Petrozavodsk State University
Department of Computer Science

cs.karelia.ru

Andrey S. Vdovenko, Dmitry G. Korzun

Planning Social Activity in SmartRoom: Ontology-based Service Design

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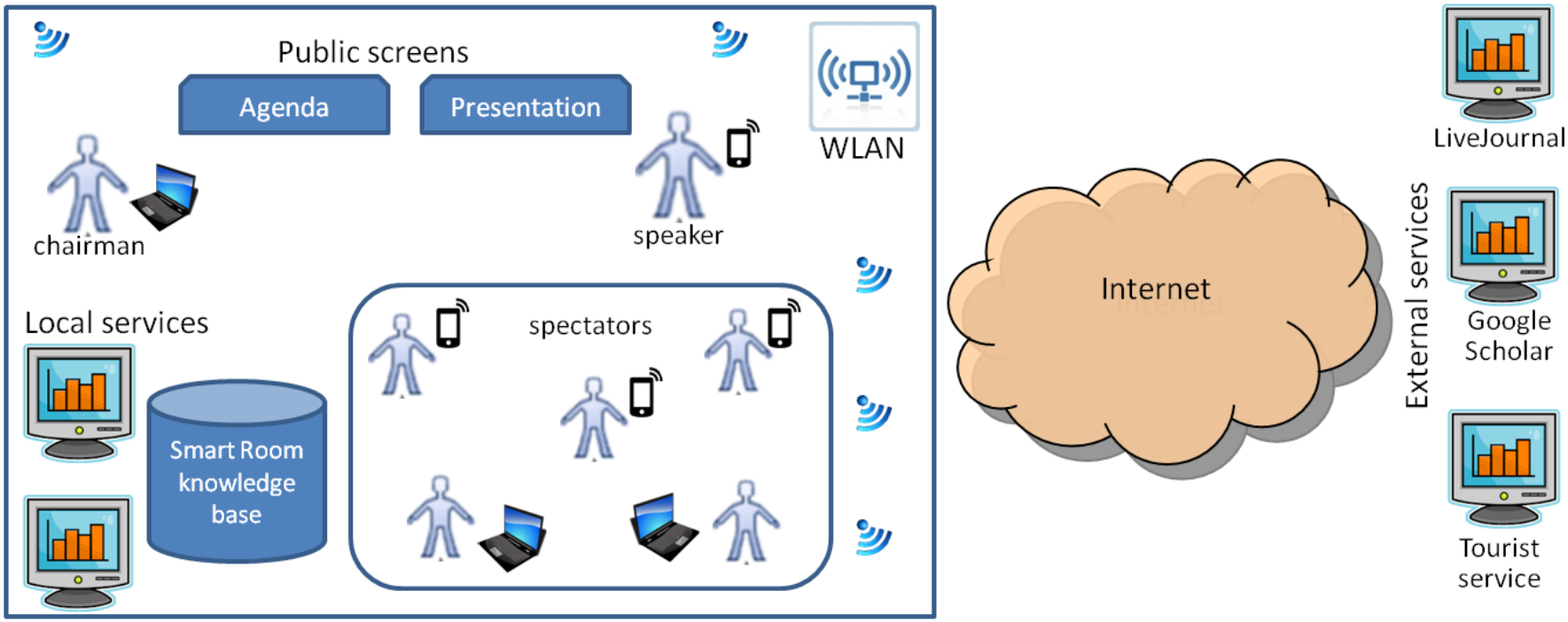
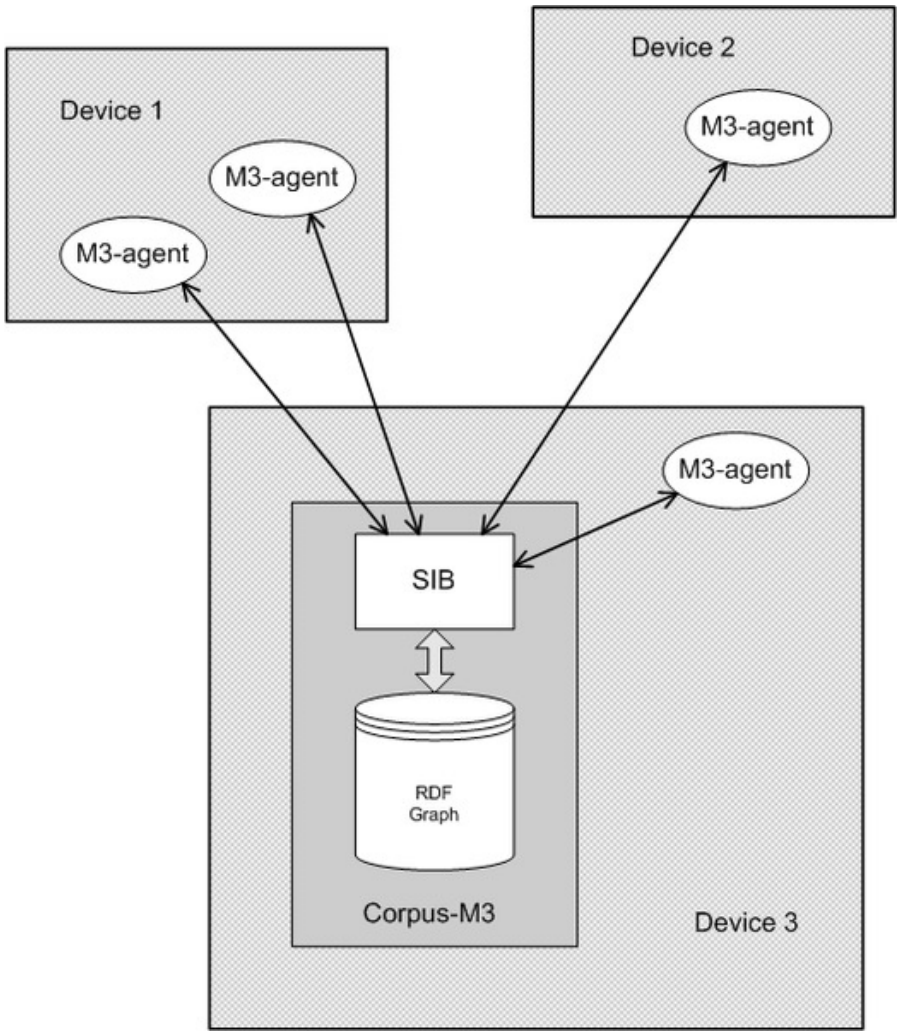
SmartRoom System



