AI - Impact on R&E

EDUCATION

Personalized Learning

- Adapts to individual student needs
- Provides real-time feedback
- Identifies learning gaps quickly
- Customizes pace and difficulty
- Breaks down language barriers

Teaching Support

- Automated grading and feedback
- Content creation assistance
- Administrative task automation
- Intelligent tutoring systems

RESEARCH

Enhanced Data Analysis

- Processes massive datasets quickly
- Identifies patterns humans miss
- Accelerates research timelines

Research Tools

- Automated literature reviews
- Hypothesis generation
- Predictive modeling
- Lab automation and experiment optimization

Interdisciplinary Benefits

- Enables cross-field discoveries
- Combines insights from multiple domains
- Creates new research methodologies

IMPACT (GÉANT Community)

Generative AI

- Use wherever possible (content generation)
- Removes human error (data relationships)

FAIR for F-AI-R

- FAIRhub and AI READI project (example)
- Access to Open/Brokered/Contracted data

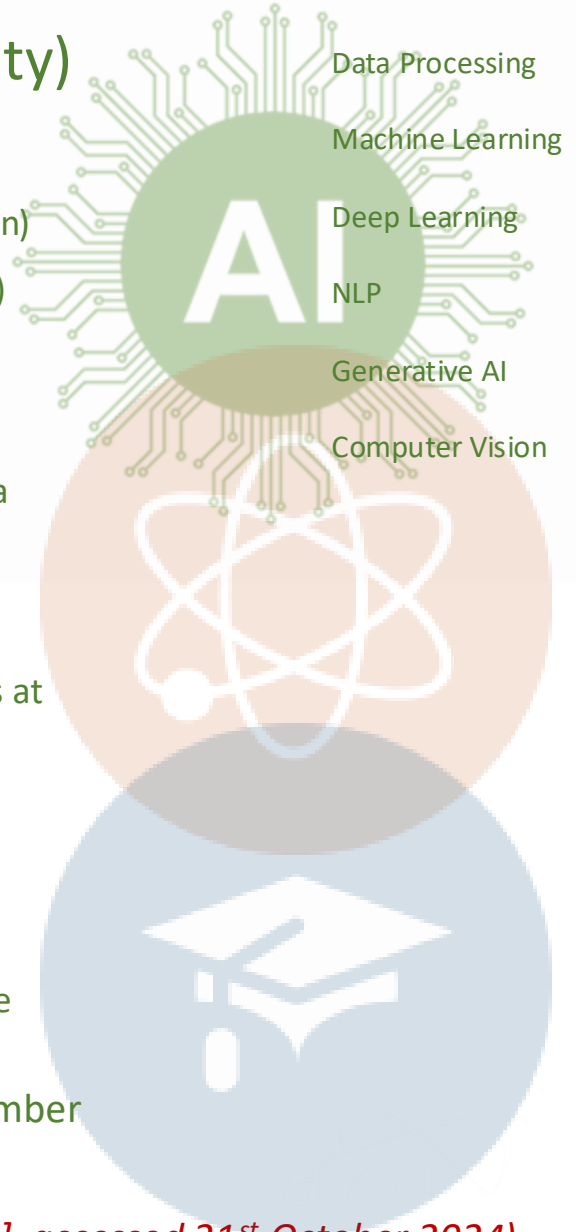
TRE (Trusted Research Environments)

- Secure research data hosting and sharing
- Algorithm (ML) based compute workloads at the cloud edge

GÉANT SERVICES IMPACTED

1. **AAI** – Data/Services brokering
2. **AtN** – Procurement/DRE/TRE
3. **Network** – Data visitation/Edge compute

***SIG-AI 1st Meeting 2024 –** 11 December



(Anthropic (2024). Claude [Large language model], accessed 21st October 2024)

AI usage and plans in DeiC

Strategiske pejlemærker

SIG-MSP, Poznan

24th October 2024

Head of NRENMartin Bech
martin.bech@deic.dk

Activities in DeiC that include AI

Services:

- Speech-to-text services Amberscript and the REACH module in Panopto
- OCRE includes a range of AI-based services (including training and usage of LLMs)
- Development and sharing of recipes for running a license free LLM on your own laptop/server. The results of this is presented at the annual DeiC users' conference next week.

Ideas for new services:

- A self-hosted environment for running trained AI models
- Analysis of logfiles and traffic statistics, based on AI (although that may be stretching what AI is capable of)
- Whisper - an AI based speech-to-text function
- Generation of meta data for datasets as part of out data management services
- Creating data management plans

For our internal productivity:

- Code revision/development
- Translation, text analyses and documentation
- Our own LLM/GPT, trained on our own content
- A component in the workflow of processing applications (but then we have serious concerns about the transparence and objectivity of the our decisions)

AI @ NORDUNET

SIG MSP, Poznan, 24 October 2024

NORDUnet
Nordic Gateway for Research & Education

Lars Fischer

AI AT NORDUNET

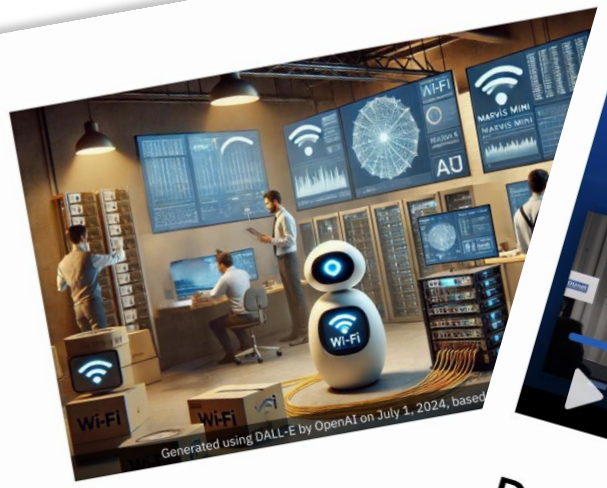
- No major initiatives
  - Follow the developments
  - Allow for experimentation
  - Make resources available
- Pilot adoption where there’s an immediate use case (for existing services)
- Impact on future strategic objectives being evaluated

PILOTS

WIFI network management (MIST)

