



Vi finns till för att

Erbjuda smarta lösningar för morgondagens flyg.

Vårt verksamhetslöfte handlar om att

Hjälpa våra kunder att ta position.

Det gör vi genom arbeta med

Flygsäkerhet • **Innovation** • Effektiva arbetssätt • Kundfokus

...och att vara

Lösningsorienterade • Engagerade • **Nytänkande**

# VI ÄR LFV

# Regleringsbrevet

- ✓ LFVs huvuduppgift är att tillhandahålla en **säker, effektiv** och **miljöanpassad flygtrafiktjänst** för civil och militär luftfart.
- ✓ LFV ska inom och utom landet tillhandahålla **flygtrafiktjänster samt service- och konsulttjänster** som är knutna till verksamheten.
- ✓ LFV ska svara för **forskning och innovation** som motiveras av myndigheternas uppgifter.
- ✓ LFV får direkt eller genom till verket knutna bolag **bedriva tjänsteexport** inom sitt verksamhetsområde.



Cross border  
operations &  
maintennance

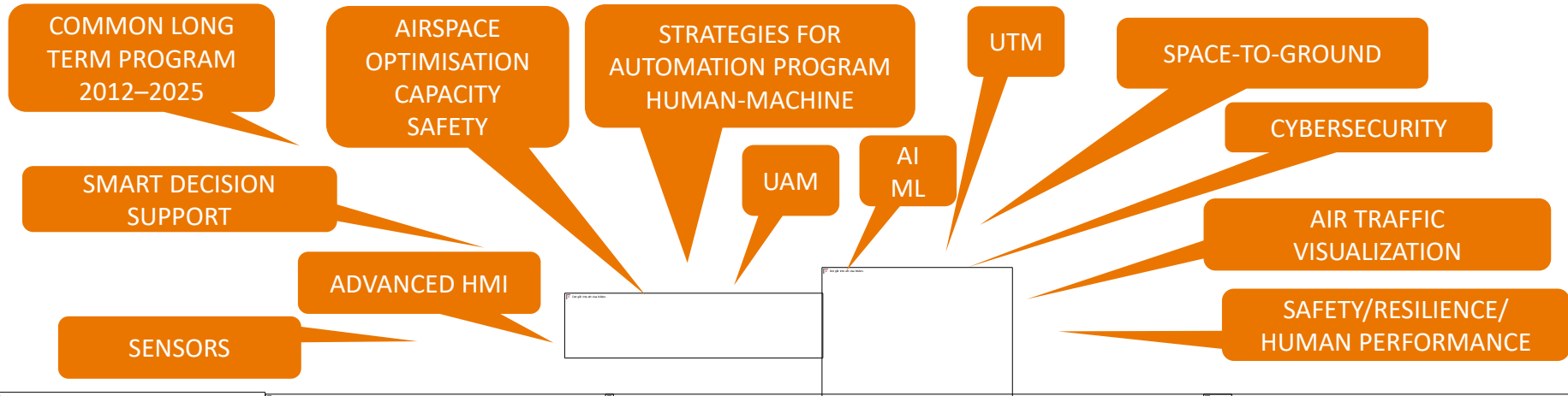
Legal challenges

**COVID 19**

Common synergies,  
developmetns, trade offs

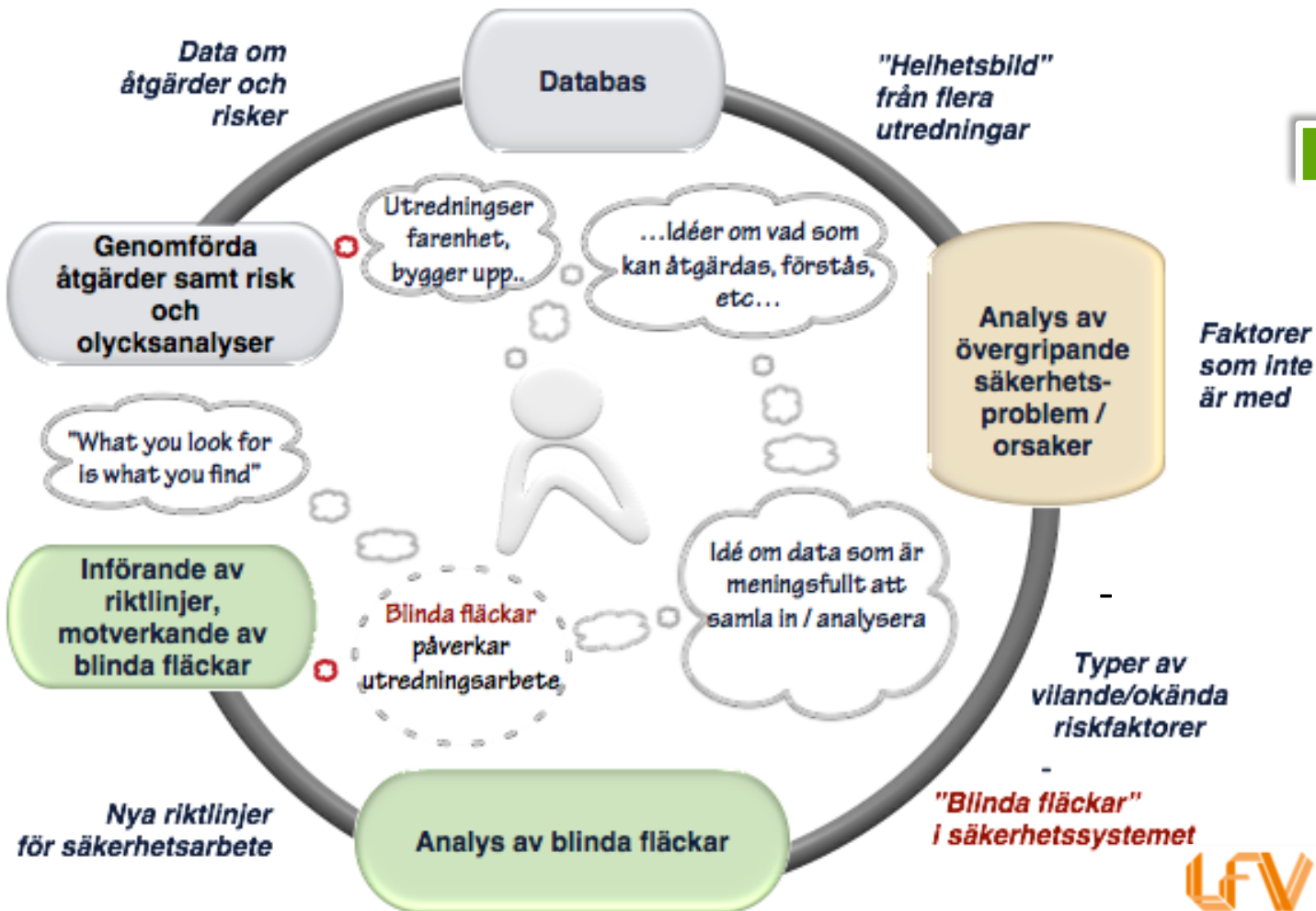
# Collaboration LFV and LiU

## Science & Applied research for the aviation of tomorrow



Ca 30 tal projekt, 5 PhD, PostDoc, assistenter

# SAMPLE PROJECTS







UAM (rejected by VINNOVA, Energimyndigheten, Norrköpings fonden), Valentin P.  
"det bedöms osannolikt att drönare ska befordra människor i den omfattning som anges i ansökan"



## Airspace Availability: Crucial for UAM Network Design



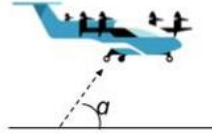
**Network design:** how is the ground connected through the air?