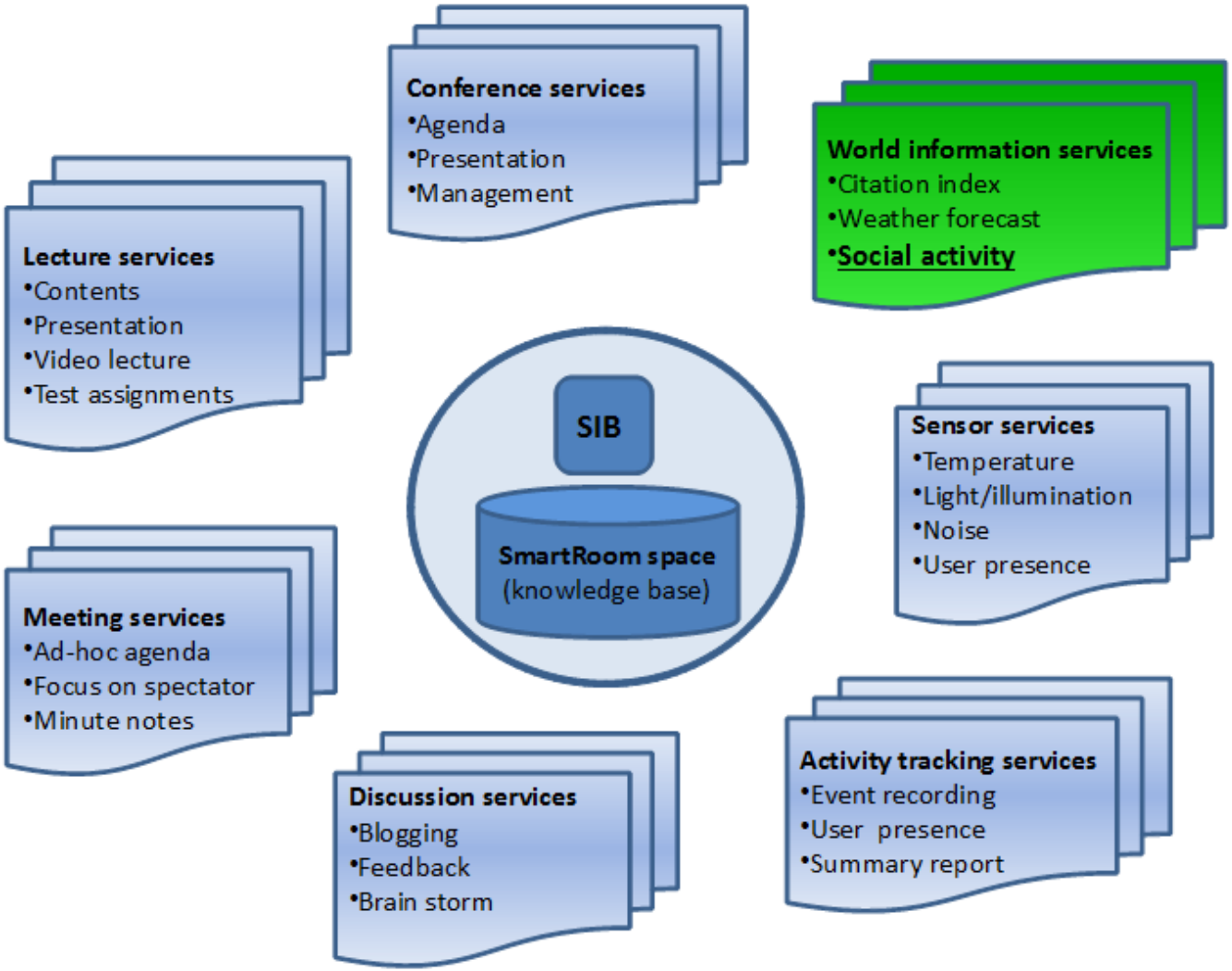
- Many services (composition, personalization)
  - ⇝ informational, control, collaborative work, . . .
- Participation of many users (user can be indoor and outdoor)
  - ⇝ Many (mobile) clients running and accessing services
- Users come with own devices
  - ⇝ Many mobile platforms, IoT-like device diversity

