DOMEO, an open robotic platform for cognitive and physical personalized homecare services

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Workshop PAL

Sophia-Antipolis

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DOMEO

Call AAL-2008-1

AAL Project

- starting date : July 1st, 2009
- duration : 36 months
- Partners
  - F : ROBOSOFT, ISIR, CHUT, TAS
  - HU : BME, NIMR
  - AT : TUW
- budget : 2,4 M€
- n° AAL : AAL-2008-1-159
- www.aal-domeo.eu

robosoft Advanced Robotics Solutions

Meditech

ThalesAlenia Space

Hôpitaux de Toulouse

Országos Orvosi Rehabilitációs Intézet

Institute 'integrated study'

ISIR INSTITUT DES SYSTÈMES INTELLIGENTS ET DE ROBOTIQUE

MŰEGYETEM 1782 Budapesti Műszaki és Gazdaságtudományi Egyetem (BME)

DOMEO: 2 identified main goals

Based on a robotic platform (Hw, Sw), the field tests are focusing on 2 main services :

- Risk assessment/Doubt removing (NIMR/BME)
- Telemedecine (CHUT)

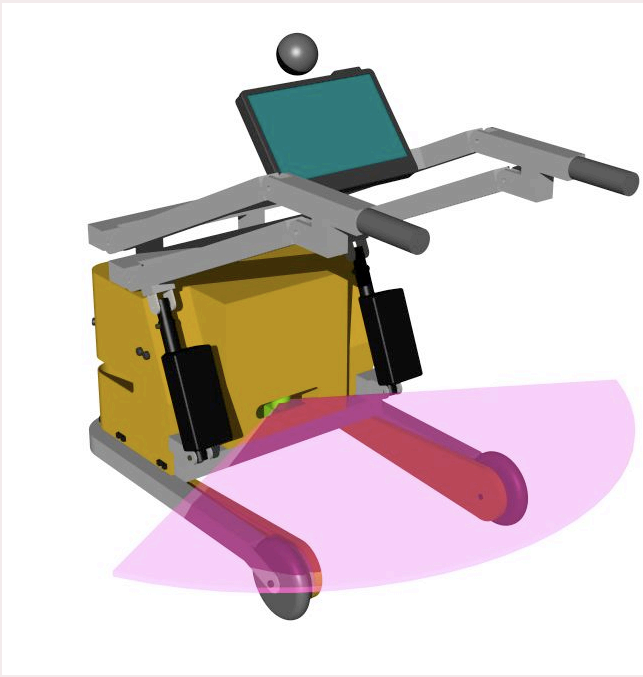
Both scenarios will also investigate the other available cognitive functions (communication, reminders, entertainment …).

