

What can AI and Robotics do for Elder Care?

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**ALFRED NOBEL
SCIENCE PARK**

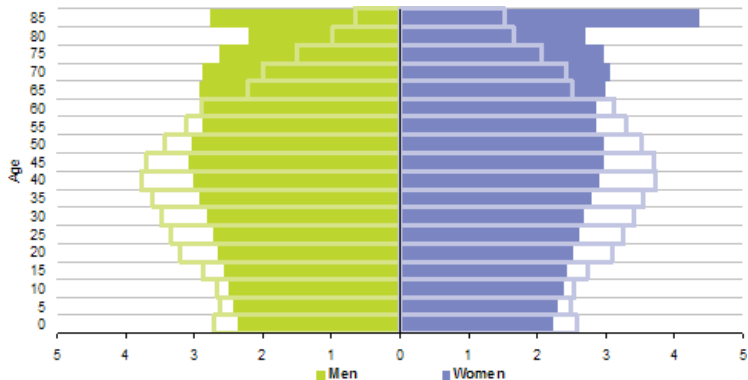
* *Joint work with the Ängen-RIA steering group*
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ängen

Research & Innovation

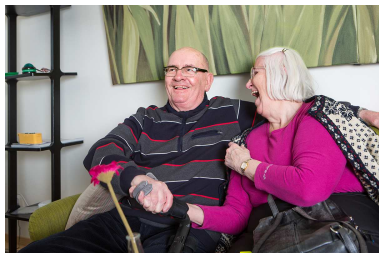
Motivation



Population pyramids 2011 & 2060, % of the total population in EU-27 (source: Eurostat)

Our Goals

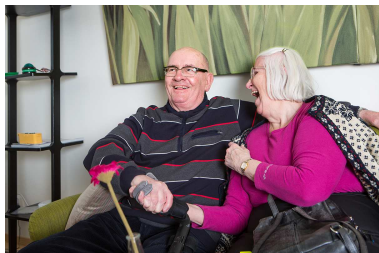
- **Improve the quality of life** of elderly people and the jobs of those who assist them
- **Prolong time** that people can live an **independent life** in their own home



- How to build **technology** that serves these goals?

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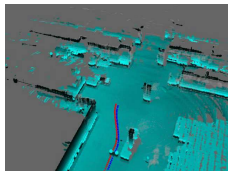


- How to build **technology** that serves these goals?
- How can **AI** and **Robotics** benefit this technology?
- What **challenges in AI and Robotics** stand in the way?

Center for Applied Autonomous Sensor Systems (AASS)

- **Intelligent robot systems:** robots that understand their environment, act appropriately, deal with changes

Perception, mapping



Motion planning, manipulation



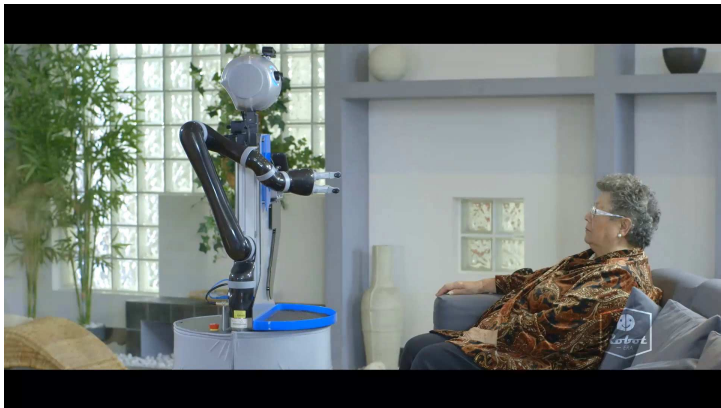
Reasoning, planning



- Basic research in **Artificial Intelligence** and **Robotics**
- Specific competence in **integration** of AI and Robotics

Physical and Cognitive Domestic Support

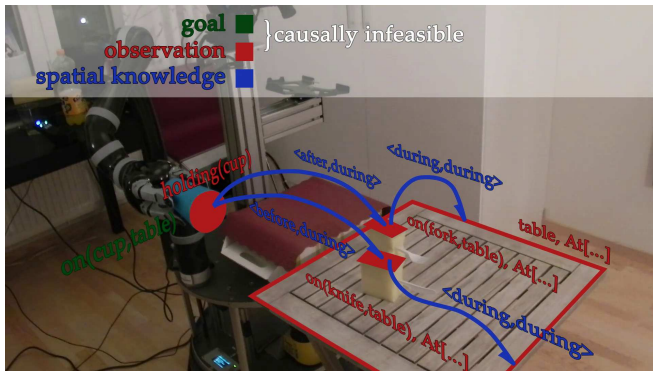
[EU Project Robot-Era / A. Saffiotti, J. Bidot, M. Di Rocco, F. Pecora, J. Grosinger, S. Sathyakeerty, C.S. Srinivas]



