AALIANCE2 Roadmap
A positive perspective
September 11, 2014
AAL Forum, Bucharest

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AALIANCE2
European Next Generation Ambient Assisted Living Innovation Alliance

AALIANCE2 ROADMAP AND SRA 2014
AALIANCE2

Next Generation European Ambient Assisted Living Innovation Alliance

Funding scheme: Coordination Action (CA), FP7-ICT-2011.7

- Investigating the current SoA and market developments in AAL in Europe, North America and Asia, addressing possible Business models;

- Further developing the AALIANCE2 AAL Roadmap and Strategic Research Agenda for future technologies and applications;

- Addressing standardisation issues and initiating corresponding standardisation activities;

- Enhancing the sustainable network of AALIANCE involving the major AAL Stakeholders;

Consortium

1. Scuola Superiore S. Anna, IT
2. OFFIS, DE
3. Deutches Telekom Ag, DE
4. Tunstall, UK
5. Tecnalia, ES
6. Age Platform, BE
7. VanMorgen, NL

www.aaliance.eu
AALIANCE 2010 - 2014

Ageing well (@home, @mobile)
PERSONAL AUTONOMY AND WELL-BEING

Ageing well in one’s social environment
PARTICIPATION

Ageing well in one’s working environment
ACTIVE AND PRODUCTIVE AGEING

PREVENTION
Task supporting cognitive and motor abilities before severe disease (i.e. Health periodic monitoring, fall prevention..)

COMPENSATION & SUPPORT
Task supporting cognitive and motor abilities after severe disease (i.e. Smart walker, pedestrian GPS,..)

INDEPENDENT & ACTIVE AGEING
Task supporting independence of elderly (i.e. Social inclusion, work, leisure and entertainment,..)

Ambient Assisted Living Roadmap
July 2014

Ambient Assisted Living Strategic Research Agenda
July 2014

AALIANCE2 is a Coordination Action funded by the European Programme FP7-ICT-2011.5.4 (Project reference: 288705)
Roadmap and SRA 2014: Workflow

**ROADMAP**

- Stakeholders’ Needs
- AAL Service Areas & Scenarios
- Technological Gaps

**SRA**

- Key Service Scenarios
- Key Enabling Technologies (KETs): Challenges & Timeline

**Transversal Issues & Recommendations**
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Bucharest, Romania
September 09-12, 2014

User needs & Recommendations

- Questionnaires (130+ stakeholders)
- Online survey (40+ stakeholders)
- 3 Exhibitions (AAL Forum 2013, ICT 2013, ForItAAL 2013)
- 3 Workshops in Europe (200+ stakeholders)
- 1 Conference (Brussels, March 2014)
- 2 Online surveys (40+ stakeholders)
- 1 Conference (Brussels, March 2014)
Roadmap and SRA: Workflow

Stakeholders’ Needs
- Secure environments
- Contacts with friends, family, society
- Healthcare in my home, comfort, peace of mind
- Appropriate response when things go wrong
- Be able to work ...

AAL Service Areas and Scenarios
- Prevention
  - Scenarios for Prevention
- Compensation and Support
  - Scenarios for C&S
- Independent and Active Ageing
  - Scenarios for I&AA

Key Enabling Technologies
- Sensing
- Reasoning
- Acting
- Interacting
- Communicating

Examples:
- Secure environments
- Contacts with friends, family, society
- Healthcare in my home, comfort, peace of mind
- Appropriate response when things go wrong
- Be able to work...
We are talking about...
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Some of their roles in the society

WHAT?
Older people usually contribute to society (volunteer)

1. Charitable giving, caring for family members and civic engagement of all types;
   - informally, outside their immediate families;
   - formally, through groups and organizations.

There is clear evidence from scientific studies that volunteering benefits health.

Source: Citizenship Survey 2009-10
Customs

- Old people handed down customs, traditions, experience and wisdom from generation to generation.
People in their 50s and 60s start businesses at nearly twice the rate of those in their 20s, because they have the capital, the credit, and, often, a wealth of experience that younger workers lack.

