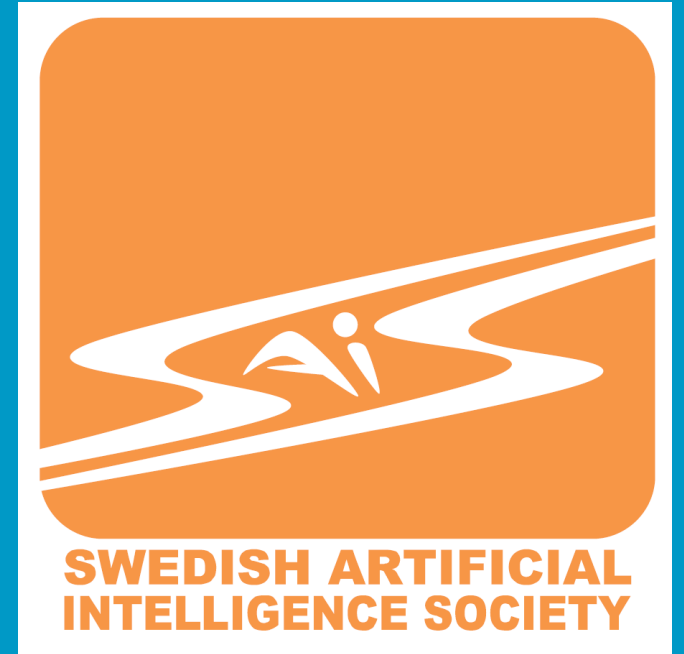


AI idag och imorgon

Ett forskningsperspektiv





SAIS – The Swedish AI Society

- A society promoting research and application of AI.
- Members are Swedish universities, organizations, researchers, professionals and students active in, or interested in the area of Artificial Intelligence.
- Active since 1982.
- About 100 members.
- A representative board with university and industry representatives.
- Main activities: Yearly workshop, Yearly Master's Thesis Award, Information sharing: web site, mailing list, Twitter and Facebook
- Host of IJCAI-ECAI 2018 in Stockholm.
Co-located with AAMAS and ICML. Also COLT held Jul 5-9.



July 13-19, 2018
Stockholm, Sweden
27th International Joint Conference
on Artificial Intelligence held jointly
with 23rd European Conference on
Artificial Intelligence.

Program

- Forskningsöversikt Sverige (10.30-12.30)
- *Keynote Internetdagarna Payal Arora (13.15-14.00)*
- AI Research – An International Perspective (14.00-15.00)
- The Future of AI Research in Sweden (15.30-17.00)

Program

- **Forskningsöversikt Sverige (10.30-12.30)**
 - 10.30-10.50 AI-forskning i Sverige - En översikt, Fredrik Heintz, SAIS
 - 10.50-11.00 AI för diagnostisering av prostatacancer, Ida Arvidsson LTH
 - 11.00-11.10 Explainable and Ethical Machine Learning with Applications to Healthcare, Panagiotis Papapetrou, SU
 - 11.10-11.15 KORT PAUS
 - 11.15-11.30 En riskorienterad tvilling av världen – hur en kunskapsgraf modellerar hot och sårbarheter, Staffan Truvé, RecordedFuture
 - 11.30-11.45 AI for Telecom: Research and Applications, Elena Fersman, Ericsson
 - 11.45-12.15 Panel med talarna, moderator Fredrik Heintz
- AI Research – An International Perspective (14.00-15.00)
- The Future of AI Research in Sweden (15.30-17.00)

Program

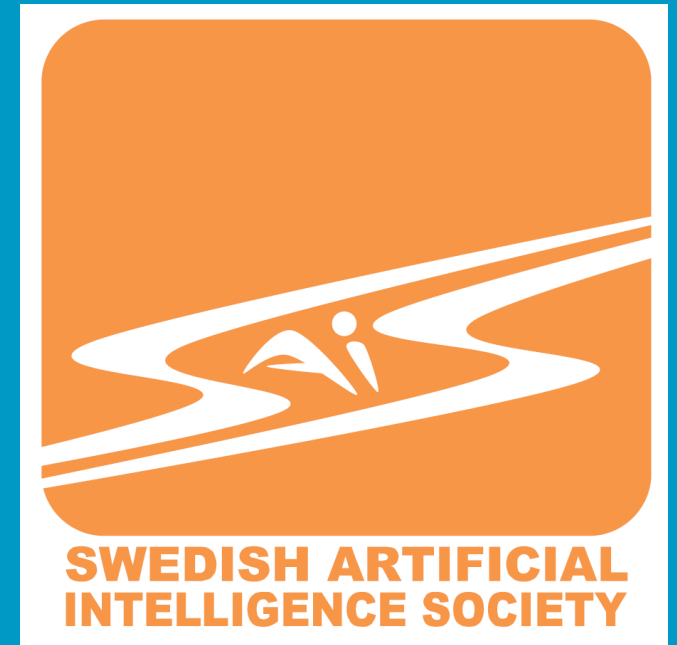
- Forskningsöversikt Sverige (10.30-12.30)
- **AI Research – An International Perspective (14.00-15.00)**
 - 14.00-14.20 AI an American perspective, Francesca Rossi, IBM and AAAI President-elect
 - 14.20-14.40 AI a European perspective, Barry O'Sullivan, UCC and EurAI Former President
 - 14.40-15.00 Panel discussion with the speakers, moderator Fredrik Heintz
- The Future of AI Research in Sweden (15.30-17.00)

