feeling that there was more to it than that. Rogers, after all, did not talk about barriers or resistance at all. Was there, along with the pro-innovation bias, a con-barrier bias in innovation literature? I also started to wonder what would become apparent if I looked at my empirical material as instances of innovation resistance using STS theories. Would these questions be real breakdowns in Alvesson and Kärreman's sense of the term? Breakdowns that could be acknowledged by the wider scientific community and turn out to be mysteries and constitute real contributions?

When Alvesson and Kärreman (2007) talk about finding and exploring mysteries, they refer to mysteries that are not yet solved by existing theory. When you find your mystery – you have located your research question. Uncovering a mystery does also entail finding many mysteries that others have already explained. In figure 43 is an illustration of the process based on their 2007 paper:

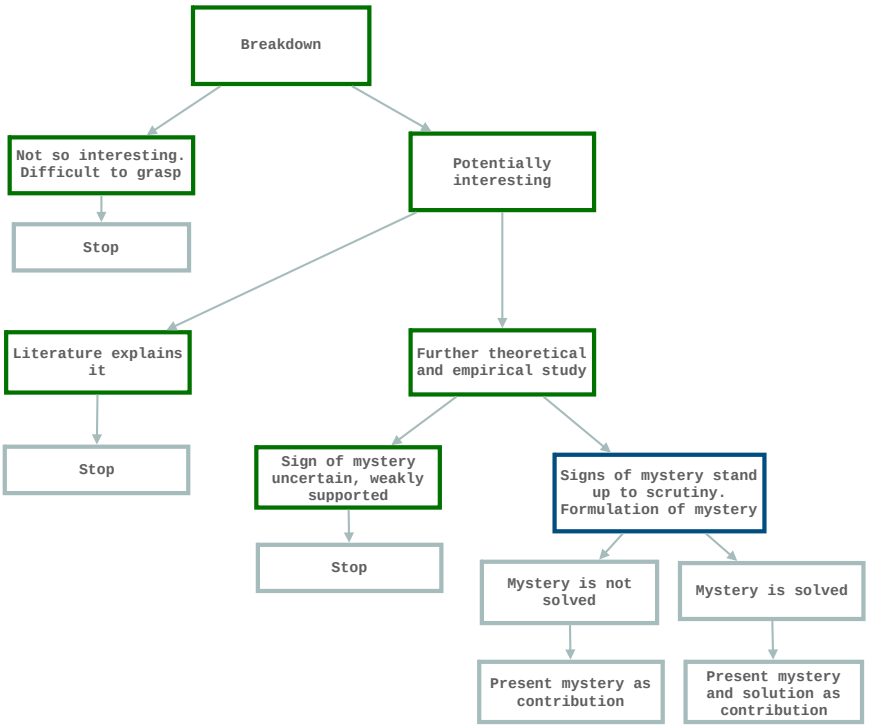


*Figure 43:Illustration from Alvesson and Kärreman (2007) of the process of finding a mystery worth pursuing.*

When a supposed mystery turns out to not be a mystery, after all, a researcher can become nervous over failing to make a contribution. It can also be a source of joy – someone else has described something you really want to know. Since Alvesson and Kärreman (2007) have such a strong focus on the breakdown

not being the result of a junior scholar's ignorance, their description of the research process does not wholly capture my experience. I adapted their model to fit better the research process leading up to this thesis, which is illustrated in figure 44. The main difference, compared to Alvesson and Kärreman's figure, is that instead of *'stops'*, new questions arose.

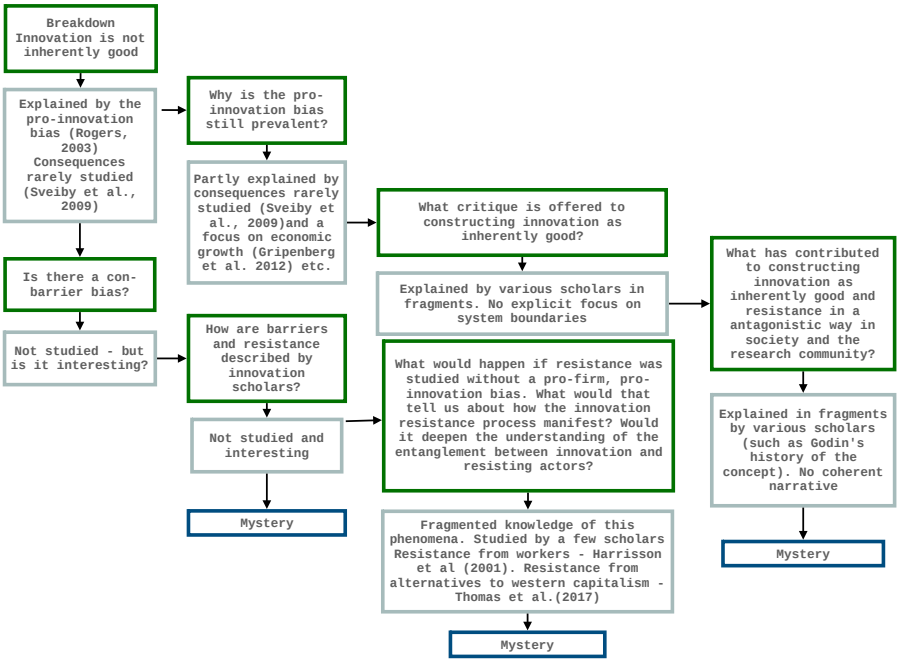


*Figure 44: Illustration of my endeavour to find mysteries. This is constructed in hindsight when I knew what I had found and reflected upon the journey there.*

The very structured account in the picture was not clear to me when conducting the studies but has been created in hindsight to illustrate how the movements in thought evolved.