- **Physical support** services (e.g., bring objects, walking aid)
- **Cognitive support** services (e.g., remind to take medicine)

Understanding Qualitative Instructions

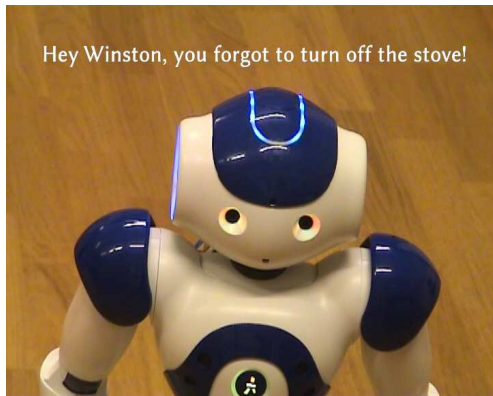
[EU Project RACE / F. Pecora, M. Mansouri]



- Robots with **human common-sense** understanding of space (e.g., “dishes go between fork and knife”)
- Can program robots with **more general instructions**

Understanding Context and Acting Appropriately

[F. Pecora, A. Saffiotti, A. Loutfi, J. Bidot, M. Di Rocco, J. Grosinger, A. Kristoffersson, A. Kiselev, A. Persson, S. Tomic, J. Ullberg]

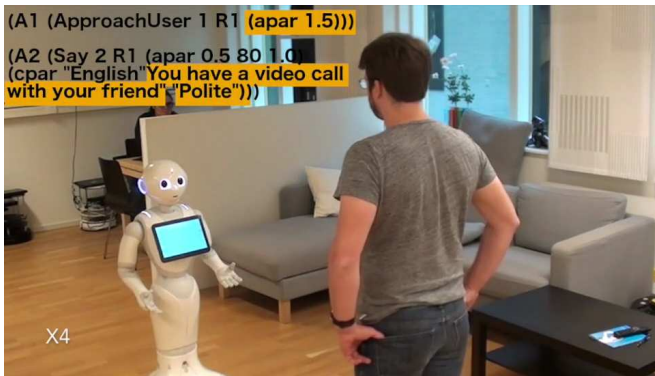


- **Context** of the user is key to providing support

$$\begin{aligned} &\mathbf{Context} \\ &= \\ &\text{ubiquitous sensor data} \\ &+ \\ &\text{knowledge about user} \\ &+ \\ &\text{reasoning} \end{aligned}$$

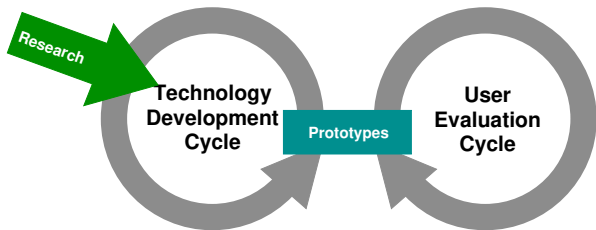
Adapting to Cultural Context and Preferences

[EU Project Caresses / A. Saffiotti, F. Pecora, U. Köckemann, A.A. Khaliq]

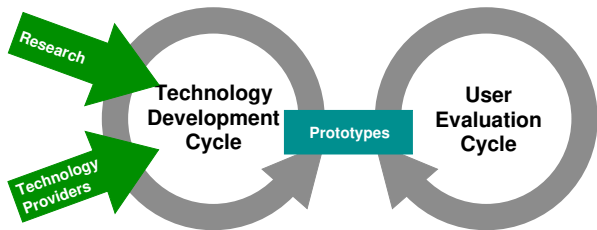


- Robots adapt their behavior to **cultural context** and **learn user preferences**
- Better **customization** of products and services

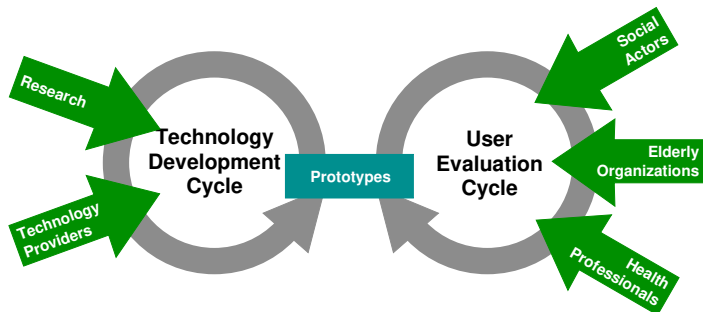
Enabling Innovation in Technology for Eldercare