Home › Silent revolution in conference networks

Silent revolution in conference networks

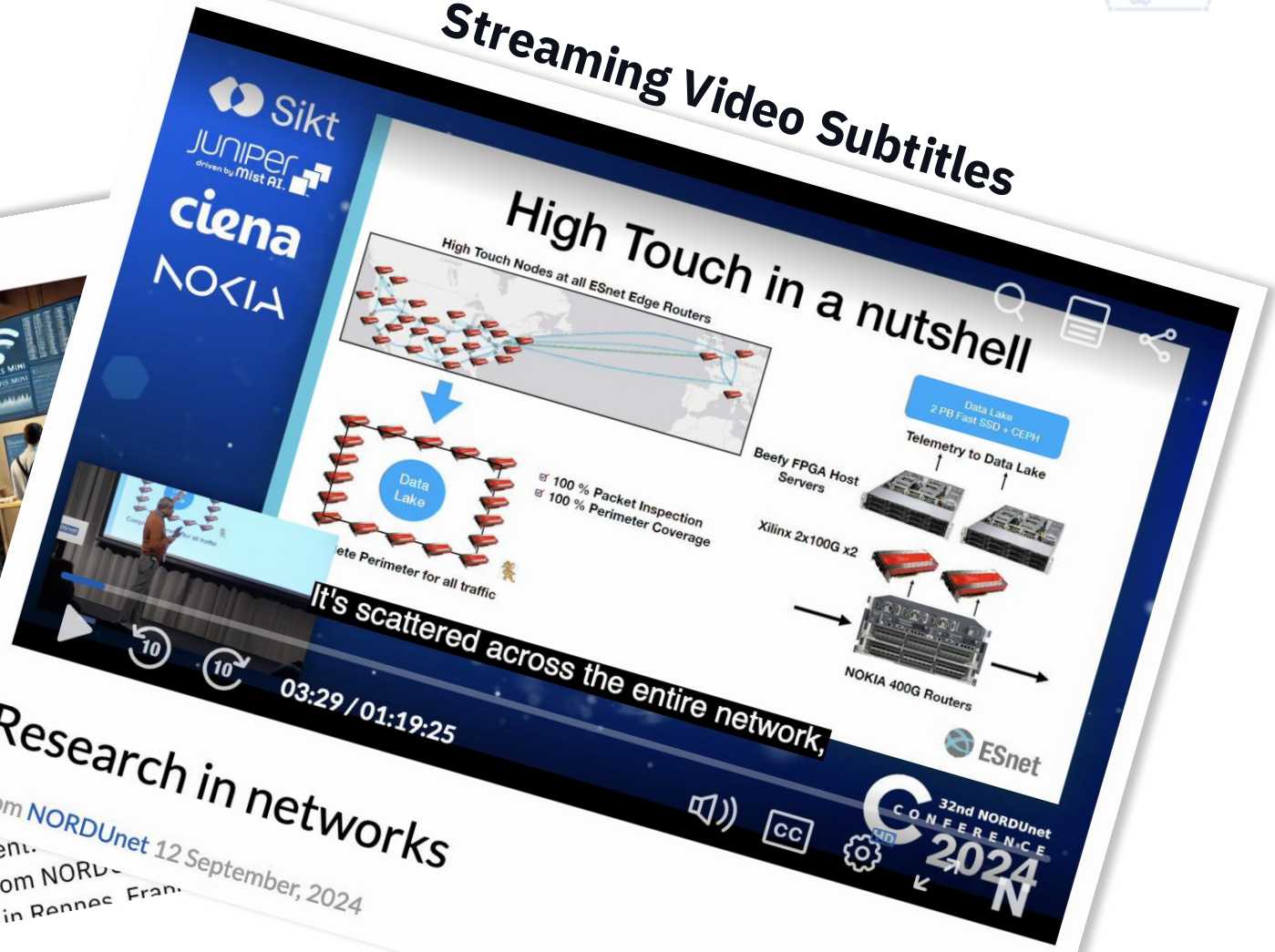


July 2, 2024

At the recent TNC24 conference in Rennes (hosted by RENATER, ed.), a c
NORDUnet used Artificial Intelligence to improve the quality of Wi-Fi a

Setting up a network for a conference is like being a referee at a sports event.
about your performance, you have done a good job. Still, four engineers from NORD
a noteworthy effort as they set up the network for the TNC24 conference in Rennes, Fran

Streaming Video Subtitles



Research in networks

From NORDUnet 12 September, 2024

49 0

NORDUnet
Nordic Gateway for Research & Education

THANK YOU!

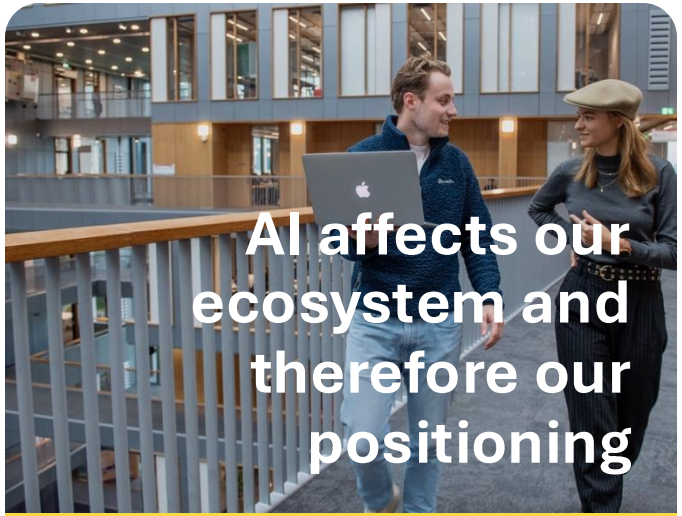
Lars Fischer
<lars@nordu.net>

Impact of AI on SURF

Thijs van der Horst

SIG MSP, 24 October 2024

Impact of AI (1/2) – Making SURF AI-ready

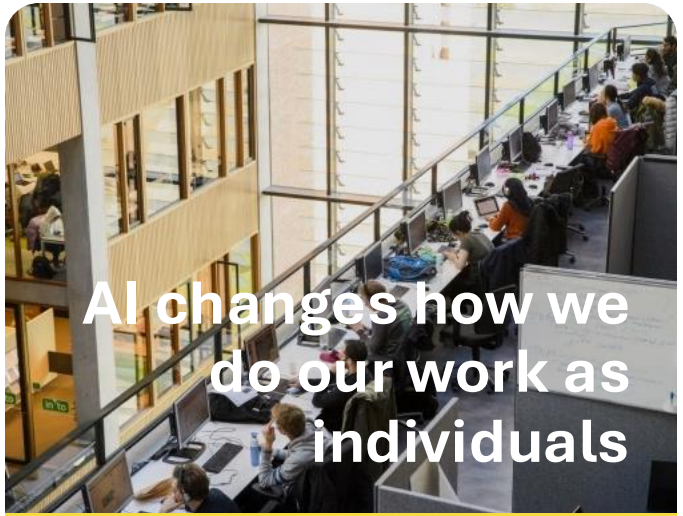


AI affects our ecosystem and therefore our positioning

- Facilitate strategic discussions
- Support prioritization
- Strategic decision making
- Internal coordination & expertise sharing

AI impacts our operations

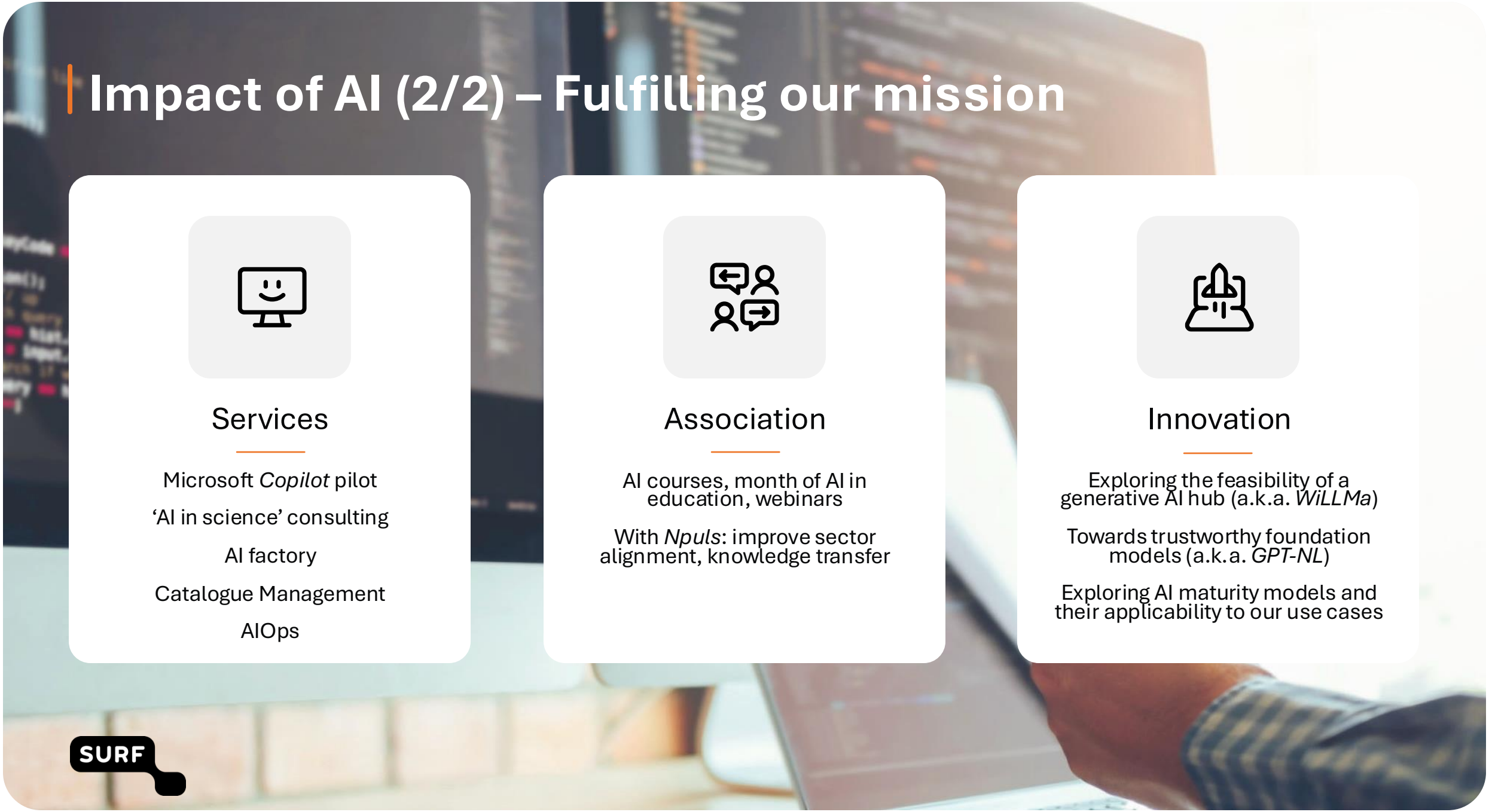
- AI act preparation, responsible AI guidelines
- Impact on services review