Smart-M3 Platform



- Implements infrastructure of Smart Spaces for knowledge sharing by agents (M3-agent, knowledge processor, KP)
- SIB: Semantic Information Broker for maintenance of shared content
- RDF data representation model: semantic interoperability and ontology-driven programming

SmartRoom: A Multi-Service System



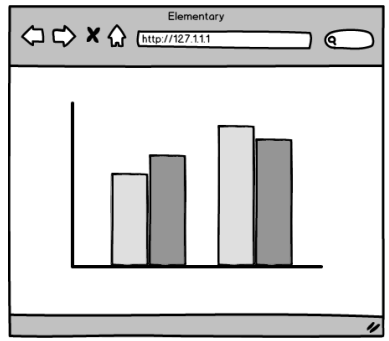
Two Types of Services from Client View

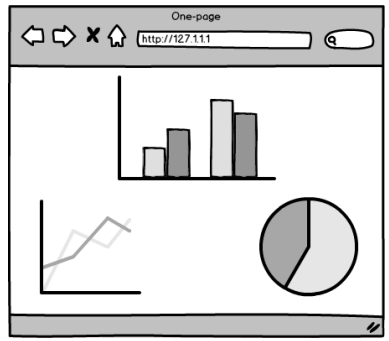
- **Off-the-shelf service**
  - thick client: local processing
  - UI is customized
  - platform-aware implementation
  - low runtime flexibility

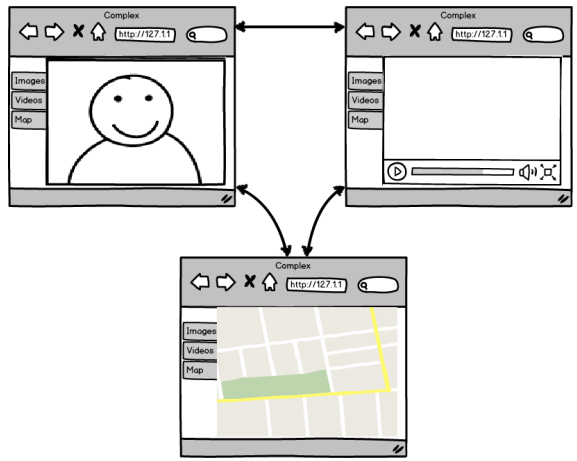
- **Ad-hoc service**
  - runtime construction
  - thin client: delegated processing
  - lightweight UI
  - flexibility for personalization

Ad-hoc Service: Composition on Client Side

- Elementary
  - small piece of information
  - e.g., data from a sensor
- One-page
  - fits one web-page
  - structured visualization
  - e.g., activity report
- Complex
  - several web-pages
  - essential data processing on the client side
  - e.g., image search function

