

Linked Open Innsbruck A Ontology for Public Transportation in IBK

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Domain and Scope of the Ontology

Domain & Scope | Competency Questions | Usage Scenario | Reuse | Ontology Presentation | Instances & Data Sources | Limitation & Improvements | Conclusion

- ▶ **Domain:**
 - ▶ Public Transportation in Innsbruck (Bus, Fiaker, Railway, Cable Car...)
- ▶ **Usage:**
 - ▶ To describe public transportation possibilities and their routes, times and costs within Innsbruck
- ▶ **Possible Users:**
 - ▶ Tourists, Locals, Tourist Centers, Info-Hotline, Websites...
- ▶ **Administration / Maintenance:**
 - ▶ Innsbruck Tourist Information Center, transport data should be supplied by the transportation owners (e.g. IKB, POST, Nordkettenbahnen...)

Competency Questions

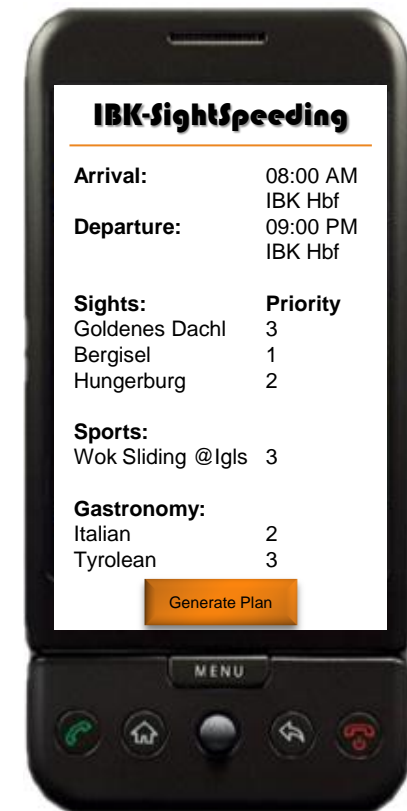
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- ▶ What is the fastest way from A to B?
 - ▶ duration
- ▶ Which transportation medium can I use to get from C to D?
 - ▶ transportation types
- ▶ Which is the nearest tramway stop
 - ▶ geographic
- ▶ How much does it cost to get from F to G using Horse-driven carriage (HDC = Fiaker)?
 - ▶ price

Usage Scenario: IBK-SightSpeeding

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- ▶ Idea: Many tourists, e.g. Chinese, have only one day to visit Innsbruck – however, they want to see as much as possible.
- ▶ Scenario:
 - ▶ Start the **IBK-SightSpeeding App** on Smartphone (Android, iPhone)
 - ▶ Enter arrival time+place and departing time+place
 - ▶ Prioritize places to visit, provided by other ontologies from Linked Open IBK (Sight seeing, Sports, Gastronomy...)
 - ▶ IBK-SightSpeeding uses the Public Transport ontology to create an efficient route in respect to time and price



Ontology Reuse

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- ▶ We found various ontologies when searching for „transport“
 - ▶ <http://schemacache.test.talis.com/Schema/?uri=http%3A%2F%2Fwww.aktors.org%2Fontology%2Fportal>
 - ▶ <http://www.pms.ifi.lmu.de/reverse-wga1/otn/OTN.owl>
- ▶ However:
 - ▶ they had the wrong focus and ended with a class „transportation-device“ without subclasses
 - ▶ they do only scratch the surface (i.e. listing transportation mediums as bus, taxi without routes, times or tickets)
- ▶ Found a paper that covers the theory to build a transportation ontology:
 - ▶ Junli Wang, Zhijun Ding, Changjun Jiang, "An Ontology-based Public Transport Query System" skg, pp.62, First International Conference on Semantics, Knowledge and Grid (SKG'05), 2005

The Public Transportation Ontology

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- ▶ Tool used:
 - ▶ Protégé 4.x caused problems when renaming and restructuring
 - ▶ **Protégé 3.4.4 + OWL**
 - ▶ Better Usability
 - ▶ We tried to set up a collaborative database
 - ▶ Includes various tools for visualization (Jambalaya, OntoViz...)

