

Towards Longer, Better, and More Active Lives

-Building Mutual Assisted Living Community


for Elder People

Hong Sun

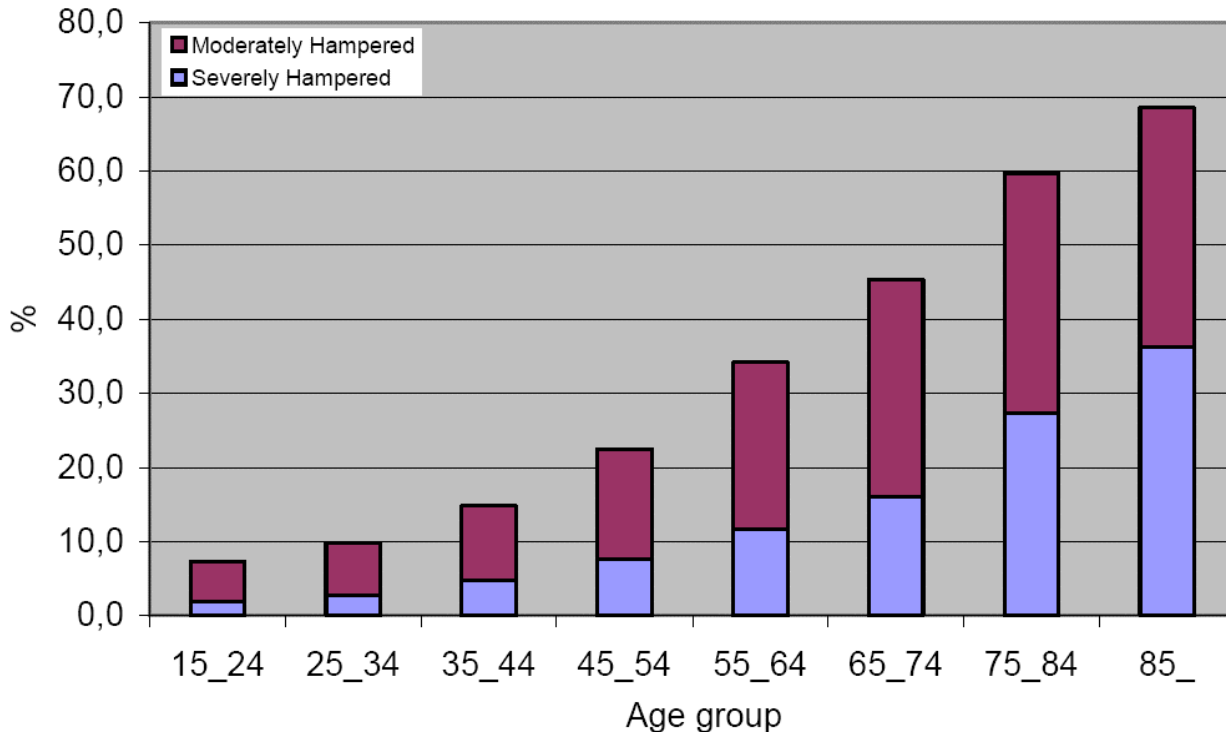
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Interdisciplinary institute for BroadBand Technology (IBBT)

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.
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Challenges we are currently facing



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

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.

Ambient Assisted Living

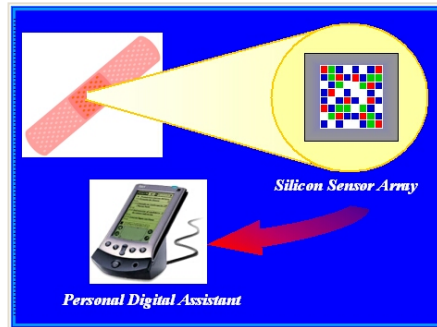
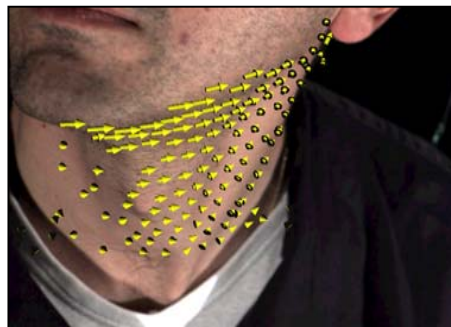
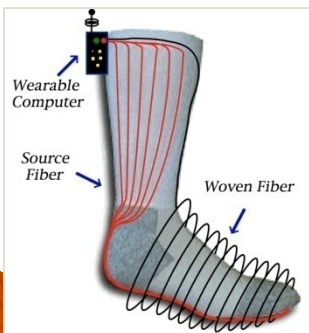
“A concept aiming at prolonging the time, people can live in a decent way in their own flat by increasing their autonomy and self-confidence, the discharge of monotonously everyday activities, to monitor and care for the elderly or ill person, to enhance the security and to save resources. ”

–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".