**Sensitivity analysis:** what are the effects of different:



runway flow configurations



aircraft performance

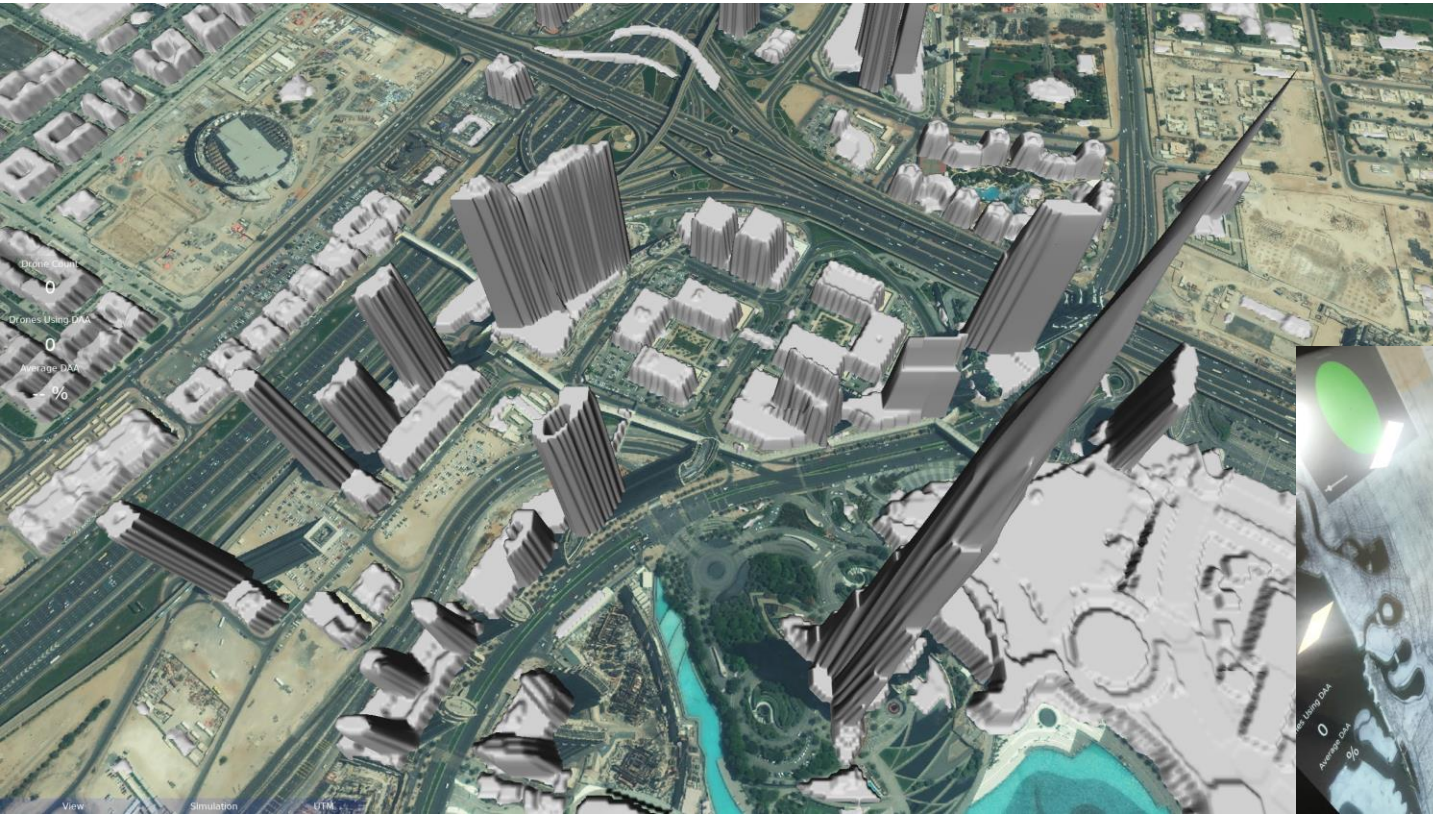


weather conditions



air traffic control policies

# LFV-LiU-SAAB-Sharjah University et al. SWE EMIRATI collaboration , Dubai UAM 2018-2021





Per Wistbo Nibell



Per Johannesson



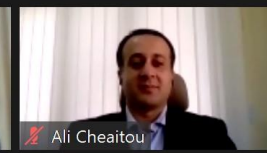
Björn Stavås



Henrik Landerho...