- ▶ **Presentation of the Ontology (Live-Demo)**

Instances & Data Sources

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- ▶ **Already created instances:**
 - ▶ 4 Bus lines (e.g. *BusLine C*)
 - ▶ 15 Bus stops (e.g. *Marktplatz*)
 - ▶ 15 Coordinates (e.g. *MarktplatzKoordinaten*)
 - ▶ 1 Ticket (e.g. *TicketStandard*)
 - ▶ 4 Schedules (e.g. *CWorkday09AM*)
 - ▶ 17 TimeStops (e.g. *Marktplatz | 0. | 4*)
 - ▶ 2 Bus types (e.g. *Bus3080IBK*)

Instances & Data Sources (contd.)

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- ▶ Useful databases for the population of the Public Transport Ontology
 - ▶ Google earth database
 - ▶ Coordinates
 - ▶ IVB database
 - ▶ Bus line, tramway line
 - ▶ Bus stop, tramway stop
 - ▶ Ticket for bus and tramway
 - ▶ Schedule of bus and tramway Line
 - ▶ Transportation Medium
 - ▶ Tourist Information database
 - ▶ HDC lines
 - ▶ HDC stops
 - ▶ Tickets for HDC
 - ▶ Schedule of HDC
 - ▶ Transportation Medium

Instances & Data Sources (contd.)

Domain & Scope | Competency Questions | Usage Scenario | Reuse | Ontology Presentation | Instances & Data Sources | Limitation & Improvements | Conclusion

- ▶ Useful databases for the population of the Public Transport Ontology (contd.)
 - ▶ ÖBB database
 - ▶ Train Line
 - ▶ Train Station
 - ▶ Ticket for Train
 - ▶ Schedule of Train
 - ▶ Transportation Medium
 - ▶ Database of Nordkettenbahnen
 - ▶ Tramway Line
 - ▶ Tramway Stop
 - ▶ Ticket for Tramway
 - ▶ Schedule of Tramway
 - ▶ Transportation Medium

Instances & Data Sources (contd.)

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- ▶ How to keep the data up-to-date?
 - ▶ Google
 - ▶ IVB
 - ▶ Tourist Information
 - ▶ ÖBB
 - ▶ Nordkettenbahnen

- ▶ Who should host the ontology?
 - ▶ Innsbruck Tourismus (Innsbruck Tourism)

Limitations and further Improvements

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- ▶ The modeling of various transportation charges and different ticket types (e.g. Junior / Senior...) is not fully supported yet
- ▶ Approach how to integrate / link it with other ontologies (Linked Open Innsbruck) needs to be defined!
 - ▶ Issues: Interfaces? Similar Classes? Reuse? Relationship?
- ▶ The other ontologies in Linked Open Innsbruck need to provide coordinates for their entities to support the usage scenario (IBK-SightSpeeding)

Conclusion

- ▶ Ontology for public transport in Innsbruck covering
 - ▶ Times (Schedules, Arrival Times...)
 - ▶ Location (Stops, Coordinates...)
 - ▶ Transportation Medium Types (Bus, Tramway, HDC...)
 - ▶ Prices (Tickets...)
- ▶ General concept is the most important step → errors in the concept lead to redesign and rework effort
- ▶ Always possible to further extend the granularity / capability of the ontology → necessary to define the detail level
- ▶ Reuse of available ontologies problematic due to divergent scopes and application domains

Thank you for your attention!

Literature & Sources

- ▶ Junli Wang, Zhijun Ding, Changjun Jiang, "An Ontology-based Public Transport Query System" skg, pp.62, First International Conference on Semantics, Knowledge and Grid (SKG'05), 2005
- ▶ Noy, N. F. & McGuinness, D. L. Ontology Development 101: A Guide to Creating Your First Ontology. Knowledge Systems Laboratory, March, 2001.
- ▶ Innsbrucker Verkehrsbetriebe (IVB) www.ivb.at
- ▶ Google Earth <http://www.google.com/earth/>
- ▶ Google Maps <http://www.google.com/maps/>
- ▶ Swoogle <http://swoogle.umbc.edu/>
- ▶ Protégé <http://protege.stanford.edu/>
- ▶ Vocamp http://vocamp.org/wiki/Ontology_list