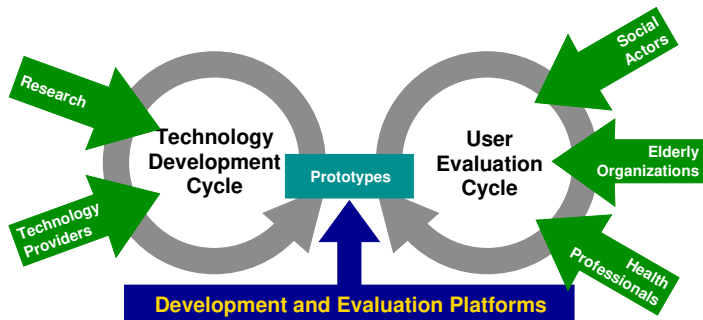
Enabling Innovation in Technology for Eldercare



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Enabling Innovation in Technology for Eldercare



The Ängen Facility



- Unique **cooperation of healthcare (Region) and eldercare (Municipality) organizations** in Sweden
- Ängen Research and Innovation Apartment **adds research capability**

The Ängen Research and Innovation Apartment

- A **development and evaluation platform** located in the Ängen senior residence facility (Örebro, Sweden)



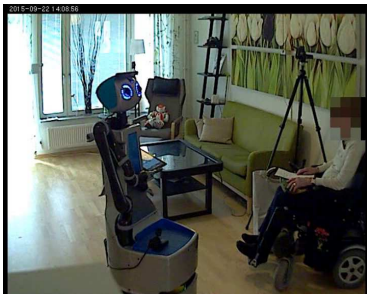
- On the surface, an apartment like others in the building. . .

The Ängen Research and Innovation Apartment



Research: The Robot-ERA Project (EU-FP7, 2011–15)

www.robot-era.eu



- Robotic services developed in **Ängen Research and Innovation Apartment**, located in seniorboende in Örebro
- Over **100 hours of testing** with elderly users

Research: The GiraffPlus Project (EU-FP7, 2011–14)

www.giraffplus.eu



Showcasing Research Prototypes and Innovative Products

SVT report, aired 2012-05-25



Ängen Research and Innovation: Participating Companies

- **Länsgården:** senior living facilities
- **GPBM Nordic:** fire safety devices
- **Camanio Care:** home automation, telepresence robotics, elder care
- **Abilia:** environmental control, cognitive assistance tools
- **Tunstall:** environmental/physiological sensors, hemtjänst call handling
- **Bioservo:** strength-enhancing wearable technology
- **Q-Fog:** mobile fire control units
- **Top Hygien:** accessible bathroom equipment
- **CloudEnablers:** cloud computing services
- **Athena Nordic:** home design and adaptation for accessibility
- **Järven Health Care:** hygienic, re-positionable, fire-proof mattresses etc.

Companies contribute **products** to Ängen Research and Innovation

Ängen Research and Innovation: Public Sector

- **Örebro Kommun:** care of the elderly, *hemtjänst*
- **Region Örebro Län:** healthcare
- **Länsgården:** special-purpose real estate



Public bodies contribute **requirements** to Ängen Research and Innovation

For More Information on Ängen Research and Innovation

<http://angeninnovation.se>



ängen
Research & Innovation

Start Forskning och utveckling Tillgängligheten Projekt Partners Press & Media Kontakt

Engliska Svenska

Genvägen till en bättre äldrevard – forskning och utveckling med djup förankring i verkligheten

På Ängen Research and Innovation möts forskare, innovatörer, vårdgivare och äldre. Mötet skapar förutsättningar för bättre lösningar, kortare utvecklingstid och snabbare produktlämningar. Vårt övergripande mål är att äldre och sjuka skall få hög livskvalitet och god vård i sin hemmiljö.

Inspirationsfilm

ÄNGEN Inspirationsfilm

Thank you!

Ängen Research and Innovation Services

S1. Open access to innovation

- **Beneficiaries:** *mainly companies, but also other researchers*
- **Added value:** *access to research prototypes mitigates need for research department in participating company*
- **Forms:** *joint research projects, link to ORU Innovation*

S2. Evaluation platform

- **Beneficiaries:** *companies and researchers*
- **Added value:** *access to wide range of relevant users which are otherwise difficult to find (primary/secondary end users, stakeholders, etc.)*
- **Forms:** *projects*

Ängen Research and Innovation Services

S3. Access to current state-of-the-art products

- **Beneficiaries:** *public bodies and other caregivers*
- **Added value:** *access to innovative technology for delivering better and/or more cost-effective care services for citizens*
- **Forms:** *testbed (e.g., Smarta Äldre)*

S4. Showcase of new products and services

- **Beneficiaries:** *companies, researchers*
- **Added value:** *dissemination, exposure to potential clients, highly relevant exposure*
- **Forms:** *visits, demonstrations*