Imad Alsyof



Ali Cheaitou



Maamar Bettayeb



Martin Rantzer



Talal Al Hammadi



Zein



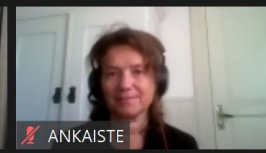
alnaimiy, Hamid



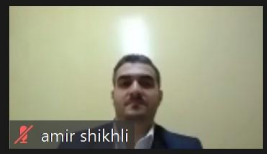
Bassam Khalifa



Anna-Karin



ANKAISTE



amir shikhli



محمد احمد



Shorok Lindgren



Doraid Dalalah



olivier alain petit



André Hedberg



Oualid Jouini



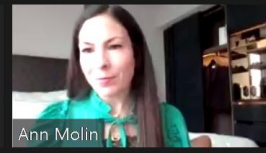
Ahmed Al-Shamma'a



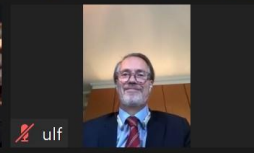
EmmBac



David



Ann Molin



ulf



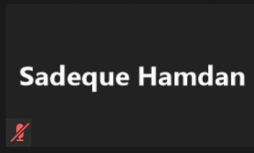
Niclas Gustavsson



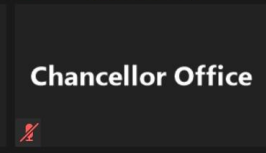
Ruba Abdelal



Anders Carlsson



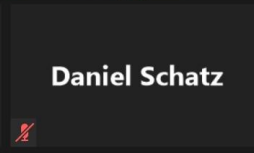
Sadeque Hamdan



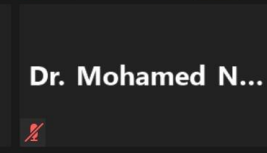
Chancellor Office



Haytham Abdual...



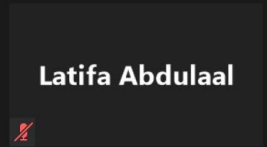
Daniel Schatz



Dr. Mohamed N...



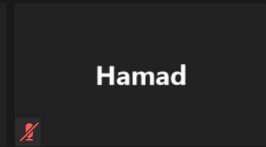
Gianluca Valente



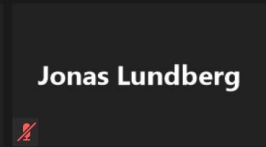
Latifa Abdulaal



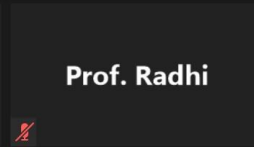
Tobias Andersso...



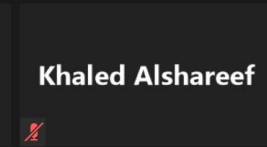
Hamad



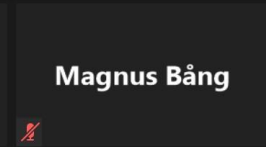
Jonas Lundberg



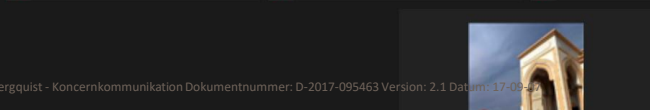
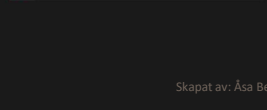
Prof. Radhi



