

Slides for ModProd 2024

Slides from Niclas Fock

Presented by Peter Fritzson

WASP

WALLENBERG AI,
AUTONOMOUS SYSTEMS
AND SOFTWARE PROGRAM





AFFILIATED GROUPS OF EXCELLENCE at



Vision

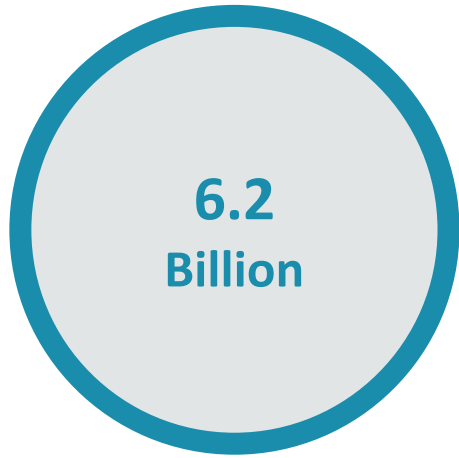
Excellent research and competence in artificial intelligence, autonomous systems and software for the benefit of Swedish society and industry.

Mission

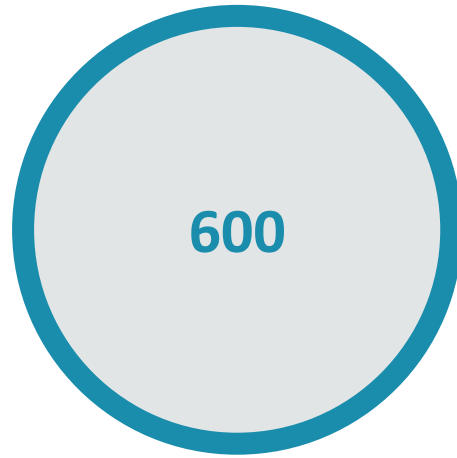
Build a platform for world class academic research that interacts with leading companies and actors in Sweden to develop knowledge and competence for the future.

*Knut och Alice
Wallenbergs
Stiftelse*

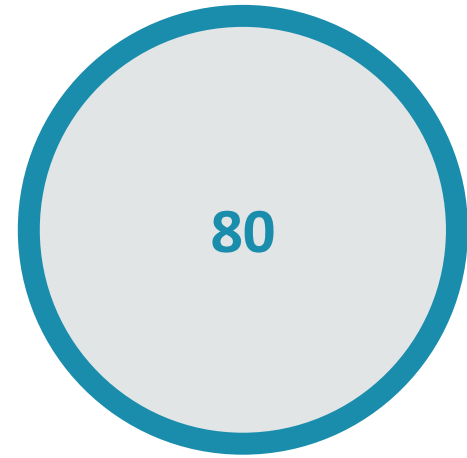
WASP in Numbers



6.2 billion SEK for 16 years until 2031



600 Graduated PhDs



80 Faculty Recruitments

WASP Instruments

The program acts through six strategic instruments. Each instrument is realized by different initiatives and activities.

- Research program
- Graduate school
- Recruitment
- **WASP Research Arenas (WARA)**
- Internationalization
- Communication events networking



WASP Research Arenas

Main objective

Increase the value and relevance of research and shorten knowledge transfer between academia and industry.

Focus

- Seek and leverage on industrial and institutional motivation and ownership.
- Integrate WARA in other WASP instruments: calls, projects, graduate school, etc.

Director

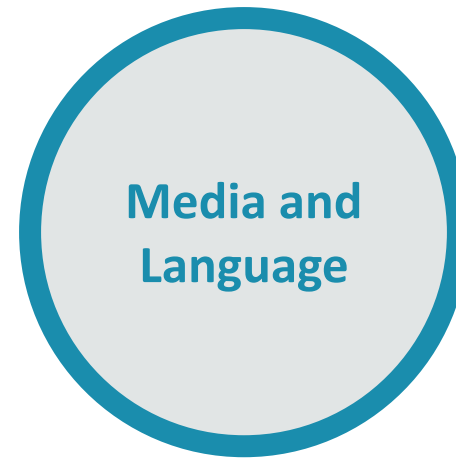
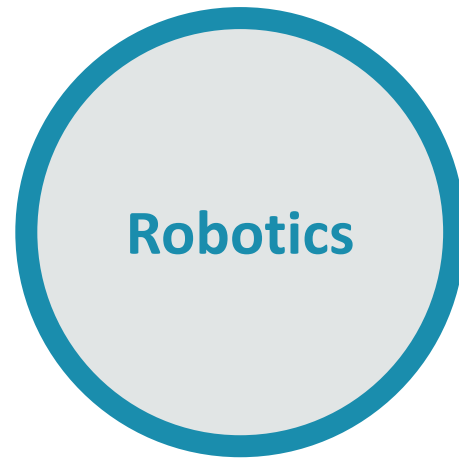
Niclas Fock, Adj Lecturer at ISY, Linköping University

“ Increase the value and relevance of research by strengthening and promoting collaboration between WASP researchers and industry partners.