AI changes how we do our work as individuals

- Internal pilots: e.g., code generation, generative models, assistants
- Literacy building, best practices

Impact of AI (2/2) – Fulfilling our mission



Services

Microsoft *Copilot* pilot

'AI in science' consulting

AI factory

Catalogue Management

AIOps

Association

AI courses, month of AI in education, webinars

With *Npuls*: improve sector alignment, knowledge transfer

Innovation

Exploring the feasibility of a generative AI hub (a.k.a. *WiLLMa*)

Towards trustworthy foundation models (a.k.a. *GPT-NL*)

Exploring AI maturity models and their applicability to our use cases

SURF

SURF

Status of AI Activities in HEAnet

- HEAnet at the “experimental stage”
- Microsoft CoPilot, ChatGPT
- Software Development / config generation
- AI a feature of new Strategy 2025 – 2030 (launched in November conference)
- Concerns re compliance, risks but also opportunities e.g. automation
- AI policy in development – driven by strategy, AI Act & FOMO
- Next stage, approval mechanism & governance

HEAnet
Ireland's National Education & Research Network

HEAnet
Ireland's National Education & Research Network

CSC

CSC – IT Center for Science Ltd

www.csc.fi

Total turnover: **90 Meur**

Funet NREN volume**: 9 Meur**

AI volume**: 3 Meur**

www.lumi-supercomputer.eu

CSC provides **comprehensive AI infrastructure** for our users and AI consultation services **primarily using our own infrastructure**. On some cases commercial clouds are used (e.g. Azure AI).

CSC's AI activities are funded by CSC, Ministry of Education and Culture, Academy of Finland...etc.

Total employees: **670**

Funet NREN FTE's: **25**

AI related FTE's**: 20**

Current AI service portfolio

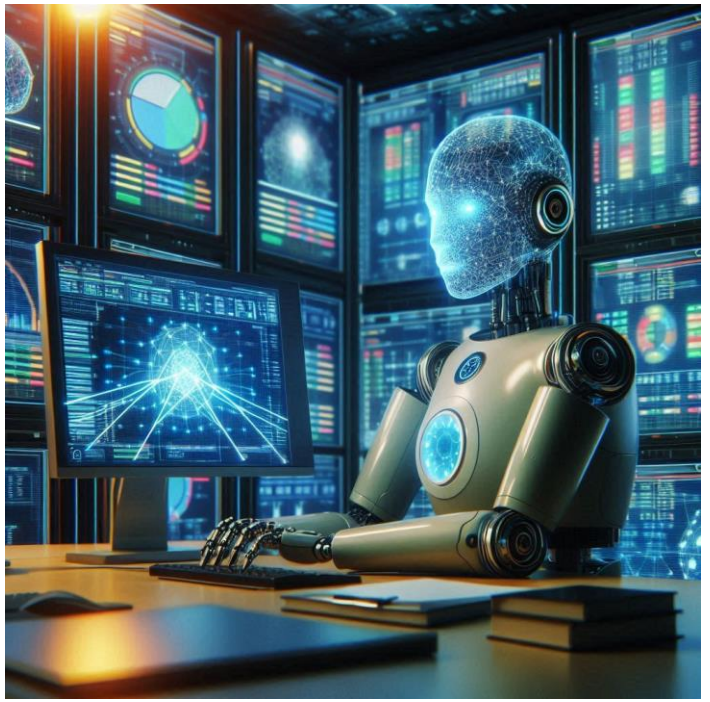
- AI-HPC computing environments (LUMI, Mahti-AI, Puhti-AI)
- AI cloud capacity (cPouta, ePouta)
- AI container capacity (Rahti)
- AI/ML expert support
- AI consultation

Strategic goals under finalisation:

1) Enabling **bleeding edge** AI development
2) Integration of **data resources** with AI systems
3) Supporting customer organisations in **AI transformation**

AI in my NREN

- ❌ **NO AI services for clients**
- ✅ **AI in research projects**
  - Network security
  - Machine learning since 2014
  - LLM in last three years
  - 💰 by research projects
  - About 6 final theses a year
- ✅ **AI in daily work**
- 💡 **Aspiration: AI handling L1 Service Desk**



Key AI Projects and Initiatives

1. **Project BrAIn**

   A strategic project using AI to optimize learning and education through personalized recommendations for students and teachers in Croatian schools and development of curriculum and digital educational content in the field of AI

2. **AI in Customer Support**

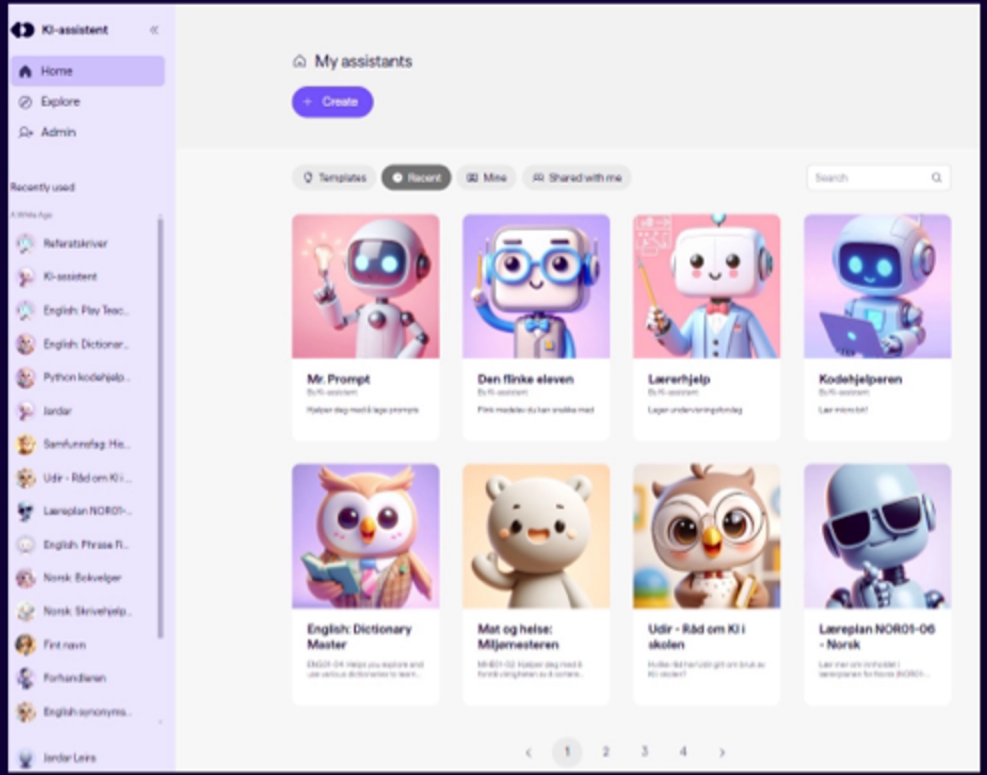
   Pilot of Watson Chatbot: Deployed in domain support, assisting users by automating responses to frequently asked questions

   IBM watsonx Integration: Email Categorization and Response Generation: Using Retrieval-Augmented Generation (RAG) to streamline email sorting and response times.

   Focused on reducing unnecessary manual tasks and speeding up responses during high-demand periods.