Khaled Alshareef



Magnus Bång



Naser Nawayseh

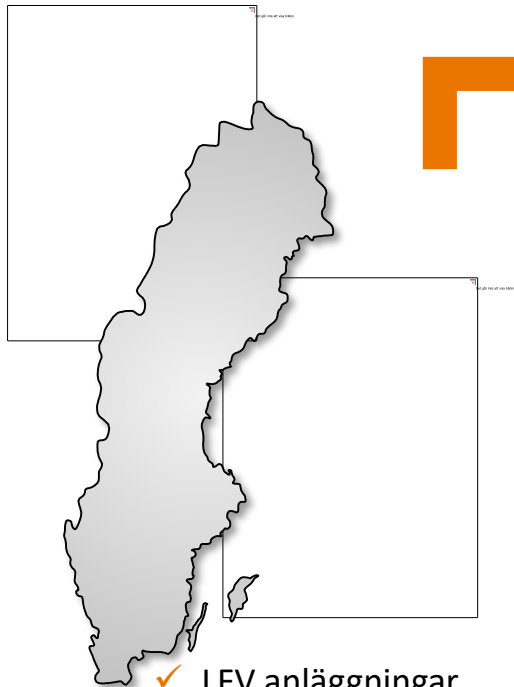


# WHAT TO DO ?

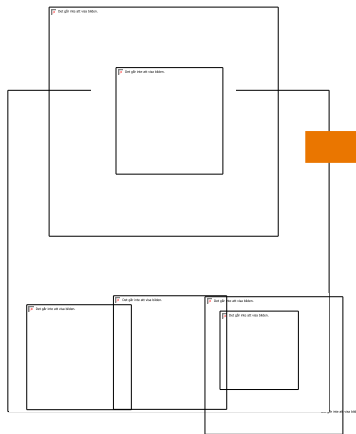
# VDM: Interaktiv visuell dataanalys av övervakningsdata från ATM-system



## Visual Data Mining



✓ LFV anläggningar runt landet



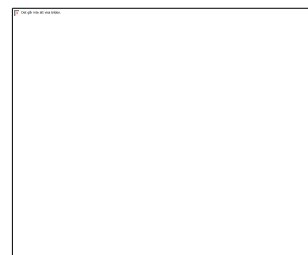
✓ Datainsamling för övervakning ATM-system



✓ Explorativ visuell sekvensanalys



✓ Prediktiv systemunderhåll

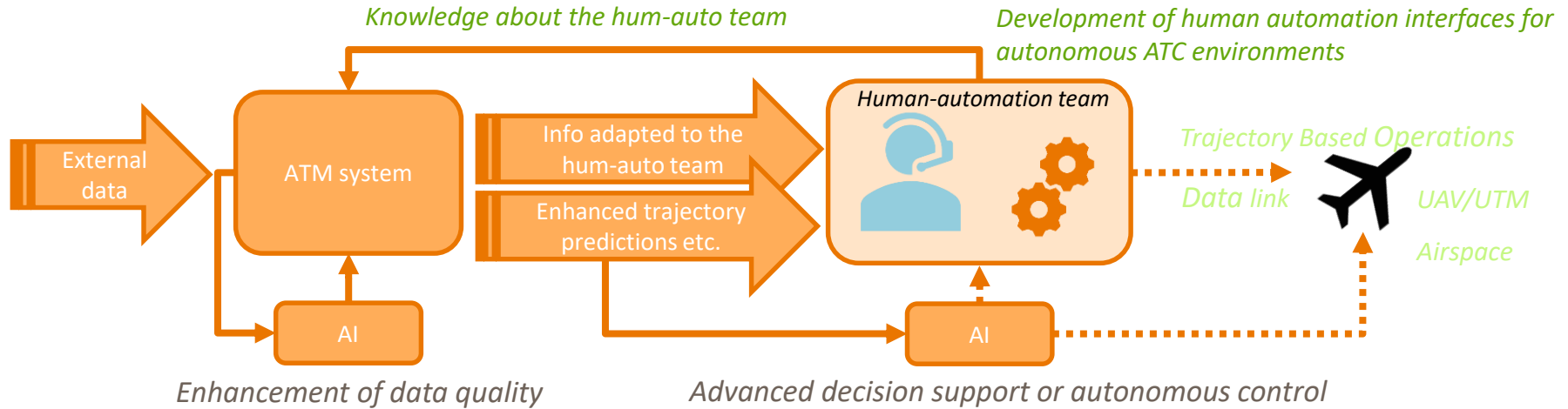


✓ Datastyrd underhållsplanering





# AI & ML & Adaptive Automation



A simulation environment where prototypes from both projects can be integrated and tested





