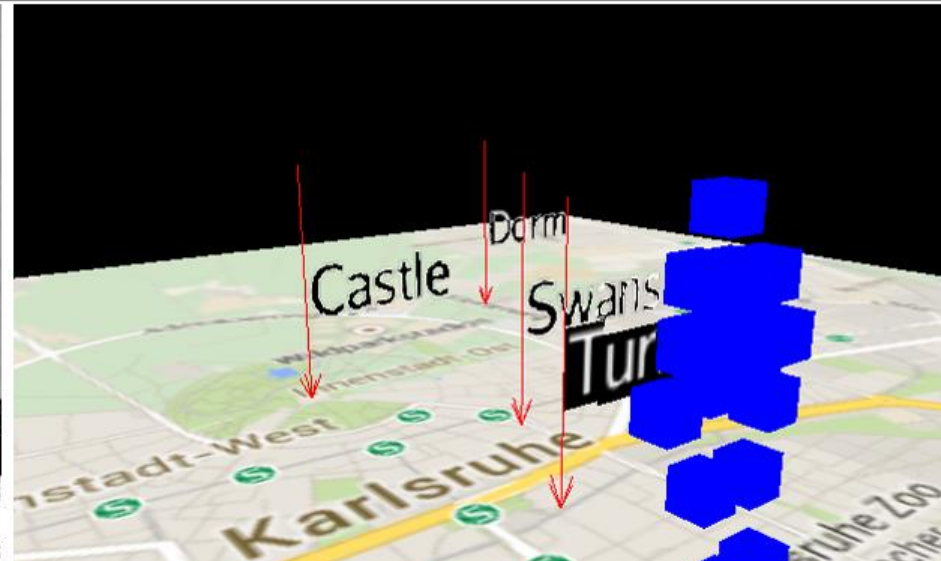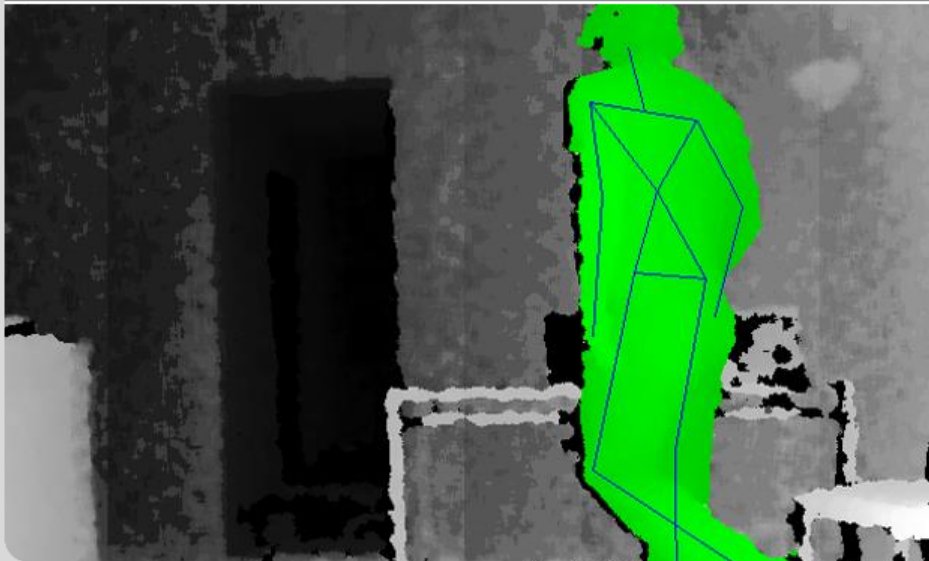# Stream Reasoning in Mixed Reality Applications

