Towards Longer, Better, and More Active Lives

- Building Mutual Assisted Living Community for Elder People

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Brief Introduction

- My topic is about the vision of providing a seamless integration of human power and assistive devices to help the independent living of our elder generation.

- The goal is to build up an online “mutual assistance community” to provide the elder people with longer, better, and more active lives.

- In such a community, social connections will be enhanced, dependence on societal resources will be reduced, and the elder people are expected to have a more active attitude.
Challenges we are currently facing

The proportion of elderly people keeps increasing

Daily activities of these elderly people are hampered by aging

- These elderly people need assistance to maintain their independent lives.

Percentage of people hampered in daily activities, by age [EUROSTAT]

- 15_24
- 25_34
- 35_44
- 45_54
- 55_64
- 65_74
- 75_84
- 85_
Ambient Assisted Living

“A concept aiming at prolonging the time, people can live in a decent way in their own flat by increasing their autonomy and self-confidence, the discharge of monotonously everyday activities, to monitor and care for the elderly or ill person, to enhance the security and to save resources.”

–from www.aal169.org, Article 169 (of the EC treaty),

Responding to the needs of Europe's growing ageing population, the Commission has today adopted a European Action Plan for "Ageing Well in the Information Society".

– e-Inclusion :: Ageing Well in the Information Society
How to assist these aging people?
How to assist these aging people?

Nobody wants to be taken care of only by a bunch of cold metals

© Risto Karisson (Printed in Helsingin Sanomat 18.10. 1996)
How to assist these aging people?

Solution = Technologies + Interactions of human beings
Philips Smart Environment Scenario
Human Tasks in Ambient Assisted Living

- “The (assistive) devices are not useful if not combined with services and formal or informal support and help (from human beings)” – AAL country report of Finland

- I share this view and deem that human resource is indispensable in Ambient Assisted Living.

- Assistances from informal carer may help to provide needed services in a prompt and cost effective way. And also keep the social connection of the elder people to the outside world.
Mutual Assistance Community

Informal service provider

Commercial vendor

ABC Shop

Smart devices

OSGI Gateway

Create OWL-S

Access

A smart house

Coordination center

OWL-S Matcher

Service Request

OWL-S service publication

Doctor (professional)

Community
Combine Technologies Together

Mutual Assistance Community

- Smart Devices
- Adaptive Human Computer Interface
- Virtual Reality
- Semantic Description Matching
- Human Task Computation
- SOA
Service Oriented Architecture (SOA) is a paradigm for organizing and utilizing distributed capabilities that may be under the control of different ownership domains.

SOA also allow different applications to participate in business processes. These functions are loosely coupled with the operating systems underlying the applications.
Human Tasks Computation

Web Services Human Task (WS–HumanTask),
Version 1.0, June, 2007
Provides a notation, state diagram and API for human tasks, as well a coordination protocol that allows interaction with human tasks in a more service–oriented fashion and at the same time controls tasks’ autonomy.

WS–BPEL Extension for People (BPEL4People), Version 1.0, June, 2007
Introduces an Extension to BPEL in order to support a broad range of scenarios that involve people within business processes.

Human tasks are services “implemented” by people. They allow the integration of humans in service–oriented applications.
Ontology library should be pre-built so that the objects could be used for service description. An ontology library defines objects and the relationship between certain objects, such as parent class, etc.