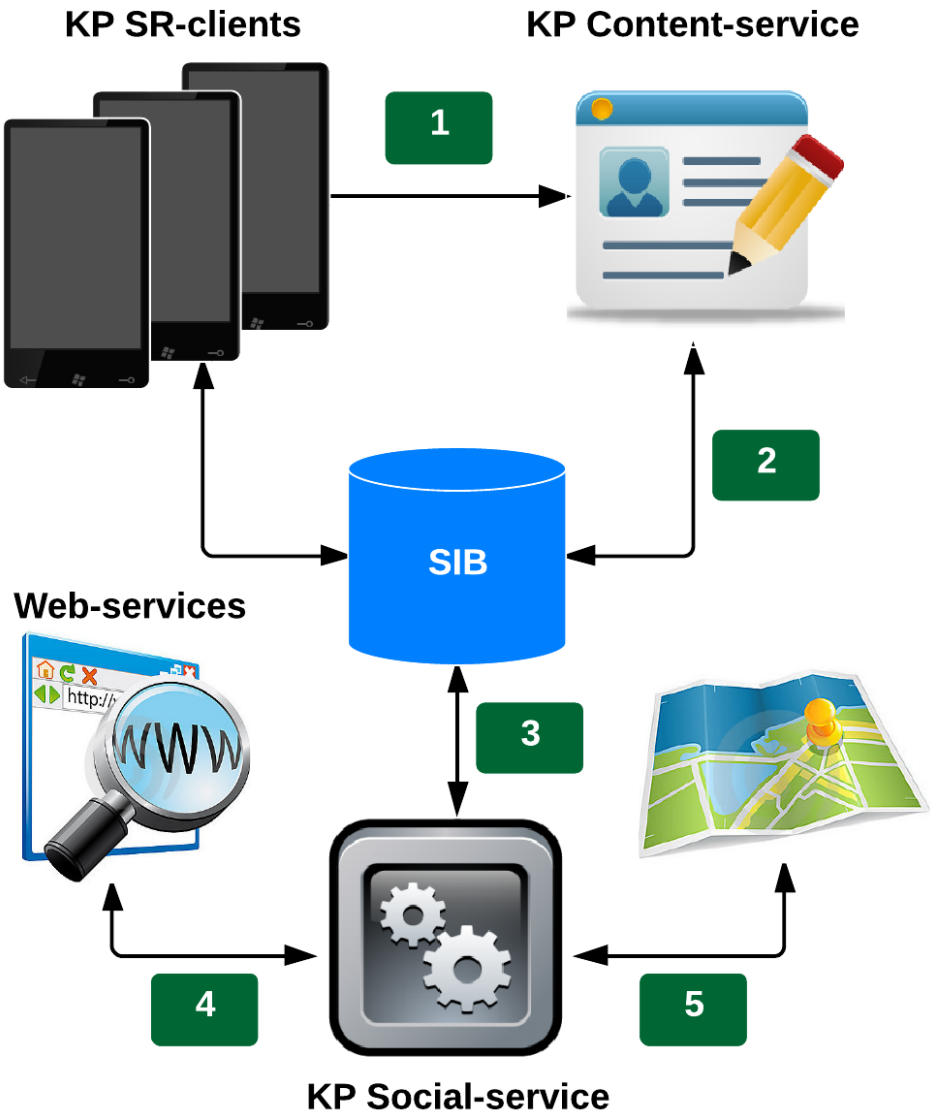






Scenario 1: Participant Geography

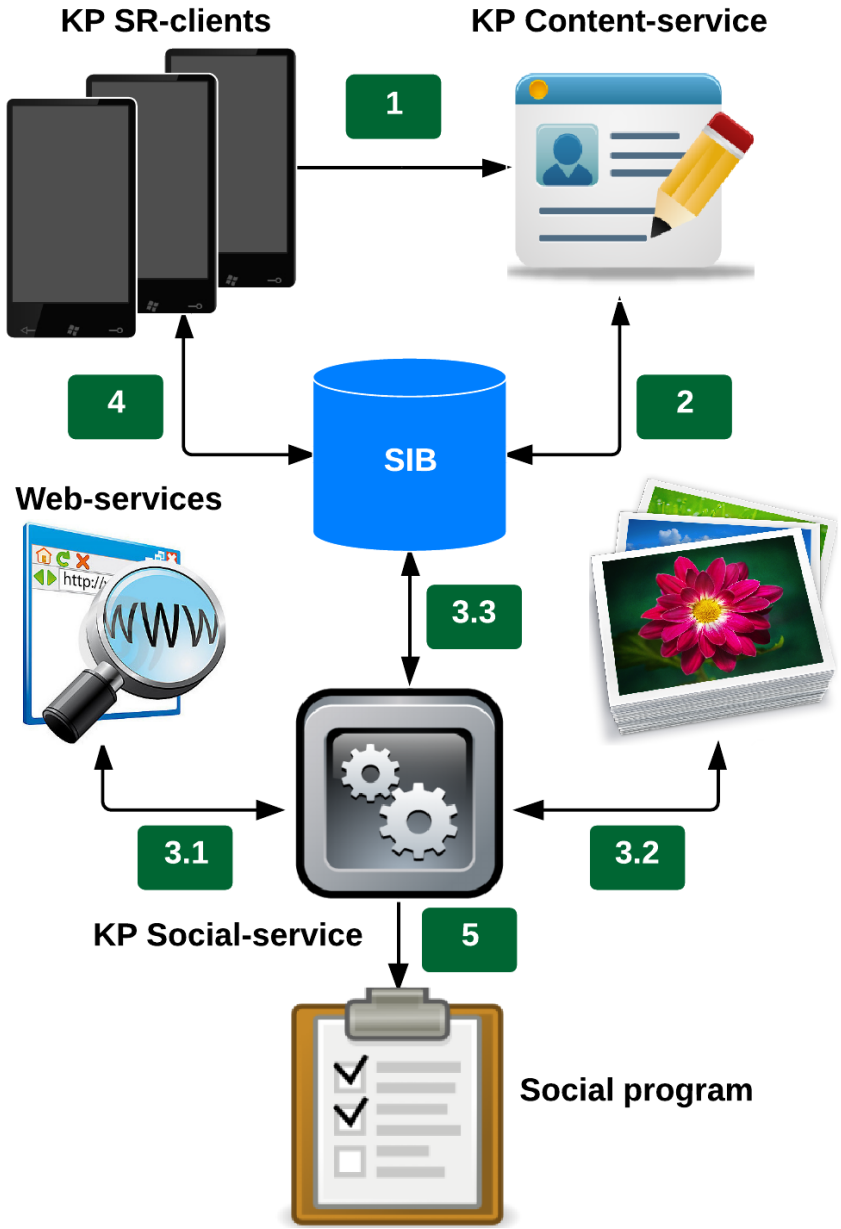
1. Participants provide personal information including their regions
2. Information is stored in SmartRoom Space
3. Service analyzes information about regions
4. . . . and makes web-search of popular pictures for each region
5. – Agenda-service displays pictures in the context of current speaker;
   – Clients show a map with pictures associated with participants