## A1.3 The third stop: Exploration of the theoretical field

The theoretical contributions to the field of innovation research were, to me, a sea of text in which I attempted to put down stakes to delineate the area with relevance to the first study at BigE. The literature around resistance and barriers to innovation was first reviewed in a few iterations to grasp the field. The first iterations consisted of categorisation of different areas in which barriers to innovation could be found (Fornstedt, 2017). When I became puzzled over my tendency to view barriers in a negative light, I could therefore be pretty confident that this was not just something happening in my brain – I had gotten it from somewhere. The first literature review made me strongly suspect that this negative view on barriers and resistance was apparent in the literature as

well. I, therefore, began a new review, this time inspired by Derrida's deconstruction.

### A1.3.1 Inspiration from deconstruction

Deconstruction is sometimes described as a practice and not as a theory (Rehn & De Cock, 2009) or a proper methodology. It can serve as reading glasses (see, e.g. Rehn & De Cock, 2009; Skoglund, 2017) for academic work. In this thesis, deconstruction has inspired the reading and made me more open to 'the subtext of the text'. It has also given me the confidence to look for hidden agendas and normative assumptions in the work of scholars who have much more experience and academic merits than myself.

Deconstruction can be viewed as an invitation to confirm and give voice to the 'excluded Other'. This means that a person does not perform deconstruction; rather, they discover the deconstruction that is already there in the text or the concept. In this view, a text or a concept is not independent or have impenetrable boundaries; rather, it is inviting and keeps the door open for old and new meanings and for that 'other' than itself. According to Ruitenberg (2009; 2005 as cited by Langmann), Derrida's deconstructions can be seen as 'conceptual hospitality'. Deconstruction as such cannot be initiated or caused by the researcher. Just as it is not possible for a guest to invite him or herself to some else's home and call that hospitality, a researcher cannot force new meanings and openings on a concept from the outside. Instead, a deconstructionist reading helps us see that a concept already is in deconstruction (Langmann, 2013). Nonetheless, how does one show that a concept already is in deconstruction? Derrida describes how to go about when attempting to follow a strategy of deconstruction as the usage of a double gesture, a double writing, a double science.

Critchley (1992) says that this first reading, or first phase, is a reconstruction of the concept or text. This means that a concept or text should be understood and read on its own terms where attention is put on its argument, movement, meaning, context and historical reception. The second reading is done in parallel with the first reading, and this second reading means going through a phase of *overturning*. Derrida claims that this overturning is necessary since *'in classical philosophical opposition we are not dealing with the peaceful coexistence of vis-á-vis, but rather with a violent hierarchy'* (Derrida, 2004, pp. 38-39). Following Nietzsche, Derrida claims that every language is imposed on Others by some master who coins the language. He also says that *'there is no culture in which at some point there was not a violent imposition of the language'* (Derrida, 2001); then after some time, this initial violence is forgotten. In binary oppositions, there is one term that governs the other. The first move to deconstruct this opposition would be to overturn the hierarchy at a given moment. If we neglected this overturning, we would forget the dual

opposition's conflicting hierarchical structure and instead neutralise the concepts and treat them as if the hierarchy between them does not exist (Derrida, pp. 39-40). Critchley (1992) understands this second reading or phase as taking place in parallel with the first phase. He also says that this phase is an interpretive phase where a concept or text is opened up for new meaning. But since we cannot force these openings upon a concept or text, we must search for them within the concept or text by paying attention to its 'blind spots' or aporias (could be understood as a philosophical puzzle, state of puzzlement, dilemma, paradox, etc.). Instead of viewing these aporias as problems, we, in a deconstructive reading, view them as interruptions in the concept's self-identity that can give it new meaning. Thus, this meaning is not given to the concept by ignoring its previous boundaries and content of meaning; rather, it is manifested through also going beyond these boundaries (Lucy, 2004 as cited by Langmann, 2013). According to Derrida, to remain in this phase of overturning is to *'operate on the terrain of and from within the deconstructed system'* (Derrida, 2004, p. 39).

Inspired by this dual reading, the concepts relating to 'Innovation barrier' and 'Innovation resistance' were explored. I do not claim to have deconstructed 48 texts. I have, nonetheless, had these ideas in the back of my head when reading; thus, my reading has been inspired by this dual reading or dual writing. It is important to note then that I do not seek to deconstruct a particular text; instead, I move towards deconstructing a collection of related concepts (i.e. the keywords mentioned earlier) connected to a phenomenon I call 'innovation resistance'. I do not focus on one text but a collection of texts; this is, to some degree, similar to the approach of Langmann 2013, but she, unlike me, claims to deconstruct the concept. I have seen the texts as being conceptually hospitable. I not only looked at what was being said but also on what was not being said, what value was ascribed to certain words, which hierarchies were imposed on the concepts and what assumptions were underlying the arguments. In reading the texts, I attempted to identify some 'blind spots' or aporias that take us beyond the boundaries of the concept 'Innovation Barrier' or 'Innovation resistance' as understood in the top innovation journals. Based on what I learned through this, I got building blocks that could be used to present a new understanding of the concept 'innovation resistance' '*that can no longer be, and never could be, included in the previous regime*[s]' (Derrida, 2004, p. 39).