There are some ontology libraries existing, but for the mutual assistance community we require a customized ontology library for its service description.
SDM–Service Description

```xml
<profile:textDescription>
    <profile:hasInput rdf:resource="#InformalProvider"/>
    <profile:hasOutput rdf:resource="#Entertainment"/>

    <profile:has_subclass rdf:resource="AAL_SERVICE_PROCESS"/>

    <profile:has_process rdf:resource="AAL_SERVICE_PROCESS"/>
</profile:Profile>

<process:ProcessModel rdf:ID="AAL_SERVICE_PROCESS_MODEL">
    <service:describes rdf:resource="#AAL_SERVICE_SERVICE"/>
    <process:hasProcess rdf:resource="#AAL_SERVICE_PROCESS"/>
</process:ProcessModel>

<process:AtomicProcess rdf:ID="AAL_SERVICE_PROCESS">
    <process:hasInput rdf:resource="#InformalProvider"/>
    <process:hasOutput rdf:resource="#Entertainment"/>
</process:AtomicProcess>

<process:ServiceType rdf:ID="#Entertainment">
    <process:parameterType rdf:resource="http://127.0.0.1/ontology/my_ontology.owl#Entertainment"/>
    <rdfs:label></rdfs:label>
</process:ServiceType>

<process:ServiceProvider rdf:ID="#InformalProvider">
    <process:parameterType rdf:resource="http://127.0.0.1/ontology/my_ontology.owl#InformalProvider"/>
    <rdfs:label></rdfs:label>
</process:ServiceProvider>
```

Define inputs/outputs

Specify OWL (Web Ontology Language) library
SDM–Service Matching

### OWL-S Matching Interface

**Requested Service**
- Current Profile: AAL_QUERYPROFILE
- ServiceProvider: InformalProvider
- ServiceType: Indoor

**Advertised Service**
- Current Profile: AAL_SERVICEPROFILE
- ServiceProvider: InformalProvider
- ServiceType: Entertainment

#### Setting Matching Requirements

**Match Selected Services**

<table>
<thead>
<tr>
<th>Input matching</th>
<th>Output matching</th>
<th>Profile matching</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATCH</td>
<td>TYPE_SUBSUME</td>
<td>TYPE_SUBSUME</td>
</tr>
<tr>
<td>FAIL</td>
<td>UNCLASSIFIED</td>
<td>TYPE_INVERT</td>
</tr>
</tbody>
</table>

#### Matching Result

**Matching Result:** MATCH

- **Profile matching result**
  - Matching result: UNCLASSIFIED
  - Minimal expected degree: UNCLASSIFIED
  - Partial result: MATCH

- **Input parameter matching result**
  - Matching result: MATCH
  - Minimal expected degree: MATCH
  - Partial result: MATCH

- **Output parameter matching result**
  - Matching result: TYPE_SUBSUME
  - Minimal expected degree: MATCH
  - Partial result: MATCH

- **Plug-in matching result**
  - All active plug-ins matched
  - Partial result: MATCH

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Mutual Assistance Community
Media Technologies—Virtual Reality

Towards building up online virtual community for mutual assisted living.
Human Computer Interface

Interactive TV, etc.
Scenario


Request stored in service center


Request

Kate

Join Kate?

Yes

Yes

Bind, take activity together Mary Kate

Request stored in service center

Mary

Join Mary?
Role Transition

- Passively receive help; dependant on assistances; frustration, unhappy.

- Actively participate in group activities; less assistance is required; more independence & happy.

- Actively participate in group activities; provide answers/advices to the online people in need. Living creatively; degree of satisfaction improved as finding themselves useful. Feeling very happy!
Conclusion

- Human services are indispensable to provide high quality services to elder people; informal carers are important!

- Mutual assistance community, which integrate the human power and assistive devices, may provide better services to the elder people than ever before. Societal resources may also be greatly saved!

- Elder people may greatly improve their satisfaction, and live in more active ways!

- Technology is now ready! Actions are now required!
“Turning the silver challenge into a golden opportunity!”

— Frans de Bruïne, Director ICT addressing Societal Challenges, DG Information Society and Media
Publications

Towards Building Virtual Community for Ambient Assisted Living
H. Sun, V. De Florio, N. Gui & C. Blondia

Service Matching in Online Community for Mutual Assisted Living
H. Sun, V. De Florio, N. Gui & C. Blondia

Participant: A New Concept for Optimally Assisting the Elder People
H. Sun, V. De Florio, N. Gui & C. Blondia

A Service–oriented Infrastructure Approach for Mutual Assistance Communities
N. Gui, H. Sun, V. De Florio & C. Blondia

A Design Tool to Reason about Ambient Assisted Living Systems
H. Sun, V. De Florio & C. Blondia

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