Välkommen till

C

Digital infrastruktur och kommunikation

Projekt

Förstärkt verklighet med hjälp av objektdetektering och visning av manualer för transformatorkomponenter
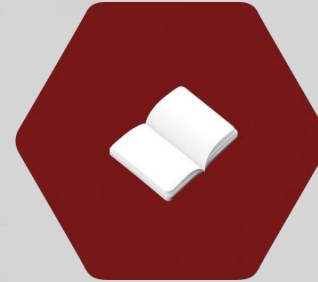
Oscar Thaung

CHALLENGE

- Kompententa experter går i pension
- Mer komplexa maskiner
- Längre träningsperioder
- Kostsamma produktions stopp
- Odokumenterad kunskap
- Resetid för experter

BRIDGING REALITIES

Cat

VISION DETECTION

AUGMENTED REALITY

LARGE LANGAUGE MODELS
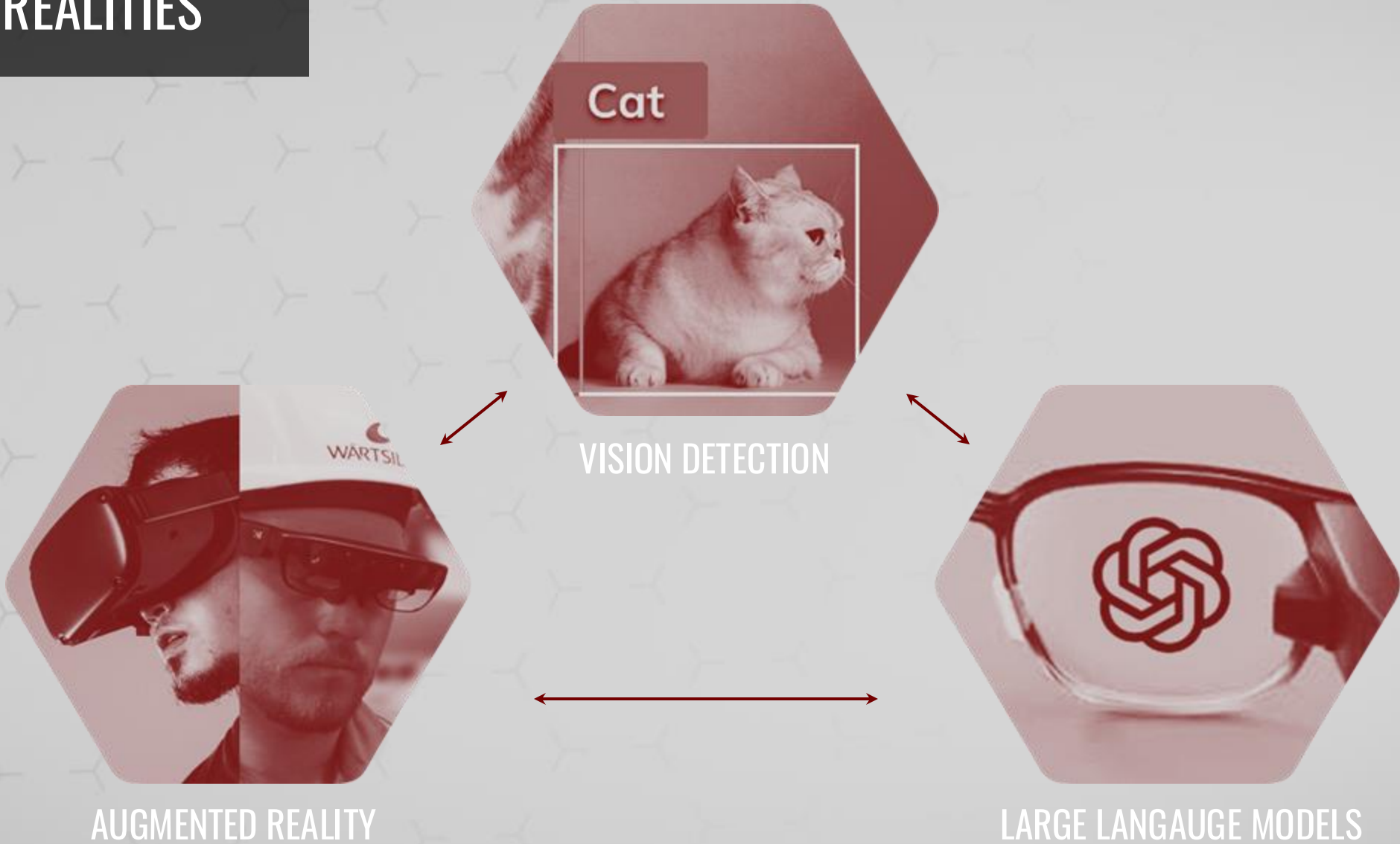
PRACTICAL APPLICATIONS

- AI manualer
- Voice igenkänning
- Prata med dokumentationen
- video strömmar av instruktioner
- Hantera data, manualer, videor på webbportalen
- Union var positiv och vill se såna här förändringar.

PROJECT INFO

Förstärkt verklighet med hjälp av objektdetektering och visning av manualer för transformatorkomponenter

Start: 2023-11-01
Slut: 2024-08-30
Hemsida: https://www.augmentedrealm.se/ai-factory-floor.html

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Francisco Penayo
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Projekt

PLENUM - PLENary multi-User developMent arena for industrial workspaces

Björn Johansson

PLENUM - PLENary multi-User developMent arena for industrial workspaces

Project coordinator Björn Johansson
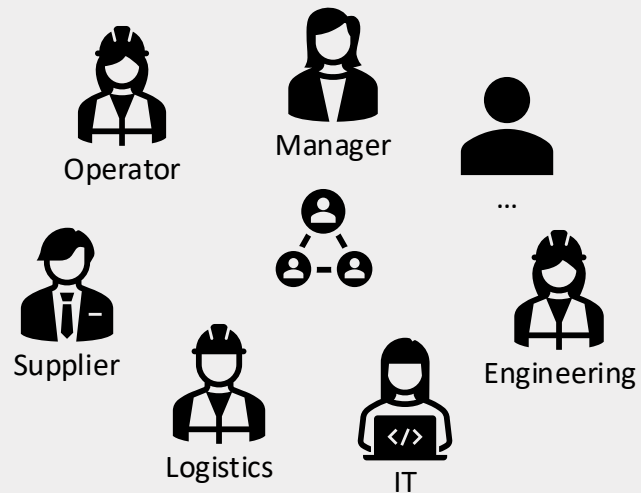
Bjorn.johansson@chalmers.se

031-772 39 09

Start date September 2025

End date September 2025

Industrial challenge

Development of factories and workplaces needs to be done more **effectively** and **sustainable** in **collaboration** with several stakeholders:

Operator

Manager

...

Supplier

Logistics

IT

Engineering
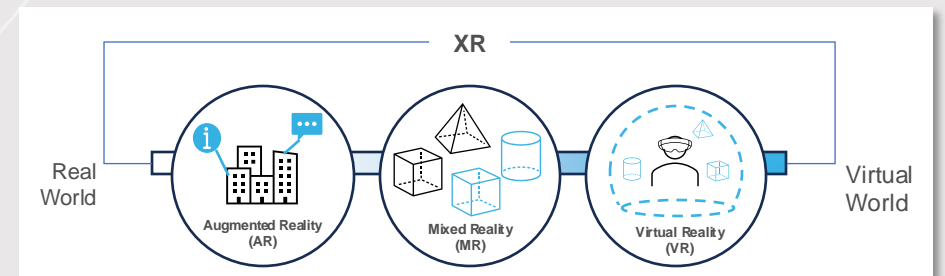
....to create sustainable:

Environment   **Work life**   **Economy**

Project scope

The PLENUM project will develop a **multiuser digital twin** solution and **multiuser XR platform** to address the industry need for model- and simulation driven development, assessment, and optimization of production systems.