AI@Sikt

- cross-organisational AI support team
  - build up competence systematically
  - help with implementing AI
- Optimise processes and services
  - ease documentation search (Feide)
  - auto-tagging suggestions for incoming tickets based on history
  - increased code quality in shared IAM
  - started: include in ethics assessment service for research project
- AI-Chat
  - legal, financial, contractial buffer + store as little as possible, universal access
- AI-assistant
  - platform for scoped chats
  - encrypted storage of prompt history
  - use cases both in primary/secondary education and HE&R



Multi-level

1. R&D
2. POTs / Demonstrations
3. Legislation and Normalisation
4. Production and User Supper

Future Plans

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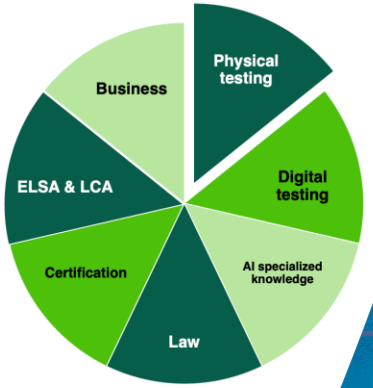
R&D - Horizon Europe/Digital Europe Projects

HE AI4EOSC

- ✓ The AI4EOSC Platform is a toolbox to develop AI models in the EOSC
  - ✓ The AI4OS dashboard. allow users to access computing resources to deploy, perform inference and train AI modules.
  - ✓ AI4OS (standing for AI 4 Open Science) is a collection of software and tools that allows to build cloud platforms for the development, training, sharing and deployment of AI applications, using distributed cloud resources. AI4OS is the software stack developed by the AI4EOSC project, and it is being used to build AI platforms for a variety of use cases.
- ✓ PSNC is involved in AI4EOSC Plant protection use case (AI based wheat and sugar beats and detection of the fungal diseases)

DEP AgriFoodTEF (The European Testing and Experimentation Facilities for Agrifood Innovation)

- ✓ The main goal of the project is to support technology companies from the agri-food industry in the development of their achievements in the field of AI and robotics and validation in real conditions and on real object
- ✓ Testing AI in real conditions and in closed areas in a controlled environment
- ✓ Validation of the AI solutions before market introduction and assistance in transitioning from TRL6 to TRL8.
- ✓ Access to 100+ demonstration farms in Poland
- ✓ Test sites for autonomous vehicles/robots
- ✓ Digital infrastructure for improving the AI models
- ✓ Domain data for training the AI models
- ✓ 60 mln Euro in 200+ 1services for companies (SME)



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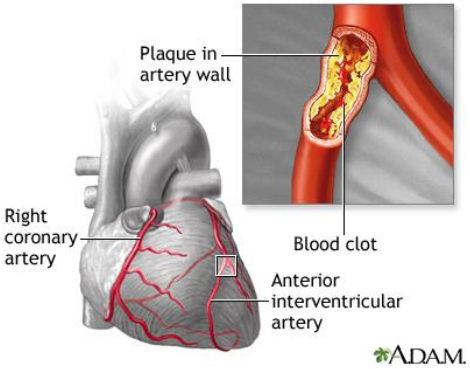
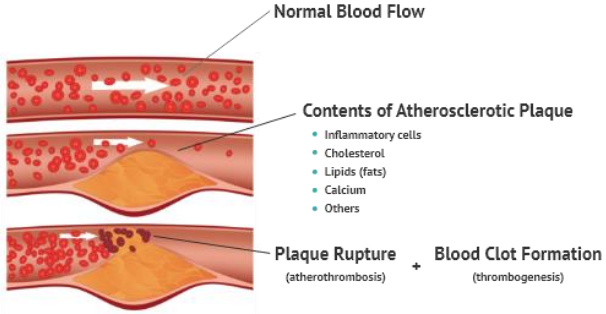
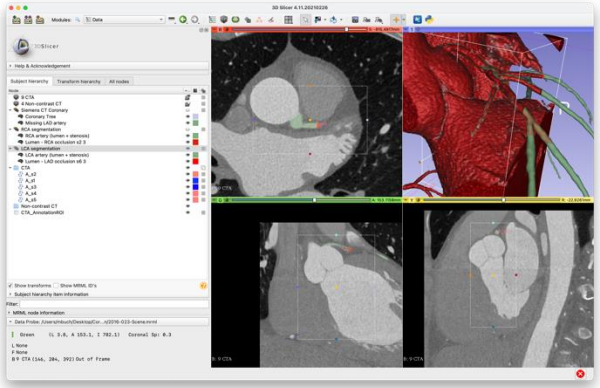
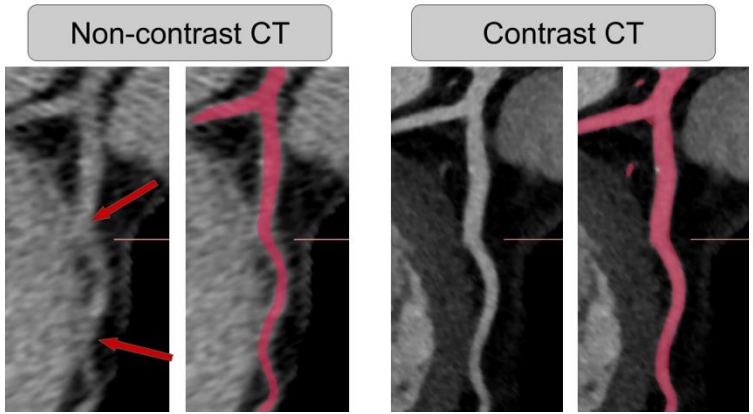
R&D - Coronary disease detection via Artificial Contrast Generation





Graphics sources:
medlineplus.gov
elitecardiovascular.com



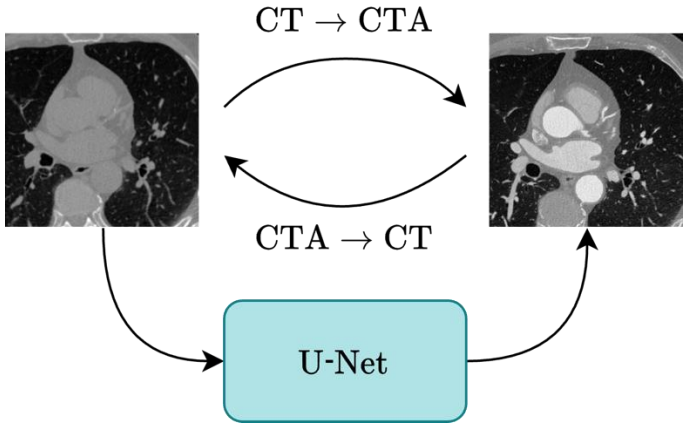


Bujny, Mariusz, et al. "Coronary artery segmentation in non-contrast calcium scoring CT images using deep learning." *arXiv preprint arXiv:2403.02544* (2024).

Coronary disease detection via Artificial Contrast Generation

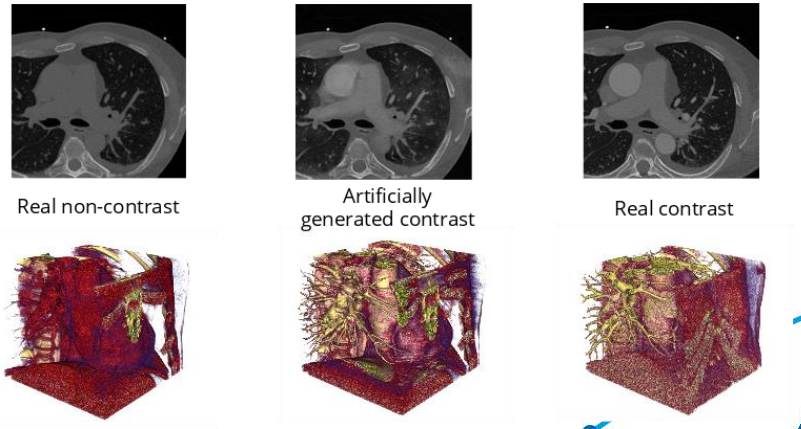
Generative AI models training

- Generating and removing contrast from computer tomography images
- Application of U-Net convolutional neural network



Computer tomography images

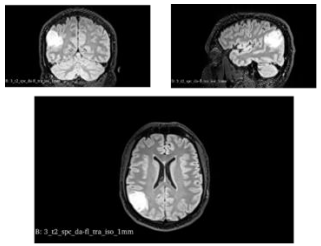
- 2D and 3D visualisations
- Results of AI-generated contrast in the middle