When going through these 48 papers, an excel sheet was filled with quotes that illustrated different salient themes. I noted how and if the value of innovation was motivated, how the studied innovation(s) were described, how the resistance was portrayed if there were any explicit or implicit hierarchies between the concept innovation and other concepts.[186] I also noted any explicit

[186] I also noted in which journals they were published, which years, what kind of methodology was used, which market they concerned, how many and which stakeholders were identified, if

or implicit openings for alternative understandings of the concept that did not see it as inherently bad.

As the review concerned the language used to describe innovation resistance, it could be said to be a discourse analysis of sorts. It is grounded in the idea that language does not mirror reality but is part of creating reality (Alvesson & Kärreman, 2011). Discourse has a vague yet influential way of shaping reality, but it does not convey all there is to say about the construction of social reality. Other aspects, such as culture and institutions, are equally important. My view on 'discourse' is close to Watson's (1994). He sees discourse as 'a connected set of statements, concepts, terms and expressions which constitutes a way of talking and writing about a particular issue, thus framing the way people understand and act with respect to that issue'. I see my deconstruction-inspired reading of the 48 papers as an exploration of how innovation scholars write about innovation resistance, which statements they make to justify the value of innovation, and the language they use to describe and make sense of resistance. I tried to grasp how the authors of the texts make sense of, reproduce and encourage others to act in relation to innovation resistance. The attempt of the thesis was to partly leave this discourse and describe innovation resistance in another manner.

### A1.3.2 Theoretical framework

What is a theory? Some, like Sutton and Straw (1995), believe that it is exceedingly hard to say what it is and instead decide to focus on what it is *not*. They argue that theory is not merely referencing other scholars' work, pointing towards a connection between them. Nor is theory a list of variables and constructs. In their understanding, the definition of a concept is, therefore, on its own, not a theory. They also believe that theory differs from a hypothesis—a hypothesis attempts to concisely state *what* is expected to occur. In contrast, a theory explains *why* something happens. According to Sutton and Straw, empirical material can act as "confirming, revising, or discrediting existing theory and guiding the development of new theory" (p. 373). Weick (1995) thinks that when Sutton and Straw attempt to point out what people mistake as theory, the things that are mistaken for theory can actually be part of a theorising process. Weick (p. 386) argues that theory development starts with *'guesses and speculations and ends with explanations and models'*. He refers back to Runkel and Runkel's (1984, 129-130) argument that theory is a continuum rather than a dichotomy. Their way of looking at theory is close to the one I employ. I see theory as connected to how it is used in daily speech: 'I have a theory' then meaning kind of 'I have an idea about how things fit together' or 'I have an idea about how this might work'. Runkel and Runkel

the study was on micro, meso or macro level and so on. But I did not end up using that material as it did not give rise to interesting enough patterns and observations.

(1984, 129-130) think that reserving the word 'theory' for Grand Theory or Good Theory would remove a good word from currency and express it as follows:

> Theory belongs to the family of words that includes guess, speculation, supposition, conjecture, proposition, hypothesis, conception, explanation and model. The dictionaries permit us to use theory for anything from "guess" to 'a system of assumptions, accepted principles, and rules of procedure devised to analyze, predict, or otherwise explain the nature or behaviour of a specified set of phenomena' (American Heritage Dictionary). Social scientists will naturally want to use terms with more care than they are used by the general populace. They will naturally want to underpin their theories with more empirical data than they need for speculation. They will naturally want a theory to incorporate more than one hypothesis. We plead only that they do not save theory to label their ultimate triumph but use it as well to label their interim struggles.

Despite some ANT scholars' reluctance to call actor-network theory a theory proper, I lean on Runkel and Runkel and see what I have been doing in this thesis as theorising. The interim struggle to come to grips with 'innovation resistance' is what I refer to as a theory of innovation resistance. I have tried to get an idea about what innovation resistance is and what it does. This does not mean that it is the *only* theory about this (as seen in chapter three and four, there are several propositions), nor does it mean that it represents a complete understanding of the concept. In producing the understanding, I have also produced the concept and the phenomenon hiding within it. I believe this construction is the best representation of the phenomena – otherwise, I would not have written hundreds of pages of arguments for it. But I do not believe that this is 'the grand theory of innovation resistance'. It is a theory, in the sense that it is an interim struggle towards better understanding. If a theory is a process, this thesis has brought the theory of innovation resistance one step further.

Another helpful construct that I connect to theory is the metaphor. A metaphor is a way to come close to describing something that is impossible to put down in words. When Shakespeare wrote, *'Shall I compare thee to a summer's day? Thou art more lovely and more temperate'* in sonnet 18, he uses a metaphor to capture a feeling which cannot be captured in text. In the same sense, the theorising in this thesis is a way to capture something that continuously escapes capture. The phenomenon cannot be translated into text without them losing contextuality, etc. (Latour, 1999). One metaphor captures part of a phenomenon, and other metaphors capture other parts. Therefore, metaphors are part of understanding and making sense of how something works. In that sense, I view metaphors and theory as similar. And this leaves me in a peculiar situation – I try to capture something in words that eludes capture, while at the same time wanting to remain in an open ontology – not closing black-boxes, while for the sake of readability and understanding having to neatly order

things in boxes. The exploration in this thesis work has been to first open common black boxes and problematise them. Then, I have made new boxes and put new things in them – am I then guilty of building a closed ontology? Perhaps, even though it was not my intention. I wanted to find 'innovation resistance to come' as Derrida puts it, even though that is impossible. The eel is still loose...