They already inject some $4.6 trillion a year in spending on consumer goods and services, including health care,
Grandparents and grandchildren

- Older grandparents (those aged over 65) are usually asked raising their grandchildren
Longevity economy (2)

- Provision of some form of financial support to their adult children

Fig. 7: Financial assistance to adult children
Parents aged 47–65 who have provided financial support to adult children

- Helped with college loans or tuition
- Allowed to move home rent free
- Helped to buy a car
- Helped with car insurance
- Helped with rent or utilities
- Co-signed a loan or lease
- Helped with medical insurance
- Helped with paying credit card debt
- Helped with house down payment
- Helped with a mortgage payment

Source: Ameriprise Financial
Older people contribute to society (work longer)

Projections for changes to the employment rate between 2010 and 2060

Source: Eurostat 2012
1. Active ageing is an important opportunity for society because healthy and active older citizens can continue to contribute to the growth and welfare of the communities in terms of support to their children and grandchildren, voluntary work, consumption and purchases, work, etc.
The presence of old people in the society is first of all an opportunity
The good thing???
There are a lot of elderly people

Projected structure of the population by age group, EU-27, 1 January 2010

<table>
<thead>
<tr>
<th>Year</th>
<th>Millions</th>
<th>% of total population</th>
</tr>
</thead>
<tbody>
<tr>
<td>1950</td>
<td>130.5</td>
<td>5.2%</td>
</tr>
<tr>
<td>2000</td>
<td>417.2</td>
<td>6.8%</td>
</tr>
<tr>
<td>2050</td>
<td>1,486.9</td>
<td>16.2%</td>
</tr>
</tbody>
</table>

Population aged 65 or more for the world


Source: Eurostat (online data code: proj_10c2150p)

Source: Author’s graph, based on data from UN (2011)
Elderly people in rural areas

1. Senior people live in rural areas and big urban areas, so well distributed in places.
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But

They are frail
Health status of the older population

The data revealed that on average men have higher incidence of fatal diseases and death, but women experience more disability.

Graphs showing:
- Heart disease rate
- Stroke rate
- Cancer rate
- Hip fracture rate
- 1+ ADL limitations rate
- Death rate

Source: SHARE, 2008 (Börsch-Supan et al., 2008)

Grey line: men
Orange line: women
Management of multiple and chronic diseases at home

1. Chronic conditions are those that last a year or more and require ongoing medical attention and/or limit activities of daily living; Examples include arthritis, diabetes, heart disease and hypertension;
Risk of accidents

1. Older persons, and especially those aged 75+, are more at risk to have accidents and in particular falls (physical weakness or effects of polypharmacy);

Rate* of Nonfatal, Medically Consulted Fall Injury Episodes,† by Age Group

Cost of Fall Injuries in Older Persons in

Graphic source: MMWR Quickstats, 02/03/2012
Insecurity, vulnerability, loneliness and depression;

1. Older persons who live alone and/or had negative experiences (like accidents, falls), may strongly perceive their loneliness and vulnerability;

2. Consequently depression and premature degeneration of both physical and cognitive health occur.

Overall, research suggests that loneliness is as much of a threat to health as smoking or obesity
Maltreatments

1. A study of the World Health Organization highlighted that in Europe annually about 4 millions of elderly older people are subject to maltreatments and abuses that often cause premature deaths;

2. There are several forms of abuse:
   - physical,
   - psychological,
   - financial,
   - sexual
   - medical abuse.
So....

It is easy!!!
We have to take care of them
Informal caregivers

- The term ‘informal caregivers’ pertains to **unpaid persons** (mainly the partner, but also other family members, friends, neighbours, etc.);
- In the majority of EU countries, informal caregivers undertake on average **60% of care requests**;
- These individuals manage a wide variety of tasks, from health care and therapy management to support for Activities of Daily Living (ADL) (bathing, dressing, cooking, cleaning the house, etc.);
- These informal carers often have **difficulty finding a good balance between their caring role and other activities of their life** (work, family, leisure, etc.)
Occupation in healthcare

The U.S. Bureau of Labor Statistics has predicted that occupations in healthcare will dramatically change.