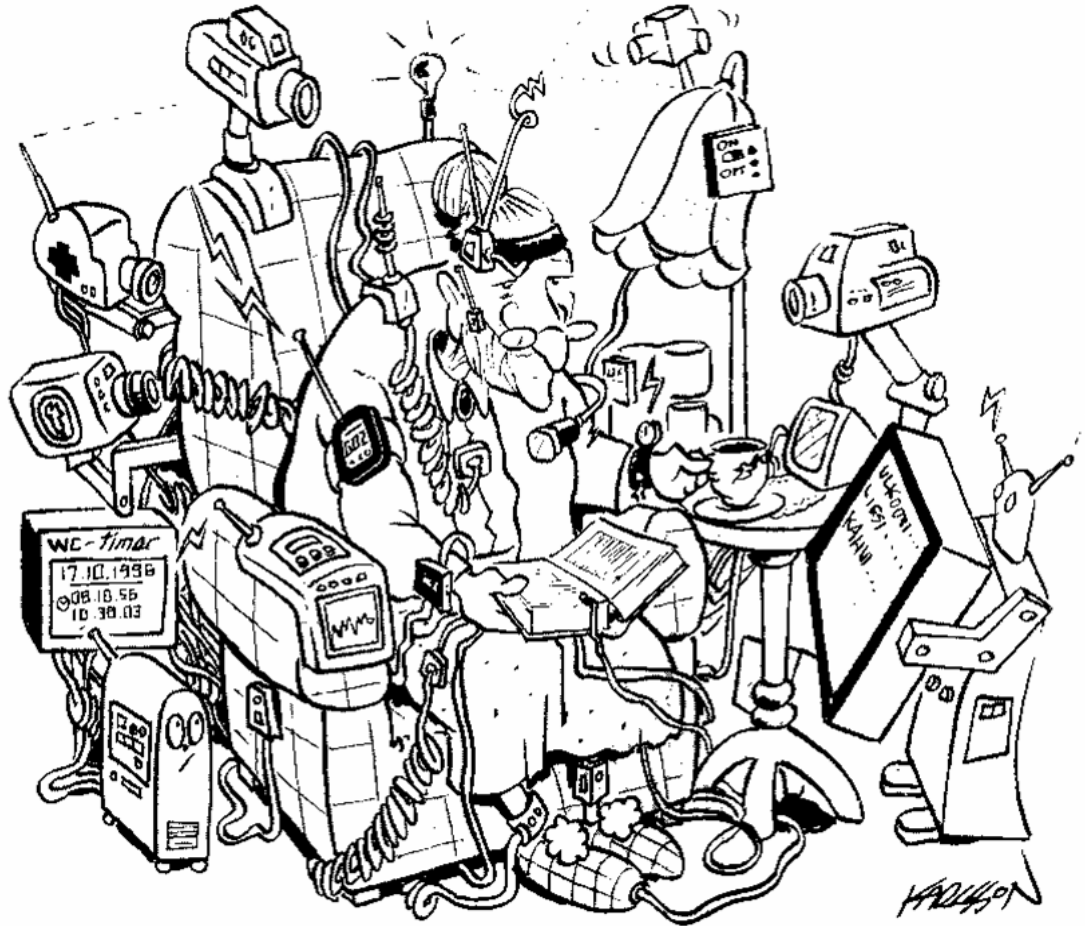
– [e-Inclusion](#) :: Ageing Well in the Information Society

How to assist these aging people?



In the future, shoes embedded with radio frequency identification (RFID) tags could interact with RFID readers inserted in the floor or carpet to help identify the room a person may have entered or fallen. The system could then alert a caregiver to the person's whereabouts.

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?