Core drivers are:

* **Workplace design optimization**

* **Biomechanical**, **cognitive** and social **ergonomics**

* Scalable multi-user **XR environments for training**

* Increased **multi-aspect sustainability**

XR

Real World

Augmented Reality (AR)

Mixed Reality (MR)

Virtual Reality (VR)

Virtual World

Project partners

Partnership between academia and industry:

Project partners - Industry

- **SCANIA**, take steps to implement solutions developed for commercial software, identify and test optimization in these software.
Layout Planning

- **CEVT**, method (use multi-user software) development and testing in real factories.
Ergonomics, Design review meetings

- **AB Volvo**, take steps to implement solutions developed for commercial software, identify and test optimization and benchmarking.
Design review meetings

- **Volvo Cars**, evaluating and implementing new XR capabilities that drives towards better decision-making in early engineering phases, preparing sustainable industrial workplaces.
Ergonomics, Operator training, Design review meetings

- **Rockwell**, providing VR and simulation environments and expertise for the demonstrations and testing,
VR assembly, digital twin

- **GKN**, developing, evaluating and implementing solutions for a new 3D printing factory in Trollhättan demonstrations and testing, *Operator training, Design review meetings*

Project partners - Academia

Chalmers
Industrial and Materials Science

- Supporting mutli-user visualization of layout planning
- Methodology for application of XR solutions for manufacturing engineering requirements

University of Skövde
Engineering Science

- Support manikin development and implementation
- Virtual ergonomics assessment
- Assymetric XR collaboration

RISE
Materials and Production

- Research methodology and support
- Best practice of XR interaction and tools
- User-centred design methods

FCC Fraunhofer Chalmers Centre
Geometry and Motion Planning

- Factory layout visualization tool
- Virtual environment for ergonomics assessments
- Multi-site and multi-user capabilities for VR

Research Approach

Using an agile research and development methodology – based
on the needs of the industrial stakeholders
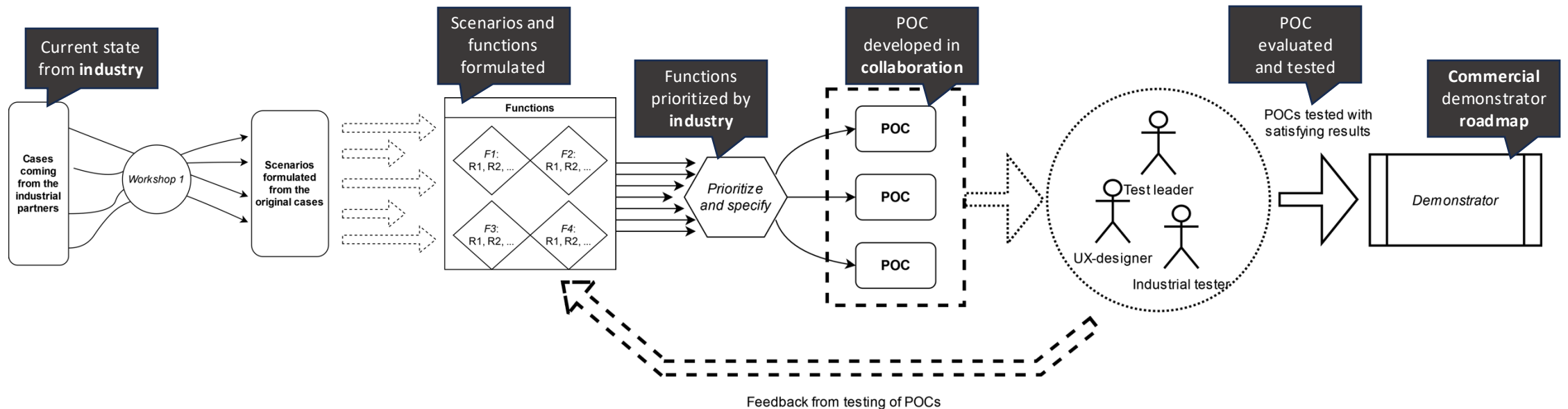
Goal & Outcome

To **create design tools and methods for sustainable workplaces** in a user friendly, **interactive 3D environment for multiple users** that can be used for:

- Factory & workplace design
- Operator upskilling & training
- Workplace ergonomics analysis
- Development work

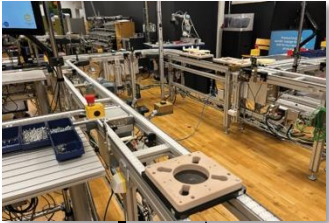To reach commercially viable end results!
Development of a **commercial multi-user VR software via FCC** (IPS)
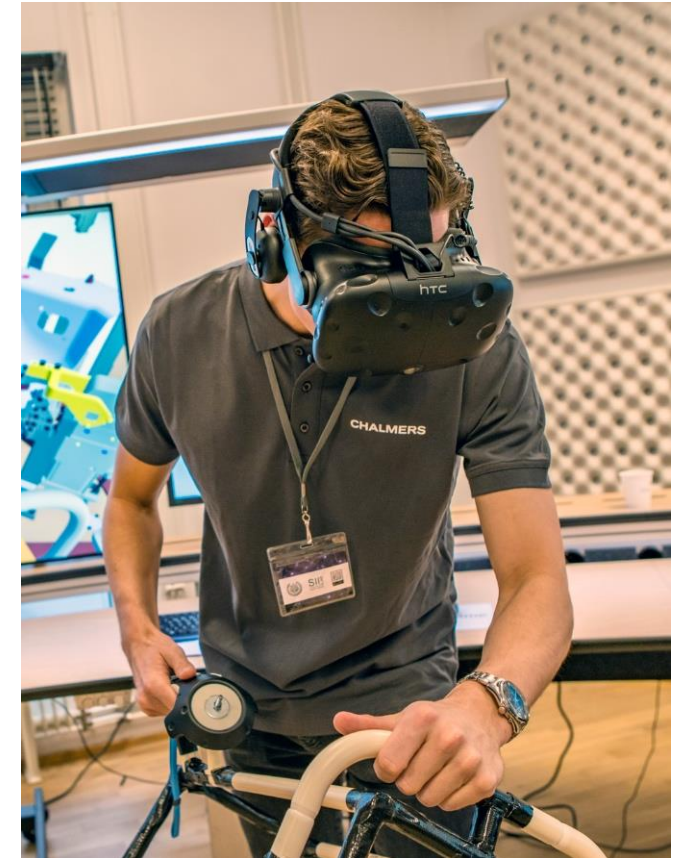
Examples of ongoing work & research –
Rockwell Emulate3D VR enabled Digital Twin

ISO 23247

Real System

Simulation Model
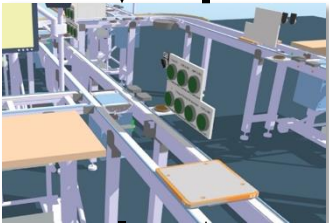
VR User
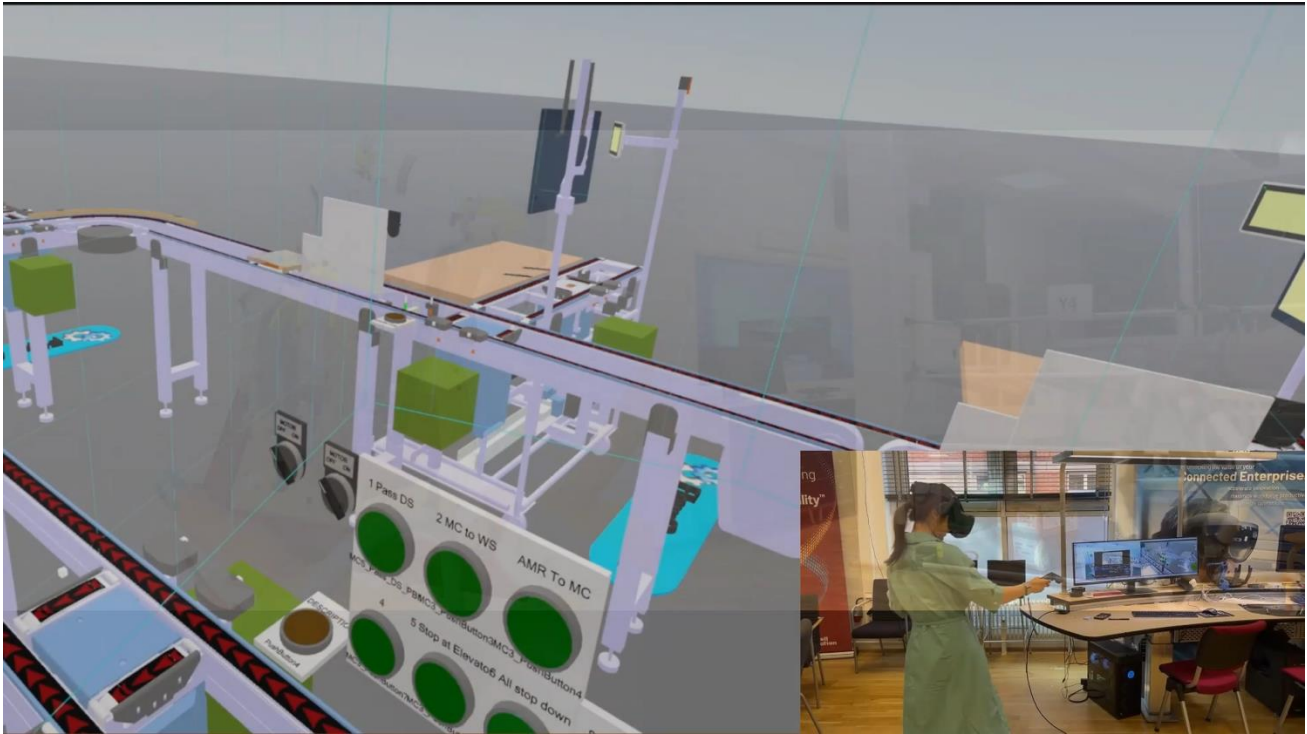
Examples of ongoing work & research –
IPS Multi-user Platform