### A1.3.3 Selecting a theoretical framework

I decided to use actor-network theory for three main reasons: (1) The symmetry between humans and non-human in actor-network theory seemed like a promising way of understanding the current literature, which brought up numerous 'barriers' and instances of 'resistance' connected to both humans and non-humans, (2) It seemed like authors who used theories from STS managed to stay clear of the pro-innovation bias. It struck me that Harrisson and Laberge (2002) and Harrisson et al. (2001) stood out in the sample of papers in top innovation journals writing about innovation resistance. They managed to remain comparably neutral to the different processes they described and neither promoted innovation nor resistance. In addition to this, I had written a paper together with Ylva Askfors (Askfors & Fornstedt, 2018) where I knew I had been very pro-innovation myself and convinced that this must have been reflected in the paper. When re-reading it with my new, more critical glasses, I did, nevertheless, find that the description was not so biased as I feared. The use of STS theory had not allowed the narrative to be heavily biased in the Innovation programme's favour, despite at least one of the authors (me) being pro-innovation. (3) Ghosh (2016, p. 31) mentions that the rise of ANT might have been timely with the renewed awareness of humans being interconnected with beings of all sorts – the non-humans. This also contributed to my viewing ANT as a promising framework for understanding resistance from aquatic organisms.

Could I have done this study in any other way? The answer is, of course: yes. As my understanding increased, other possible avenues on which I could have embarked became visible. I could have used Haraway's (1989) *Primate Vision* to enlighten how the modern western cultural, social and political environment have shaped the scientific story about innovation resistance (Holmberg, 2007). In that way, I might have gotten a narrative of how the community of innovation scholars construct a cultural myth about the resisting Other. I could have used Diprose's (2002) *Corporal Generosity.* That would have enabled me to explore the ethical dimension of resistance and dismantle the categorisations and hierarchies (Pullen & Rhodes, 2014) laid out by a privileged class of academics seeking to promote economic growth and aid capitalist firms in their struggle to survive and grow. That would have been a deeper engagement with a stream of ideas in which I now only dipped my toes, and I believe that that

exploration would have been fascinating and suitable for offering more critique of the status quo. The focus of the thesis would then have been somewhat different. The academic texts about 'innovation resistance,' which I use one chapter to problematise, would then have expanded to become a complete thesis, and little space would have remained for my empirical exploration. I chose to stay with the empirical sections because they have been important in forming my view on the phenomenon 'innovation resistance'. I see the research process as an exploration, both in literature and in the field. Therefore, I thought that writing the narrative about this phenomenon was favourably done through a representation of both.

The analysis of the empirical material could also have been done differently. *Institutional theory* is sometimes brought forward as an alternative to STS. Institutional theory, especially the Scandinavian Institutional theory, could have been used in this work. The focus on the dynamics between stabilisation and change in Scandinavian Institutional theory could have been used to illuminate how the different logics in the innovation firm(s) meet the healthcare institutions and how this changed both of them (Czarniawska & Joerges, 1996; Severinsson, 2016). The ANT notion of translation is used in this school of thought as well. It could, for instance, have been leveraged to understand how the idea of hazardous substance (ch. 6) travelled from the lakes of Sweden to a row in a list of substances to be phased out. A change in an institution that affected the reception of the low-tech medical innovation. To use Institutional theory in that manner would nonetheless have required a different set of empirics, as I did not set up studies 'following the object'. It would also have put a stronger emphasis on the organisations than I desired, as this could have made the non-human agency less visible. Moreover, Pickering's (1993) mangle of practices could have been utilised. His description of the mangle inspired me since he sees this as a dialectic between resistance and accommodation. Still, I thought that ANT described roughly the same thing but in more detail, and I preferred to use that manner of describing the phenomenon.

## A1.4 The fourth stop: What was produced?

Given all this struggle, what was actually produced in this study? To answer that question, we must pay attention to my view on science, which is influenced by Science and Technology scholars (such as Langdon, 1980; Collins, 1981; Trevor and Bijker, 1984; Kuhn, 1996). I see social science and natural science as something human made. I believe in Latour's (1999) words that *'the sciences do not speak of the world but rather, construct representations that seem always to push it away, but also to bring it closer'*.

I do not believe that it is possible to establish what reality really is. We know that a certain percentage of humankind's knowledge is wrong, but we do not

know how significant that part is and what is included in it. Through a study such as this one, we might close in on an accurate description of one dimension of the real world, but we can never get the whole picture, nor can we claim to really describe reality – instead, we construct a narration of it. We lose locality, particularity, materiality, multiplicity and continuity for every step we take away from the field. Still, at the same time, we gain compatibility, standardisation, text, circulation and relative universality. We must lose the former to gain the latter (Latour, 1999). The phenomenon that we are trying to study are circling all of this (Latour, 1999), and we can get a glimpse of it from one angle, but we can never see the phenomenon in its entirety. Therefore, transformations take place when taking something from the field to another location to analyse it. These transformations are connected to my view on what a phenomenon or case is. My view on this is coloured by Latour's (Latour, 1999, pp. 71-72), and he describes it as follows:

> Phenomena, however, is not found at the meeting point between things and the forms of human mind; phenomena are what circulates all along the reversible chain of transformations, at each step losing some properties to gain others that render them compatible with already established centres of calculation.
>
> (Latour 1999, pp. 71-72).