Program

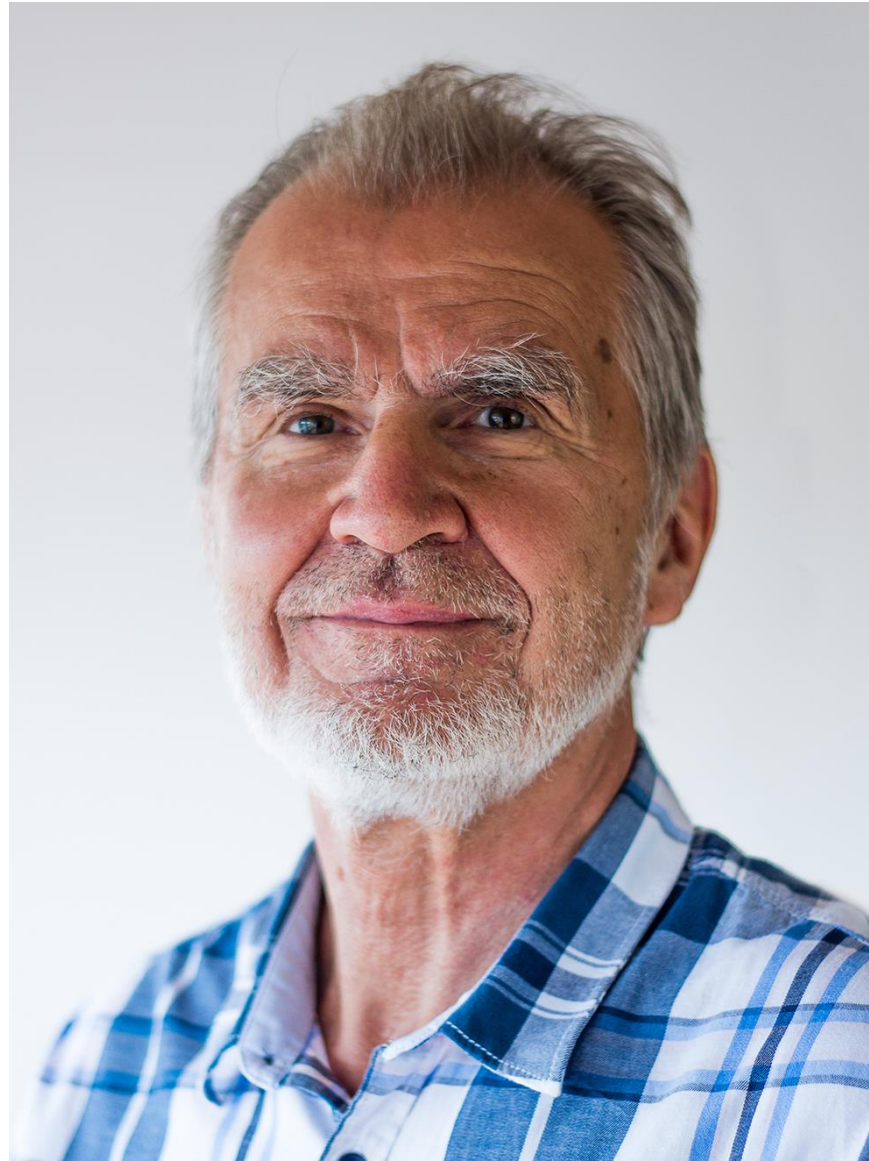
- Forskningsöversikt Sverige (10.30-12.30)
- AI Research – An International Perspective (14.00-15.00)
- **The Future of AI Research in Sweden (15.30-17.00)**
 - 15.30-15.40 WASP AI, Danica Kragic, KTH
 - 15.40-15.50 WASP HS, Virginia Dignum, Umeå University
 - 15.50-16.00 AI Sweden, Daniel Gillblad, AI.se
 - 16.00-17.00 Panel med talarna, moderator Fredrik Heintz