Pillow monitors sleep patterns; links to lighting, heating and air conditioning to control sleep and wake-up environment

twentieth floor of a New York apartment block!"

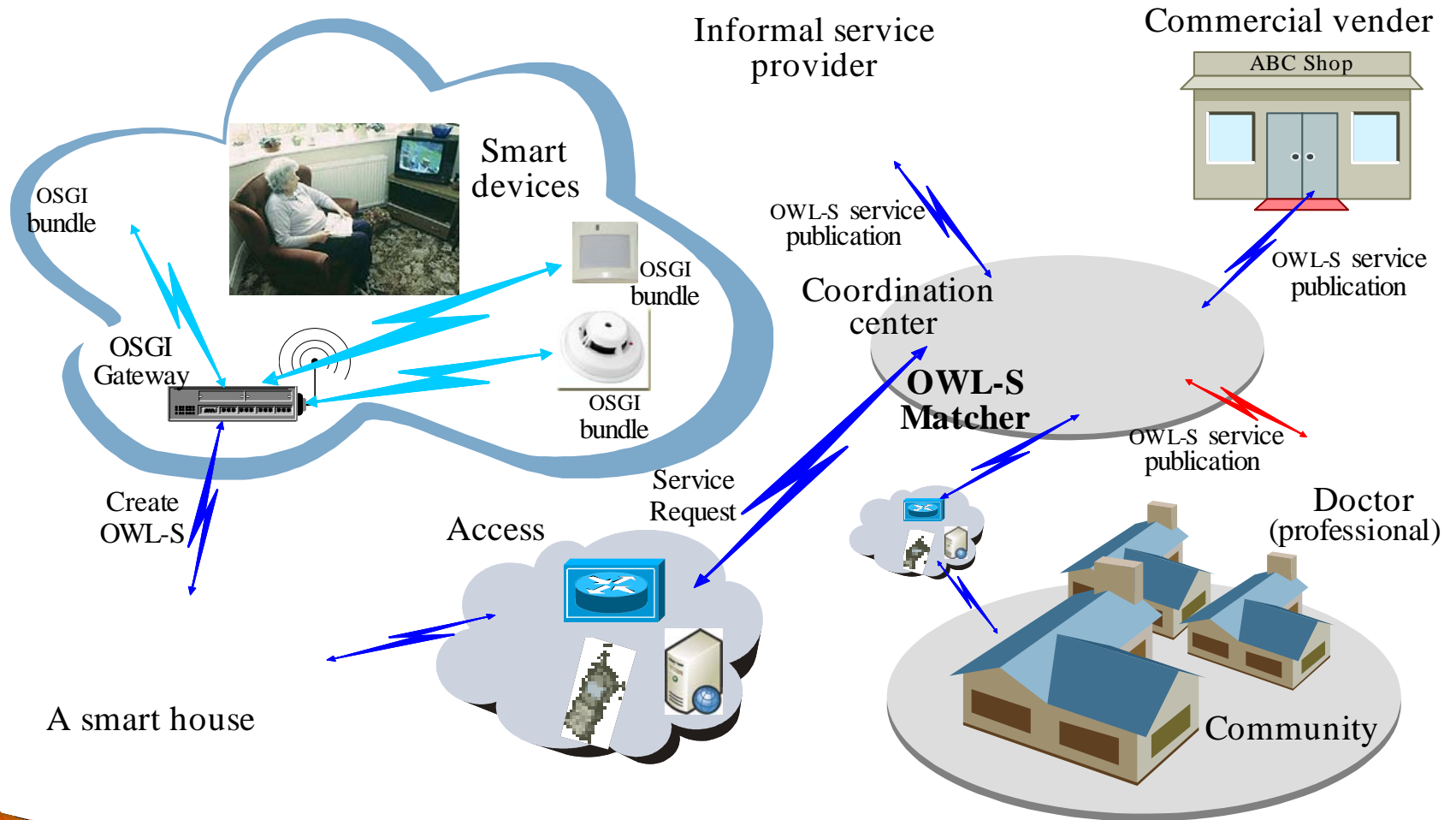


Solution = Technologies + Interactions of human beings
Philips Smart Environment Scenario