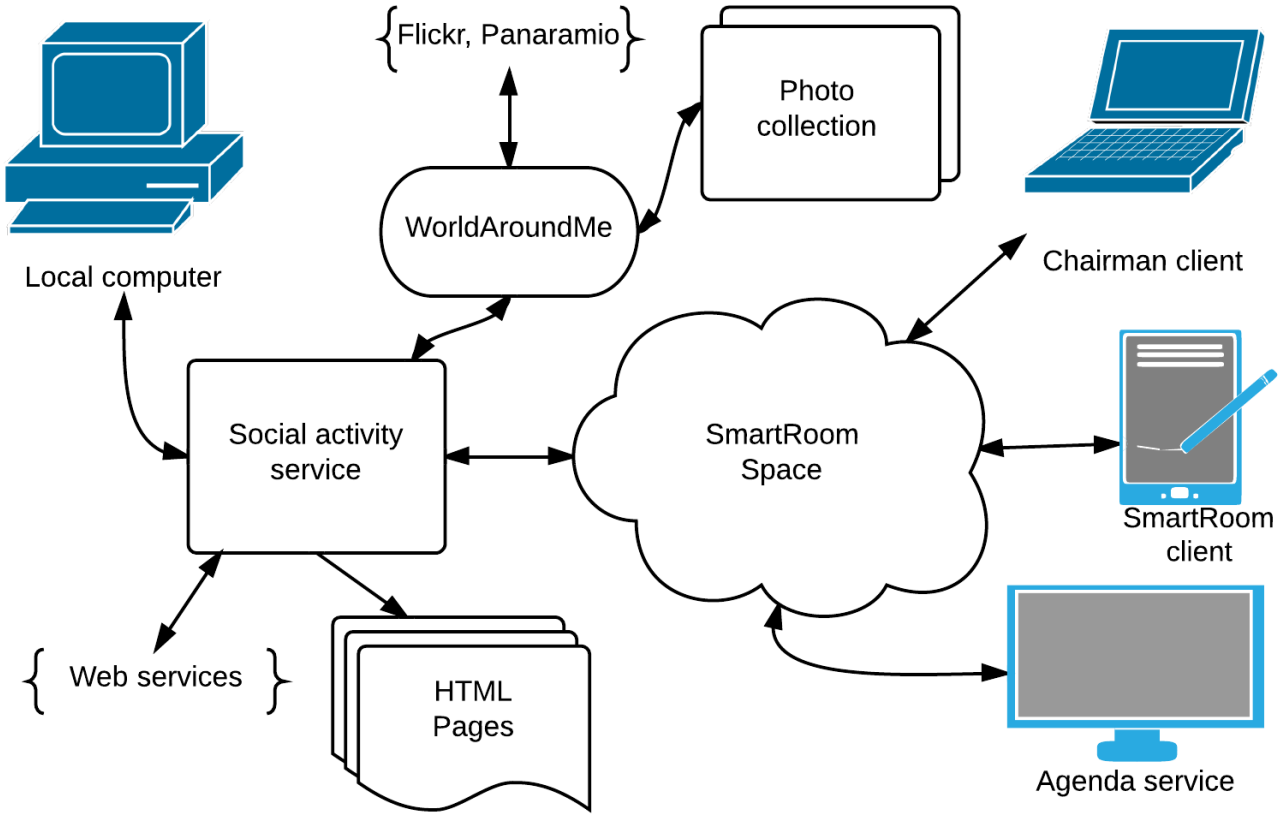
Scenario 2: Planning Social Activity Program