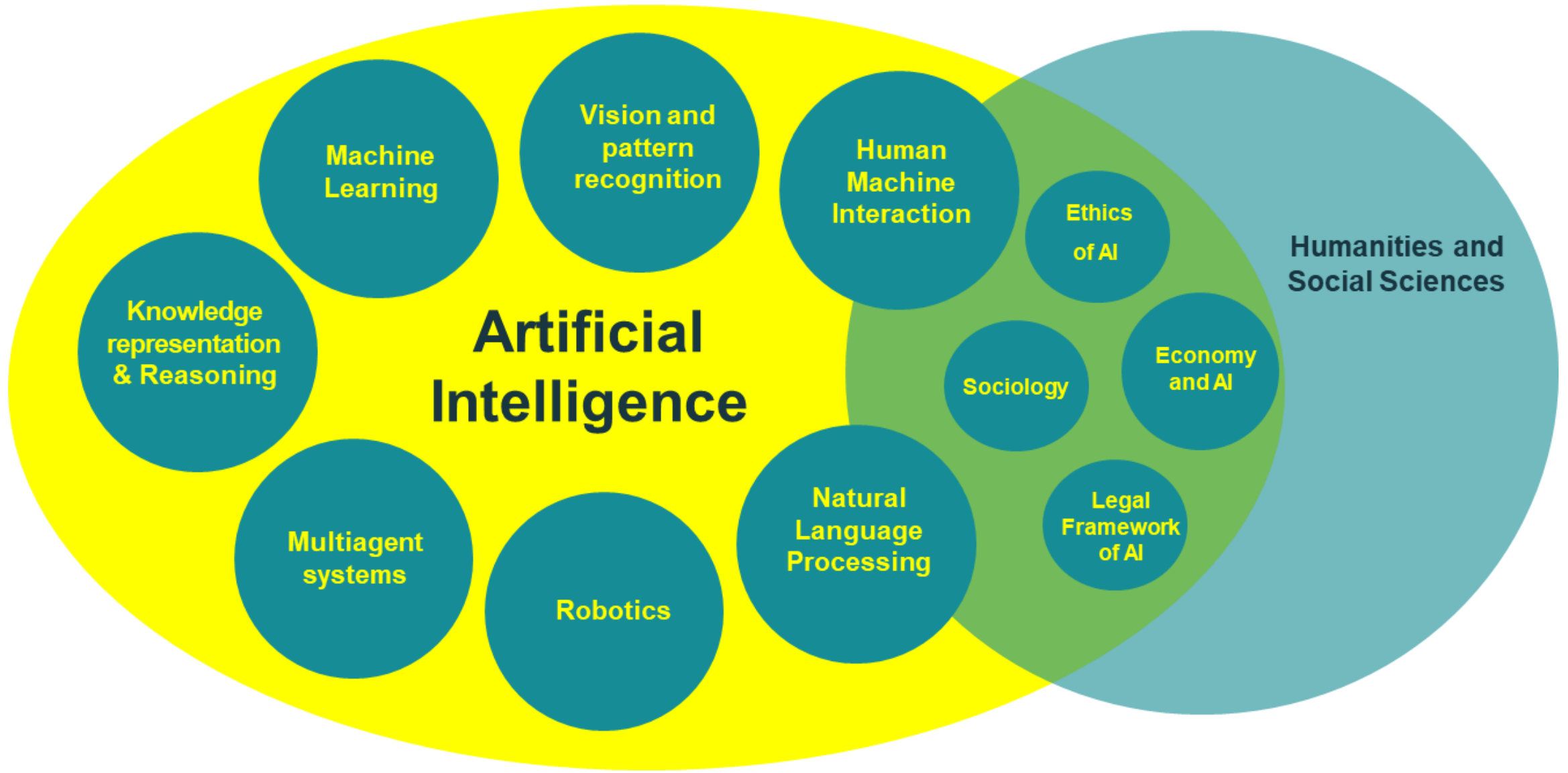
AI-forskning i Sverige – En översikt

Fredrik Heintz, Inst. för Datavetenskap
Linköping universitet
fredrik.heintz@liu.se
@FredrikHeintz



Erik Sandewall







Swedish Universities with AI Research

- Luleå Technological University (LTU)
- Umeå University (UmU)
- Mälardalens Högskola (MdH)
- Uppsala University (UU)
- Karolinska Institutet (KI)
- KTH / Stockholm University (SU)
- Örebro University (ÖrU)
- Linköping University (LiU)
- Jönköping University (JU)
- Chalmers (CTH) / Gothenburg University (GU)
- University of Borås (HB)
- University of Skövde (HiS)
- Halmstad University (HH)
- Blekinge Institute of Technology (BTH)
- Lund University (LU)
- Malmö University (MaU)