Thus, the phenomenon or the case 'innovation resistance' can be found all along the chain of transformation made throughout this thesis work. What is accessible to you, as a reader, is in the form of text and pictures. You get to see the cases from the angle of structure, standardisation, relative universality, but you see little locality, particularity, multiplicity and continuity.

As might be suspected from reading this thesis, I am sympathetic to two ontological principles that ANT scholars usually accept. The first one is *material relationalism* meaning that all entities, such as people, concepts and actions, are moulded into their present form by their associations to other entities (Gherardi & Nicolini, 2020). This is what chapter five has tried to describe, and it is also quite similar to Derrida's notion of how language is constructed. A word gains its meaning through its association with other words. The second one is *ontological performativity*, which states that all entities are performed. If something appears to be stable, that is because of an effort, not an intrinsic characteristic of the entity. The performance takes place in, by and through the entity's relationships with other entities. This means that there is no 'natural' order. The 'order' is reversible, and the outcome of a new order is uncertain (Gherardi & Nicolini, 2020). Again, this performativity has been made apparent throughout this work.

Since a qualitative method was used for this study, all empirical material is context-dependent and cannot be used for generalisation (Flyvbjerg, 2001). The actor-network theory is, however, a theory of how the entire world works.

Therefore, the reasoning that builds on ANT can be said to be applicable for more context than only the ones presented in this thesis. It is a proposition for how innovation resistance can be understood theoretically in multiple contexts. I have occupied myself with elaborating upon a concept. However, I do not see the concept as a closed case or as having a firmly set definition. I will return to deconstruction to explain this.

In deconstruction, words get their meaning through their association to and their difference compared to other words – not from the actual object, phenomenon, etc., to which it corresponds (Butler, 2016). One way to look at it would be to consider a dictionary (Langmann, 2013). In a dictionary, the word 'barrier' would be described using other words and often synonyms. These words can be seen as words in close relationship with *the* Word. In figure 45, you see the word 'barrier' and some of the words that this word is put in relationship with according to Google's dictionary. The lines illustrate that the dictionary considered the two words to be synonyms.

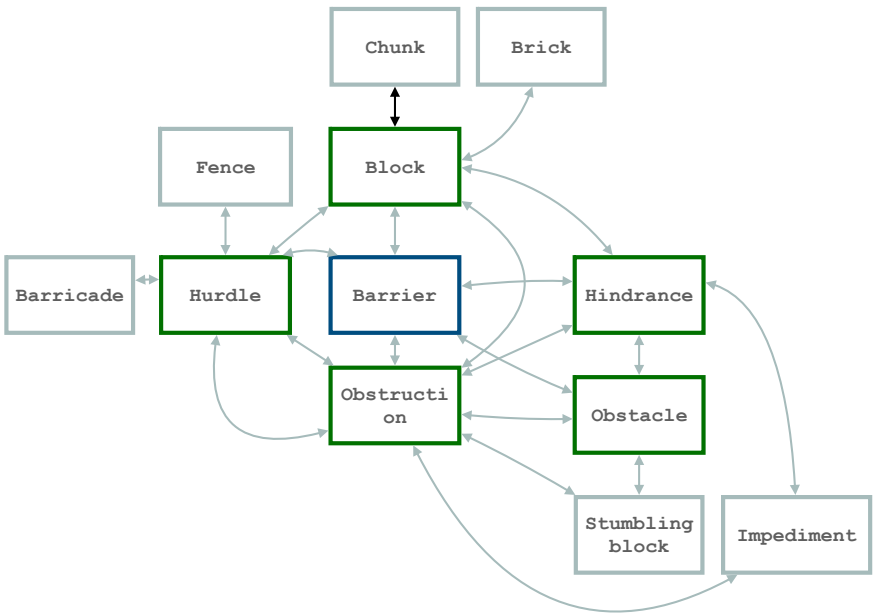


*Figure 45: Illustration of association between words in a dictionary. Associations are only presented for words in blue and green boxes. Picture inspired by Then & Now (2017).*

Deconstruction views this chain of differences and relationships as something that does not really have an end. From a deconstructionists' point of view, the map above could be expanded infinitely. In addition, the language is not only built on differences but in delaying of meaning. Within deconstruction, a word's meaning is treated as an escaping phenomenon. Derrida refers to the word (or sign) being given meaning by its relationship with other words, by

*what it is not*. Thus, the deconstruction is suspicious towards any effort to find a stable and final definition of an object's or a phenomenon's meaning. Derrida sometimes expresses this as 'to come' (for example, 'democracy to come...' in Derrida, 2001).