Steps 1 , 2 are the same as previously

3. Our service:
   1. collects points of interests nearby and their description
   2. searches photos for each place
   3. searches semantic links
4. Participants browse POIs using clients with pictures and other tourist-aware description and rate them
5. Results are used to construct a social program



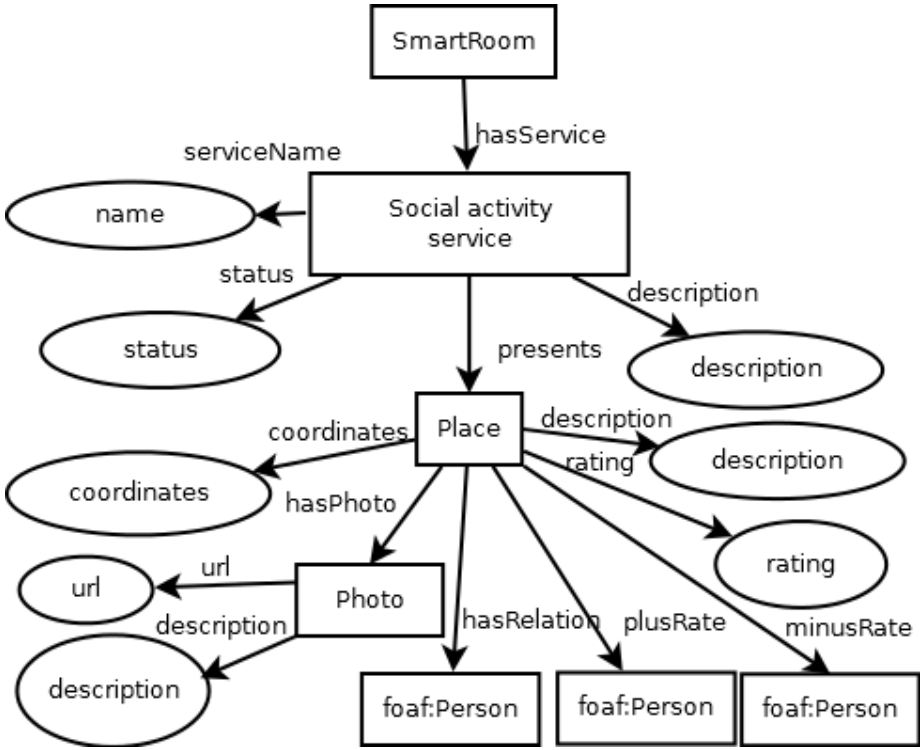
High-level Architecture to Implement Scenarios



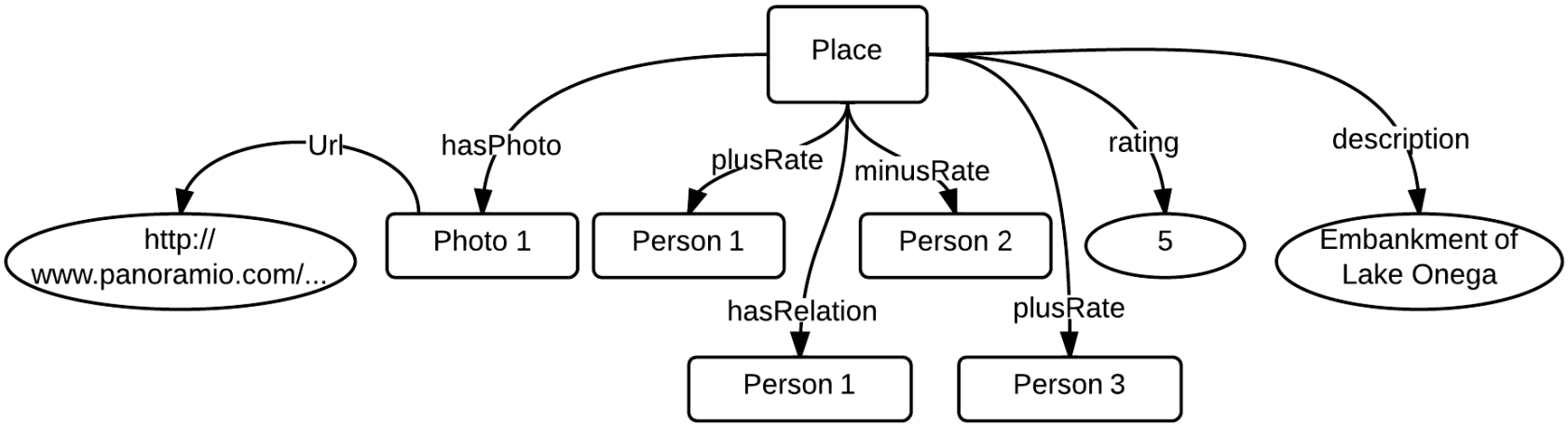
- C# for logic and HTML for GUI of generated content (*Ad-Hoc* part *One-page* for **S1** and *Complex* for **S2**)
- SmartSlog SDK is ontology-driven programming tool
- WorldAroundMe makes searching photos (Windows Phone client)