<table>
<thead>
<tr>
<th>Fastest-growing occupations 2002-2012</th>
<th>GROWTH</th>
<th># OF NEW JOBS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medical assistants</td>
<td>59%</td>
<td>215,000</td>
</tr>
<tr>
<td>Network systems, data communications analysts</td>
<td>57%</td>
<td>106,000</td>
</tr>
<tr>
<td>Physician assistants</td>
<td>49%</td>
<td>31,000</td>
</tr>
<tr>
<td>Social and human service assistants</td>
<td>49%</td>
<td>149,000</td>
</tr>
<tr>
<td>Home health aides</td>
<td>48%</td>
<td>279,000</td>
</tr>
<tr>
<td>Medical records and health information technicians</td>
<td>47%</td>
<td>69,000</td>
</tr>
<tr>
<td>Physical therapist aides</td>
<td>46%</td>
<td>17,000</td>
</tr>
<tr>
<td>Computer software engineers, applications</td>
<td>46%</td>
<td>179,000</td>
</tr>
<tr>
<td>Computer software engineers, systems software</td>
<td>45%</td>
<td>128,000</td>
</tr>
<tr>
<td>Physical therapist assistants</td>
<td>45%</td>
<td>22,000</td>
</tr>
</tbody>
</table>
Quaternary stakeholders point of view

- To make healthcare and long-term care services **efficient and financially sustainable**
- To **facilitate the access to services** by all citizens (smart cities and infrastructures)
- To have **healthy and active citizens** contributing to the welfare of the community
- To **revise regulations and funding instruments**
Healthy and active citizens contributing to the welfare of the community

• It is fundamental to **keep citizens healthy**, active and involved in the community life as long as possible;
• governments should encourage actions devoted to **disease prevention and the adoption of healthy life styles**;
• these preventive activities should be promoted to **all citizens**, young persons, adults and older people.
A model for Active and Assisted Living
Service Areas

- Prevention
- Compensation and Support
- Independent and Active Ageing

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**PREVENTION**

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Task supporting independence of elderly (i.e. Social inclusion, work, leisure and entertainment,..)

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Analysis of elderly life

Quality of Life

Without AAL devices and services

Age
Prevention

“Action to reduce or eliminate the onset, causes, complications or recurrence of disease”

Primary Prevention
Activities to avoid and delay specific diseases

Secondary Prevention
Actions taken to delay the onset of significant morbidity

Some examples:
- Point of care
- Neurodegenerative Disease
- Safety at Work
Analysis of elderly life

Quality of Life

ΔQoL

Without AAL devices and services

Effects of AAL4prevention

PREVENTION
Tasks supporting and maintaining cognitive and motor abilities before severe diseases (i.e. health periodic monitoring, fall preventions, etc.)
Compensation and Support concerns elderly people with physical or cognitive impairments that need help in their daily activities.

Technology should be part of the integrated care ‘chain’

- Monitoring and Assistance
- Personal Management of Chronic Diseases
- Daytime management
- Support in Driving
- Rehabilitation assistance
Analysis of elderly life

Quality of Life

Age

ΔQoL

Without AAL devices and services
Effects of AAL4prevention
Effects of AAL4support and compensation

PREVENTION
Tasks supporting and maintaining cognitive and motor abilities before severe diseases (i.e. health periodic monitoring, fall preventions, etc.)

COMPENSATION & SUPPORT
Tasks supporting cognitive and motor abilities after severe diseases (i.e. smart walker, pedestrian GPS, etc.)
Independent and Active Ageing

“Active ageing aims to extend healthy life expectancy and QoL for all people as they age, including those who are frail, disabled and in need of care”

Wish to remain at home feeling safe, avoiding social isolation thus being involved in society and keeping contacts with friends and family

- Safety and security
- Keeping social contacts
- Age Friendly Environments
- Keeping control over life and decisions
- Being able to work longer
- Appropriate response when things go wrong
Analysis of elderly life

PREVENTION
Tasks supporting and maintaining cognitive and motor abilities before severe diseases (i.e. health periodic monitoring, fall preventions, etc.)

COMPENSATION & SUPPORT
Tasks supporting cognitive and motor abilities after severe diseases (i.e. smart walker, pedestrian GPS, etc.)

INDEPENDENT & ACTIVE AGEING
Tasks supporting independence of elderly (i.e. social inclusion, work, leisure and entertainment, etc.)