Photo: Thor Balkhed, Linköping University

WASP Research Arenas



Scenario driven
arenas

Technology driven
arenas

Values of engaging in WASP WARA

For WASP PhD students

- Validate the potential of your research results, improve impact, learn from field, and establish new ways for feedback
- Gain access to state-of-the-art resources.
- Grow your network with others in the WASP community and Swedish industry. You may find your future career!

For WASP Faculty

- Collaborate with leading industrial researchers
- Inspiration and well-grounded sense of relevance when formulating new research challenges
- Support WASP Graduate School Project Courses

For Industries

- Influence research agendas.
- Get to understand research possibilities and challenges – what's possible now & tomorrow? How could your company contribute?
- Gain access to research results.
- Visibility to brilliant WASP PhD students



An aerial photograph of a river with white-water rapids, showing turbulent water and white foam. The image is monochromatic, with shades of blue and white.

WARA | PUBLIC
SAFETY



Research focus

Collaborative systems for public safety that supports teams of humans and systems acting and interacting in a distributed context supporting human authority and benefitting from functions with various degree of autonomy.



Photo: Peter Karlsson, Svartfeld foto & form AB

A large industrial robot arm is shown in the process of cutting a large, rectangular block of material, likely wood or a composite material. The robot arm is positioned centrally, with its end effector (a cutting tool) in contact with the block. A significant amount of dust or wood chips is being kicked up from the cutting point, creating a hazy atmosphere. The background is dark and industrial, with a bright light source on the right side, possibly a lamp or a window, casting a glow. The overall scene conveys a sense of precision and automation in a manufacturing environment.

WARA | ROBOTICS



Research focus

- Reinforcement learning
- Automated reasoning
- Perception
- Human-Robot Interaction
- Assembly with Dual-arm Robots





WARA | OPERATIONAL
DATA



Research focus

Anomaly detection

- Intrusion detection
- Denial-of-service attacks, etc

Autonomous management

- Power reduction use metrics
- Power consumption data, etc



The background of the image is a dark, textured surface of acoustic foam. The foam consists of numerous small, pyramid-shaped cells arranged in a regular grid pattern. The lighting is slightly uneven, creating subtle gradients of dark grey and black across the surface, which adds depth to the texture.

WARA | MEDIA &
LANGUAGE



Technology driven

WARA | MEDIA &
LANGUAGE

Research focus

- World-class research community for Media and Language AI
- Offer networking, infra-structure, and data
- Dedicated streams for Language and Gaming



Photo: Peter Karlsson, Svartfeld foto & form AB

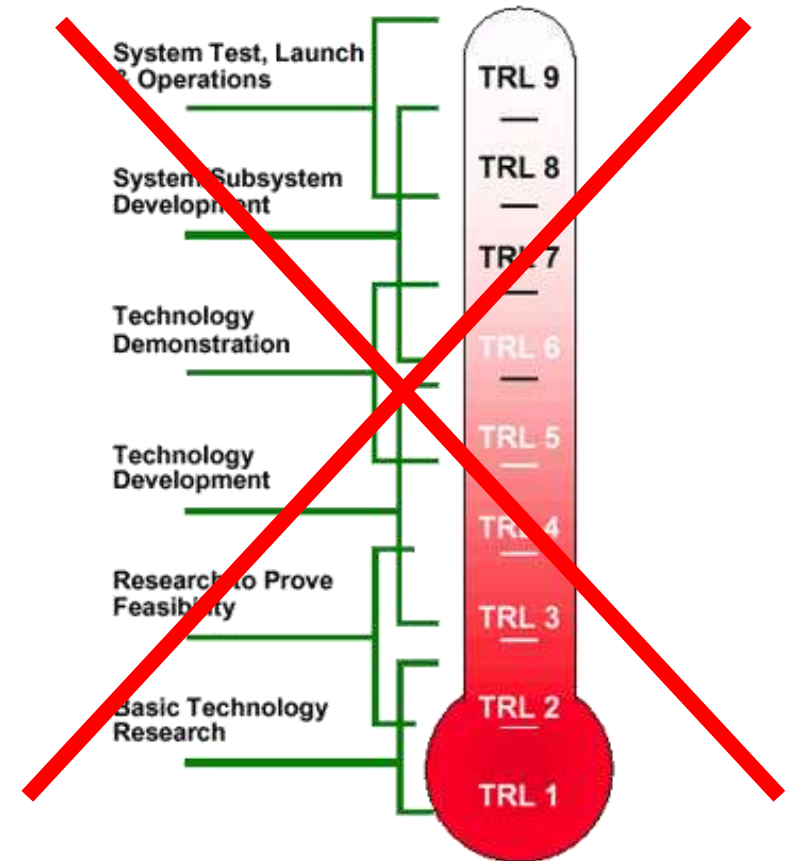
WASP 2023 Top Research Challenges

- **Complex data & models in AI (into transformers to improve)**
- **Human in the Loop and Explainability**
- **Scaling & Distribution of Resources (large amounts of data)**
- **Efficiency, Verifiability, Security & Robustness**

The process from idea to a ready product has decreased dramatically with AI

The process time from basic research to systems operation is typically considered to span over many years

During 2023, we see a dramatic change when AI research comes into production and commercial business in months



Large model availability



First attempts



Almost there



Ready for prime time

PRE 2020

2020

2022

2023

2025?