Ontology for Planning Social Activity Program

- Ontology is for presenting and storing
- Independence from data model of web-services
- Semantic links between places and participants
- Personalization is based on collective voting and rating



Example of place, its properties and relations

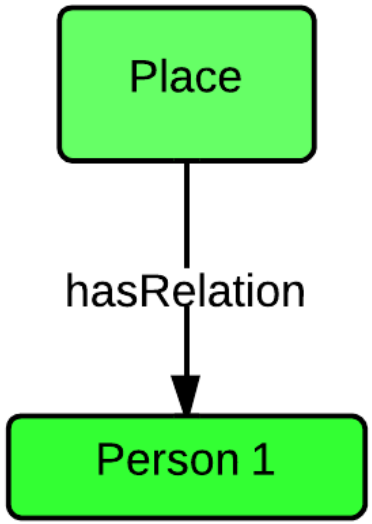


Semantic Linking

- Semantic relation of heterogeneous multi-source information
- Service analyzes SmartRoom Space and makes semantic links
- Relation of given place and participant (e.g., architect of the building is from certain country).
- Service stores semantic links in SmartRoom space in accordance with the ontology

Result: return placeList with HasRelation property

```
foreach Person in personList do
    foreach Place in placeList do
        if Place.Description contains
        Person.Information then
            Place.HasRelation = Person;
        end
    end
end
```



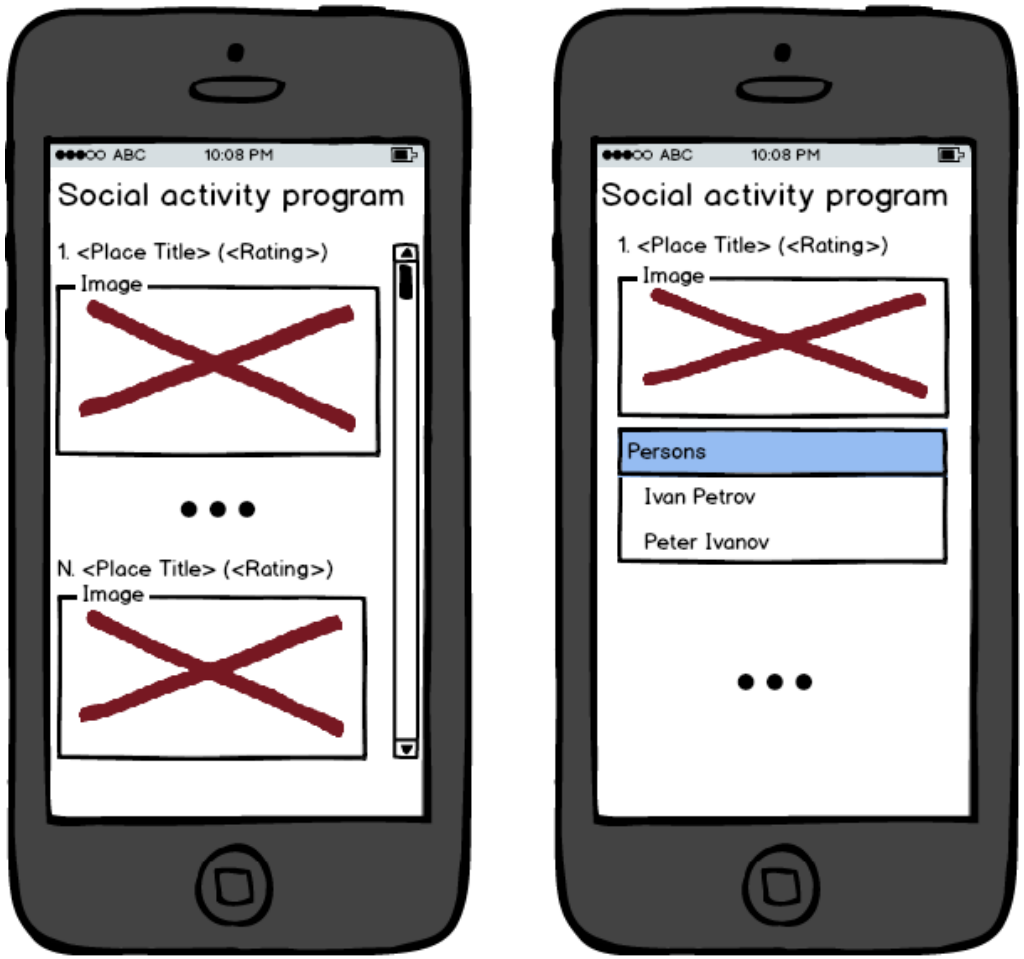
Graphical User Interface: A Prototype (1/2)