Quality of Life
ΔQoL
ΔAge

- Without AAL devices and services
- Effects of AAL4prevention
- Effects of AAL4support and compensation
- Effects of AAL4independent and active ageing
Interconnected Stakeholders Context

Social Innovation and integrated community

- The deployment and adoption of AAL technologies in the real daily life requires a strong innovation at the level of the service organizations because they should be designed, and managed in order to provide to older citizens all kinds of health and social services;
- Community services should be organized in network in order to provide high quality support to each user, optimizing the resources and avoiding redundancies;
- AAL culture should be promoted, above all for end-users.
# 10 Key Service Scenarios

<table>
<thead>
<tr>
<th>Prevention of the early degeneration of cognitive abilities</th>
<th>Healthy living</th>
<th>Management of Chronic Diseases</th>
<th>Aging-Friendly and Safety Environments</th>
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<tr>
<td>Fall prevention</td>
<td></td>
<td>Keeping social contact and having fun</td>
<td>Outdoors mobility (i.e. pedestrians, public transport and private cars)</td>
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<tr>
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<tr>
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<td>Senior citizens at work</td>
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AAL Market

- Reviewed existing models - found few solutions that include components from three domains - most focus in the overlapping space of any two
- Used ICTechnolAge study findings to identify cases for AAL reference business models
  - Scottish telecare
  - Simap
  - SOPHIA
- Looked for potential managed service models
  - UK embracing the managed service approach
  - Spanish government is working to define service outcomes consistent with the UK’s approach
  - Germany mostly focused on telecare. Telehealth still mostly small trials (700+) with the goal of demonstrating effectiveness mainly for insurance institutes

(Kubitschke & Cullen, 2010)
Managed Services Examples

- **Transfer of responsibility to a 3rd party service provider** – offers the potential to accelerate the development of a more integrated offering by managing the whole value chain on a fee per service basis.
- A variety of revenue models
  - Equipment only
  - Equipment plus call centre
  - Full service from referral to response
Telecare in Spain

- In Spain, full delegation of telecare services to a single provider is now the norm. Ease of interaction with a single provider appears to be the main reason for outsourcing under a ‘managed services’ model.
- The revenue model used is a monthly fee per user, which would cover the equipment and all the other service provisions.
- Andalusia is an exception to the rule with a direct provision model, relying on its own public infrastructure for operations. ASSDA outsourced the equipment supply, installation and maintenance, while the call centre and contact with users remain in-house.
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Managed Service Model

Prevention of the early degeneration of cognitive abilities

Management of Chronic Diseases

Aging-Friendly and Safety Environments

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10 Key Service Scenarios

- Prevention of the early degeneration of cognitive abilities
- Healthy living
- Management of Chronic Diseases
- Aging-Friendly and Safety Environments
- Fall prevention
- Management of daily activities and keeping control over own life
- Keeping social contact and having fun
- Outdoors mobility (i.e. pedestrians, public transport and private cars)
- Avoiding Caregivers Isolation
- Senior citizens at work
- Senior citizens at work
## Scenario Matrix: aligning segmentation, funding and business models

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Market segment</th>
<th>Funding</th>
<th>Business Model</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Scenario 1: Prevention of early degeneration of cognitive abilities</strong></td>
<td>High degree of prevention aids (support, equipment, etc.) in Urban areas and moderate in Comfortable+ rural areas. In poorer rural areas financial means for prevention is limited.</td>
<td>Country specific Dependent on healthcare system. Can be privately funded, reimbursed through insurance or users may have recourse to public funding</td>
<td>This could be either the telecare or telehealth models covered in D3.2 i.e. Spain - Telecare</td>
</tr>
<tr>
<td><strong>Scenario 3: Management of chronic diseases</strong></td>
<td>Comfortable+ and Less Affluent (rural and urban). Many countries offer services for the management of chronic diseases.</td>
<td>Depends on national healthcare system. For many there is government funding or combinations of private and insurance reimbursement. There is a lot of movement towards marketing direct to the users, making some products privately funded.</td>
<td>The Telehealth models as described in D3.2 (UK, Spain, Germany) are the best fit models for this scenario.</td>
</tr>
<tr>
<td><strong>Scenario 4: Age-friendly and safe environments</strong></td>
<td>Offered to a high degree in rural and Urban areas. Prevalent in countries that allow this to be funded by healthcare system.</td>
<td>Available in many countries with a combination of funding (private, insurance and public).</td>
<td>The UK telecare model covers the range of services offered for Age-friendly and safe environments.</td>
</tr>
</tbody>
</table>
Do we have technology?