- Multi-user collaboration

- Cloud-based solution

- Web interface

- Secure communication

- Cross-platform
  - *Browser view*
  - *VR view*
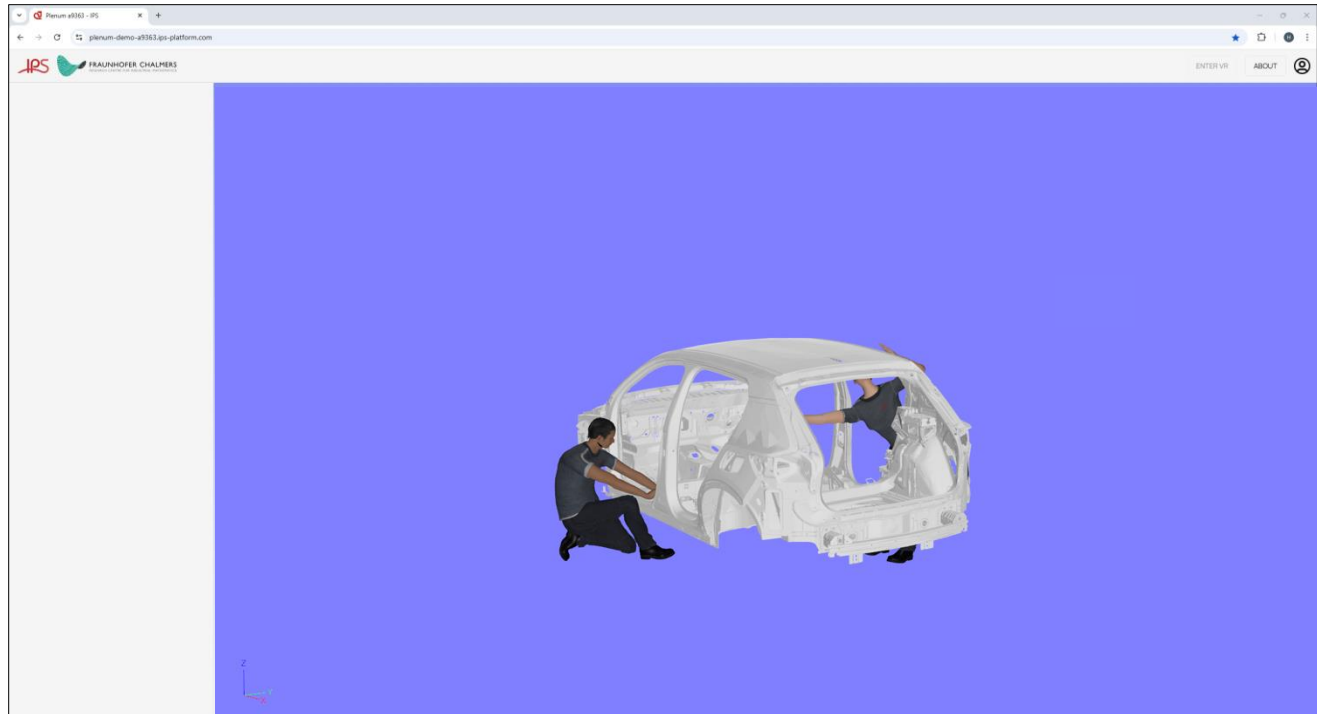
Examples of ongoing work & research –
Volvo Cars XR Sealant Training

Examples of ongoing work & research –
Volvo Cars XR Sealant Training

Projekt

SIMCON (System av Uppkopplade Intelligenta arbetsmaskiner)

Fredrik Cederstav

SIMCON: System of Intelligent Machines for Construction

FREDRIK CEDERSTAV, RISE AB

Financed by VINNOVA

Start: 2023-05-01
End: 2026-04-30
Budget: 20 MSEK

Partners: RISE, Volvo CE, Skanska, MDU and Ericsson

Background

- The Construction industry has fallen behind in productivity

- Urban densification: Increased amount of city projects

- Focus on future CO2-emissions/Global warming

- Huge potential in utilizing digital tools and 5G

- Complex & Dynamic ecosystems

- Higher concern and focus on safety

RISE   Mälardalen University   ERICSSON   SKANSKA   VOLVO   VINNOVA   RISE

Scope

- The project aims to improve efficiency and increase production capacity in large construction and infrastructure projects, combined with an enhanced level of automation, improved safety, and a more sustainable production.

- The goal is to reduce climate impact and minimize work-related injuries.

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SE

Challenge & Opportunities

- The customers are now requiring higher safety and environmental ambitions

- The construction industry has pressure to increase maturity level within digitalization and automation

- A typical construction site has machines & vehicles with several brands

- Yet, no cross-industry standard for vehicle and machine communication

- More electrified machines means need for automated charging

Source: Skanska

SIMCON Solution:

- Create an iSoS Architecture and Data models for iSoS (intelligent System-of-Systems)

- Focus on real construction tasks and machinery

- Apply to a hands-on construction site and feedback with stakeholders (Slakthusområdet)

- Develop a Digital Twin for the specific construction site by creating digital models of machines, vehicles, equipment and people.

- Create a Simulation tool to visualize the real construction use cases

Source: Skanska

RI.
SE

Results 2024:

Source: Volvo

- A first scientific paper "Exploring different Actor Roles in Orchestrations of System of Systems" presented at Systems Engineering Conference (SoSE) in Seattle 2024.

- A research article, "Towards an Integrated Safety-Security Ontology for System of Systems" presented at IEEE-ISSE symposium in Perugia in Oct 2024

- Terminology at the construction site is being mapped

- Six different example Use cases created for the Slakthuset Construction site

- Work has started with a Digital Twin to be finalized by June 2025

RI.SE

Questions?

fredrik.cederstav@ri.se

Want to know more about our project?

RI.
SE

Projekt

Adaptiv automation för ortdrivning

Oskar Lundberg

Adaptive Automation for Face Drilling

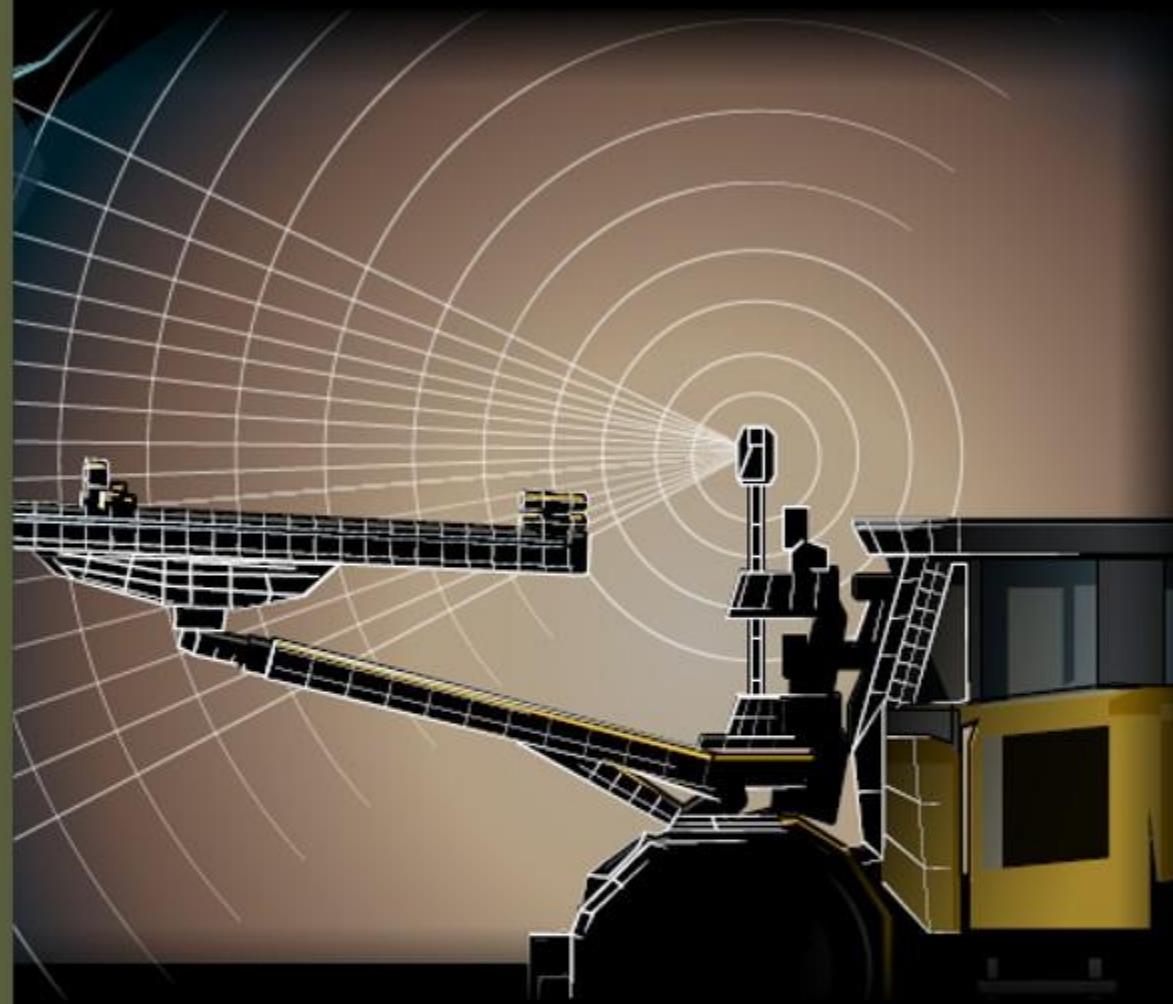Oskar Lundberg, Mötesplats Avancerad Digitalisering 2025-01-23

Epiroc

Content:

- Project Partners
- Autonomous face drilling objective/features
- Simulations as an enabler

Project period:

- March 2022 – March 2025

Contact (project lead):

- oskar.lundberg@epiroc.com

Autonomy in action

If the adaptive automation project accomplishes the goals it has set out to reach, a finished solution might come to look something like this. A Boomer rig, equipped with a laser scanner and an AI system, is positioned for drilling. It scans the face, doing a local analysis of the topography and potential problems. The digital drill plan is adjusted to compensate for any obstacles before proceeding with the actual drilling. Unlike today, the adjustment will not require any operator participation.