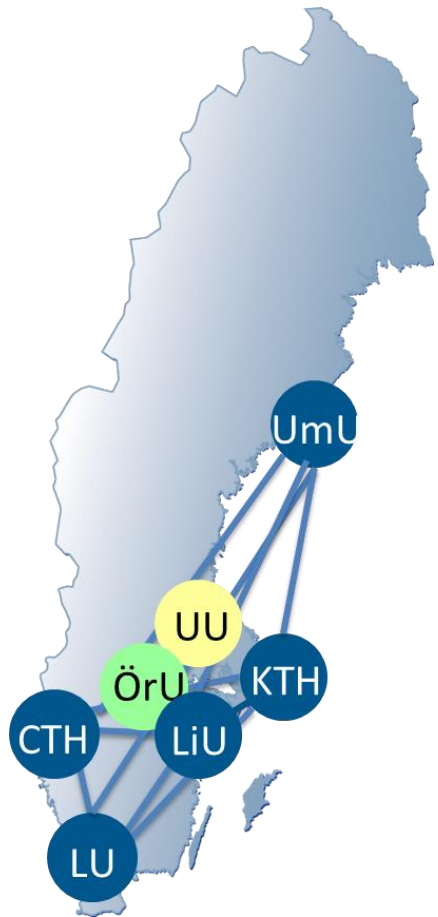


(Partial) Research Topics

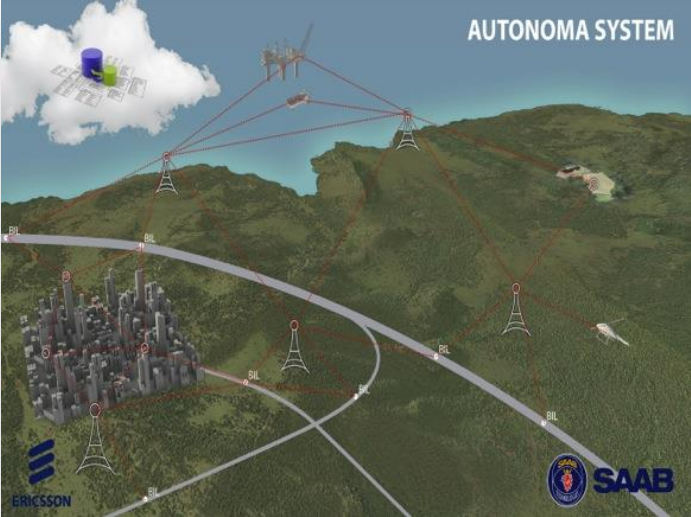
- Knowledge representation and reasoning (HiS, LiU, LU, UmU, ÖrU)
- Planning (LiU, ÖrU)
- AI/Robotics (HH, KTH, LiU, LU, UmU, ÖrU)
- Constraint Programming (KTH, LiU, LU, UU)
- Reinforcement Learning (CTH/GU, KTH, LiU, UmU)
- Deep Learning (CTH, HiS, KTH, LiU, LU)
- Bayesian Learning (CTH/GU, KTH, LiU, LU, UU)
- Data Mining (BTH, CTH/GU, HH, HiS, JU, KTH, LiU, SU, UmU)
- Multi-agent systems (BTH, KTH, LiU, MaU, UmU, ÖrU)
- NLP (CTH/GU, KTH, LiU, LU, UmU, UU)
- Cognitive Science (GU, HiS, LiU, LU, UmU)
- Theoretical foundations of AI (HH, KTH, LiU, UmU, UU)
- Explainable AI (BTH, HH, HiS, JU, LU, UmU)
- Human-AI Interaction (BTH, HiS, KTH, LiU, LU, UmU, UU, ÖrU)
- Semantic Web (LiU, LU)



AI Innovation, Competence and Research in Sweden



Elements of AI



Wallenberg AI, Autonomous Systems and Software Program (WASP)

<http://wasp-sweden.se/>

Sweden's largest research program
15 year program 5500 MSEK (550MEUR)

Research Program

The best researchers in the field

Graduate School (400+ PhDs)

Ambitious program, Industrial PhDs

Demonstrator Arenas

Demonstrations with external parties

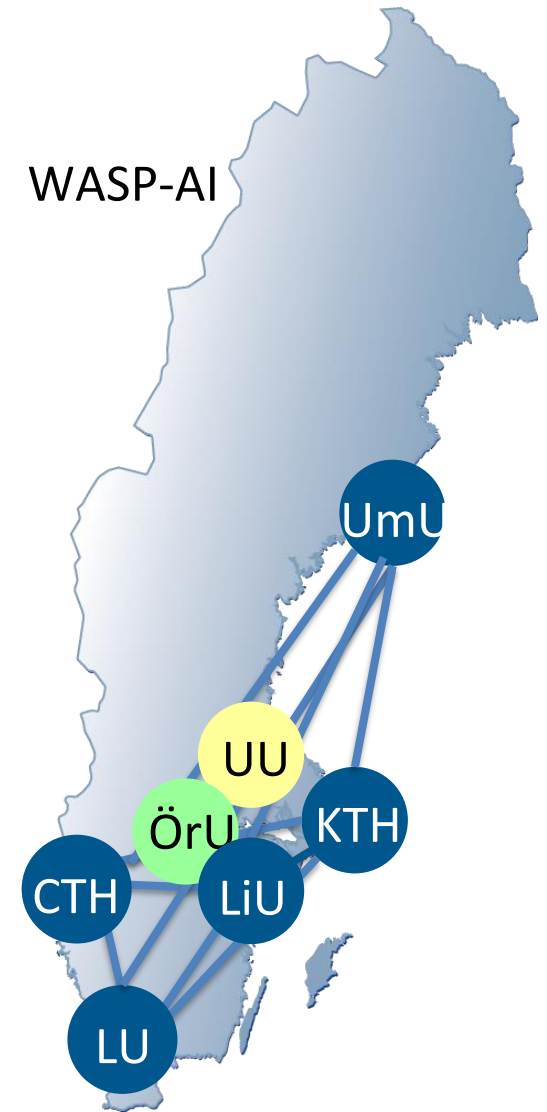
Recruitment Program (60+ Researchers)

Internationally competitive offers



WASP AI Research

- AI/MLX
 - Representation learning and grounding
 - Sequential decision-making and reinforcement learning
 - Learning from small data sets, GANs and incremental learning
 - Multi-task and transfer learning
- AI/Math:
 - Novel mathematics contributing to the understanding and development of AI



WASP-AI Collaboration Projects

Projekt	Universitet
Statistical and Adversarial Learning in Continuous System Control	LU, KTH
Reinforcement Learning in Continuous Spaces with Interactively Acquired Knowledge-based Models	LU, ÖU
How to Inject Geometry into Deep Learning - Theoretical Foundation and New Computational Methods	Chalmers, LiU
Probabilistic models and deep learning - bridging the gap	UU, Chalmers
Robot learning of symbol grounding in multiple contexts through dialog	KTH, ÖU
Under-Supervised Representation Learning	KTH, Chalmers
Beyond supervised learning for semantic analysis of visual data	KTH, LiU
Exploration and uncertainty in generative networks for supervised learning and reinforcement learning	KTH, Chalmers
Deep Probabilistic Neural Networks for Survival Analysis	UU, KTH
Data-driven foundations for robust deformable object manipulation	Chalmers, KTH

WASP-HS

- The Marianne and Marcus Wallenberg Foundation (a “sister” foundation to KAW).
- WASP-Humanities and Society, WASP-HS, a program of SEK 720 million
- A program to support research in social science and humanities that can give insights in how to tackle consequences of upcoming technology shifts.
- Initial areas of interest:
 - Ethics and autonomous systems and AI
 - Economy of autonomous systems and AI
 - Law for autonomous systems and AI
 - Social consequences, including effects on the labor market of autonomous systems and AI
 - Improved information systems for autonomous systems and AI
- Research within WASP-HS will be conducted separate from WASP but will add new competence to the WASP Program.