YES
The market perspective: electronic health

Consumers believe they should have more access to their electronic health records

Overwhelmingly, consumers feel it is important for their medical providers to offer electronic capabilities.

- 82% book, change or cancel appointments
- 76% receive reminders
- 73% refill prescriptions
- 69% communicate via secure email with providers
- 81% access their medical records electronically

Although the majority of consumers value electronic capabilities, most say that their current providers do not offer these services.

- 37% book, change or cancel appointments
- 26% receive reminders
- 21% refill prescriptions
- 19% communicate via secure email with providers
- 23% access their medical records electronically

69% of consumers say that these services are very or somewhat important.

Accenture consumer survey on patient engagement
mHealth is a term used for practise of medicine and public health, supported by mobile devices.

**Top 10 Mobile Health Apps**
- 52% of smartphone users gather health-related information on their phones.
- 4 million free & 300K paid downloads per day.

**Do Doctors Recommend mHealth Apps?**
- 80% of physicians use smartphones and medical apps.
- 40% of physicians believe mHealth technologies can reduce the number of visits to doctors' offices.
- 25% of physicians are using mobile technology to provide patient care.
- 93% of physicians believe that mobile health apps can improve patient's health.
- 93% of physicians find value having a mobile health app connected to Emergency Health.

**mHealth User Statistics**
- Average age: 35
- 87% have a smartphone (of whom 76% use social media for health)
- 33% of men use their smartphones when taking a prescription
- 61% have downloaded a mHealth app
- 76% of smartphone owners use health apps
- 54% male
- 30% caregivers
The market perspective: digital impact

The Role of the Internet in Healthcare

Services Customers find valuable if offered online via Internet

- 30% use computer or mobile device to check for medical or diagnostic information
- 29% Treatment reminders
- 30% Information for managing drug side effects
- 40% Appointment reminders

Privacy in Healthcare

Information Customers are willing to share Online

- 63% of customers are comfortable with storing their medical records on a cloud
- 39% don’t trust internet sites to keep my health information private and secure

- 25% Exercise / Physical activity
- 28% Weight
- 26% Sleep Patterns
- 20% Nutritional information (e.g., calories consumed, etc.)
- 25% Symptoms / General health complaints
- 15% Vital signs (e.g., blood pressure, heart rate, etc.)

Cisco customer experience report for healthcare

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The market perspective: sensors in healthcare

"The whole sensor field is going to explode. It's a little all over the place right now, but with the arc of time it will become clearer."
-- Tim Cook, CEO, Apple, 2013

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The market perspective: wearable technology

By 2017, the connected wearable market is expected to reach 64 million shipments (8X larger than in 2012).

Forecast: worldwide spending on wearable technology

<table>
<thead>
<tr>
<th>Year</th>
<th>2013</th>
<th>2018</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spending</td>
<td>$1.4 billion</td>
<td>$19 billion</td>
</tr>
</tbody>
</table>

**SPORT DEVICES**
- **SHOTTRACKER** Basketball: Tracks all shot attempts, makes, and misses.
- **MISFIT SHINE** Running, cycling, swimming: Tracks steps taken, activity level, and sleep.
- **INSTABEAT** Swimming: Tracks heart rate, calories, number of laps, and breathing pattern.
- **TRACE** Action sports: Tracks speed, distance, time, weather, and rotation.
- **PUSH** Weightlifting: Tracks reps and sets, force, power, balance, speed, and explosiveness.

**HEALTH DEVICES**
- **PEBBLE** Smartwatch: Displays critical apps and notifications from a user's wrist, including music control and sleep.
- **SONY SMARTWATCH** Snowboard notifications: Displays notifications, weather, and other notifications, such as when a call is received.
- **GOOGLE GLASS** Augmented reality glasses: Displays voice commands, maps, and other information.