Andreas Harth
Joint work with Felix Keppmann, Steffen Stadtmueller and Tobias Kaefer
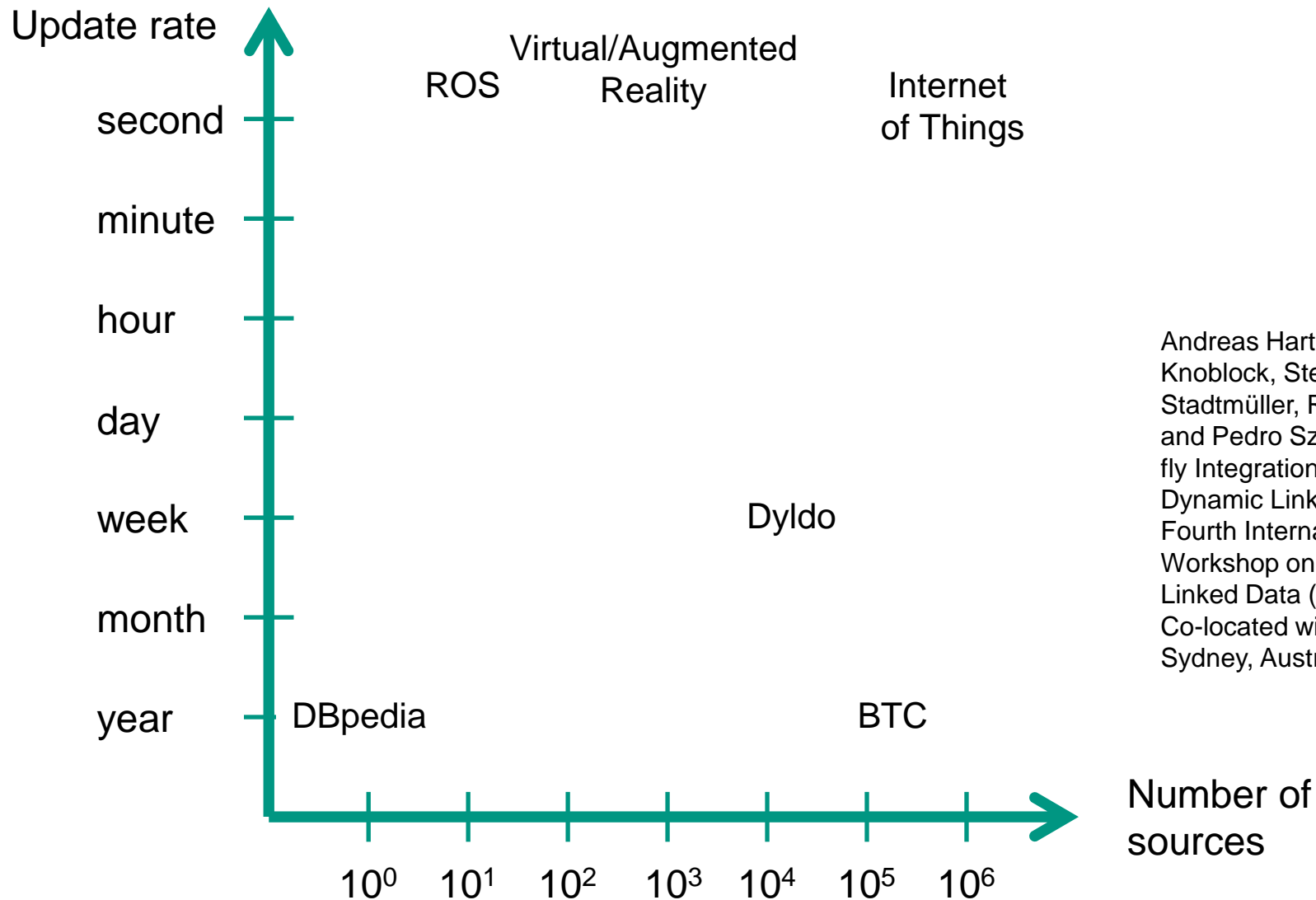**Stream Reasoning Workshop, Vienna, November 2015**

INSTITUTE AIFB

Outline

- Motivation
- Representation and Interface
- Architecture
- Applications
- Conclusion

