Smart Spaces Development:

Open Innovations Association FRUCT Activities

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FRUCT WG on Internet of Things and Smart Spaces

- Since 2008
- Research organizations and SMEs from Europe and Russia, fruct.org/smart/
- “Are You Smart (ruSMART)” community and annual international conference, rusmart.e-werest.org
- Collaborative network with international R&D projects in the area of Ubiquitous Computing, IoT and Smart Spaces
- Leading developer team for Smart-M3 open source platform, sourceforge.net/projects/smart-m3/
Services: Examples

- SmartConference
  Assistance for conferencing activity

- SmartScribo
  Mobile semantic multi-blogging

- SmartRoom
  Service environment for collaborative activity

- Mobile Tourist Guide
  - Ridesharing: shared use of cars
  - Tourist Attraction Information Service (TAIS): information and recommendations
SmartConference
sourceforge.net/projects/smartconference

User Software

User KP 1
KP

User KP 2
KP

...  

User KP n
KP

Services

Smart Space

Whiteboard
KP
Ontology

Projector
KP
Ontology

External Services
KP
Ontology
SmartScribo
sourceforge.net/projects/smartscribo
SmartRoom
sourceforge.net/projects/smartroom
Mobile Tourist Guide

Smart Space

Tourist mobile Device
- Client Module
  - Context-Based Information
- Tourist Profile

Other Devices
- Available Services
  - Recommendations
  - Context
  - Information about attractions
  - Public Transport
  - Ridesharing
  - Taxi
Ridesharing

Attraction 1

Attraction n

Driver 1

SSAP

Smart Space

Driver n

SSAP

Tourist 1

SSAP

Tourist m

SSAP

Information Broker
Service Integration

- Pecha Kucha for SmartConference
  - Special client for automatic demo presentations show
- Blogging in SmartConference
  - Discussion service in conferencing
- Event Recording in SmartRoom
  - Summary report on the passed activity
- Ridesharing for Mobile Tourist Guide
  - Alternative transportation means for the tourist
Smart-M3 Platform

sourceforge.net/projects/smart-m3

- Maintenance and installation packages
- SDK
- Platform-embedded solutions
- Application-level solutions
Smart-M3 Maintenance (1/2)

Developers server: http://smart-m3.atlassian.net
Smart-M3 Maintenance (2/2)

- Installation packages (deb repository)
  http://download.geo2tag.org/smart-m3-repo/

- Short-term release plan

<table>
<thead>
<tr>
<th>Feature set</th>
<th>Release</th>
<th>Date</th>
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<tbody>
<tr>
<td>- Red SIB 0.9 integration</td>
<td>0.1</td>
<td>05.11.2013</td>
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<tr>
<td>- Support for raptor2</td>
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<td></td>
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<tr>
<td>- Agent substitution mechanism</td>
<td>0.2</td>
<td>05.02.2014</td>
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<tr>
<td>- Virtuoso DB support</td>
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<td></td>
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<tr>
<td>- Unit test set</td>
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<tr>
<td>- Smart-M3 security</td>
<td>0.3</td>
<td>05.04.2014</td>
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<tr>
<td>- Systematization of KPIs</td>
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<td>- Performance test suite</td>
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SmartSlog: Ontology-driven SDK

- Code generation
- Low-capacity devices
- Session
- Subscription
- Multiple OWL ontologies
- ANSI C: Linux, Windows, Android, Raspberry Pi, Qt-based, Mac OS (C KPI)
- C#: Windows, Windows Phone (C# KPI, C KPI)

http://sourceforge.net/projects/smartslog/
Agent substitution mechanism for dataflow network

- Uses restricted computational model: dataflow network
- When an agent falls down it is substituted by another agent
- Dependent services in the network are not disrupted
- Mechanism is implemented as SIB modification
RoDaFlow Framework

- SDK for services based on dataflow network model
- Simplifies creation of dataflow network agents
- Developer describes only data processing procedure of the agent
- No knowledge of substitution implementation details expected from developer
- No boilerplate code for agent lifecycle needed
Access Control Model for Information Sharing

Application-level solution
Properties (1/2)

- Mobile participants
  - Personal end-user device is a primary access/control point
- Objects universe
  - devices, agents, services, compositions of them, etc.
- Interoperability
  - devices, information, services
- Dynamicity
  - presence-aware programming
- Localization
  - hub-like relation of locally and globally accessed knowledge
Properties (2/2)

- Ambient Intelligence in services
  - Adaptability, personalization, service composition, recommendation, proactive delivery
  - Delegation, mediation
- User collaboration
- Resilience in IoT-settings
- Security
Conclusion

- Pilot services for Smart-M3
  - New use cases and business models
  - Emerging market of smart spaces services
- Open source Smart-M3 platform and SDK
  - Leader developer team for the Smart-M3 platform
- Toward a methodology of Smart Spaces development
  - Experience, principles, methods

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Partners