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.
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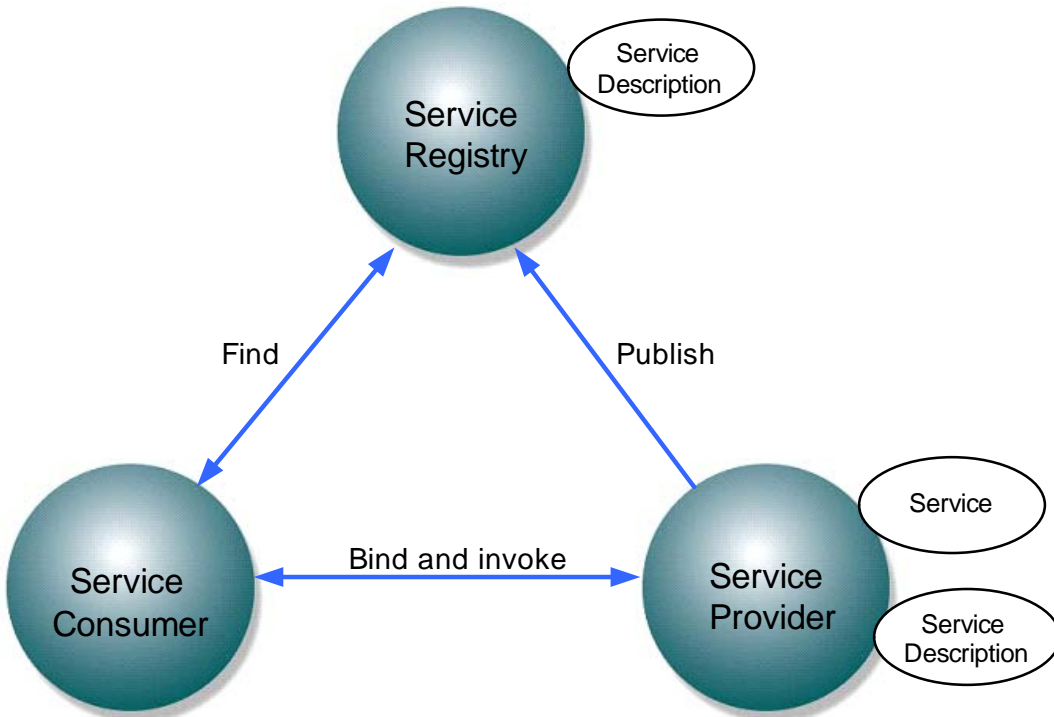
Mutual Assistance Community



Combine Technologies Together



Service Oriented Architecture



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),

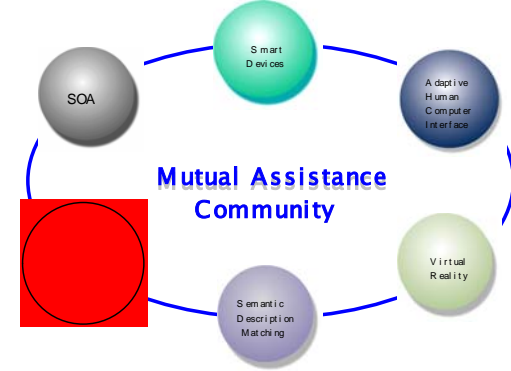
Version 1.0, June, 2007

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.

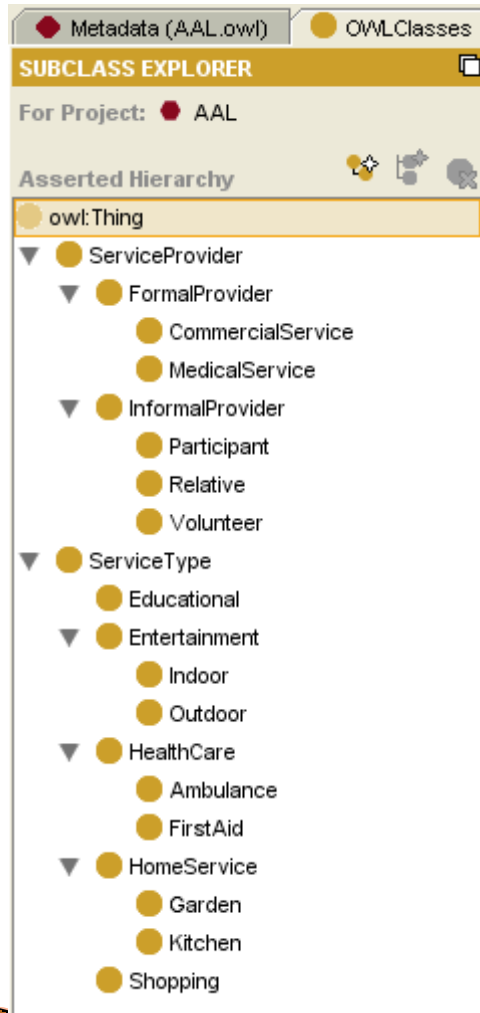
WS-BPEL Extension for People (BPEL4People), Version 1.0, June, 2007

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.