Motivation: Data Integration and System Interoperation at Scale

Update rate

- second
- minute
- hour
- day
- week
- month
- year

ROS

Virtual/Augmented Reality

Internet of Things

Dyldo

DBpedia

BTC

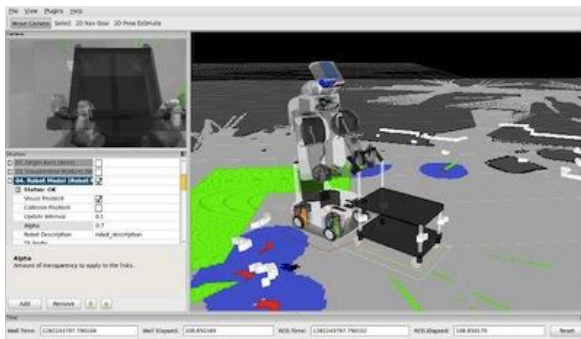10^0 10^1 10^2 10^3 10^4 10^5 10^6

Number of sources

Andreas Harth, Craig Knoblock, Steffen Stadtmüller, Rudi Studer and Pedro Szekely. "On-the-fly Integration of Static and Dynamic Linked Data". Fourth International Workshop on Consuming Linked Data (COLD 2013). Co-located with ISWC 2013, Sydney, Australia.
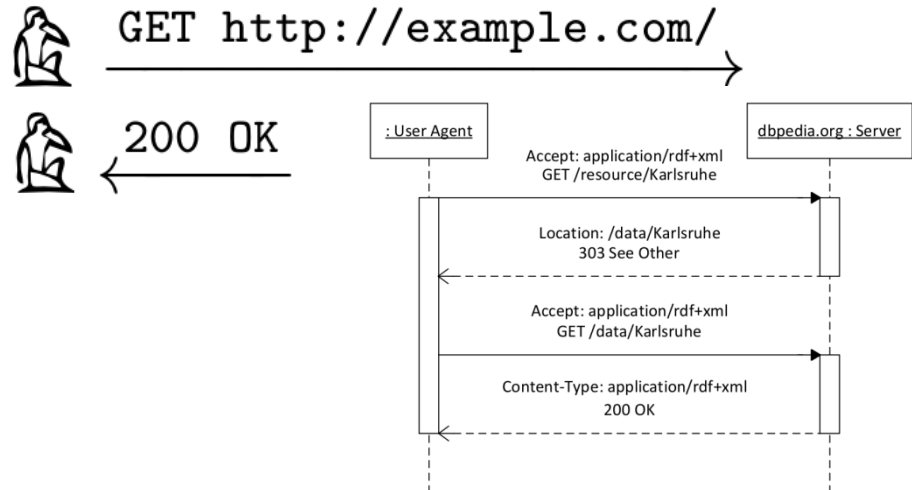
Representation and Interface