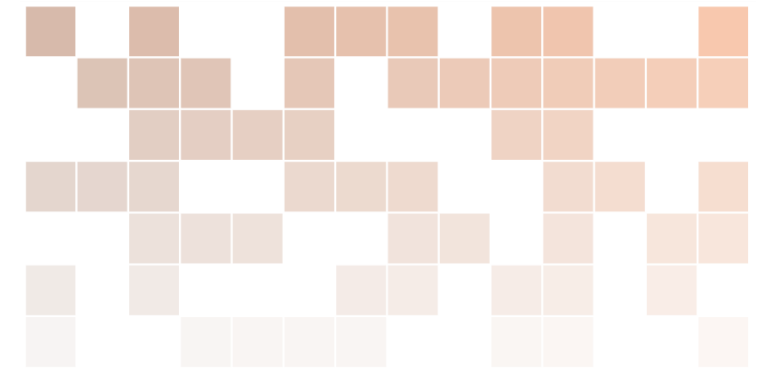
Chair Kerstin Sahlin and Director Virginia Dignum

WASP-HS Projekt

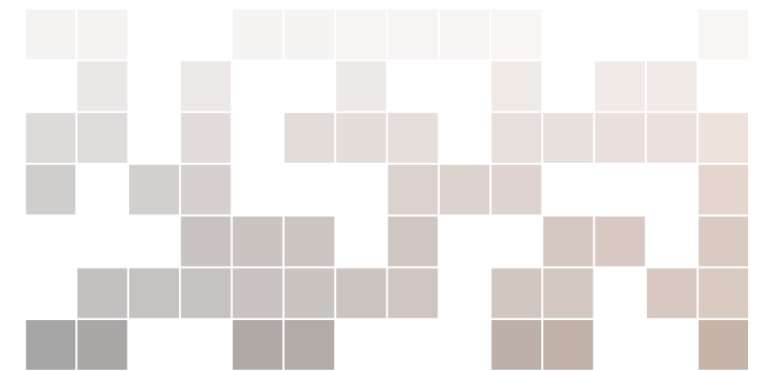
- "The rise of social drones: A constructive design research agenda"
- "Professional trust and autonomous systems"
- "Gothenburg research initiative for politically emergent systems (GRIPES)"
- "Predicting the diffusion of AI-applications"
- "Bias and methods of AI technology studying political behavior"
- "Ethics as enacted through movement - shaping and being shaped by autonomous systems"
- **"The emergence of complex intelligent systems and the future of management"**
- **"The ethics and social consequences of AI & caring robots. Learning trust, empathy and accountability"**
- "The imperfect creator creating the perfect: Ethics for autonomous systems/AI"
- "Quantum law: The legal significance of quantum computing"
- **"AI transparency and consumer trust"**
- "Digital companions as social actors: Employing socially intelligent systems for managing stress and improving emotional wellbeing"
- "BioMe: Existential challenges and ethical imperatives of biometric AI in everyday lifeworlds"
- "Artificial Intelligence, democracy and human dignity"
- "The labor-market impact of firm-level adoption of AI and autonomous systems"
- "The new scientific revolution? AI and big data in biomedicine"

Swedish Infrastructure for AI

- Report based on 8 science cases
- 10 Major Findings presented, including:
 - Documented urgent and critical need in many groups
 - A few very advanced user groups and many rapidly evolving fields in Sweden
 - Access to fast GPUs is the current choice
 - High bandwidth to large scale memory is essential
- 70 MSEK should only be seen as a first step towards AI-Infra.
- New delivery model, cloud based, needs to be developed for HPC to support AI users
- One coordinated system in integrated with SNIC is recommended



Swedish Infrastructure
for AI



Strategiska Forskningsområden



FOCUS THEMES

1. Autonomous vehicles and robots 6
2. Big data and network science 8
3. Communications and networks beyond 5G: sensors, IoT, and cloud. 10
4. Industry 4.0 12
5. Intelligent assistants and tools. 14