Adaptive automation

The goal is to increase safety by minimizing human presence at the face. This requires expert AI systems to stand in for operator knowledge.
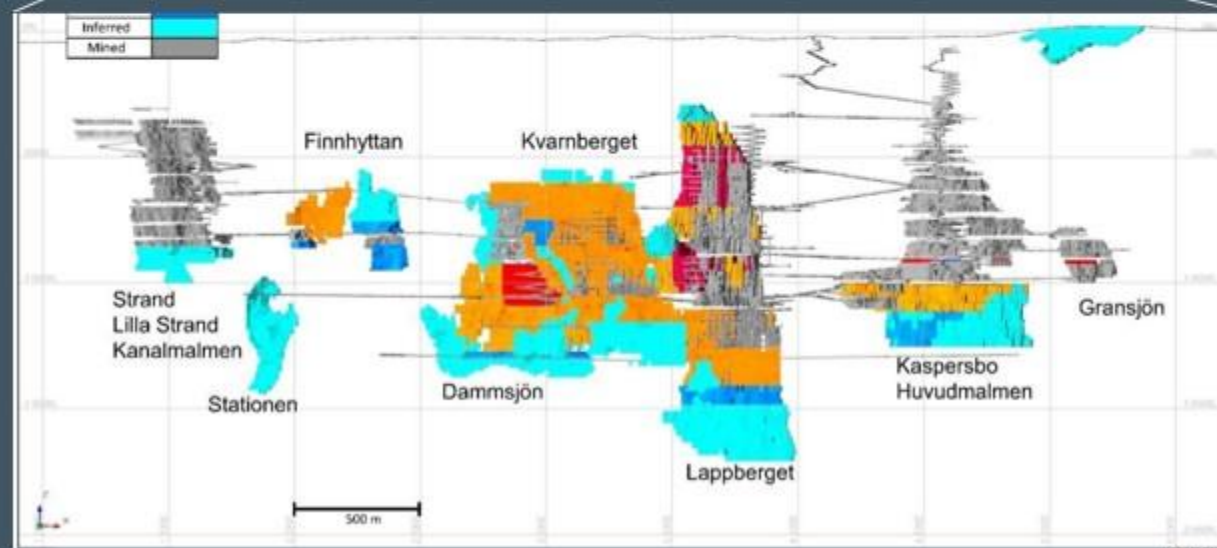
Consortia of Swedish R&D

Academia, Machine manufacturer, Simulation experts and End user

Umeå → Algoryx

Test site for drilling automation

Garpenberg →

Garpenberg → NEW BOLIDEN

Örebro → Epiroc

ÖREBRO UNIVERSITET

Inferred
Mined

Finnhyttan   Kvarnberget

Strand
Lilla Strand
Kanalmalmen

Stationen   Dammsjön

Lappberget   Kaspersbo
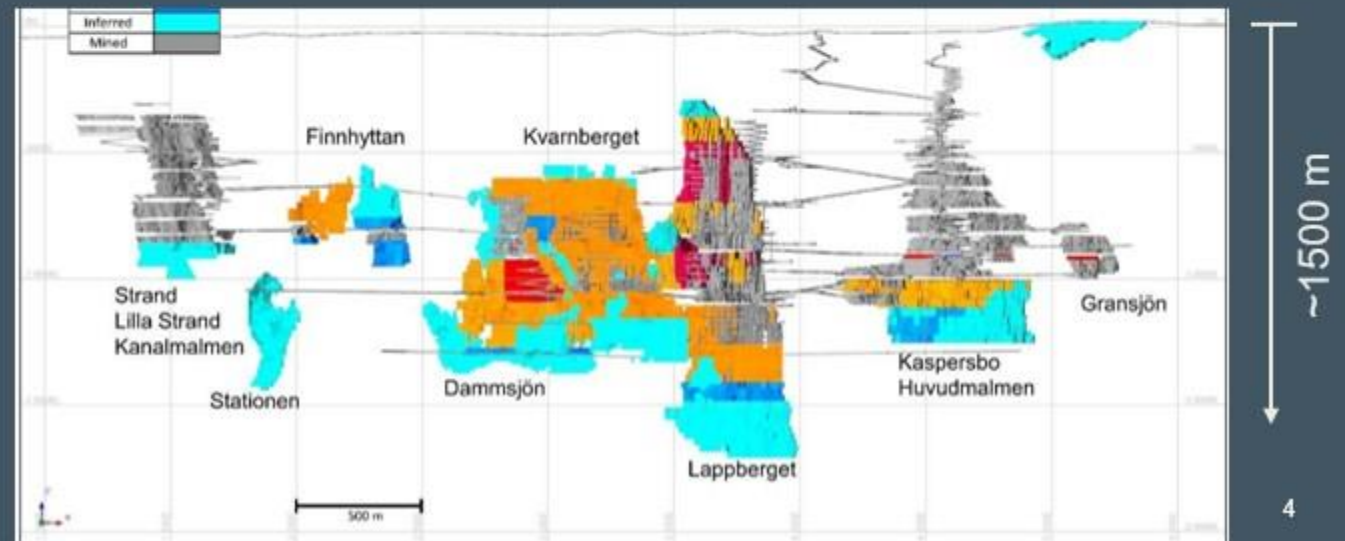Huvudmalmen   Gransjön

~1500 m

500 m

3

Functional development

Journey towards full automation

Cutting edge industrial robotics algorithms for Optimized autonomy of the rig's booms

Use of high-definition scanning and machine learning algorithms for environment awareness

Simulation is an enabler for automation

- Simulations is a natural toolbox in the development journey
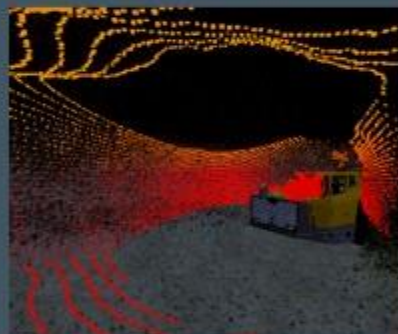- In fact, simulations are built into the system of future mining machines
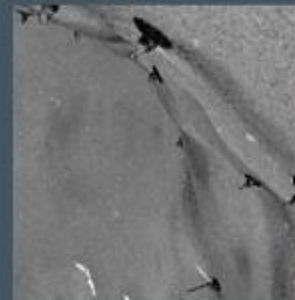

Unreal

Real

Animations to align and guide the team

Physics-based simulations to learn, test and verify

Simulated (measured) reality as input for machine decision making

Tests in real environment

Today

2022	2023	2024	2025

Boom automation

Simulation in drill rig

Simulation of control system

Building awareness of environment

High resolution mapping of environment

Building awareness of environmental features

Workshops and physical meetings drives success

United. Inspired.

Performance unites us, innovation inspires us,
and commitment drives us to keep moving forward.
Count on Epiroc to deliver the solutions you need
to succeed today and the technology to lead tomorrow.

epiroc.com

Epiroc

Partners

Epiroc is coordinating partner for the 3-year project

Epiroc Rock Drills AB is a global provider of equipment to Mining and Tunnelling industry, focusing on supplying rock excavation equipment and services. Epiroc is technical leader in the field and has set a target to enable our customer to meet their green transition to a sustainable future mining. Within this project Epiroc will provide expertise in machine interfaces, boom kinematics, tele remote operation, and drill sequence planning. Together with the other partners Epiroc will develop and implement the next step of autonomous functions for face drilling. Epiroc will provide equipment, test sites, use cases, and testing and evaluation expertise to the project. Epiroc will also drive patent-search efforts and aid in market analysis for commercialization. Epiroc will be integrator and the provider to end customer of the technology developed within the Adaptive automation for face drilling project. The primary contacts are Magnus Karlberg and Katarina Öquist.

Boliden is a high-tech metals company with its own mines and smelters that work over the long term to guarantee society's supply of base metals and precious metals through the mining of ore (minerals) and the production and delivery of high-quality metals to industry. Our high productivity is based on experience, innovation and advanced technology, developed in collaboration with Nordic technology and engineering companies. Today, around 6000 people work at Boliden, which has operations in Sweden, Finland, Norway and Ireland. Garpenberg is one of the world's most modern mines and it is leading in mine automation. This made Garpenberg more operationally reliable, eco-friendly and cost-effective, it is Boliden's goal continue and accelerate this journey. In this project Boliden will see to it that the solutions are of such a TRL that they can be used in a production setting. The primary contacts are Michael Andersson and Emma Bjur.

