

Development of Smart Room Services on Top of Smart-M3

Dmitry Korzun, Ivan Galov, Sergey Balandin

Petrozavodsk State University
Department of Computer Science

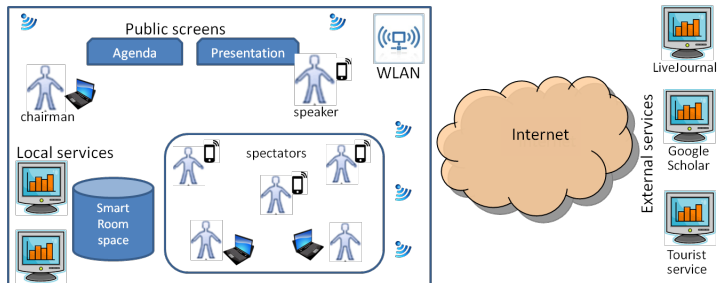
This project is supported by grant KA179 of Karelia ENPI — joint program
of the European Union, Russian Federation and the Republic of Finland



14th FRUCT conference
November 12, 2013, Helsinki, Finland

SmartRoom System

Collaborative work activity:
conferences, lectures, meetings, etc.



Evolution of SmartConference system (FRUCT, SPIIRAS)



Functions to be made smart

1 Presentation

- ▶ slide show
- ▶ multiple sources for slides (e.g., video flows)
- ▶ audio support (e.g., microphone)
- ▶ interactive (e.g., online drawings)

2 Activity organization

- ▶ agenda: automatic updates
- ▶ chairman control and collaborative construction
- ▶ background activity: online discussion

3 Local and remote participation

4 Content collection, analysis, summarization

5 Collaborative work (e.g., planning social events and tours)



Components

- Users: activity participants (end-users of services)
 - 1 chairman
 - 2 active speaker (in turn relay manner)
 - 3 spectators (inactive speakers, guests)
- Access/control: from clients on personal (mobile) devices
- Services: a distributed system deployed on surrounding devices, computers, Internet services
- Interoperability platform: Smart-M3



Development Method

Class: smart spaces service-oriented systems

Conceptual blocks:

- 1 digital environment
- 2 service set
- 3 computing infrastructure
- 4 ontological modeling
- 5 service construction and delivery



Digital (Service) Environment: Distribution

On the agent level

- Smart space is a named search extent of shared information
- Agents run on various computational devices
- Cooperative utilization of the smart space content

System

- Computing equipment is localized in a room
- WLAN provides connectivity
- External computing systems (corporate, global)

Extensions

- Resource-consuming processing can be delegated
- Existing Internet services can be used

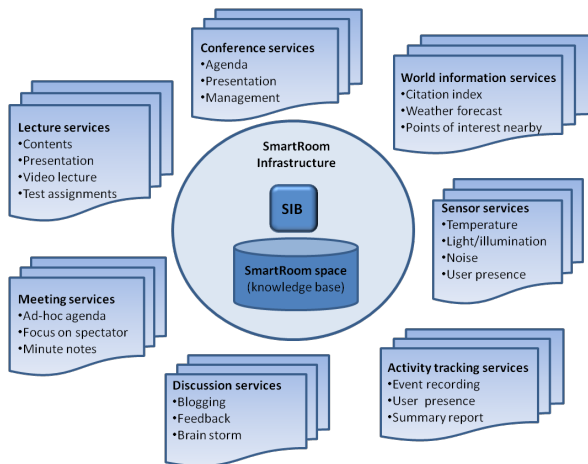


Digital (Service) Environment: Interfaces

- Core services: **Agenda** and **Presentation**
- Two big public screens are user interfaces for the services: **Agenda-screen** and **Presentation-screen**
- Information for all participants is visualized on public screens (composed from multiple services)
- End-user clients: personal screens
- SmartRoom UI elements: public screens and clients



Service Set



Activity type

- Conference
- Meeting
- Lecture

Composition

- Presentation
- Agenda
- Extensions

Informational

- Passive
- Control

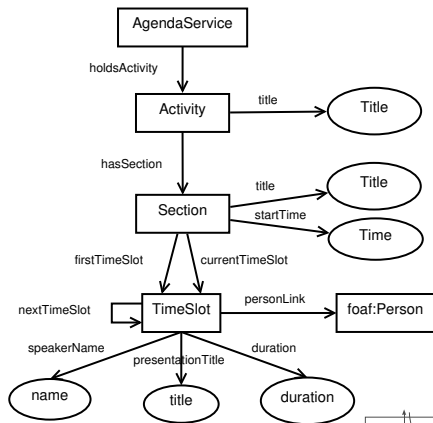
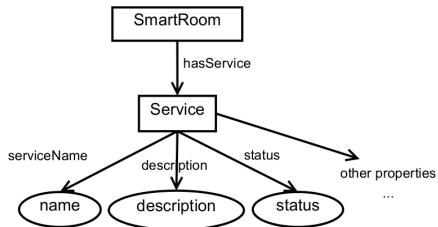


Computing Infrastructure

- interoperable information sharing platform
- Smart-M3 SIB: desktop computer or server
- Infrastructural KP: service-level knowledge processors
- Delegation of service processing to the infrastructure
- Deployment
 - ▶ Cluster near SIB: online 24/7 service mode, ease of installation and control
 - ▶ Device-specific: make an embedded or consumer electronics device a SmartRoom participant
 - ▶ Server: extensive or complex processing, data source mediation



Ontological Modeling



Service Construction and Delivery

Property	Description
Explicit representation	Service is represented as an ontological instance in the smart space. A change in the representation activates the delivery
Compositional visualization	UI element uses multiple services and composes the most important information on a area-restricted screen
Personalization	End-user UI element uses personal information and context when visualizing the services
Collaboration	Service representation is constructed in a P2P manner by several KPs, including clients



Conclusion

Reference smart space system?

- Multi-agent: IoT-like variety of devices and computing facilities
- Multi-service: core, extension, composition
- Digital services: visualization, personalization
- Development split
 - 1 digital environment
 - 2 service set
 - 3 computing infrastructure
 - 4 ontological modeling
 - 5 service construction and delivery



Open source code:

<http://sourceforge.net/projects/smartroom/>