EMERGING RESEARCH THRUSTS, TECHNOLOGIES, AND CHALLENGES

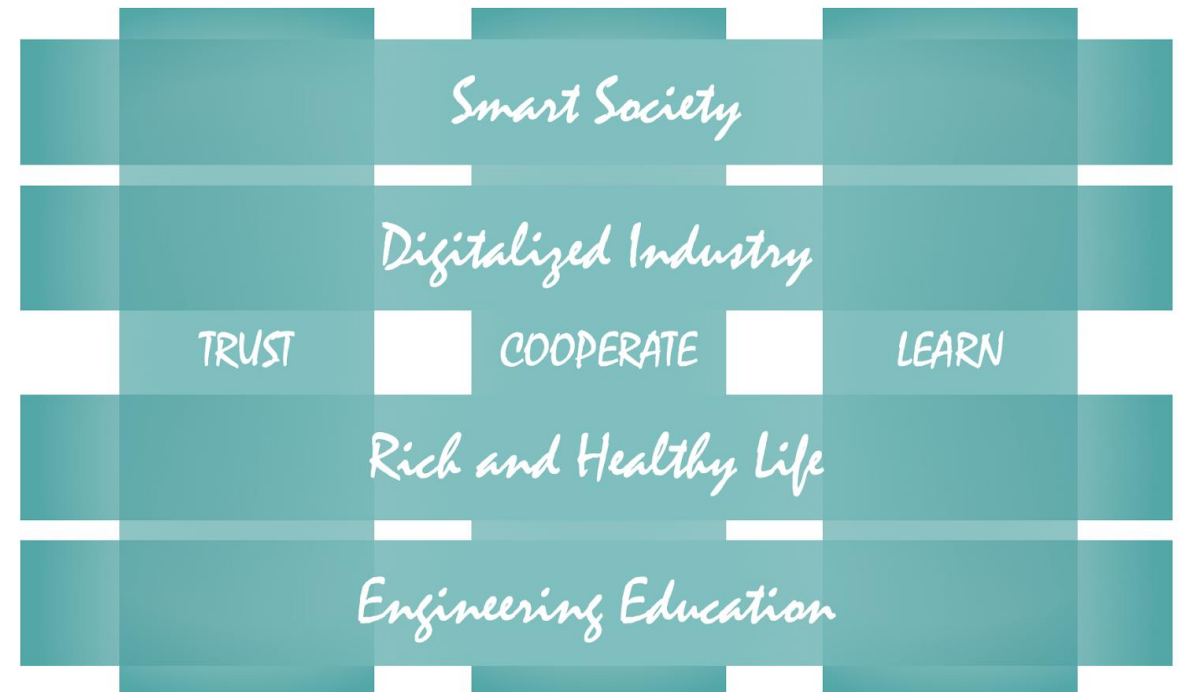
- A. AI, large-scale algorithms, machine learning, deep learning, and XAI. 18
- B. Digital business models and legal aspects. 20
- C. Next-generation software technology 22
- D. Mobile processing architectures and devices. 24
- E. Design for security, privacy, and trust 26