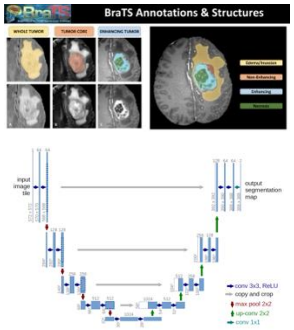
PCSS 30
30 LAT DZIAŁALNOŚCI POZNAŃSKIEGO CENTRUM SUPERKOMPUTEROWO-SIECIOWEGO

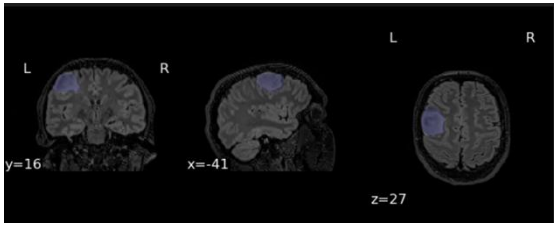
Imaging biomarkers for glioblastoma diagnosis and classification

Glioblastoma diagnosis and classification pipeline using AI

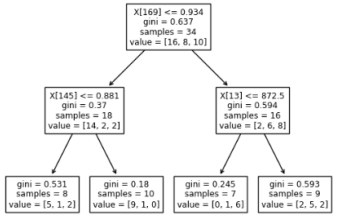


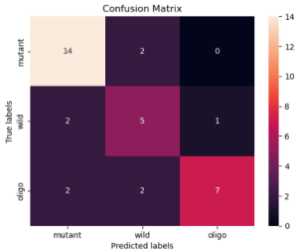
Brain extraction



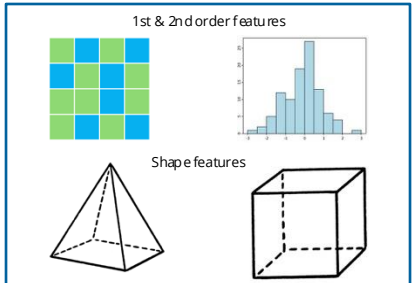


Segmentation





Classification



Radiomics extractions

Tumor classes:

- Tumor necrosis (core),
- Enhancing tumor,
- Edema,
- Not-tumor

PCSS 30
30 LAT DZIAŁALNOŚCI POZNAŃSKIEGO CENTRUM SUPERKOMPUTEROWO-SIECIOWEGO

Legislation and Normalisation

Participation in AI group next to Ministry of Digital Affairs

- ✓ The strategy for AI in Poland
- ✓ The AI data subgroup
- ✓ The International collaboration subgroup

RIAG – Research Infrastructure Advisory Group – EuroHPC JU

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PoC - TRL9

AI4EOSC consortium introduced LLM4EOSC

- ✓ The beta LLM4EOSC API service offers powerful capabilities for natural language processing and understanding, enabling researchers and scientists to enhance their workflows and projects. By leveraging advanced AI technologies, users can perform tasks such as text generation, summarization, question answering, and more, all within the context of the EOSC.

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PoC - TRL9
SCADvance

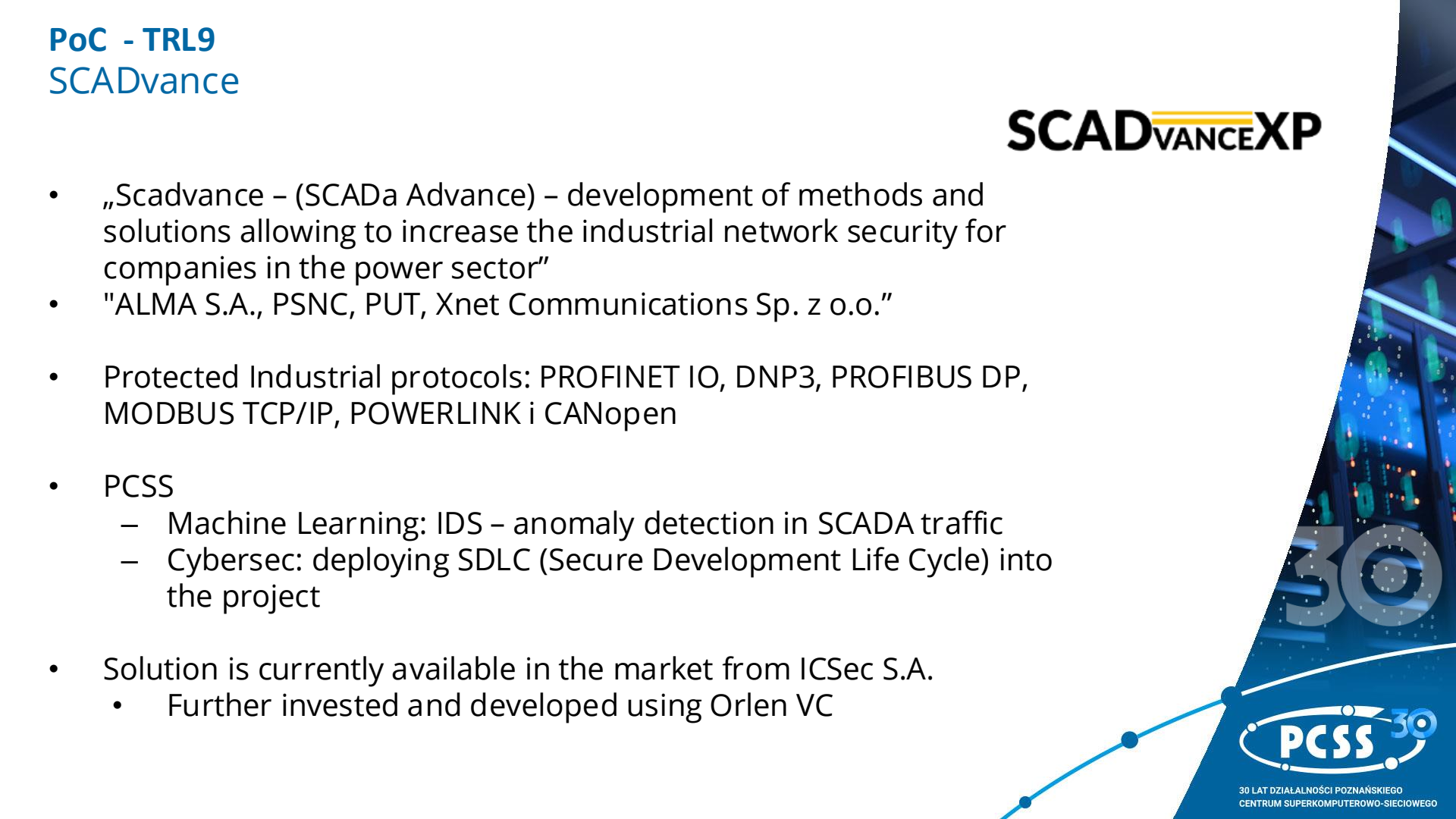
SCADvanceXP

- „Scadvance – (SCADa Advance) – development of methods and solutions allowing to increase the industrial network security for companies in the power sector”
- "ALMA S.A., PSNC, PUT, Xnet Communications Sp. z o.o.”