1. Use URIs as names for things

2. Use HTTP URIs so that people can look up those names.

3. When someone looks up a URI, provide useful information, using the standards (RDF*, SPARQL)

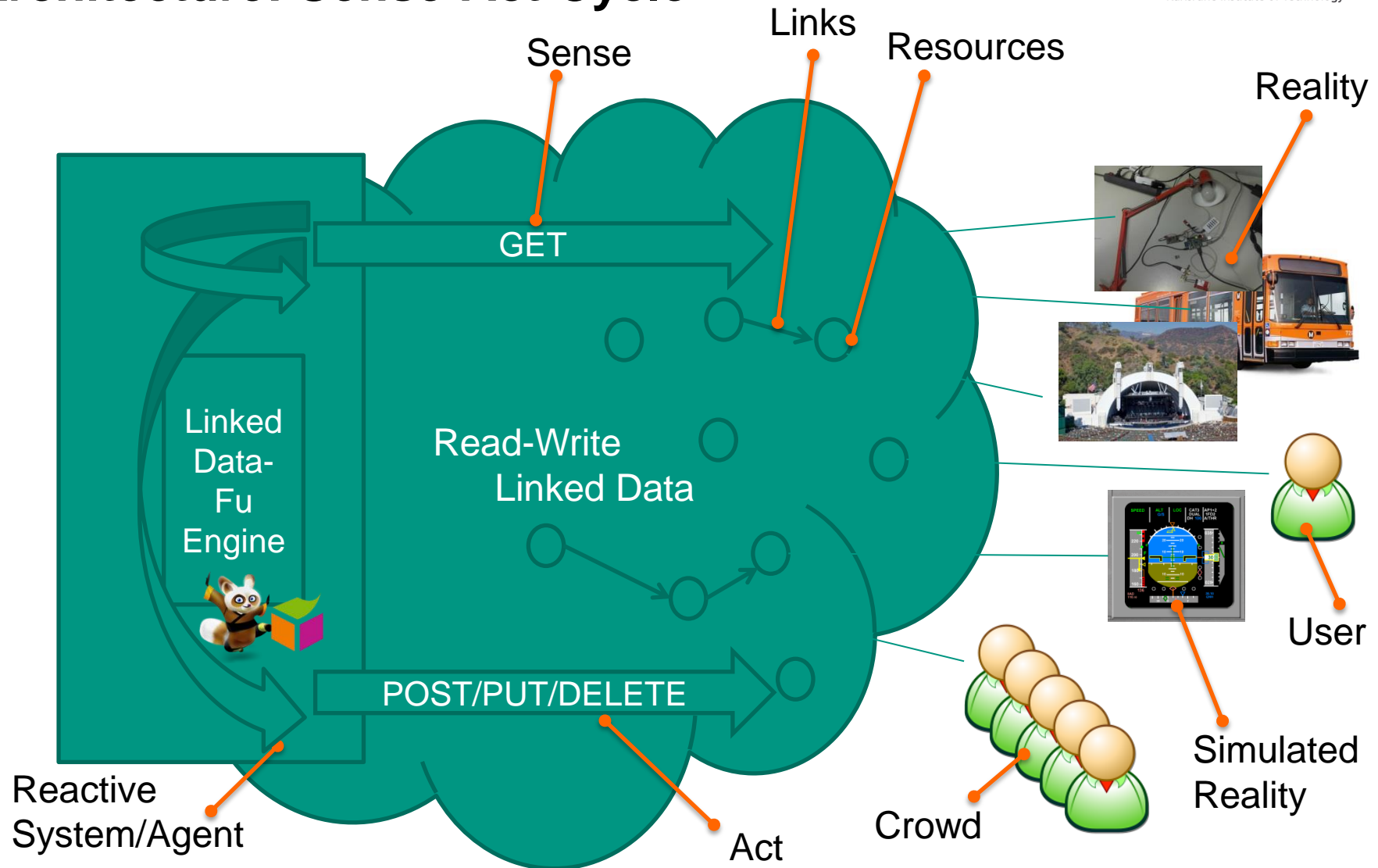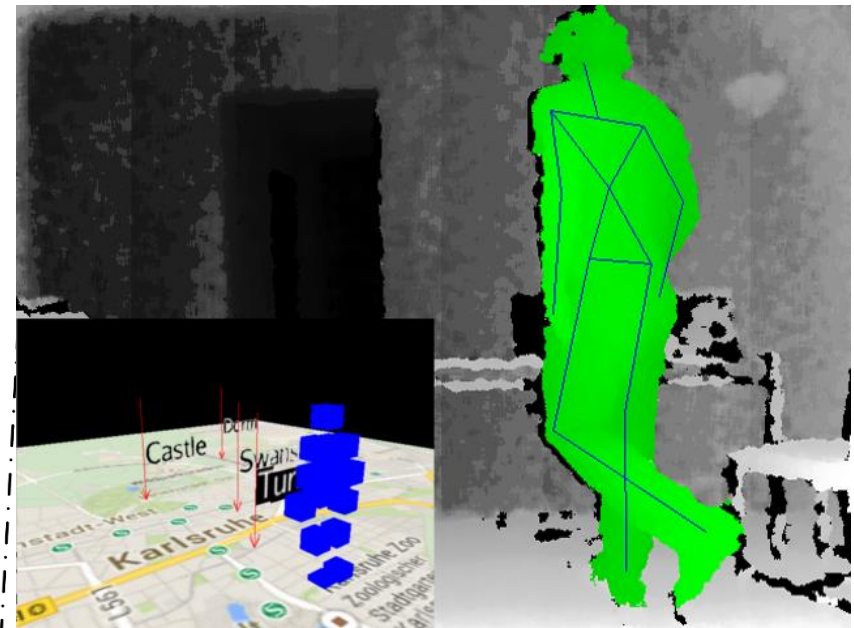4. Include links to other URIs. so that they can discover more things.