Along those lines, what I think I have presented here is closer to 'innovation resistance to come' than a stable definition. To use a straightforward metaphor, we can consider concepts as bags in which we put different associations, values, meanings, etc. If we know of the concept, that means we have a bag with its name on it. However, no actor has the same content in their bag since the concept has interpretative flexibility. One scholar might, for instance, associate Intellectual Property rights (IPR) with the words 'barrier to radical innovation'. In contrast, others might associate it with the word 'enabler of incremental innovation' (example based on the findings by Brüggemann et al. 2016). This is also valid for the phenomenon that researchers observe and interact with in the field. These phenomena can be seen as bags in which a researcher puts meaning, associations, value, etc. The scientific process here is much about translating a phenomenon into a neat bag with associations, meaning, etc. In this process, we lose context, materiality, and associations we could not see or did not deem important, etc.. Still, we also gain text, structure, transferability and more (this is connected to Latour 1999, reasoning about the journey from field to desk). An illustration of the bag metaphor can be seen in figure 46.


*Figure 46: Illustration of the meaning of a word shifting between different people.*

Thus, the concept 'innovation resistance' is not a locked ontological category; its content is constantly shifting, and, as noted in chapter ten, sometimes tied to ascriptions and prescriptions made by macro programs. Reinterpreting a concept means putting some new things in the bag, but it does not mean that the bag is closed, more items might be added later, and things might be taken out. This thesis has attempted to add and remove things in the bag labelled 'innovation resistance' without closing it.

## A1.5 The fifth stop: The wrapping section

The last stop on this tour is the wrapping section of the laboratory, where we will find the tools I used for packaging the findings into something accessible to readers. There is some difficulty in knowing when to stop when exploring a network (Burrell, 2009). Practically speaking, one way to stop is when time runs out, and one is to reach saturation or natural conclusion (Burrell, 2009). An indication that one has reached a natural conclusion of one's study is when *'interviews with new people and observations in new locales yield a repetition of themes'* (ibid, p. 194). I am a bit sceptical about it being possible to reach saturation and believe that there will always be more details and aspects to explore. When translating a rich context to text, so much is lost – that more text and further studies will always move the narration closer to that which it tries to narrate. Instead, I think that the exploration ended when I had reached a good enough description of the events I tried to capture. The timing of this conclusion was a combination of reaching this 'good enough' and running out of time. The network could have been explored much more, and with Latour (1999,) I can say, *'when we have barely arrived, we must leave'* (p. 39). At the same time, I perceived that no new mind-blowing information was provided regarding the phenomenon under study after a period of interviewing and reading documents. In the story of Latour's (1999) botanist in the Amazon forest, there was *'an enormous pile of newspaper stuffed with plants brought back from the site and awaiting classification (p. 39)'.* This was the case for me as well. The enormous pile of material that Latour's (1999) botanist brought home was, in my case, digital but just as much in need of analysis, categorisation, sorting, etc., to be comprehensible to readers (see figure 47).

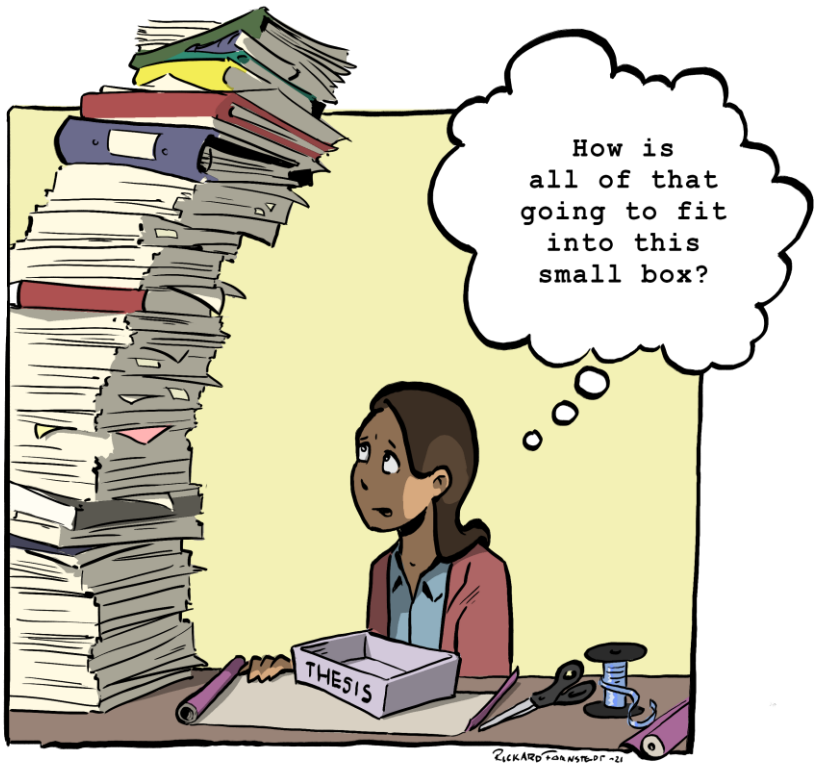


*Figure 47: An illustration of the researcher's dilemma of not capturing the entirety of the phenomenon under study, while at the same time ending up with a vast amount of knowledge. Which part of it and how much of it is the researcher to make accessible to readers? Illustration: Rickard Fornstedt. Idea: Helena Fornstedt*

In chapters 6-8, the empirical material is presented in the form of a narrative or a plot constructed by the researchers. By plot, I refer to the introduction to a structure that makes sense of the material (White, 1973) and directs what material to use in the narrative and what material to leave out or present in an appendix (Czarniawska, 2014). White (1973) introduced the term '*emplotting'* and used it to describe that '*historians do not find a plot in history but put it in themselves'* (White as described by Czarniawska, 2014). In chapters 7 and 8, the emplotting is made by chronology. In chapter six, the number of narratives and views and the closeness in time between the events made a straightforward chronological narrative redundant. Instead, I used what Ryan (2001) would describe as *constructing characters*. The characters then became different counties with different interactions with the medical device. There is a tendency in social science to gear the plot towards the conclusions (Czarniawska, 2014). The emplottment in the chapters was used to do just that and this

removed some of the richness of the context description. Still, it was necessary to present it in a relatively short chapter, in a reasonably long thesis.