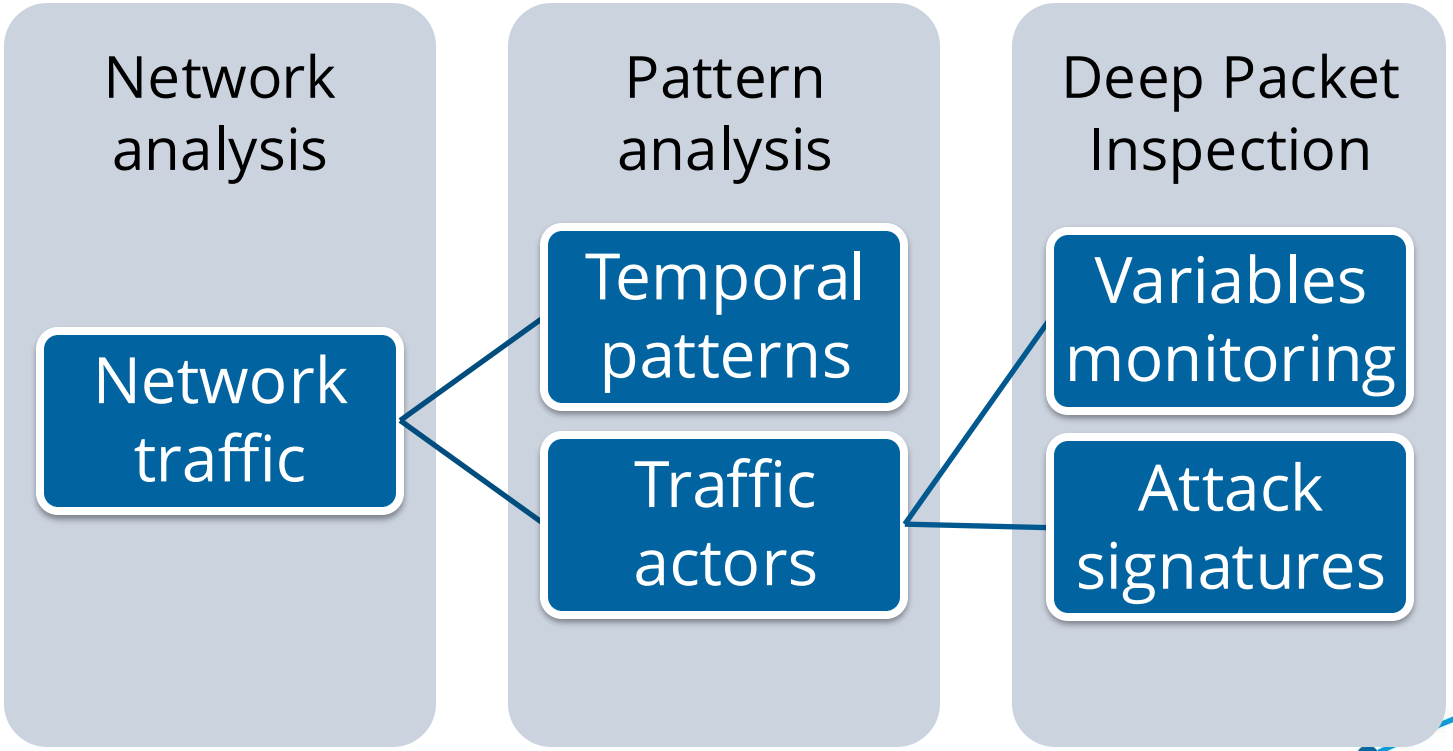
- Protected Industrial protocols: PROFINET IO, DNP3, PROFIBUS DP, MODBUS TCP/IP, POWERLINK i CANopen

- PCSS
  - Machine Learning: IDS – anomaly detection in SCADA traffic
  - Cybersec: deploying SDLC (Secure Development Life Cycle) into the project

- Solution is currently available in the market from ICSec S.A.
  - Further invested and developed using Orlen VC



Machine learning and rule based SCADvance IDS



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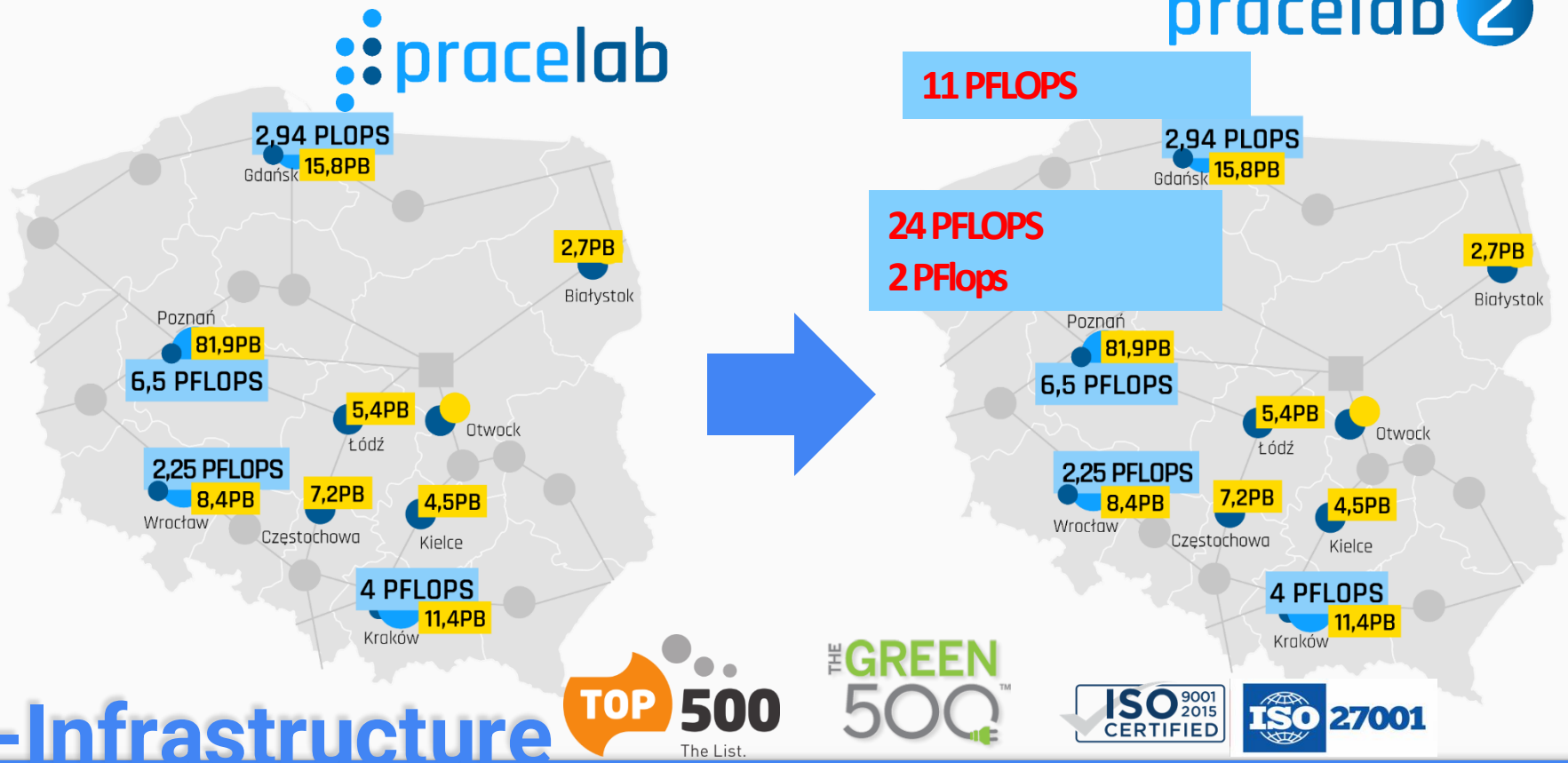
Production & User Support



e-Infrastructure

TOP 500 The List.

THE GREEN 500

ISO 9001 2015 CERTIFIED

ISO 27001

Future

- AI at EOSC
  - National Data Storage – with AI ”pieces”
  - National Node @Poland
- AI Factory
- AI trainings – for LLM security

DATACOMP

AI, HPC and Big Data Analysis for Grand Challenges

Switch

AI Analysis

G. Hoevenaars + V. Vogel
Version 1, 23 October 2024

AI: product playing field (1)

Applications:
- Generic Chatbot with built-in data protection
- AI assistant for a certain organisation (comparable to student app)
- AI assistant for a certain discipline (like biology) or even a certain course
- AI generator of exam questions
- AI generator of key words (SEO, OER, etc.)

Market Definition:
- Especially teaching universities and universities of applied sciences
- Size dependent on use case
  - AI assistant: Per student calculate with CHF 7.50 as a first vector

Risks
- This market is going too fast (similar to cybersecurity).
- Everybody wants AI, but many started AI projects fail.
- People/knowhow level is low. We need to invest or seek partnerships.