<https://www.liu.se/elliit>

digital futures



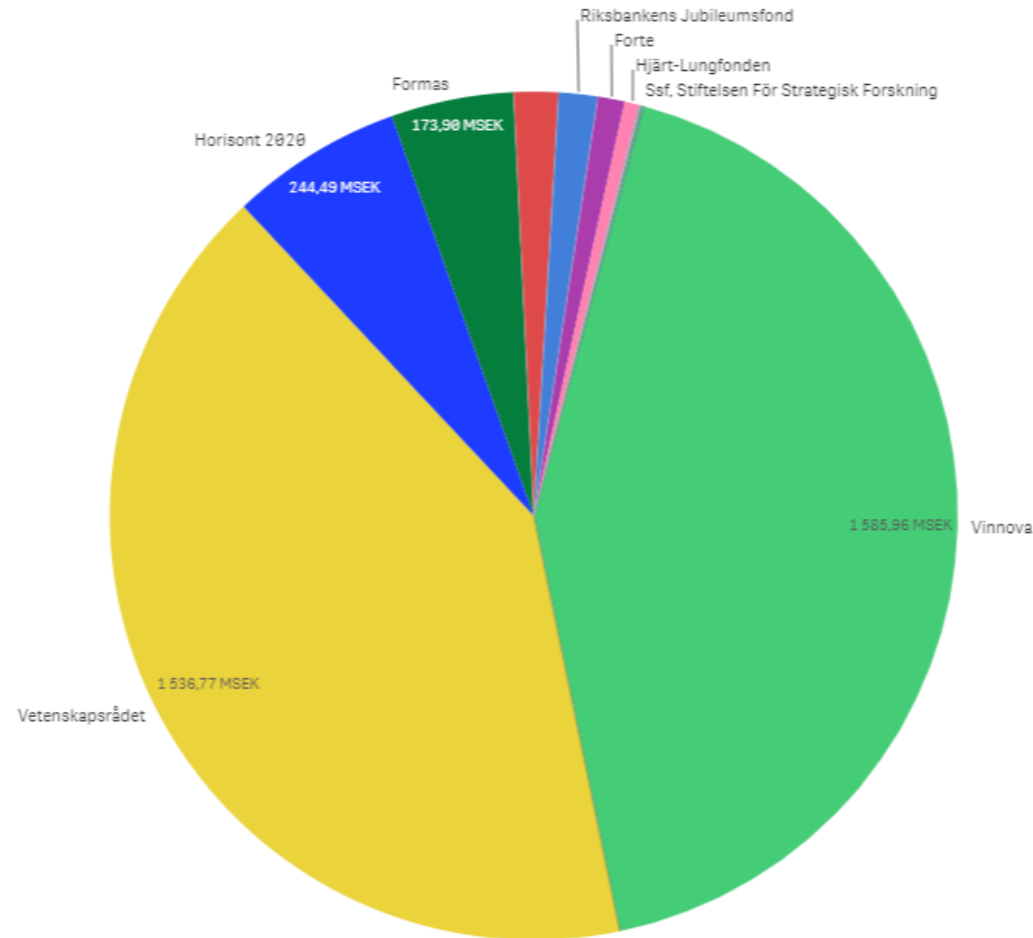
Stockholm University



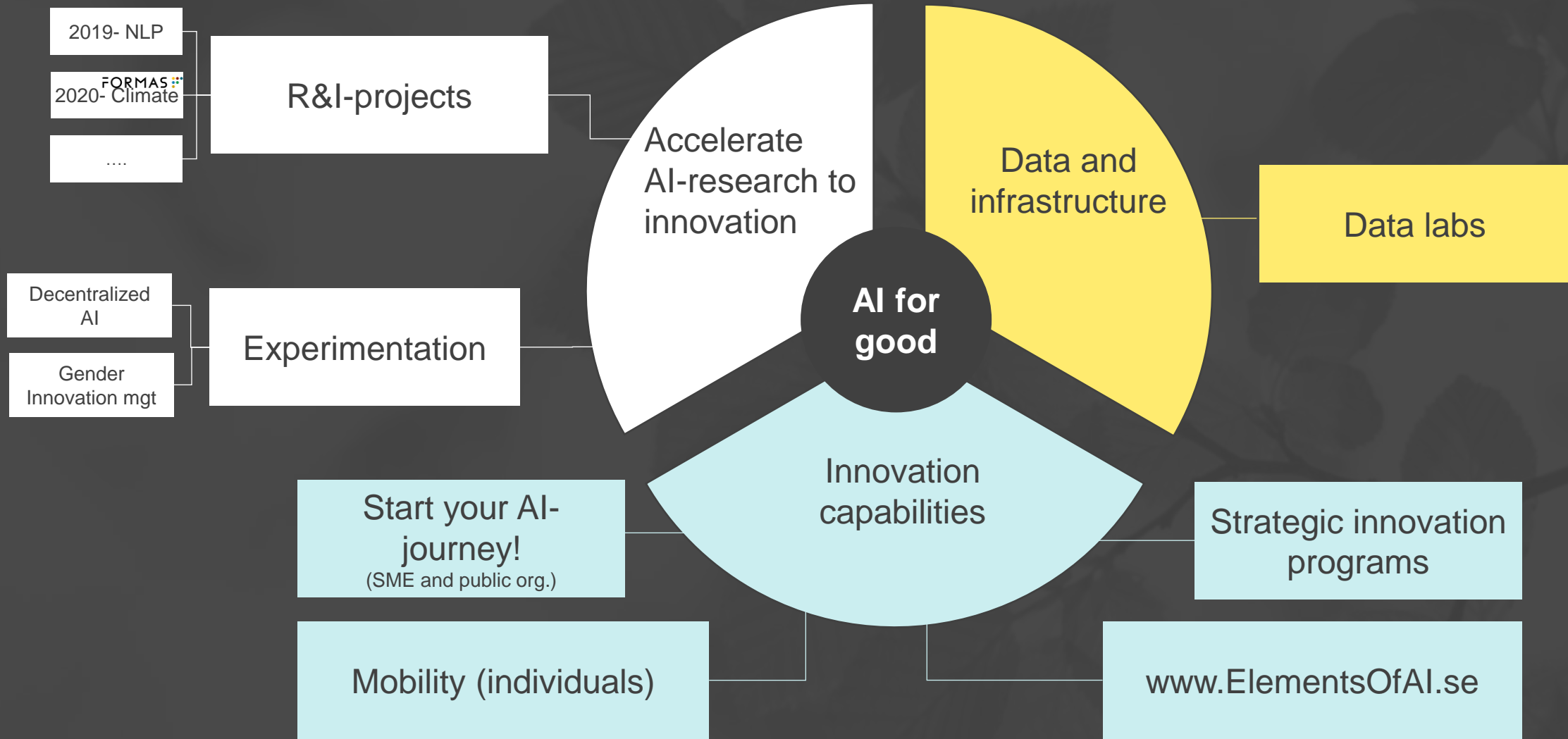
<https://www.digitalfutures.kth.se/>

Finansiärer med omfattande AI-satsningar

- Vinnova
- VR
- H2020
- Formas
- KK-stiftelsen
- Forte
- Riksbankens jubileumsfond
- SSF



AI-specific calls/initiatives



CLAIRE

**CONFEDERATION OF LABORATORIES FOR
ARTIFICIAL INTELLIGENCE RESEARCH IN EUROPE**

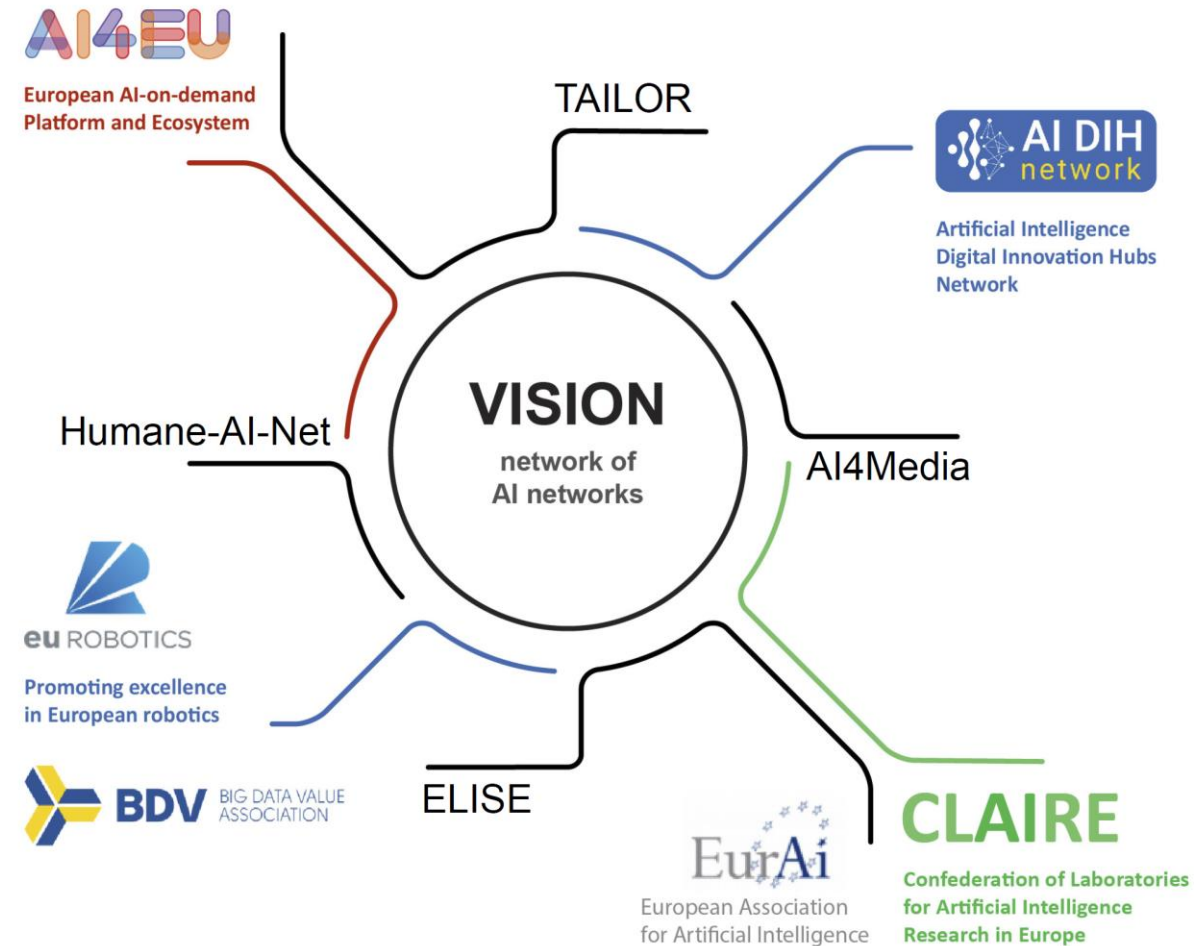
**Excellence across all of AI. For all of Europe.
With a Human-Centred Focus.**