With the exception of this methodology section, the thesis is written as realist tales (Van Maanen, 2011) with a third person voice that makes the researchers invisible in the text. On the other hand, this chapter is written more like a confessional tale (Van Maanen, 2011) to supplement the realist's report of the study. Here, I want to demystify the exploration process, make myself visible and reflect upon how my choices, backgrounds and interests influenced the exploration of innovation resistance.

To make this thesis more accessible for a non-academic public without travelling into the realm of popular science, the story of innovation resistance is told on two levels. A detailed level is found in the text body, and a high-level narrative is located in the summaries and different illustrations and comics throughout the thesis. My thought with this was to enable a general public, or indeed a time-pressed scientist, to grasp the content of the thesis by just browsing through the around 300 pages, stopping only to read the summaries and the comics. My hope was that a shallow read would arouse curiosity and encourage the reader to dive further into the story.

# Appendix 2: List of the 48 articles analysed in chapter three

List of the 48 papers analysed in chapter three

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| 1 | Abrahamson, E., 1991. Managerial fads and fashions: the diffusion and rejection of innovations. Academy of management review, 16(3), pp. 586–612. |
| 2 | Baldwin, J. & Lin, Z., 2002. Impediments to advanced technology adoption for Canadian manufacturers. Research Policy, Volume 31, p. 1–18. |
| 3 | Bhatt, P., Ahmad, A. J. & Roomi, M. A., 2016. Social innovation with open source software: User engagement and development challenges in India. Technovation, Volume 52–53, pp. 28–39. |
| 4 | Bigliardi, B. & Galati, F., 2016. Which factors hinder the adoption of open innovation in SMEs?. Technology Analysis & Strategic Management, 28(8), pp. 869–885. |
| 5 | Brüggemann, J., Crosetto, P., Meub, L. & Bizer, K., 2016. Intellectual property rights hinder sequential innovation. Experimental evidence. Research Policy, Volume 45, pp. 2054–2068. |
| 6 | Chen, P.-T. & Kuo, S.-C., 2017. Innovation resistance and strategic implications of enterprise social media websites in Taiwan through knowledge sharing perspective. Technological Forecasting & Social Change, Volume 118, pp. 55–69. |
| 7 | D'Este, P., Rentocchini, F. & Vega-Jurado, J., 2014. The Role of Human Capital in Lowering the Barriers to Engaging in Innovation: Evidence from the Spanish Innovation Survey. Industry and Innovation, 21(1), pp. 1–19. |
| 8 | D'Este, P., Iammarino, S., Savona, M. & Tunzelmann, N. V., 2012. What hampers innovation? Revealed barriers versus deterring barriers. Research Policy, Volume 41, pp. 482–488. |
| 9 | Das, P., Verburg, R., Verbraeck, A. & Bonebakker, L., 2018. Barriers to innovation within large financial services firms An in-depth study into disruptive and radical innovation projects at a bank. European Journal of Innovation Management, 21(1), pp. 96–112. |
| 10 | De Massis, A., Audretsch, D., Uhlaner, L. & Kammerlander, N., 2018. Innovation with Limited Resources: Management Lessons from the German Mittelstand. Journal of Product Innovation Management, 35(1), pp. 125–146. |
| 11 | Dougherty, D., 1992. Interpretive Barriers to Successful Product Innovation in Large Firms. Organization Science, 3(2), pp. 179–202. |