**PERSONAL DEVICES**
- **SAMSUNG GALAXY GEAR** Smartwatch: Tracks notifications, calls, emails, and weather, and has a voice control feature.

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Medical electronics

A shift towards home or patient centric health care: personal healthcare monitoring, diagnostic and preventative medical electronics.

From $91 billion USD in 2011 to $119 billion USD in 2017
Average rate of 4.6% per year (Prismark)
Robotic Market

ROOMBA: as of Feb 2014, over 10 million units have been sold worldwide
PREVENTION OF EARLY DEGENERATION OF COGNITIVE ABILITIES

AAL systems should be developed in order to avoid the early degeneration of cognitive abilities and delay the overcome of cognitive impairments. These tools should stimulate the interaction of the user with other persons and at the same time stimulate the cognitive capabilities by making people stay mentally active.

Reminder and informer
Cognitive gaming at community centres
Cognitive gaming at home
Remote control by clinicians

Short
Mid
Long

Advanced interfaces (haptic interfaces, augmented reality), self-learning-modelling of cognitive abilities
Reasoning tools for the modelling and recognition of cognitive abilities from gaming data
Personalised gaming applications for the stimulation of cognitive abilities
AAL TECHNOLOGIES COULD SUPPORT OLDER PERSONS IN MANAGE EASILY THEIR CHRONIC DISEASES: SMART INTERFACES AND TOOLS CAN BE USED FOR TELE-CARE AND TELE-HEALTH, SMART DRUG DISPENSER CAN HELP USERS IN TAKING CORRECTLY DRUGS, PORTABLE REHABILITATIVE DEVICES FOR REHABILITATION AT HOME, POINT-OF-CARE AND WEARABLE SENSORS TO MONITOR HEALTH PARAMETERS.

- Health monitoring
- Taking drugs
- Rehabilitation
- Remote control by clinicians

**Short**

- Standalone point of care, On-body sensors for health and motor monitoring

**Mid**

- In-body (ingestible, implantable) sensors for health monitoring, Body area network

**Long**

- Advanced intelligence for self-learning-modelling and prediction of health conditions

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**AGE-FRIENDLY AND SAFE ENVIRONMENTS**

AAL TECHNOLOGIES, LIKE IMPERCEPTIBLE ENVIRONMENTAL SENSORS, ADVANCED PROCESSING TOOLS FOR EVENTS RECOGNITION AND PREDICTION, SMART ELECTRONIC APPLIANCES AND ROBOTS, COULD BE ADOPTED IN ORDER TO MAKE HOUSES SAFER AND AGE-FRIENDLY ENVIRONMENTS IN WHICH LIVING

- **Short**
  - House safety
  - House management
  - Remote control by caregivers

- **Mid**
  - Safe data transfer and protection
  - And Wide area net-work
  - Multimedia appliances and applications for remote control of the house and of user’s status

- **Long**
  - Assistive robots
KEY ENABLING TECHNOLOGIES (KET)
KET panorama

'SENSING' sensor principles and technologies.

'REASONING' intelligent systems, learning, knowledge

'COMMUNICATING' machine to machine interfaces

'INTERACTING' human machine interfaces

'ACTING' automatic technology and robotics
‘SENSING’

new sensing principles and technologies to measure physical, chemical, electrical, optical, etc. quantities of a phenomenon and to produce outputs usable to improve the AAL services.

**Sensing:**
- Smart Sensors
- MEMS
- Lab on Chip
- Biosensors
- Vision Sensors

**Environmental sensors**
- Pervasive Sensing & Smart Environments
- In / On Body Sensors
- Quantum Sensors
- Energy harvesting
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Sensing

Telehealth

Implantable Sensors

Environmental Sensors

Wearable Sensors

Sensors for personal monitoring

Telecare

Smart Environment

Ingestible Sensors

Sensing

Environmental Sensors

Implantable Sensors

Wearable Sensors

Sensors for personal monitoring

Telecare

Smart Environment

Ingestible Sensors
‘REASONING’

Intelligent systems with computational capabilities able to generate knowledge using logical techniques of deduction, induction or other forms of reasoning.