http://www.w3.org/DesignIssues/LinkedData.html

https://en.wikipedia.org/wiki/Robot_Operating_System

Architecture: Sense-Act Cycle

Sense

Links

Resources

Reality

GET

Read-Write
Linked Data

Linked
Data-
Fu
Engine

POST/PUT/DELETE

Reactive
System/Agent

Act

User

Simulated
Reality

Crowd

Integrating Highly Dynamic RESTful Linked Data APIs in a Virtual Reality Environment
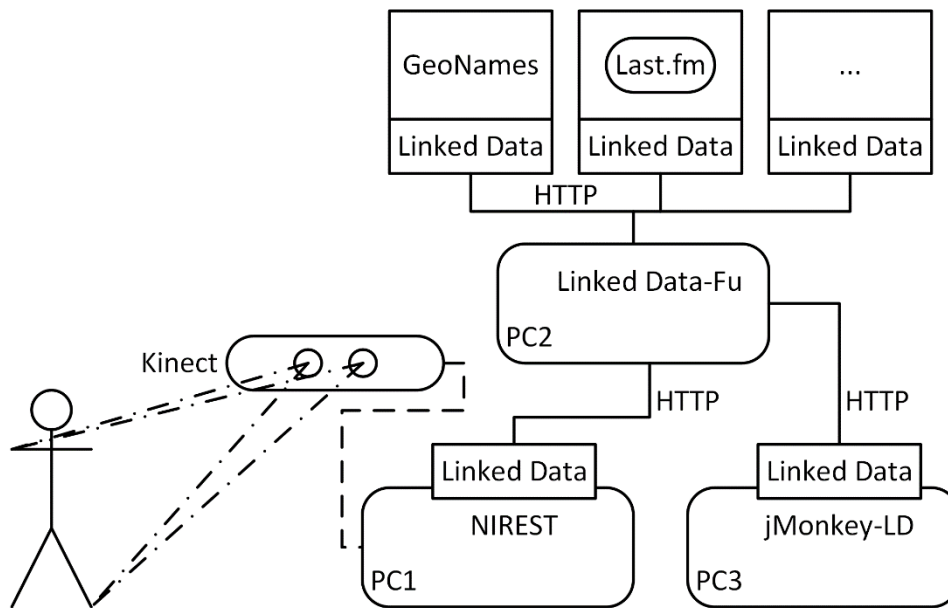
Felix Leif Keppmann, Tobias Käfer, Steffen Stadtmüller, René Schubotz and Andreas Harth. "Integrating Highly Dynamic RESTful Linked Data APIs in a Virtual Reality Environment". International Symposium on Mixed and Augmented Reality (Posters & Demos). ISMAR 2014, Munich, Germany.

Felix Leif Keppmann, Tobias Käfer, Steffen Stadtmüller, René Schubotz and Andreas Harth. "High Performance Linked Data Processing for Virtual Reality Environments". International Semantic Web Conference (Posters & Demos). ISWC 2014, Riva del Garda, Italy.

Conclusion

- Read-Write Linked Data provides a simple and elegant interface to diverse data sources and data sinks with varying update rates

- We are able to scale rule-based system to large number of sources (via hyperlinks – several GBs of data from the LOD cloud) and high update rates (suitable for interactive VR/AR applications)

- We can address industrial use cases with a simple cognitive architecture accessing the environment

- Future work concerns the representation, observation and execution of procedural knowledge