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| 12 | Ferlie, E., Fitzgerald, L., Wood, M. & Hawkins, C., 2005. The Nonspread of Innovations: The Mediating Role of Professionals. The Academy of Management Journal, 48(1), pp. 117–134. |
| 13 | Greis, N. P., Dibner, M. D. & Bean, A. S., 1995. External partnering as a response to innovation barriers and global competition in biotechnology. Research Policy, Volume 24, pp. 609–630. |
| 14 | Hadjimanolis, A., 1999. Barriers to innovation for SMEs in a small less developed country (Cyprus). Technovation, Volume 19 , pp. 561–570. |
| 15 | Harrisson, D. & Laberge, M., 2002. Innovation, Identities and Resistance: the Social Construction of an Innovation Network. Journal of Management Studies, 39(4). |
| 16 | Harrisson, D., Laplante, N. & St-Cyr, L., 2001. Cooperation and resistance in work innovation networks. Human Relations, 54(2), pp. 215–255. |
| 17 | Heidenreich, S. & Handrich, M., 2015. What about Passive Innovation Resistance? Investigating Adoption-Related Behavior from a Resistance Perspective. Journal of Product Innovation Management, 32(6), pp. 878–903. |
| 18 | Heidenreich, S. & Kraemer, T., 2016. Innovations—Doomed to Fail? Investigating Strategies to Overcome Passive Innovation Resistance. Journal of Product Innovation Management, 33(3), pp. 277–297. |
| 19 | Heiskanen, E. Hyvönen, K; Niva, M; Pantzar, M; Timonen, P; Varjonen, J 2007. User involvement in radical innovation: are consumers conservative?. European Journal of Innovation Management, 10(4), pp. 489–509. |
| 20 | Hossain, M., 2018. Motivations, challenges, and opportunities of successful solvers on an innovation intermediary platform. Technological Forecasting & Social Change, Volume 128, pp. 67–73. |
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| 27 | Kohn, S. & Hüsig, S., 2006. Potential benefits, current supply, utilization and barriers to adoption/ An exploratory study on German SMEs and innovation software..pdf. Technovation, Volume 26, pp. 988–998. |
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| 31 | MacVaugh, J. & Schiavone, F., 2010. Limits to the diffusion of innovation - A literature review and integrative model. European Journal of Innovation Management, 13(2), pp. 197–221. |
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| 34 | Nijssen, E. J., Hillebrand, B. & Vermeulen, P. A., 2005. Unraveling willingness to cannibalize: a closer look at the barrier to radical innovation. Technovation, Volume 25, pp. 1400–1409. |
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| 36 | Ram, S. & Jung, H.-S., 1991. "Forced" Adoption of Innovations in Organizations: Consequences and Implications. Journal of Product Innovation Management, Volume 8, pp. 117–126. |
| 37 | Ram, S., 1989. Successful innovation using strategies to reduce consumer resistance: an empirical test. Journal of Product Innovation Management, 6 (1), pp. 20–34. |
| 38 | Reilly, M. & Sharkey Scott, P., 2014. Subsidiary driven innovation within shifting MNC structures: Identifying new challenges and research directions. Technovation, Volume 34, pp. 190–202. |
| 39 | Roud, V., 2018. Understanding the heterogeneity of innovation modes: performance effects, barriers, and demand for state support. Technological Forecasting and Social Change, Volume 133, pp. 238–253. |
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Dissertation presented at Uppsala University to be publicly examined in Häggsalen, Lägerhyddsvägen 1, Box 169, 751 04, Uppsala, Friday, 12 November 2021 at 10:00 for the degree of Doctor of Philosophy. The examination will be conducted in English. Faculty examiner: Professor Hervé Corvellec (Lunds Universitet).

**Abstract**
Fornstedt, H. 2021. Innovation Resistance. Moving Beyond Dominant Framings. *Uppsala Dissertations from the Faculty of Science and Technology* 146. 329 pp. Uppsala: Acta Universitatis Upsaliensis. ISBN 978-91-513-1300-9.

Science, Technology and Innovation (STI) research has mainly had an outlook that frames innovation in a pro-innovation, pro-firm, manner. Connected to this perception of innovation is a view of human and non-human resistance as a temporary unwanted response that will eventually be overcome. Studies on innovation resistance avoiding the pro-firm and pro-innovation bias are rare, and the findings provide a fragmented understanding of innovation resistance. Moreover, despite focusing on challenging the lingering pro-innovation bias, Critical Innovation Studies have not yet explained why this bias, accompanied by a derogatory view on resistance, lingers in academic writings.

Therefore, this study aims to shed light on central presuppositions and limitations of the scholarly knowledge production on innovation and innovation resistance. Specifically, it aims to empirically explore the manifestation of innovation resistance and the dynamics involved in its entanglement with innovation processes. This is achieved through reviews of extant literature combined with an actor-network analysis of interviews, public documents and news articles concerning three different innovation processes.

Using an actor-network theory lens, the study finds that innovation resistance is a process *between* programmes that manifests when an innovation programme intercepts an Other programme. The process consists of layered movements of resistance that entangle the Other with the innovation actor. The movements are conceptualised as non-programmatic behaviour, distortion, estrangement/interessement and rejection. The process enables the Other actor's agency and restricts the innovation actor's agency. The resistance can prompt accommodation from the innovation actor, consequently shaping the innovation process. For the Other, innovation resistance can protect from the influence of an unwanted innovation process. It can also be how the excluded Other (re)gains influence over an innovation process by which it is affected.

Moreover, the study finds that the scholarly knowledge production around innovation and its resistance has been conducted from within the mega programme of Industrial Capitalism, including Top Tier journals and the Innovation Studies tribe programmes. Consequently, they lock out Other actors (such as the more than human world, people of colour, women, workers and research non-programmatic with the Top Tier journals and the Innovation Studies programmes), making them essentially invisible or negligible in the innovation research. This explains the narrow system boundaries of the field (allowing researchers to assume that innovation processes lead to a positive sum-game) and the pejorative view on resistance.

*Keywords:* Innovation; Innovation Resistance; Barriers to Innovation; Actor-Network Theory; Critical Innovation Studies; Science, Technology and Innovation Studies; Knowledge production; Innovation in the Anthropocene; Sustainability

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ISSN 1104-2516
ISBN 978-91-513-1300-9
URN urn:nbn:se:uu:diva-453894 (http://urn.kb.se/resolve?urn=urn:nbn:se:uu:diva-453894)

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