AI: product playing field (2)

Product Playing Field

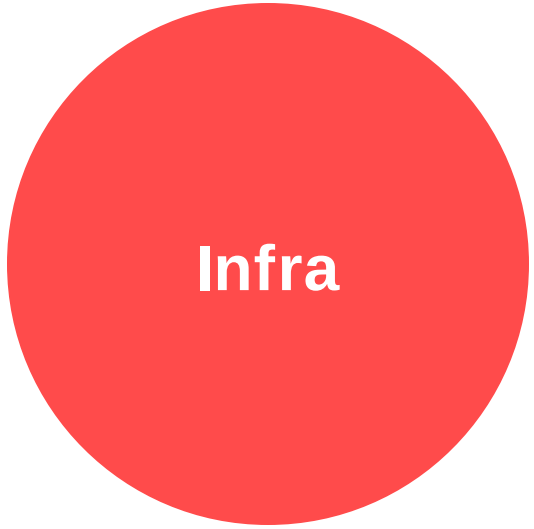
Technical Requirements:

- For AI Detection use cases, standard computational resources are probably sufficient.
- For the chatbot/service use cases a considerable amount of VRAM and GPU power are required if the application would be self hosted. It is a major need of the community to have a professionally-run infrastructure service
- Use the RAG technique to prevent hallucinations and to specialise on a certain subject
- Use smaller LLMs (based on OS) for smaller applications (e.g. Switch App)

Legal Challenges:

- GDPR, sensitive data protection laws
- EU AI act
  - Use of AI without any 4-eye principle
  - Use of AI for important decisions (such as grading an exam)

Proposal to start with Product Development



We provide a stable infrastructure with data security, which is easy to budget

We assist the universities by offering consultancy in the area of LLM choice, RAG, use cases

Switch can set-up the service, provide legal assistance & procurement, but also operate an LLM

Switch_

NICIS
NATIONAL INTEGRATED CYBERINFRASTRUCTURE SYSTEM
SANReN

South African National Research Network (SANReN)

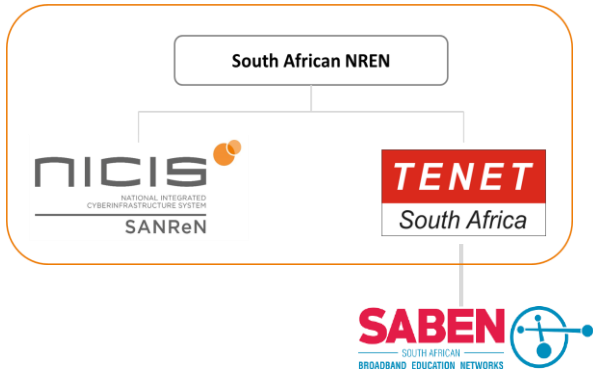
Ajay Makna
Head of Operations
SIG-MSP Autumn 2024,
24 October 2024,
Poznan, Poland

A national initiative of the Department of Science and Innovation and implemented by the CSIR

science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

CSIR
Touching lives through innovation

South African NREN: Structure



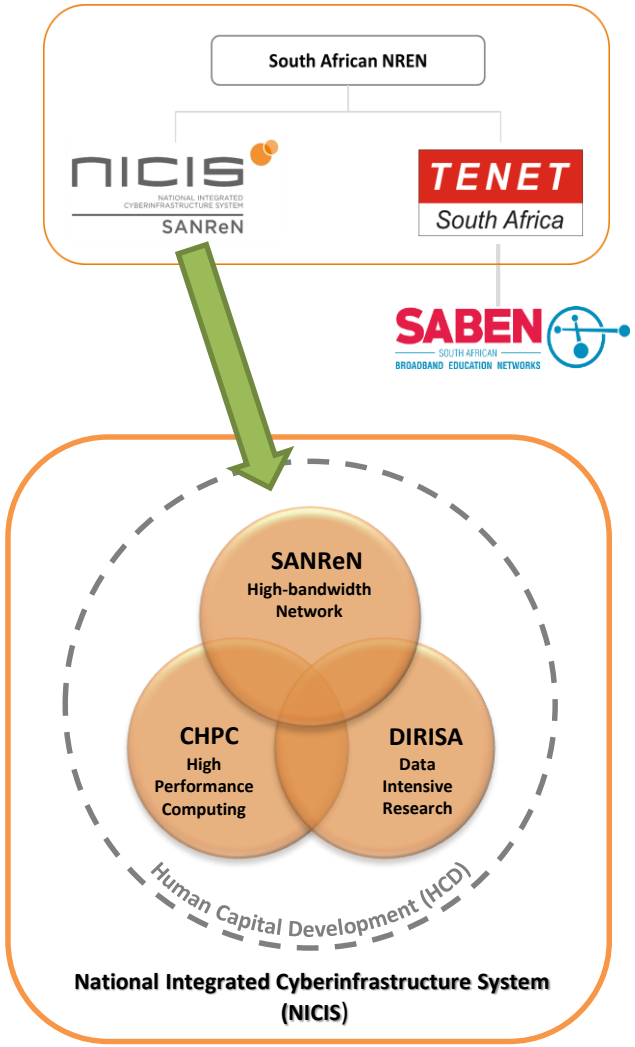
A national initiative of the Department of Science and Innovation and implemented by the CSIR

science & innovation
Department:
Science and Innovation
REPUBLIC OF SOUTH AFRICA

CSIR

NICIS Structure

- No dedicated Comms and Marketing functions in SANReN



A national initiative of the Department of Science and Innovation and implemented by the CSIR
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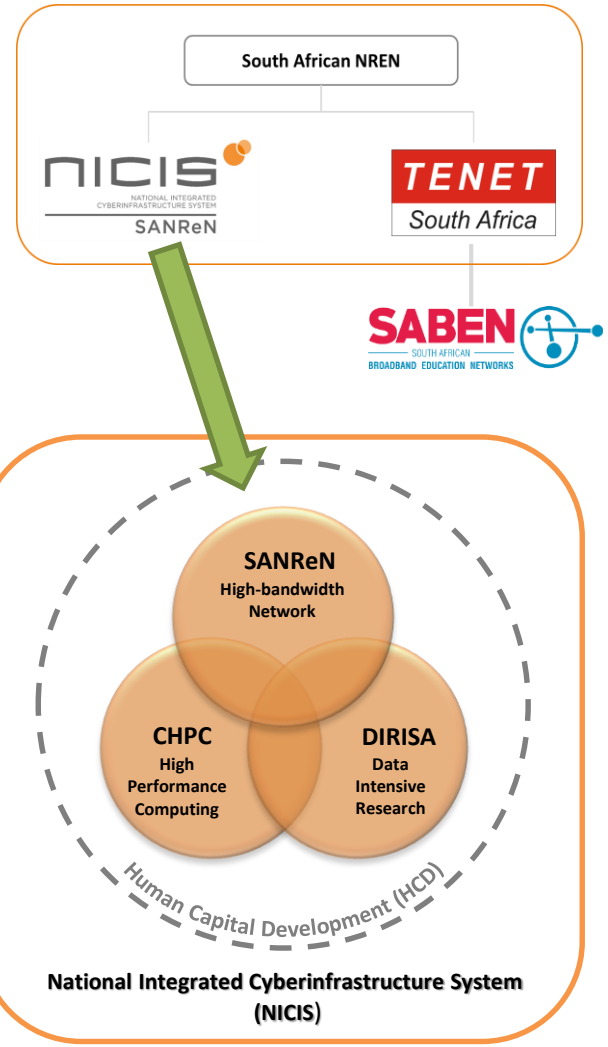
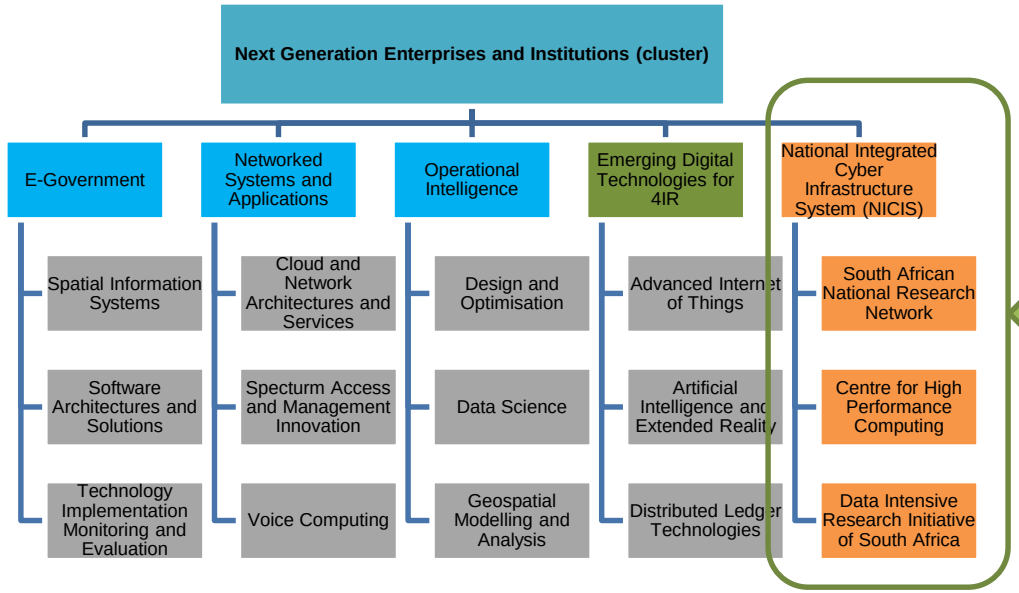
SANReN Placement