Algoryx Simulation is a global leader in the niche market of industry grade real-time physics simulations. Algoryx is a spin-off from research at Umeå University, Sweden, and still has strong academic bonds to many universities around the world. Algoryx staff have published more than 50 scientific research papers and numerous technical reports. Algoryx has participated in or lead more than 30 R&D projects with industrial and/or public funding and has extensive experience in working closely with partners and clients. Algoryx role in the project is to build a simulator that is used to validate and verify the machine autonomy, and also to train machine learning systems on synthetic data. This requires faithful physics simulations of the machine and its components, and also simulated representation of the sensor systems, so that synthetic data can be produced. Primary contact is Urban Wikman.

Örebro University will participate in this project through the AASS research centre, which is responsible for organizing research and graduate studies in Autonomous Systems and is one of the appointed research environments of the Swedish Knowledge Foundation (KKS). AASS has a long experience in collaborative projects with industry, as well as conducting basic research within autonomous systems. AASS will serve as the primary academia-to-industry knowledge transfer partner and drive technical innovation at lower TRL levels. The primary contact at Orebro University will be T. Stoyanov, who has substantial prior experience in perception systems and mining-related innovation projects.

Mingel

Inspirationstalare

AstraZero

Timo Kero

OPERATING THE FIRST AND MOST ADVANCED PROVING GROUND FOR
THE SAFE, CONNECTED, AUTOMATED MOBILITY AND TRANSPORT IN THE WORLD

WELCOME TO THE WORLD OF ASTAZERO

Dr. Timo Kero, CTO

AstaZero Company history

- 2011 – Company founded

- 2011 – Exploration and design

- 2012 – Start construction

- 2014 – Proving ground inauguration 21 August, four tracks

- 2016 – 4G networks established

- 2017 – Testbed for the automated transportation system. Research Capability launch

- 2018 – Super Multilane, Confined Loop, 5G

- 2019 – Crossroads

- 2020 – DryZone

- 2023 – FLX Zone, Generic Site, Connectivity 2.0

- 2025 - => Cyber Physical objects …

Dr. Timo Kero, CTO

AstaZero

Structure

Owner

RI.SE

Industrial partners

VOLVO — Volvo Car Corporation   SCANIA   VOLVO VOLVO GROUP   Qualcomm   APTIV

Main Technology Partners

Telia   ERICSSON

Dr. Timo Kero, CTO

AstaZero

Industrial Partners

A Manufacturing mindset must be kept to operate a Tech Infrastructure/Lab/ etc...

Key Success Factors:

Long term commitment from Customers => Partners

If you cannot commit customers long term, you are wrong!

- Meet customer demands
- Regulatory Compliance
- High-Quality Equipment and Technology

Easy to book

Easy to enter

Easy use

Dr. Timo Kero, CTO

AstaZero

Phase 1, 2014-2017, Test Track for ADAS…

Testing conducted by vehicle companies on AstaZero tracks

AstaZero
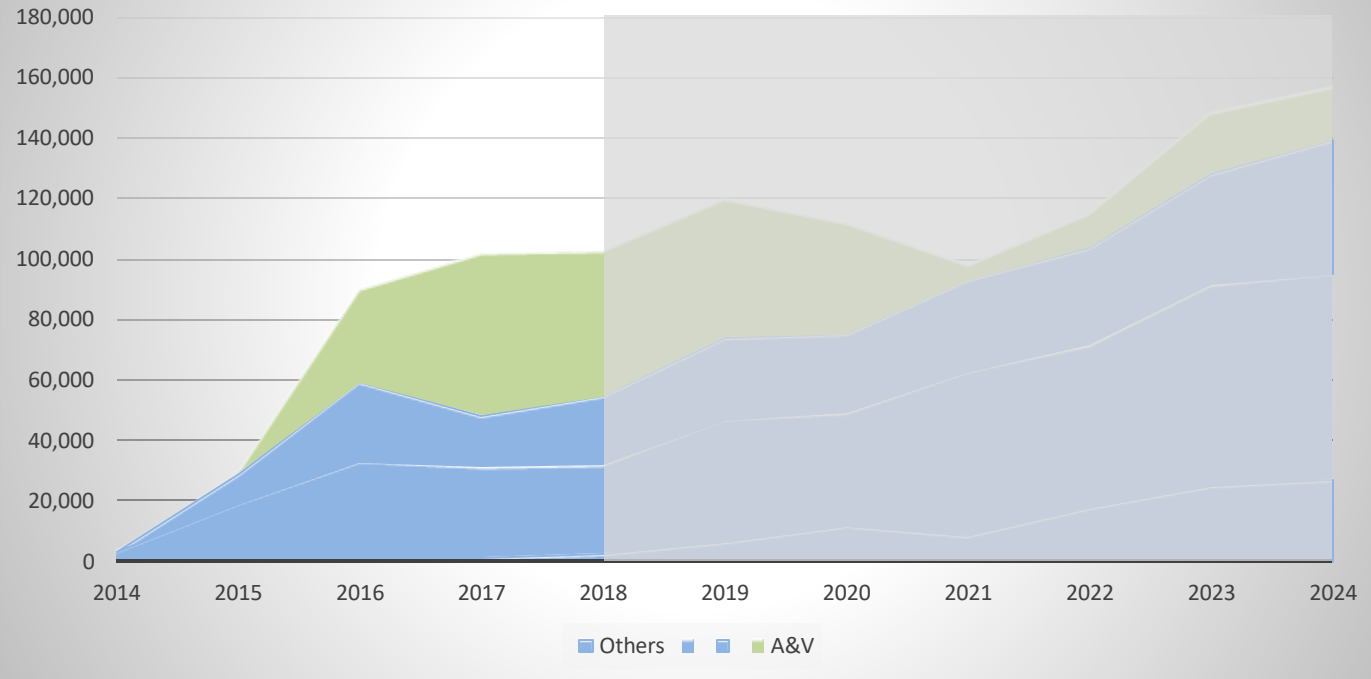
Phase 2, 2018-2025 a Proving Ground for System-to-System Testing

Combined capabilities and competence for testing of all types of automated vehicles- cars and trucks, pods, drones etc... Across multiple domains- ADAS performance, connectivity, cyber security etc...
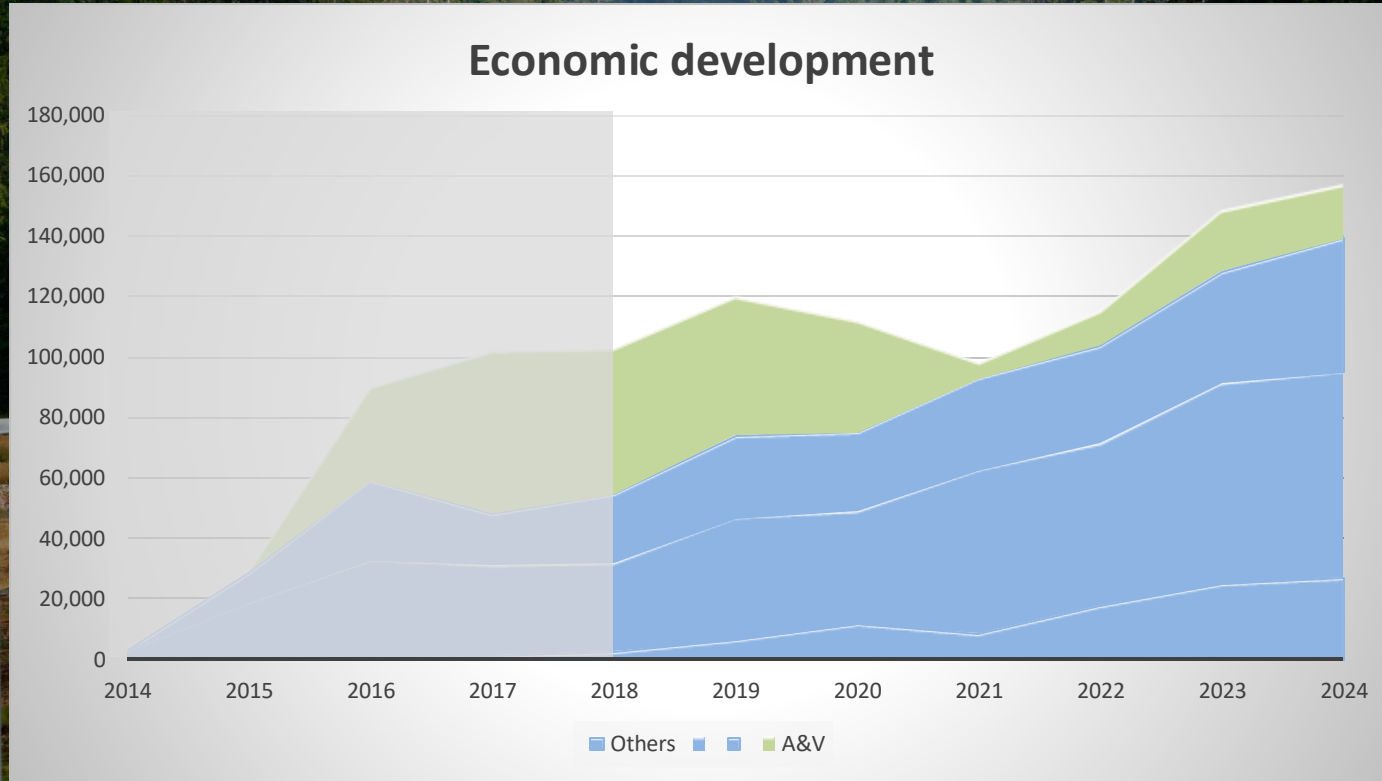
AstaZero