SDM-Building ontology



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



```
</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

File Match Help

Requested Service **Advertised Service**

Current Profile: AAL_QUERY_PROFILE Current Profile: AAL_SERVICE_PROFILE

Requested Service		Advertised Service	
Inputs	Outputs	Inputs	Outputs
ServiceProvider : InformalProvider	ServiceType : Indoor	ServiceProvider : InformalProvider	ServiceType : Entertainment

Match Selected Services

Please select the expected minimal matching degrees

Input matching: MATCH

Output matching: TYPE_SUBSUME

Profile matching: TYPE_SUBSUME

Matching Result

Matching Result: MATCH

Profile matching result

Matching result	UNCLASSIFIED	Partial result: MATCH
Minimal expected degree	UNCLASSIFIED	

Input parameter matching result

Matching result	MATCH	Partial result: MATCH
Minimal expected degree	MATCH	

Output parameter matching result

Matching result	TYPE_SUBSUME	Partial result: MATCH
Minimal expected degree	TYPE_SUBSUME	

Plug-in matching result

All active plug-ins matched	Partial result: MATCH
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OK

Setting Matching Requirements

Media Technologies–Virtual Reality



Second Life



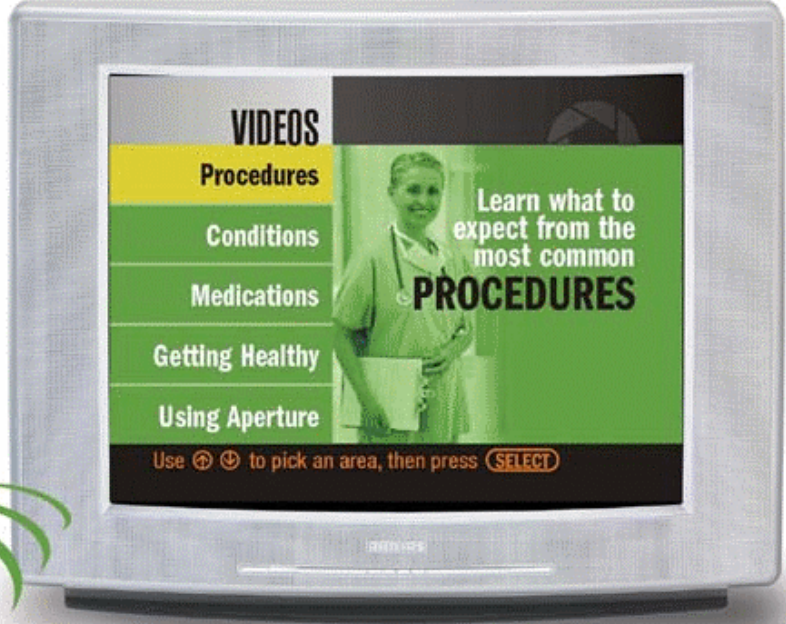
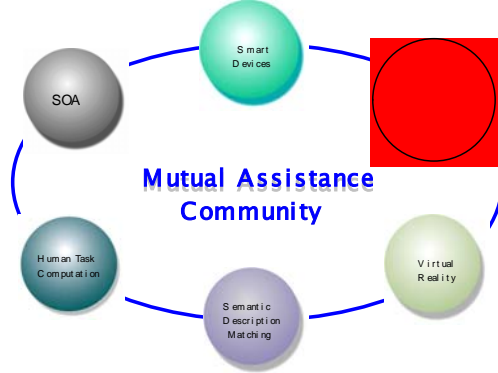
Google Earth



You Tube

Towards building up online virtual community for mutual assisted living.

Human Computer Interface



Interactive TV, etc.



Scenario

Required service: Walk with someone.
 Location: **Some park**, Antwerp.
 Deadline: **7pm**, 1st, August, 2007.
 Service model: Participant of Group Activities, **or help from informal carer.**

Request stored in service center

Required service: Walk with someone.
 Location: **Middelheim park**, Antwerp.
 Deadline: **8pm**, 1st, August, 2007.
 Service model: Participant of Group Activities.

Service Matching

Request



Kate

OWL-S Matching Interface

File Match Help

Requested Service | **Advertised Service**

Current Profile: AAL_QUERY_PROFILE | Current Profile: AAL_SERVICE_PROFILE

Requested Service		Advertised Service	
Inputs	Outputs	Inputs	Outputs
ServiceProvider : InformalProvider	ServiceType : Indoor	ServiceProvider : InformalProvider	ServiceType : Entertainment

Match Selected Services

Please select the expected minimal matching degrees

Input matching: MATCH