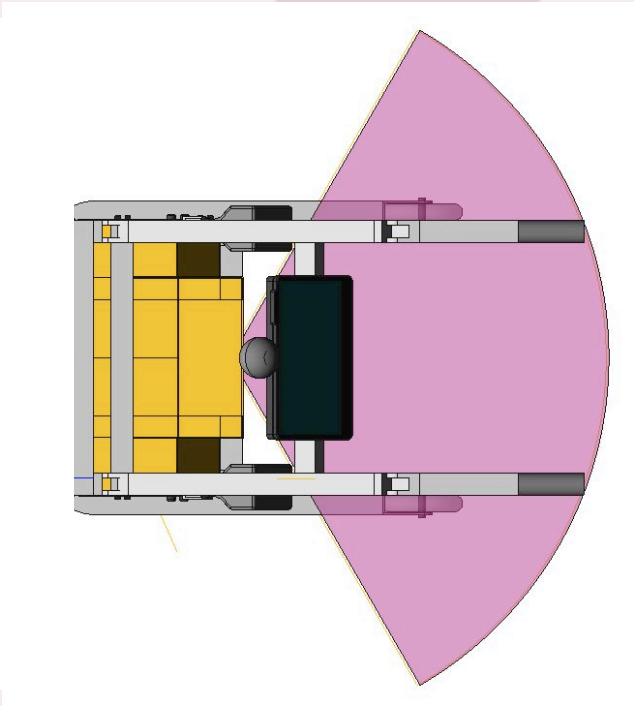
robuMATE

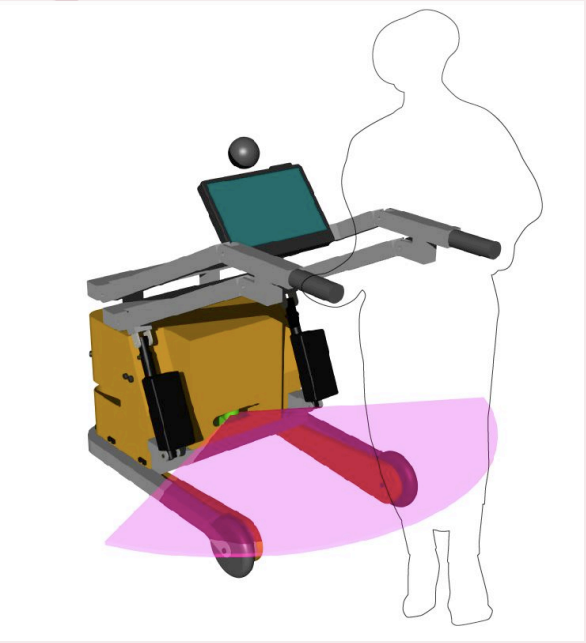
- Based on ROBOSOFT's Kompaï robot
- Middleware robuBOX Open Source
- Based on MRDS (Microsoft)
- Passed ethical committees in France and Hungary

robuWALKER

- For physical assistance
- No site trials for ethical and certification reasons
- Only lab tests and site demos scheduled