Case: Advanced Connectivity

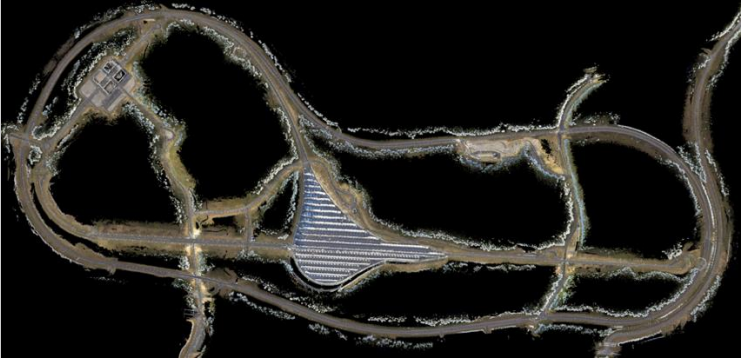At the AstaZero proving ground in Sweden

Case: The Truman Show

Dr. Timo Kero, CTO

Phase two...

Economic development

Test environment for the automated transport system

Phase 3?

This is the proof

AstaZero

Advanced 3-Dimensional Infrastructure

Physical Infrastructure	Digital Infrastructure	Connected Infrastructure

Physical testbed:
- Air
- Asphalt
- Confined Areas
- Water
- Mines

Virtual testbed:
- Digital Twins
- Augmented reality
- Virtual reality

Connected test infrastructure
- 5G / V2X / Wi-Fi etc.
  - 2 private networks
  - 1 public network
  - 1 fully experimental network
  - 1 innovation network

A Proving ground and research department for the safe, automated and connected mobility and transport

AstaZero

Phase 3, 2025 towards cyber physical test eco system including

- Advanced test capabilities of any system or system of system with connectivity and automated objects such as drones or vehicles

- Competence in-house or accessible within Swedish academia and RISE to support advanced testing of Cyber Security, AI Act compliance, and system dependability as well as system integration

- Technologies such as ATOS, connectivity and others that make safe testing of potentially dangerous systems possible

- Accelerator of development and innovation rate for whole Swedish and European industry, authorities and academia across tech domains: Drones, mining, forestry, shipping, vehicles and telecom

- Competence and tech infrastructure is portable and can support these organizations in most location pending testing scope and safety

Combined capabilities and competence for testing of all types of automated vehicles- cars and trucks, pods, drones etc... Across multiple domains- ADAS performance, connectivity, cyber security etc...

AstaZero

AstaZero

Dr. Timo Kero, CTO

timo.kero@astazero.com

AstaZero

Diskussion

Projekt

Swedish Wireless Innovation Network (SweWIN)

Emil Björnson

Swedish Wireless Innovation Network (SweWIN)

"Förverkligar hållbar, motståndskraftig och rättvis trådlös kommunikation och radar"

Den stora samhällsutmaningen:
Hållbarhet

"Big data"

