Virtual Shared Workspace for Smart Spaces and M3-based Case Study

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15th FRUCT conference
April 24, 2014, Saint-Petersburg, Russia
Smart Spaces

• Smart spaces paradigm
  • Many predictions and comments on importance and perspectives;
  • The lack of practical development platforms.

• Internet of Things (IoT)
  • Opportunities and challenges for smart spaces deployment

• Example scenario – a virtual shared workspace supporting collaboration activity.
  • M3-based case study of the technology maturity (Smart-M3)
  • Advanced multi-domain services (SmartRoom + e-Tourism)
Virtual Shared Workspaces

- People communicate, analyze & create knowledge, share findings.
- Smart assistance and “Be here” experience.
- IoT environment is localized in physical spatial-constrained area.
- Participants: locally present or remote, personal mobile devices.
- Computations: local with access to external (Internet) services.

From CISCO report on Trends in IT (May 2012): Flexible Collaborative Workspaces
SmartRoom System

- Holding collaborative activity (conferences, meetings, ...)
- Deployed in room equipped with electronic devices to create a virtual workspace
  - Agenda: activity program
  - Presentation
  - Personal mobile devices
- Software agents construct and deliver services in a shared smart space
  - Local services
  - External services
Devices in SmartRoom Environment

- WLAN equipment
- Media projectors, interactive boards, loudspeaker (with attached computers)
- Local and server computers
- Video and audio capture devices
- Physical data sensors
- Network activity sensors
- Personal mobile devices
Smart-M3: space-agent approach

- Semantic information broker (SIB) maintain smart space content in RDF triples
- Application: knowledge processors (KPs) running on various devices
- Agent KPs share ad-hoc knowledge
  - join, leave
  - insert, update, remove
  - (un)subscribe
Services Construction

- SmartRoom infrastructure: Infrastructural KPs
- Responsibility: Service construction and delivery
- Service: interaction of one or more infrastructural KPs
## Services example

<table>
<thead>
<tr>
<th>Conference-service</th>
<th>Activity control</th>
</tr>
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<tbody>
<tr>
<td>Meeting-service</td>
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<tr>
<td>Presentation-service</td>
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<tr>
<td>Agenda-service</td>
<td>Information visualization</td>
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<tr>
<td>Content-service</td>
<td>Keeping/providing multimedia content</td>
</tr>
<tr>
<td>Other local services</td>
<td>Providing specific pieces of information and assistance for spectators</td>
</tr>
</tbody>
</table>
## Types of Services

<table>
<thead>
<tr>
<th>Informational</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Providing multimedia content for users</td>
<td>• Changing data representation of activity processes</td>
</tr>
<tr>
<td>• Visualization of ongoing processes in the room</td>
<td>• Control of ongoing activity</td>
</tr>
<tr>
<td>• Information sources: activity program, presentations, audio from participants, video from cameras, etc.</td>
<td>• Delegating the control on presentation to the next speaker</td>
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Services Algorithms

**Informational**
1. event-based activation
2. information selection
3. target UI devices
4. service delivery

**Control**
1. event-based activation
2. information selection
3. formulation of control action
4. service delivery

SmartRoom client | Smart Space | Agenda-service
--- | --- | ---
publish arrival information | receive personal information | show welcome note

Conference-service | Smart Space | SmartRoom client
--- | --- | ---
end presentation | check next speaker availability | recalculate time | publish time
e-Tourism Scenarios in SmartRoom

Basic SmartRoom Scenarios

- Event Management
- Browse list of participants
- See current presentation
- Change slides
- Comment presentations

Inside SmartRoom

- Using mobile device
- <<include>>
- Chairman
- Speaker

Outside SmartRoom

- Remote Spectator
- <<include>>
- Spectator

e-Tourism Scenarios

- Social Event Possibilities
- Interactive Map with Smart Room and Region Attractions Place
- Provide Transportation Information
- Recommended List of Attractions for Attending
e-Tourism in SmartRoom: Architecture

SmartRoom Environment
- Agenda
- Presentation
- Public screens
- Chairman
- Speaker
- Inside Spectators

Mobile Interfaces Alternatives
- Basic Smart Room Scenarios
  - Presentation: Slide Show
  - Agenda: Control and Update
- E-Tourism Scenarios
  - Possibilities for Social Event
  - Recommended Attractions Around
  - Interactive Map with Places of Interests
  - Transportation

Internet

Additional Participants and Services
- Outside Participants
- E-Tourism Services
  - Attraction Information Service
  - Recommendation Service
  - Region Context Service
  - Public Transport Service
  - Ridesharing Service
Example Scenario of Retrieving Attractions for Spectator

1. SmartRoom client shares the spectator location and preferences in the smart space.
2. AIS retrieve attractions around the spectator.
3. Spectator chooses an interesting attraction in the SmartRoom client.
4. AIS extracts attraction details for the chosen attraction.
5. Region context service shares context information in the smart space.
6. Recommendation service ranks these attractions based on the spectator preferences and context situation.
7. SmartRoom client receives ranked attractions and provides them to spectator.
8. SmartRoom client provides details (text information and images to the spectator).
Conclusion

• Example for smart spaces based solutions: virtual shared workspace environment.

• SmartRoom system: publicly available for deployment.
  http://sourceforge.net/projects/smartroom/
  SmartRoom clients:

• Idea and architecture of e-Tourism services integration in SmartRoom.
  TAIS:

Thank you for attention!
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