# OVaK: Objektiv verifiering av kompetens mha avancerad automation

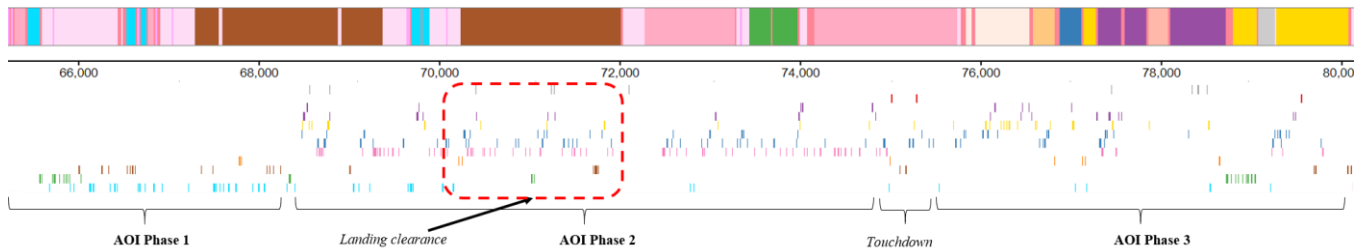
Automation to learn Automation



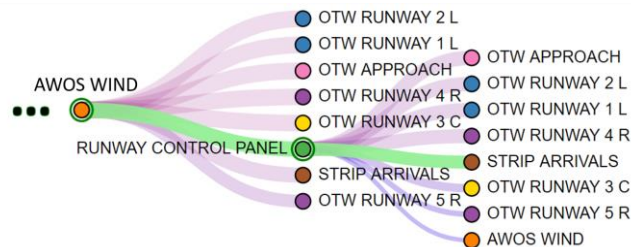
Workshops med instruktörer



Human-in-the-loop simulering med ögonrörelsemätning



## Visuell Sequence Mining



Kunskap om hur operatörer arbetar visuellt med separation av flyg

# UTM CITY, Dubai UTM

0

Drones Using DAA

0

Average DAA

-- %



View

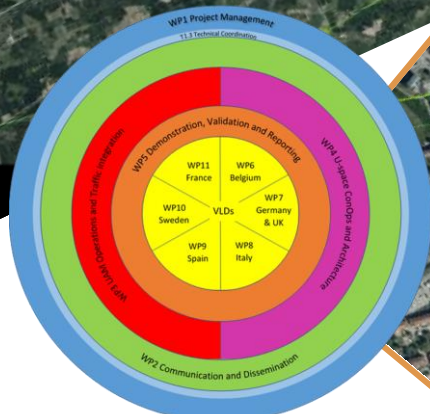
Simulation

UTM





Paris  
Belgien  
Italien  
Spanien  
UK / Germany  
Östergötland



# Nordic Drone Initiative (Swe - Nor – Fin – Dan)

## ..in a nutshell ....

- ✓ to bring together the relevant stakeholders for collaborative innovation on technologies, policies and standards that enables **cross-border goods delivery and passenger transport with drones** and
- ✓ to create a knowledge base and digital platform that **integrate the Nordic competences for accelerating the introduction of drone-based mobility services.**