🐦 Follow us at @vision_claire 🐦

f Like us at @claire.initiative f

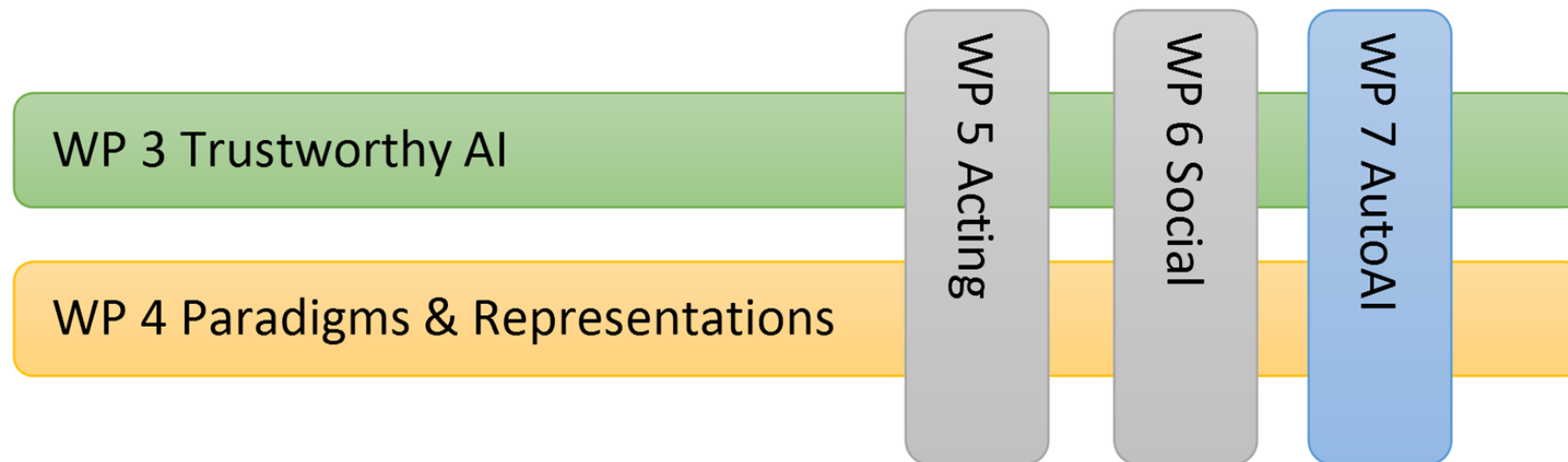
Major EU Projects and Initiatives

- AI4EU
- ICT-48 Networks (4 RIAs + 1 CSA)
 - AI4Media
 - ELISE
 - Humane-AI-Net
 - TAILOR
 - VISION (CSA)
- PPP on AI, Data, and Robotics
- Digital Innovation Hubs



TAILOR ICT-48 Network

*TAILOR brings together 54 leading AI research centres from **learning, optimisation and reasoning** together with major European companies representing important industry sectors into a single scientific network addressing the **scientific foundations of Trustworthy AI** to reduce the fragmentation, boost the collaboration, and increase the AI research capacity of Europe as well as attracting and retaining talents in Europe.*



Sammanfattning

- Sverige har haft AI-forskning sedan åtminstone tidigt 70-tal
- Alla lärosäten har AI-forskning, men volym ganska låg, men ökande
- De flesta områden inom AI är täckta, men återigen med låg volym
- Kunskapsrepresentation, robotik, datorseende är starka områden historiskt
- Maskininlärning är det område som växer mest och snabbast
- WASP är den största finansiären för grundforskning, Vinnova för tillämpad
- EU kommer troligen bli mer viktig för framtida finansiering
- **AI-forskning har en lovande framtid i Sverige!**