- No dedicated Comms and Marketing functions in SANReN





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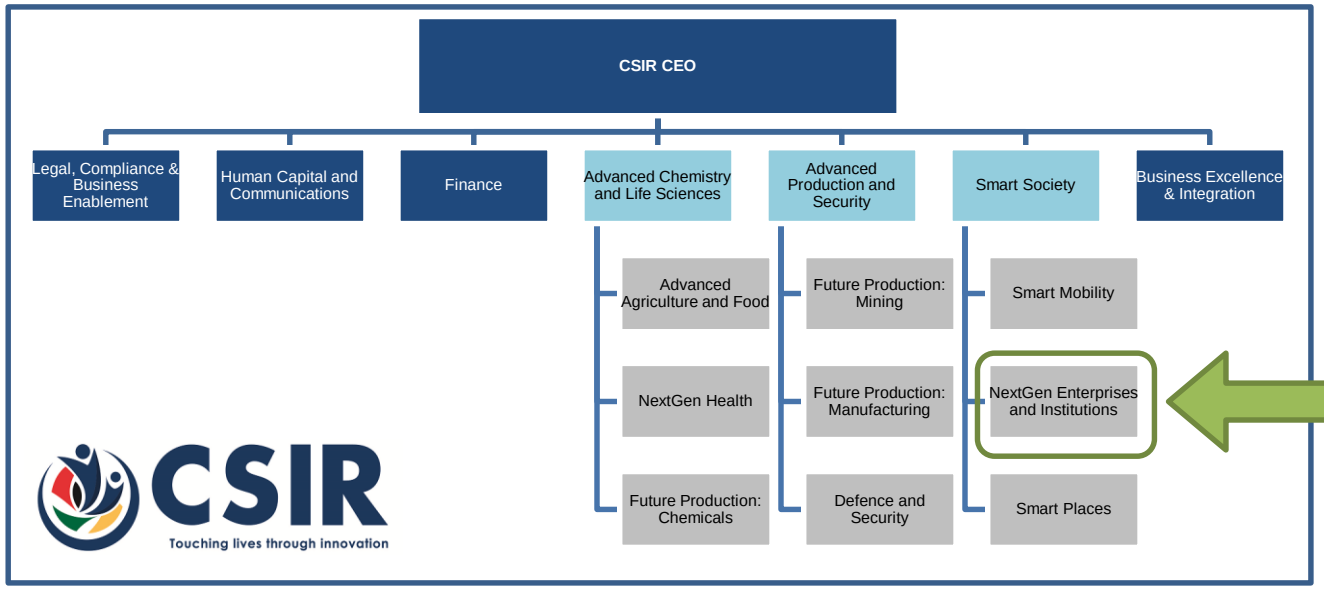
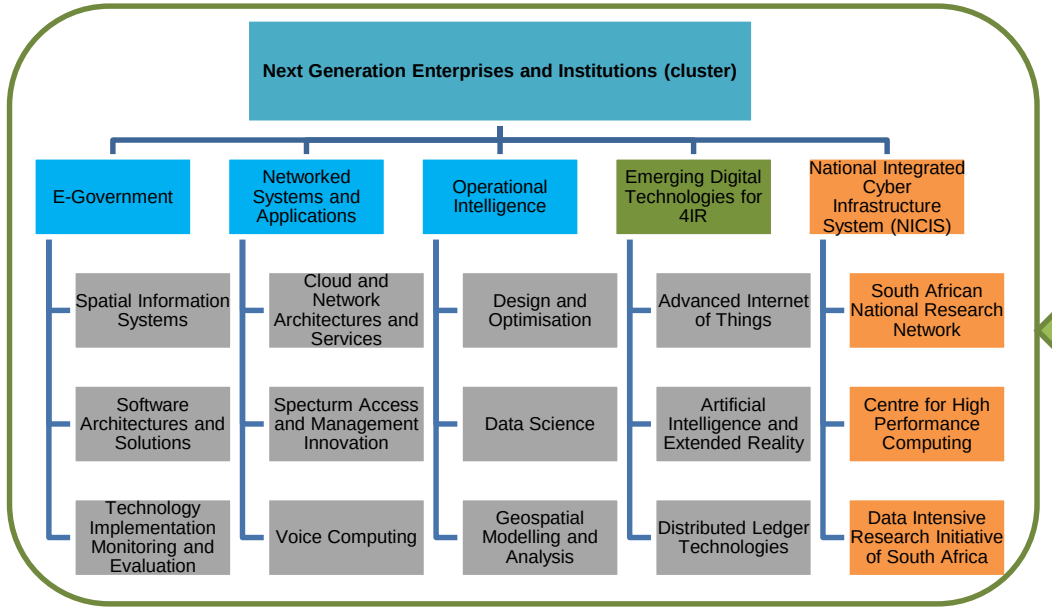
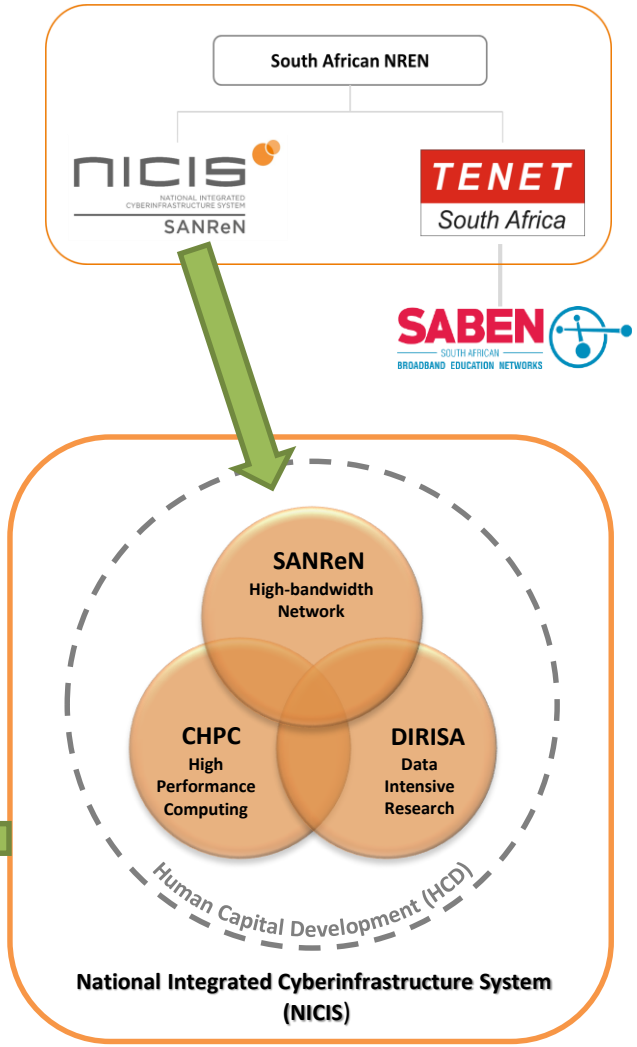
SANReN Placement



- No dedicated Comms and Marketing functions in SANReN
- Transactional in nature
  - Use CSIR Comms
  - Outsource





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