What kind of system is "our" aviation?

The aviation system model includes different environments, such as the economic, ecological, social, technological and political environments, which are the platform of the aviation market.

The fact that there are various fields of development indicates that the industry development is not only influenced by the industry actors themselves also by its structures and institutional surroundings.
Technical system or artefact?

- Traditional ‘artefact’ engineering are focused on stand-alone objects with a specific technical function.
- Systems engineering is focused on the design of complex combinations of technical artefacts.
- The meaning of the notions of scale and complexity is highly context-dependent.
- A technical artefact from one perspective may appear as a complex technical system from another.
- Aircraft can be considered as technical artefacts within a high-level analysis of civil aviation as a public transport system, but complex technical systems by themselves when looked upon from the point of view of aircraft design…

- So, it depends!
Technical, social or socio-technical system?

**Human-technology systems and socio-technical systems**
Sociotechnical systems refers to the complex interaction between people and technology in a joint (work) function. In organizational development the concept refers to an approach for complex organizational work design.

**Large technical systems and socio-technical systems**
The term also refers to the interaction between society’s complex infrastructures and human behavior. In this sense, society itself, and most of its substructures, are complex sociotechnical systems.

Industry development constantly raise new questions for both theory and practice

![Diagram showing the evolution of technical factors, human factors, organizational factors, and large technical system change from 1950 to 2030.](image)

Figur 1. Flygforskningens utveckling mot stora tekniska system och hållbarhet (Ulfvengren et al. 2016).
Aviation industry system

Porter’s five forces

Threat of new entries
Power of buyers
Power of suppliers
Threat of substitutions

Fig. 2.6 The aviation industry system (Source: Own illustration in relation to Porter 1980)

System boundaries

External – what is outside
Internal – what is inside

Externalities – cost or benefit that affects a party that did not choose to incur in that cost or benefit

Internalisation – changing what is internal

Noise is a bi-product
- an externality about to become internalised..
System models and representations

Different aspects can be represented in the model:

• Structural – components, sub-system, parts
• Functional – process with input and output – what it does
• Behavioral/Processual – how
• Communication
• Actors and roles
• …
System perspectives of regime / research

Research Disciplines:
- Political Science, Law, Economics, Sociology
- Economics, Decision Theory, Organizational Sociology
- Industrial Engineering, Management & Organization
- Psychology, Human Factors, Human-Machine Interaction
- Mechanical, Chemical, and Electrical Engineering

Government
- Judgment
- Safety reviews, accident analyses

Legislation
- Incidents
- Reports

Company
- Operations
- Surveys

Management
- Logs & Work reports

Staff
- Observation Data

Work
- Hazards

Not comprehensive!
INFRA project research activities

- **System description**: boundaries, representations, perspectives
- **Historical description** of the system of interest development
  - Change of regimes, structures, roles - anamnes
  - Aviation operations capabilities and technical state of art
    - Innovations, opportunities, limitations, blockers
  - Comparisons with other large technical systems changes
    - Learning, get ideas...
- What is noise? What are particular challenges and interdependencies?
- Development and adaption of analysis method “fit for purpose”
  - various perspectives, regimes disciplines has different sociotechnical analysis approaches

Understand and map perspectives, functions, roles, interests, drivers, blockers etc…
Interdependencies and Dilemmas

Noise - Emissions
Local - Global

Noise – Health
Disturbance - Exposure

Noise - Safety

Noise – Accessibility and Growth
Airport, Aviation, Regions, Nation

Noise - Regulations

Dilemma and interdependencies

Research challenge!

Each dilemma and interdependence best described by different disciplines and perspectives

→ Multi disciplinary research group and approach.

Engineering, aviation, piloting, aviation operations, communication, linguistics, socio-technical systems, large technical systems, system change, system culture, historian perspectives, sustainability, large complex research projects....
Frågor?

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