Main window:

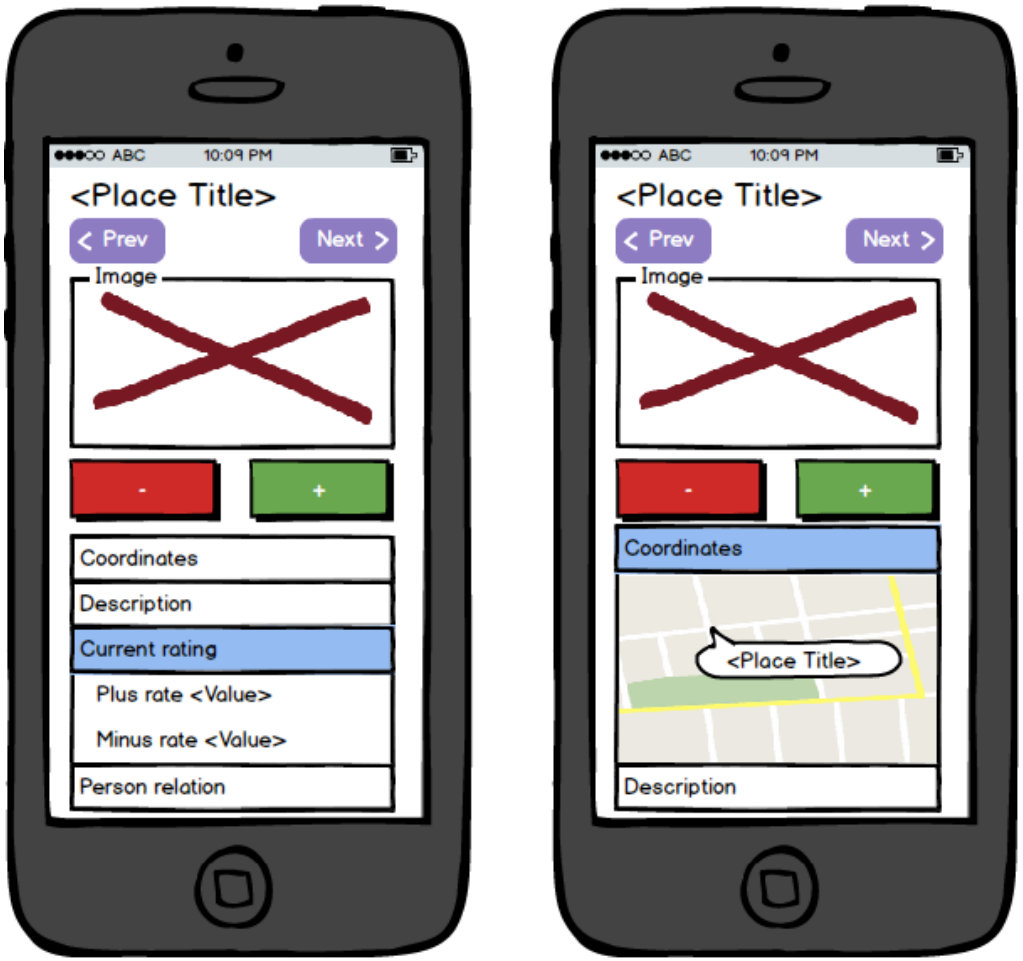
- List of all places
- Current rating of place
- Watching place information

Final window:

- List with selected places
- Each place with person's list
- Place information is available



Graphical User Interface: A Prototype (2/2)



POI information:

- POI description
- Map with POI location
- Different images for the same place
- Rating: vote-based scores
- Semantic links

Features

- Use of different photo services
  - Provided by WorldAroundMe logic (Windows Phone)
  - Flickr (`www.flickr.com`)
  - Panoramio (`www.panoramio.com`)
- Use of information from TAIS[1] application (Android)
  - Attractions nearby
  - descriptions of places (text, images, etc.)
- Use of public historical services
  - History of place
  - Place for making semantic relations

[1] Intelligent mobile tourist guide, SPIIRAN

Conclusion

- Two scenarios of services for social activity assistance in SmartRoom
- Initial system design for planning a social activity program
- Ontology for information used in the scenarios
- Use of multi-service approach on the client side
- Semantic linking and personalization for advanced services.
- Open source code:
  `http://sourceforge.net/projects/smartroom`