Towards a Global Spatial Data Infrastructure Using Web Services

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Content

- Location-Based Services (Today)
  - current LBS value chains and their problems
- Adaptive Location-Based Services (Tomorrow)
  - Web Services and adaptive service composition
- Berlin Adlershof – A Case Study
  - a distributed spatial information system
- SEMALON – The Semantic Location Network
  - approaching global scalability and interoperability
- Conclusions

LBS Value Chain

Adaptive Location-Based Services

Berlin-Adlershof
A Case Study

Campus Berlin-Adlershof – A Case Study

Wireless networks:
RFID chips:

Content provider:

GPS satellites:

Mapping services to real world objects:

Adaptive Service Composition:

- Local-IP
- GPS-Pos.
- (Local) Content

user with mobile device

Adaptive Service Composition:

- WLAN
- GPS-Pos.
- Content (via WLAN)

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- GPS-Pos.
- Content (via WLAN)
Inside the building:

Services inside the building:

Adaptive service composition:

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SEMALON – SEMAonic LOcation Network:
a globally scalable semantic network of location-based services

Discovery using UDDI

Details in: "Bach, Hölttä, Gärtel, and Malek, Location-based Discovery and Composition of Web Services."
Discovery using a Dedicated Service

1. Lookup LBDS
2. Lookup Service
3. Select and call service

UDDI Queries

- descriptive annotations can be attached to any service type or service instance and registered in the repository
- search for values that describe the entry according to a categorization scheme
- category levels can be combined using Boolean operators
- e.g., lookup services where <City> is <Berlin> and <Building> is <Sony Center>
- to interpret these attachments semantically, shared ontologies, i.e., standardized, commonly available, and machine-interpretable categorization schemes, must be provided

Spatial Ontologies - Example

Location Semantics

Geographic position:
N52°32.39' E13°24.64'

Semantic Position:

<rdf:Description about="urn://prater.theatres.berlin.de">
  <rdf:type resource="urn://myontology.myID.de/Schema/theatre"/>
  <rdf:type resource="urn://myontology.myID.de/Schema/places/ambient"/>
  <t:Name>Prater</t:Name>
</rdf:Description>

Translation Example

Value: Geo-coordinates, Theater, Silent Space, Mute

Ontology: WGS84, Places, Places/Theater, CalPhone Profiles

Conclusions and Outlook

Conclusions
- To arrive at a GSDI we have to overcome the ‘Multi-X’ problem
- Web Services are a promising way to do so
- Our SEMALON-approach adds location-based service discovery and semantic interoperability

Outlook
- Performance and Availability
- Reputation systems
- Legal issues