Sakernas internet

Artificiell intelligens

Trådlös uppkoppling

Ny teknik

Automation
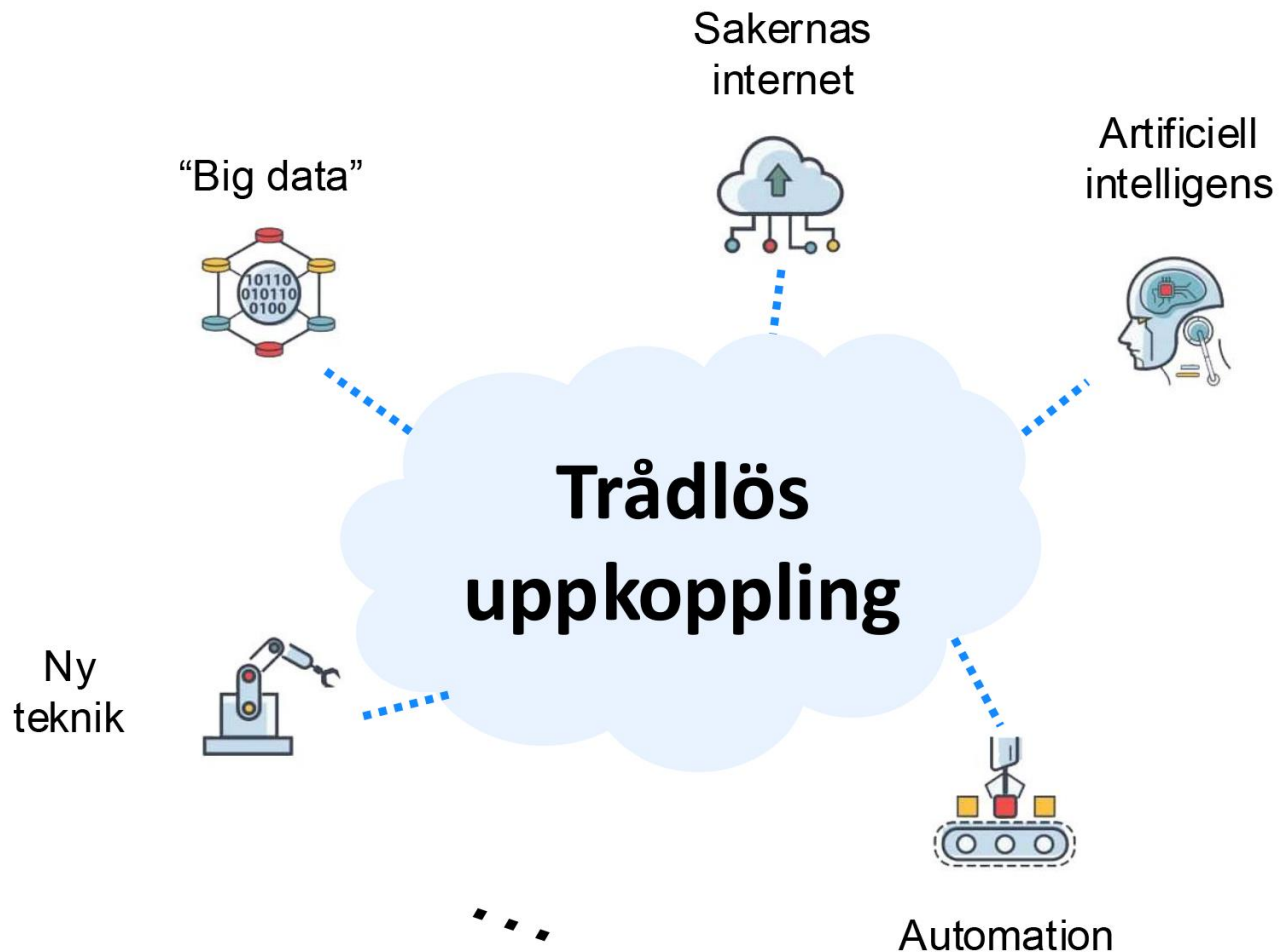
För hög resursanvändning

Ekonomisk tillväxt: Förbättrad levnadsstandard

↓

Effektivare resurshantering

↓

Nyckeln: Digital omställning

Ökade krav på trådlös teknik

1. Tillgänglighet   2. Pålitlighet   3. Grön teknik

5G

Prestandamått

Datahastighet
Bandbredd
Latenstid
…

Vår "6G" vision:
Skifta fokus mot nya mått och funktioner
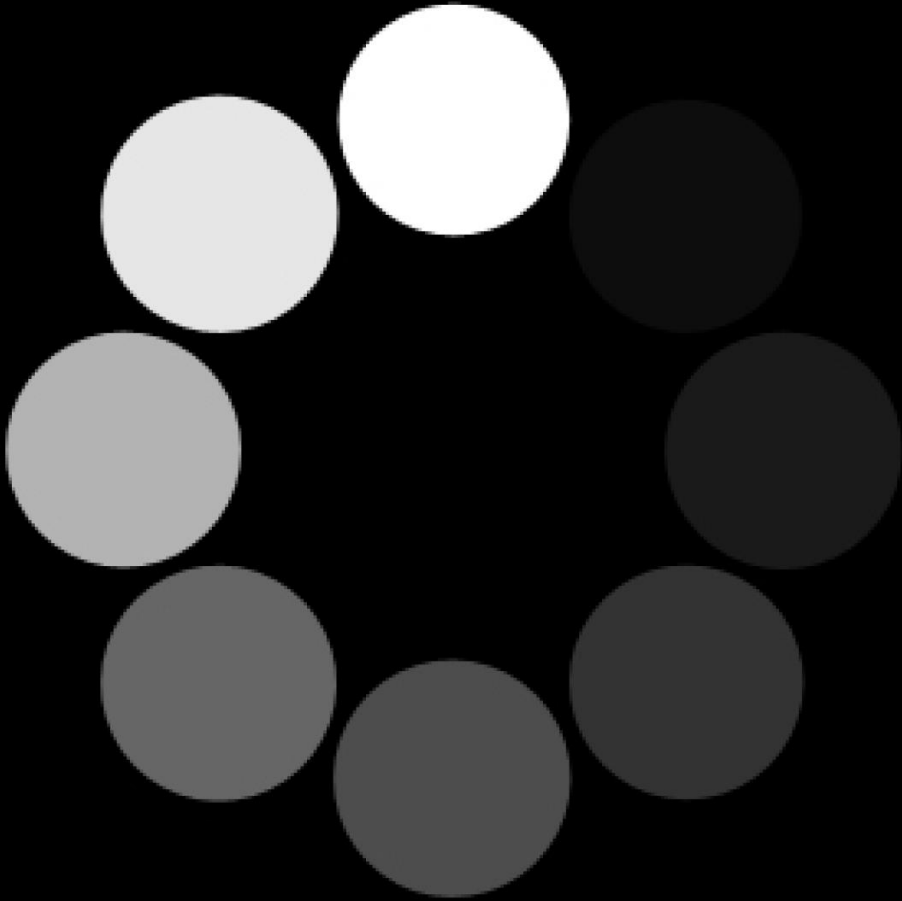
Digitalisering med integrerad kommunikation, radar, positionering

Grön teknik

Hårdvara, infrastruktur, styrning, etc.

Pålitlighet

Förutsägbar fördröjning och hastighet

Robust mot störningar
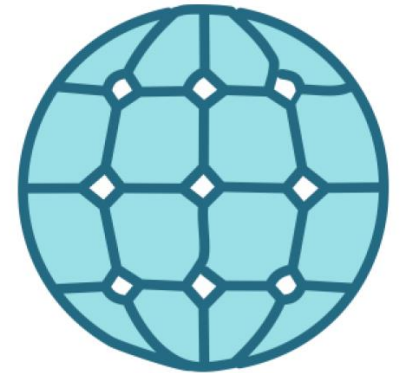
Tillgänglighet

Garanterad uppkoppling överallt

Kostnadseffektivitet

Forskningsområden

1. Radio-elektronik och antenner

2. Fysiska signaler och nätarkitektur

3. Resurshantering och orkestrering

4. Motståndskraft och säkerhet

5. Lärande och optimering

6. Trådlös funktionell säkerhet
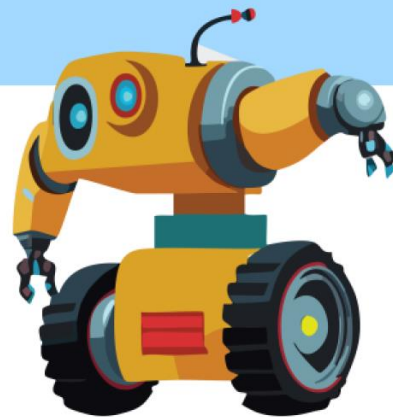
Kontakta gärna SweWIN!

Föreståndare: Emil Björnson, emilbjo@kth.se
Webbsida: https://www.kth.se/swewin

Forskningsledare i
Swedish Wireless Innovation Network (SweWIN)

Projekt

Nästa generations kommunikations- och beräkningsinfrastrukturer och applikationer (NextG2Com)

Maria Kihl

Next Generation Communication and Computational Infrastructures and Applications (NᴇxᴛG2Cᴏᴍ)

Maria Kihl, Professor in Internetworked systems at LU
Director of NᴇxᴛG2ᴄᴏᴍ

NextG2Com:
End-to-end Technology Research and Integration

DevOps & MLOps — Software & Data

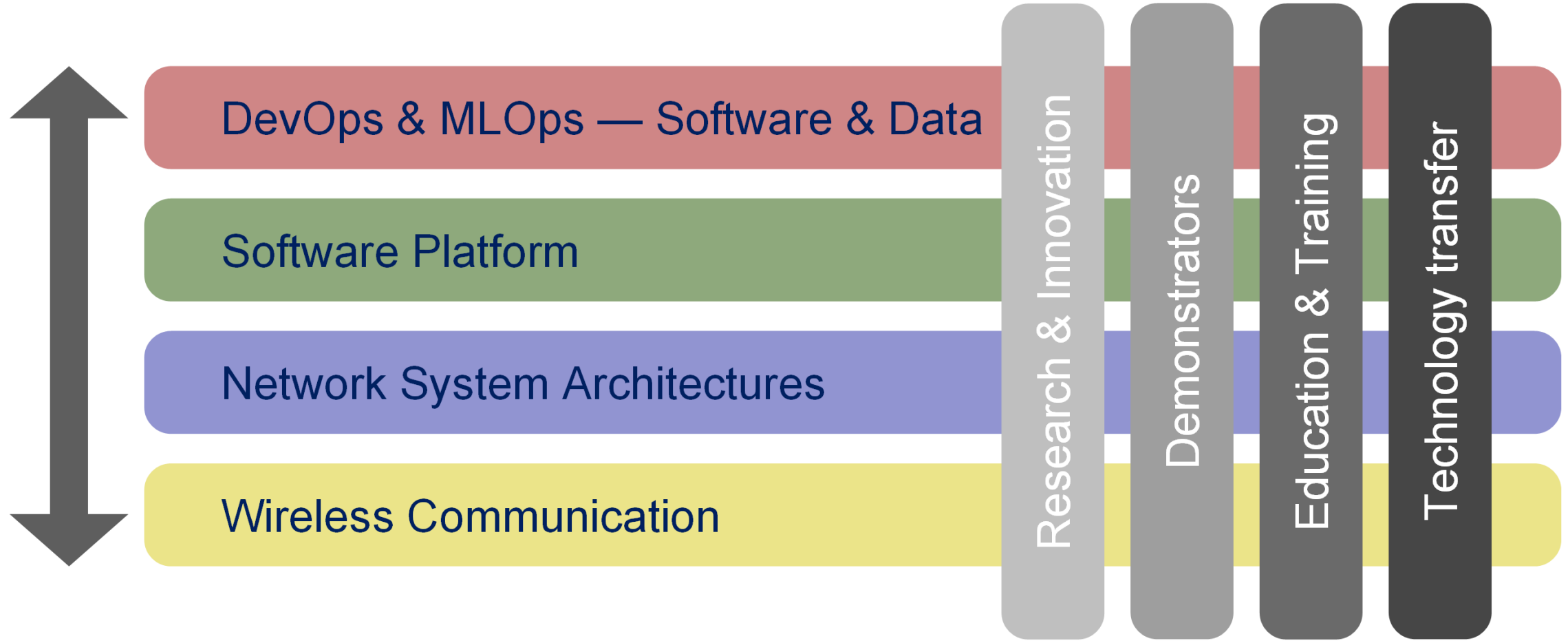Software Platform

Network System Architectures

Wireless Communication

Research & Innovation

Demonstrators

Education & Training

Technology transfer

NEXTG2COM Aims

- Catalyze the transition **from Pipelines to Platforms**, i.e. turning today's infrastructure and application technologies into integrated general-purpose platforms, utilizing recent machine learning (ML) advancements,

- focus on **integrating multiple layers of technology and components** into end-to-end systems,

- covering **infrastructure** technologies and **design methodologies** for next generation communication and computational systems and applications,

- ranging from **wireless communication** technologies and **networks**, to **software**, **data**, **security**, and relevant application areas.