**Reasoning:**
- Context Awareness and Sensor data fusion
- Artificial Intelligence
- Advanced controls for robotics and automation
- Self Dependability and Maintainability
Reasoning

- Expert Systems, Fuzzy logic and rules
- Semantic web and Cloud
- Ontologies
- Statistical and Machine Learning Data
- Emotion/mood
- Autonomous services management and problem optimization
- Collaborative filtering
‘ACTING’

Automated systems and robotics, which proactively act for providing useful services, including physical and cognitive support.

**Acting:**
- Home automation
- Service Robotics
- Smart Mobility
- Smart Actuators
- NeuroRobotics
- Wearable Robotics
- Cloud Robotics
- Social Robotics
Cloud robotics is not specific to a robot or a type of robot. It is the way robots store information and access a base knowledge.

(James Kuffner Carnegie Mellon University, @ Humanoids 2010)
Social Robotics

A social robot is an autonomous / semi-autonomous robot that interacts and communicates with humans or other autonomous physical agents by means of social behaviors and rules.
“INTERACTING”
All kinds of means, both software and hardware, that allow interaction processes and bridge capabilities between users and service/machines.

**Interacting:**
- Sensorial interfaces
- Spatial Interfaces
- Natural language interfaces
- Multi-modal interfaces
- Neural Interfaces and Brain Computer Interfaces
- Service integrations
- Apps
Neural and multimodal interfaces

EEG-based BCI techniques

Invasive BCIs CI techniques

Noninvasive EEG-based BCIs

Nerve controlled prosthesis

Holograms

Avatars

Haptic Voice Recognition

AALIANCE2 is a Coordination Action funded by the European Programme FP7-ICT-2011.5.4 (Project reference: 288705)
‘COMMUNICATING’

Technologies related to machine to machine interfacing that allow devices to communicate and cooperate.

Communicating
- BAN/PAN
- LAN/Home network

- WAN
- Standardisation and certification
- Data protection regulations
Grand Tech Challenge

IoT, Cloud market
(Google, Amazon, ...)

Robotics Market
(I-Robot, Panasonic, Honda, ...)

Communication Mobile market
(Telecom, ...)

Consumer Electronics market
(Telecom, ...)

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For real exploitation and deployment, please, don’t forget...

Transversal issues
Transversal Issues

Ethical, Legal, Social

Power management, Green technology

Standardization

Dependability

Acceptability

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AAL Forum 2014
Bucharest, Romania
September 09-12, 2014
Recommendations (1)

- End-users’ and all stakeholders’ perspective
  - design services
  - evolution of the structure of the society
  - intergenerational relationships
  - ageing starts before 65
- Design criteria
  - acceptability, user-friendliness, accessibility for all, customisability, dependability, etc.
- Experimentation and pilot sites
  - appropriate methodology with standardized metrics and benchmarks that depicts an homogeneous view of the AAL products and services and users’ quality of life
  - necessity of infrastructures and settings
Recommendations (2)

• Dissemination of AAL culture
  – Many elderly persons, caregivers, sociologists and service providers do not know AAL solutions or underestimate potentialities and benefits of ICT devices and new services

• AAL market
  – AAL stakeholders remarked that the AAL market is strongly fragmented (different culture, organisation of services and methods for financing), so necessity to coordinate initiatives to avoid this fragmentation
  – Many interviewed noticed that there is a lack of entrepreneurship among subjects working in AAL research due to market risks (Entrepreneurship and disruptive business models)
Recommendations (3)

• Policies
  – Experts recommended to develop policies, at European, national and also regional level, to rethink the organization of healthcare by renewing socio-medical services and including new innovative services with the use of AAL technologies;
  – Interoperability, standards and certification;
  – Regulation of the transmission, elaboration, sharing and storing of health and personal data;
  – The use of the AAL solutions into society is also invalidated from the lack of adequate infrastructure (e.g. presence of architectural barriers and the lack of adequate WLAN infrastructure in the rural areas).
Recommendations (4)

• Other remarks
  – Every older person should be the main carer of him/herself, so it is important to empower and make senior people aware about how they should take care of themselves.
  – AAL technologies should be facilitator of AAL services for caregivers and so they should not replace the fundamental role of formal and informal caregivers. These tools should be designed to allow clinicians and carers to follow more efficiently older people.
Thank you for your attention

www.aалиance2.eu