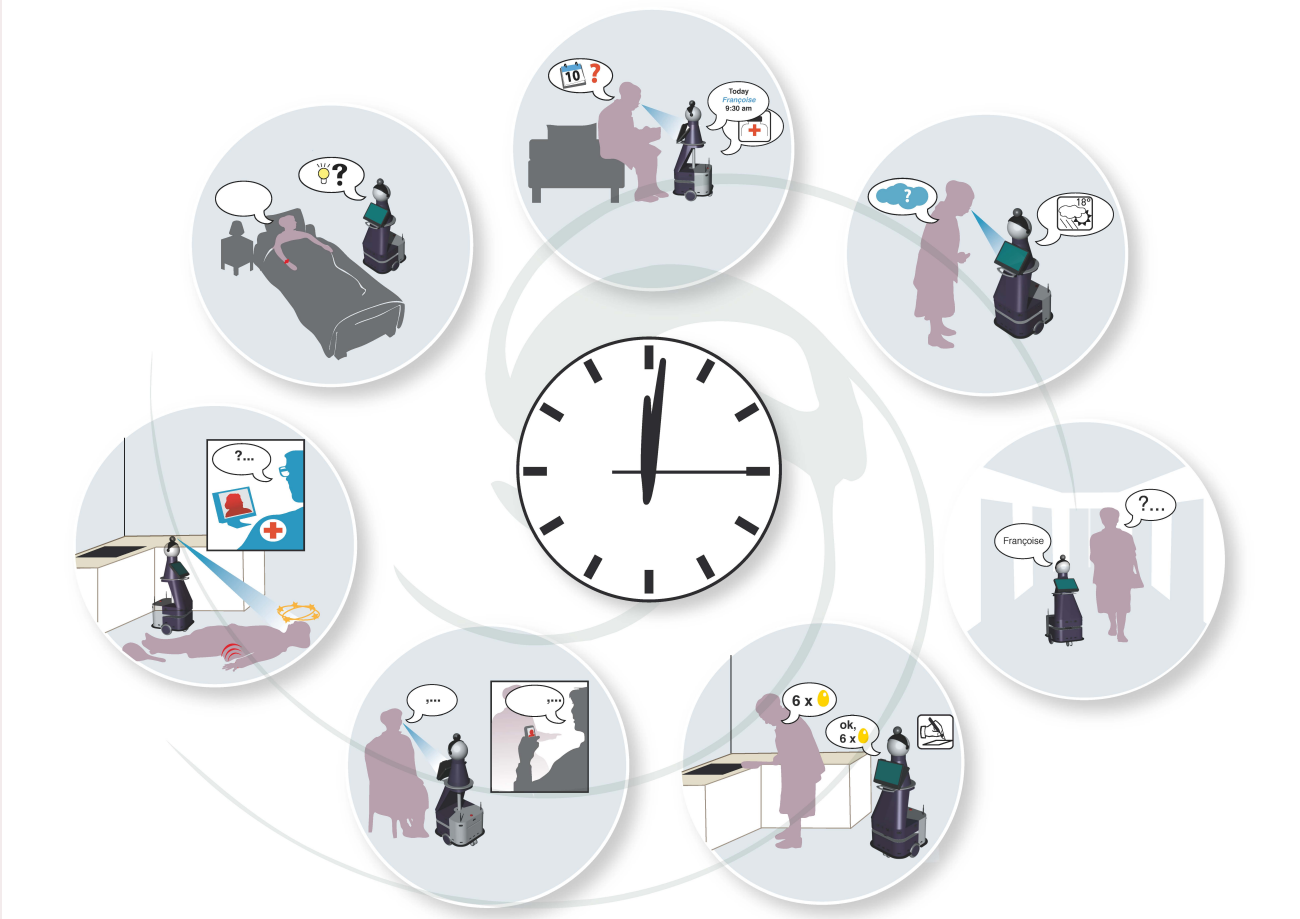




Objectives of the field tests

- Technical reliability of the robot
- Efficiency of integration of external sensors (weight scale and blood pressure)
- Cooperation between the elderly and the robot
- User's satisfaction
- Caregiver's satisfaction
- Effect of the application of assistive robot on the user's quality of life

What Kompaï does ?



What Kompaï does ?

- Removal of uncertainty
  - For caregivers, before coming
- Socialization
  - To fight against loneliness
- Cognitive stimulation
  - Reminders
  - Exercises
- Actimetry
  - Anticipate evolution

We are building our metrics

For robotic equipments : robustness and reliability

- Mean time between failures (MTBF)
- Mean Time to Repair (MTTR)
- Availability

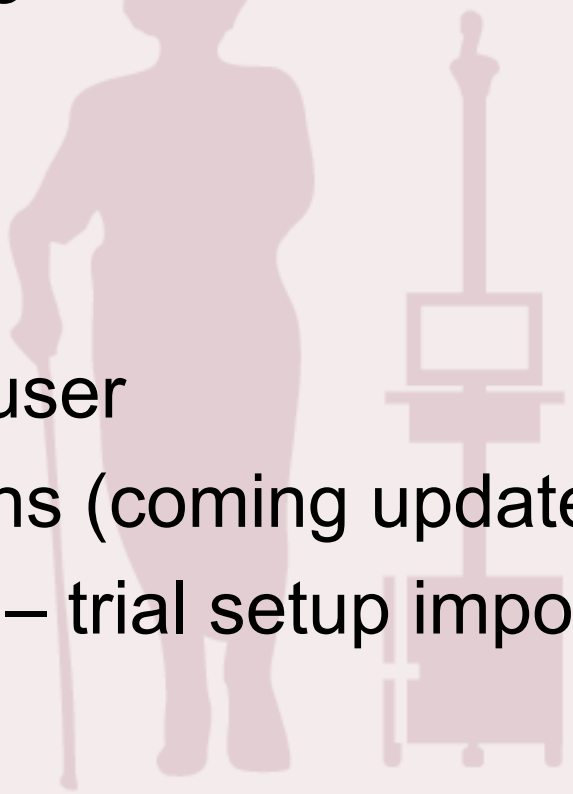
For services

- **Metrics for doubt removing** : time to decide If intervention is needed or not. In an other project, the time skipped from an average 7 mn to about 3 mn using the robot. For DOMEO the success level will be: T_DR<3 [min]
- **Metrics for avoided physical interventions :** ratio of interventions following a call, how many interventions can be avoided. If the current ratio of physical interventions is 60% through telephone-visiophone-webconferencing with secure connection-H323 video conferencing, it could be reduced to 40% with a remotely controlled robot. For DOMEO the success level will be: R_PIA>=20 [%]
- **Metrics for tele-consultation :** assess is the number of calls, the relevance of calls, the possibility to give a proper answer. Success of device will be defined as three man/months of effective deployment, 98% in connection success, good quality as assessed by users in 80% of connections.