NextG2Com consortium

NᴇxᴛG2Cᴏᴍ research themes
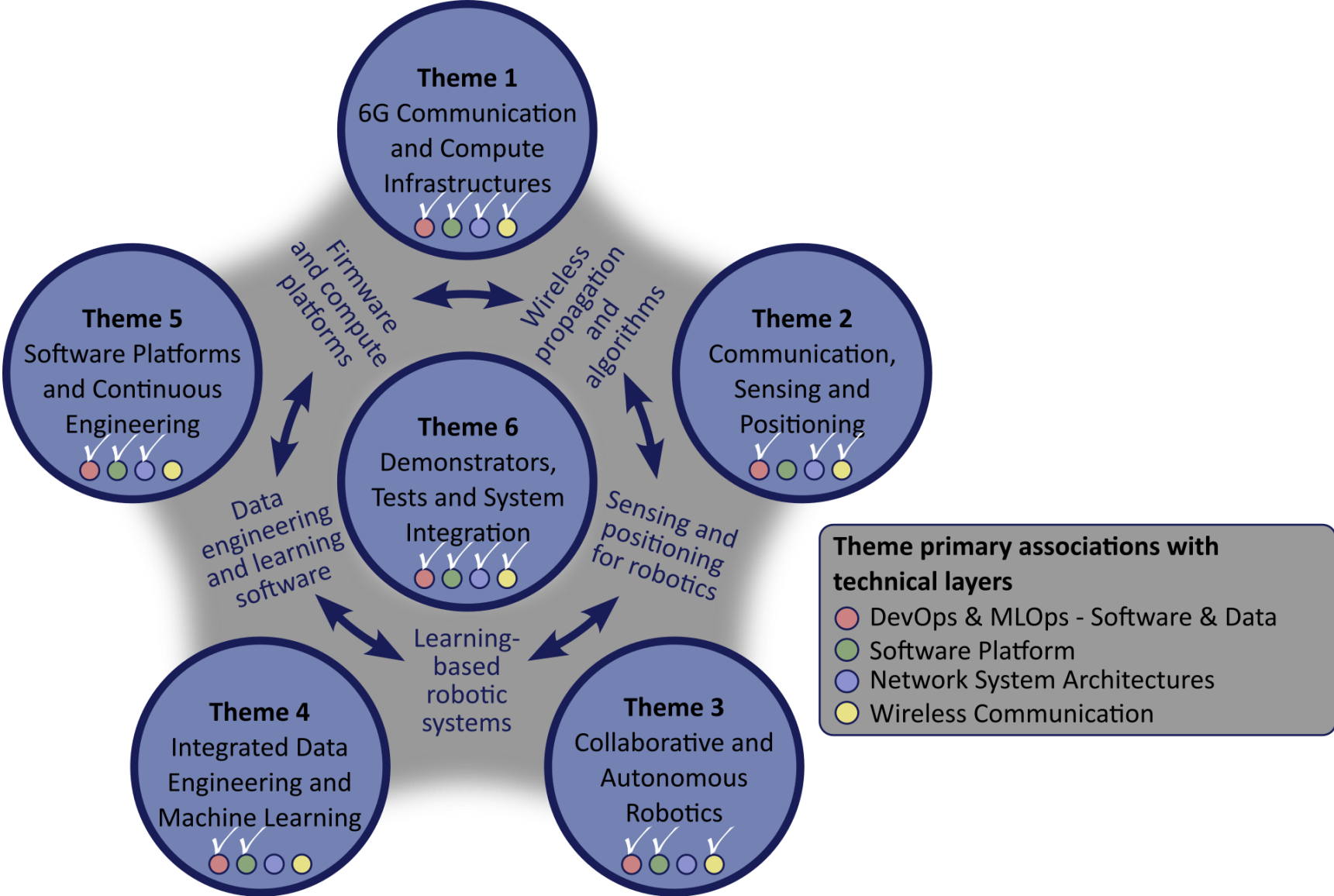
NextG2Com use cases

Search and rescue drones, Swedish Sea Rescue Society

Surgical Robot-assistants, Children's Heart center

Federated learning in e.g. autonomous driving

Data engineering for e.g. joint sensing and communication

NextG2Com - Web

Web page: www.nextg2com.lu.se

LinkedIn: https://www.linkedin.com/company/nextg2com

Lund University research portal:
https://portal.research.lu.se/en/projects/next-generation-communication-and-computational-infrastructures-a

Projekt

A Sovereign AI Stack for Portable European Cloud Services

Björn Forsberg

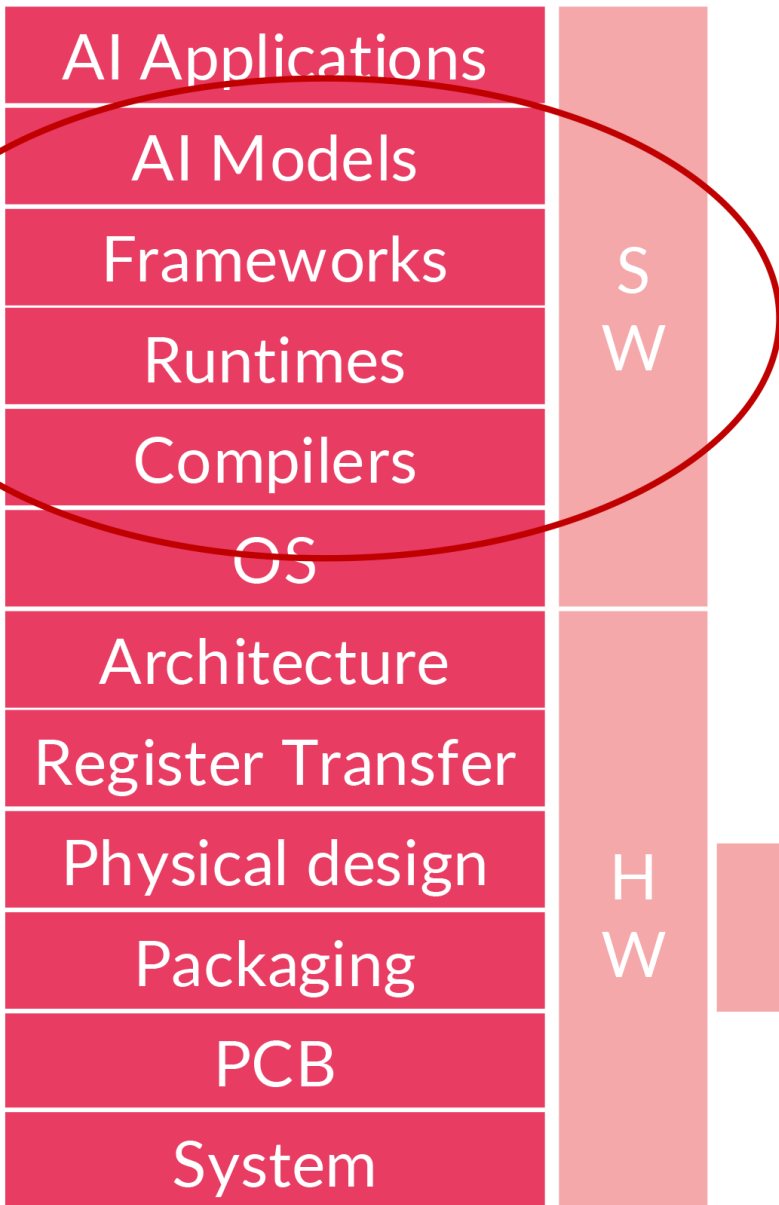# A Sovereign AI Stack for Portable European Cloud Services

Mötesplats Avancerad Digitalisering, Göteborg, Januari 2025

Björn Forsberg (RISE), Martin Körling (evroc)

Sovereignty and the Deep Technology Stack for AI Acceleration

SW (covering: AI Applications, AI Models, Frameworks, Runtimes, Compilers, OS)

HW (covering: Architecture, Register Transfer, Physical design, Packaging, PCB, System)

- ==Digital Sovereignty== has received increasing attention over the past few years, following supply chain disruptions due to covid-19, trade conflicts and military conflicts in our part of the world

  - Need for Europe to secure access to technology and gain ability to participate in ==level playing field== competition within global economy

  - No competitive and mature European alternative for HW layer

    - EU addressing through ==Chips Act==, and multiple European projects to design and manufacture European hardware, especially based on RISC-V. This includes dozens of projects including hundreds of European companies, universities, and research organizations.

- ==Our focus is therefore at the software layer==: Independent multi-target heterogeneous AI toolchains that lend sovereignty in choice of underlying hardware platform for cloud service providers' AI offerings.

RI.SE

Sovereignty in AI cloud services, data centers

- High need for cloud service vendors to have <mark>sovereignty in choice</mark> of underlying hardware platform to support cloud services, and counter vendor-lockin
  - Avoid supply chain shortages, effectively use markets to improve prices

- Realizable through *vendor-agnostic abstraction layer* in AI software stack

- Sovereignity requires:
  - Ability to compose AI software stacks that break vendor dependencies and walled gardens, enabling seamless portability with retained performance
  - Technical know-how of AI software stack internals (e.g., AI compilers) to sustain ability to maintain and adopt to fast evolving AI field
  - Ability to test and deploy software stacks components across diverse field of platforms, instruction set architectures, and models.

Sovereignty via AI Domain Specific Languages, Strong Open Source AI Compilers

- Well-established High-Level Domain-Specific Languages and Distribution Formats make AI amenable to this approach
  - Retain semantic information that allow optimization at place of deployment

- Open-source collaborative efforts are the norm in the AI revolution, and give us a solid foundation
  - Increasingly key industrial players are pooling resources into MLIR-based multi-target AI compilers to break CUDA target dominance

- *But...*
  - Low generality, tool incompatibilities, low portability out-of-the-box
  - It seldom does exactly what it says on the tin, significant assembly required

- Swedish and European industry must secure competence and solutions to meet domestic needs

Concrete reusable deliverables of the AISPECS/SovereignCloud project

- Heterogeneous configuration and infrastructure build scripts and recipes for assembling AI toolchains for diverse combinations of host and accelerator platforms for AI
  - Filling a gap not in the interest of hardware vendors to provide and test
  - Codifying knowledge required for tool configuration and setup in reproducible recipes
  - Focus on X86, Aarch64, NVIDIA CUDA, and AMD GPU instruction set architectures, bare-metal and HPC

- Testbed for AI Frameworks compatibility and performance across archs
  - Focus on Large Language Models
  - Special focus on HuggingFace, ONNX, PyTorch, MLIR toolchains, OpenAI Triton, and vLLM.

(project is not associated with above products or trademarks)

Diskussion

Tack!

Nu dags för fika, utställning och gemensamt pass.