Output matching: TYPE_SUBSUME

Profile matching: MATCH

Matching Result

Matching Result: **MATCH**

Profile matching result

Matching result	UNCLASSIFIED	Partial result: MATCH
Minimal expected degree	UNCLASSIFIED	

Input parameter matching result

Matching result	MATCH	Partial result: MATCH
Minimal expected degree	MATCH	

Output parameter matching result

Matching result	TYPE_SUBSUME	Partial result: MATCH
Minimal expected degree	TYPE_SUBSUME	

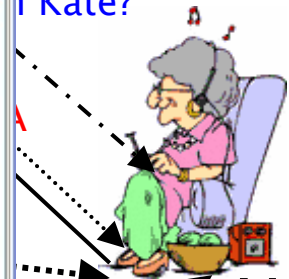
Plug-in matching result

All active plug-ins matched		Partial result: MATCH
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OK

Setting Matching Requirements

in Kate?



Mary

Role Transition



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

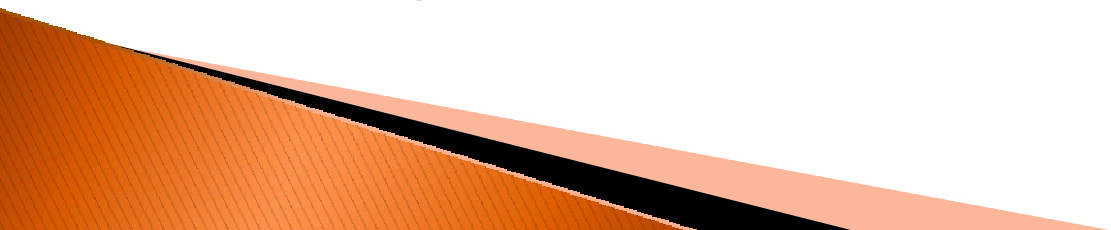


Actively participate in group activities; less assistance is required; more independence & happy.



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 Bruijne, 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

in the Proceedings of 16th Euromicro International Conference on Parallel, Distributed and network-based Processing (PDP2008). IEEE Computer Society, 2007.

Service Matching in Online Community for Mutual Assisted Living

H. Sun, V. De Florio, N. Gui & C. Blondia

in the Proceedings of the third International Conference on Signal-Image Technology & Internet Based Systems(SITIS' 2007). IEEE Computer Society, 2007.

Participant: A New Concept for Optimally Assisting the Elder People

H. Sun, V. De Florio, N. Gui & C. Blondia

in the Proceedings of the 20th IEEE International Symposium on Computer-Based Medical Systems (CBMS-2007), IEEE Computer Society, 2007.p.295-300

A Service-oriented Infrastructure Approach for Mutual Assistance Communities

N. Gui, H. Sun, V. De Florio & C. Blondia

in the Proc. of the First IEEE WoWMoM Workshop on Adaptive and Dependable Mission- and bUsiness-critical mobile Systems (ADAMUS 2007), IEEE Computer Society, 2007.p.1-6

A Design Tool to Reason about Ambient Assisted Living Systems

H. Sun, V. De Florio & C. Blondia

in the Proc. of the International Conference on Intelligent Systems Design and Applications (ISDA 06), IEEE Computer Society, 2006.p.1136-1144

I would like to thank for the contributions from my promoters: Vincenzo De Florio, Chris Blondia; and my colleague Ning Gui.