Plus metrics for quality of telemedicine

Results of 1st Lab tests

- Runtime and charging ✓
- Localization and navigation ✓
- Communication ✓
- Reminders ✓
- Usability ✓
- Smooth and safe for user
- Missing some functions (coming update)
- Some problems exist – trial setup important



Certification and Risk assessment

- **Follow-up with ISO 13482 committee**

1. **Invasive Medical robots:** this includes all invasive personal care robots that enter a human body for monitoring and treatment of persons for achieving and maintaining good health and providing good healthcare
2. **Non-invasive Medical robots**: this includes all non-invasive PC robots for monitoring and treatment of persons for achieving and maintaining good health and providing good healthcare
3. **Mobile servant robots (with/ without manipulator):** This group covers PC robots that need to move in their environment and/or perform specific service tasks of manipulation and gripping. Including the provision of a "zero level PC service":
4. **Physical assistance robots (including rehabilitation):** These PC robots assist a person to perform required tasks (restrained and restrained-free for performing supplementation and augmentation tasks).
5. **People carrier robots:** PC robots having continuous contact against gravity with humans and used to transport the humans
6. **Personal care robotic devices**: parts of a personal care robot or "simple" personal care robotic mechanisms

Some comments in comparison with a NAO robot

- Kompai looks more robust, not like a toy
- Kompai looks more like a person and communicates at eye height
- More trust that Kompai can really support a user
- Nao is not likely to cause fear, Kompai could

Who will take care of seniors ?

Aging population

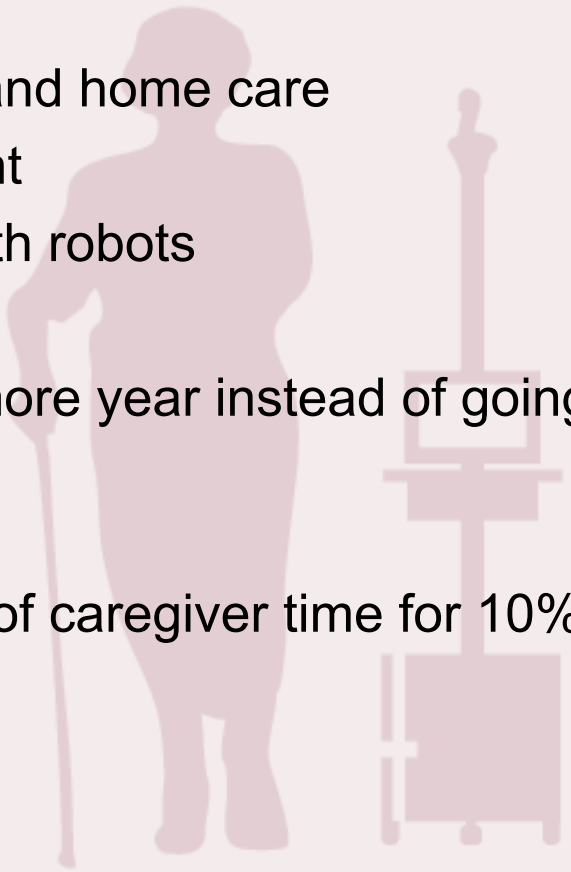
- 600 million seniors today, double by 2030, 2 billions in 2050
  - 54 millions in the US (14 millions in France)
- 1 senior for 4 workers
  - 1 for 3 in 2025

Caregiver shortage

- While seniors will increase by 100%
- Women 23-44 (new direct care workers) will increase by 7%
- US needs 1 million new care workers by 2016, more than teachers needed to educate US children

Who will take care of seniors ?

- The human dependence annual budget (USA) :
- $200B
  - 177 for nursing homes and home care
  - 23 for durable equipment
- Annual potential savings with robots
- $6B
  - If 10% stay at home 1 more year instead of going to nursing homes
- $3B
  - If the robot saves 50% of caregiver time for 10% of dependent people



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