2030?

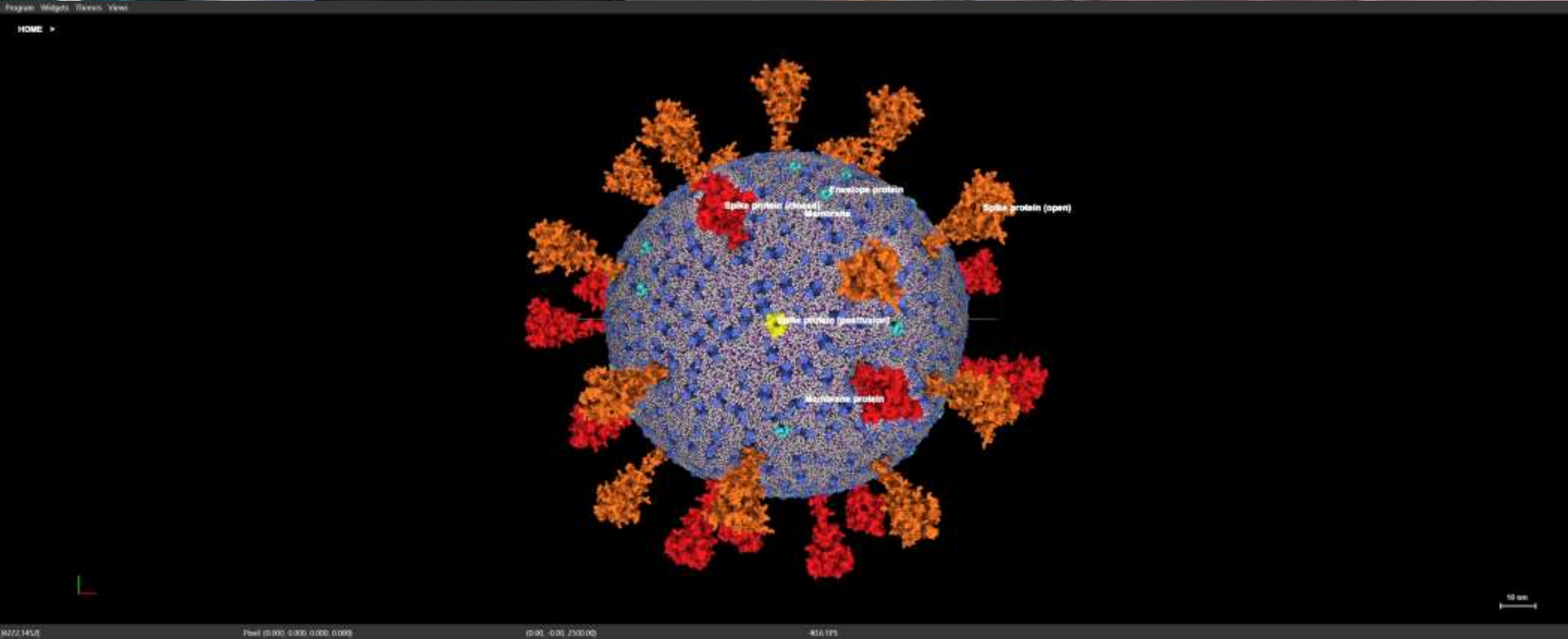
	PRE 2020	2020	2022	2023	2025?	2030?
Text	SPAM detection Translation Basic Q&A	Basic copy writing First drafts	Longer form Second drafts	Vertical fine tuning gets good (scientific papers etc)	First drafts better than human average	First drafts better than professional writers
Code	1-line auto complete	Multi line generation	Longer form Better accuracy	More languages More verticals	Text to product drafts	Text to product (final) better than full-time developers
Images			Art Logos Photography	Mock-ups (product design, architecture, etc)	Final drafts (product design, architecture, etc)	Final drafts better than professionals (artists, designers, photographers etc)
Video / 3D / Gaming			First attempts at 3D/video models	Basic first draft videos & 3D files	Second drafts	AI Roblox Video games & movies are personalized dreams

Two application results from 2023 (Norrköping Visualization Centre)

- **AI enabled conversations – interacting with digital twins through LLMs**
- **Visualized Crime Scenes – open for public at Norrköping Visualization Centre: First step to build a new arena for AI Forensics – where LiU research can help Swedish Police (NFC, Swedish National Forensics Centre)**

Finally – The Future of Forensics is Already Here

AI enabled conversations – how to talk to a Covid19 virus



Chatbot interface showing a conversation with a virtual guide:

- Bot: Welcome!
- User: I am your personal tour guide through SARS-CoV-2 model.
- Bot: You can ask me questions about it and I will do my best to answer them.
- User: Let's start exploring together!

At the bottom of the chat window, there are controls for the chatbot, including a 'Home' button and a 'Selection' button. The chatbot is identified as 'SARS-CoV-2' and is part of a 'SpectroTest' application.

by, Sweden for providing this video

Visual Crime Scene – a demonstration of interactive 3D crime scene models