## AirMOUR Fin, Nor, Swe. Tyskland + Industry +TrV



### aiRMOUR key impacts



# CHALLENGES

# Digitalisation → Automation → Increased Productivity & Safety

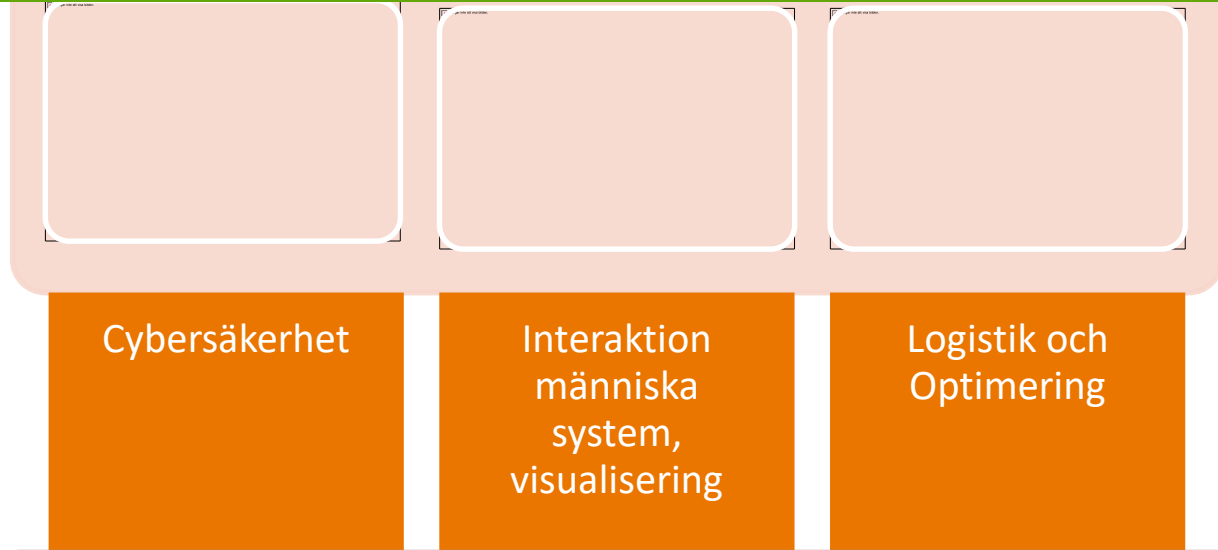
- ✓ Lack of funding
- ✓ Lack of Competencies
- ✓ To slow
- ✓ To conservative
- ✓ To much focus on your own business



- ✓ **REAL CHALLENGE is** COLLABORATION CROSS INDUSTRY - CROSS BORDER  
CROSS ADMINISTRATION - CROSS RESEARCH & INNOVATION

PARADOXERNAS TID – MÖJLIGHETERNAS TID

# AP2 – Automationsprogrammet 2, 2020-2024, Billy Josefsson



- Automation, Ny teknik & Tjänster – koordinering och förstudier
- Samhällsnyttan, övergripande synergier
- Flygsäkerhetsprestanda & Human Performance

# Data integrity & Cybersecurity , a prerequisite

LIU  IDA

## IDA

Om IDA

Utbildning

Grundutbildning

Masterutbildning

Forskarutbildning

Uppdragsutbildning

Forskning

Organisation

Avdelningar

## INTERNET

IDA internet

Studentsidor

Akut



## Outstanding Paper Award at ICNS'20

IDA-studenterna Hanna Gustafsson och Sofie Eskilsson var ledande författare till en artikel "Demonstrating ADS-B And CPDLC Attacks With Software-Defined Radio" som blev utsedd till "Outstanding Paper Award" vid konferensen Integrated Communications, Navigation and Surveillance (ICNS'20). Arbetet leddes av professor Andrei Gurtov inom projektet "Automation Program II" med Trafikverket.





## Artificial Intelligence

23 Million jobs by the year 2020.



## Machine Learning

Market is expected to grow to \$8.81 billion by 2020. In 2017, the median salary for a machine learning engineer was \$106,225.



## Cybersecurity

It is predicted that we will have 5.5 million unfilled cybersecurity jobs by 2021.



## Robotic Process Automation

The average RPA salary is \$73,861, with the top 10 percent earning over \$141,000 annually.



## Edge Computing

By 2022, the global edge computing market is expected to reach \$6.72 billion.



## Virtual Reality

## Virtual Reality

There are major players in the VR market, like Google, Samsung, Oculus and plenty of startups who are hiring.



**RISK ASSESSMENT & Demonstration of SAFETY performance**

## Blockchain

Blockchain-related jobs are the second-fastest growing category of job with an average yearly salary of \$130,000.



## Internet of Things

The number of IoT devices reached 8.4 billion in 2017, expected to reach 30 billion devices by 2020 & in need of 200,000 more IT workers.





