

Smart Data for Smart Software

Pascal Hitzler

Adila Krisnadhi

DaSe Lab for Data Semantics

Wright State University

<http://www.pascal-hitzler.de>

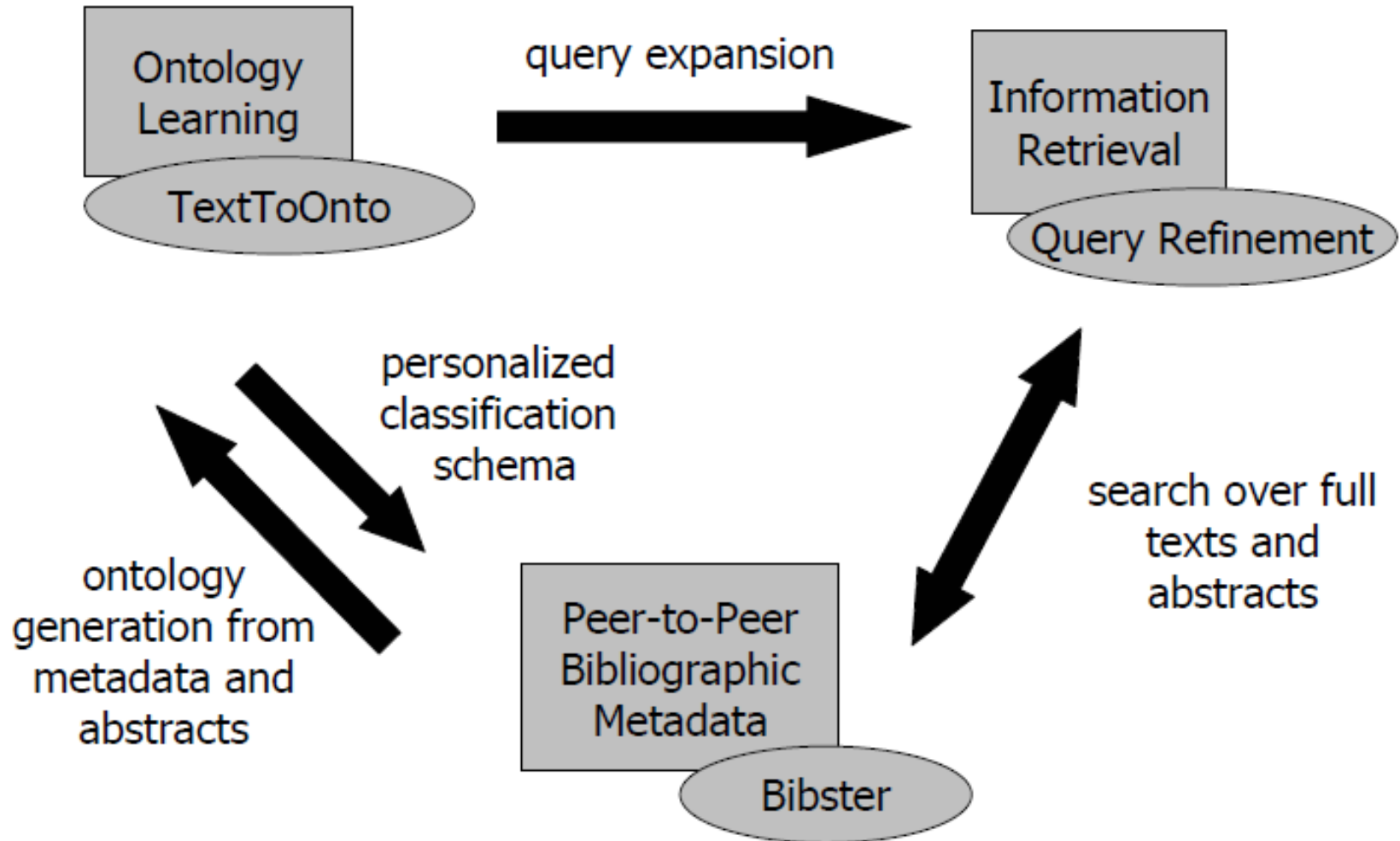
<http://knoesis.wright.edu/researchers/adila/>

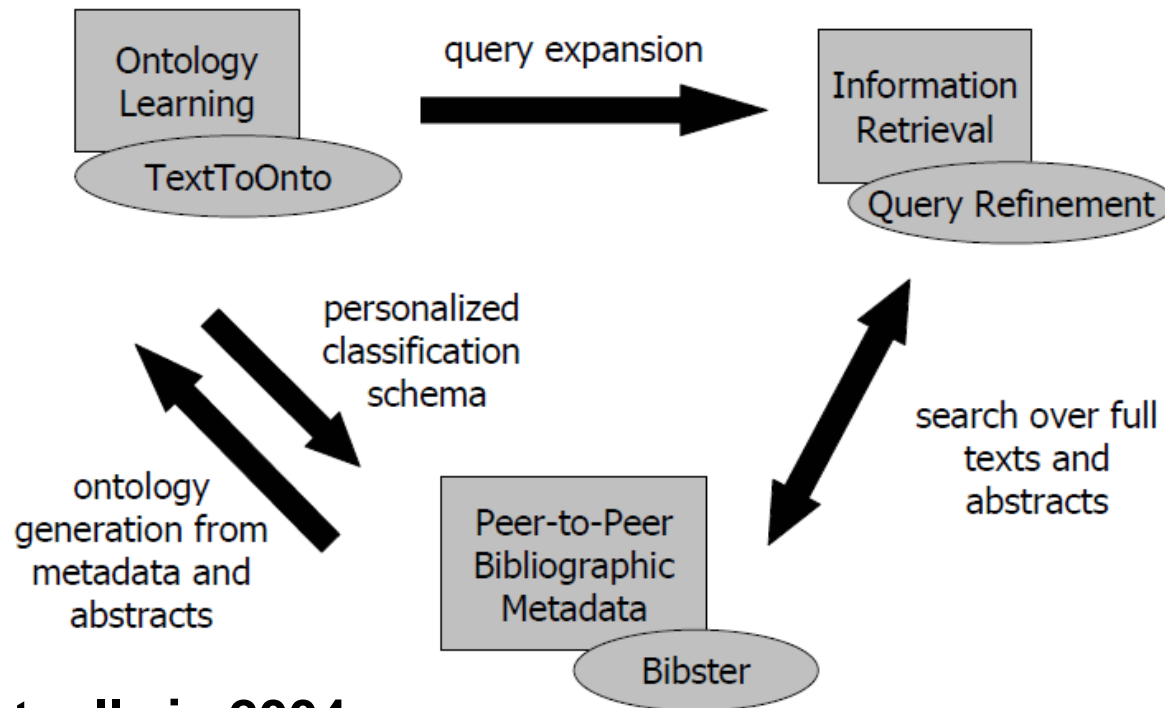
Krzysztof Janowicz

STKO Lab

UC Santa Barbara

<http://stko.geog.ucsb.edu/>





This was actually in 2004.

York Sure, Pascal Hitzler, Andreas Eberhart, Rudi Studer, The Semantic Web in One Day. IEEE Intelligent Systems 20 (3), 85-87, May 2005.

This worked, because there was an implicit agreement on data and metadata *formats* and on general *methodology*.

In this case: Semantic Web standards RDF and OWL, and corresponding technical and methodological approaches.

Where's your (meta)data?

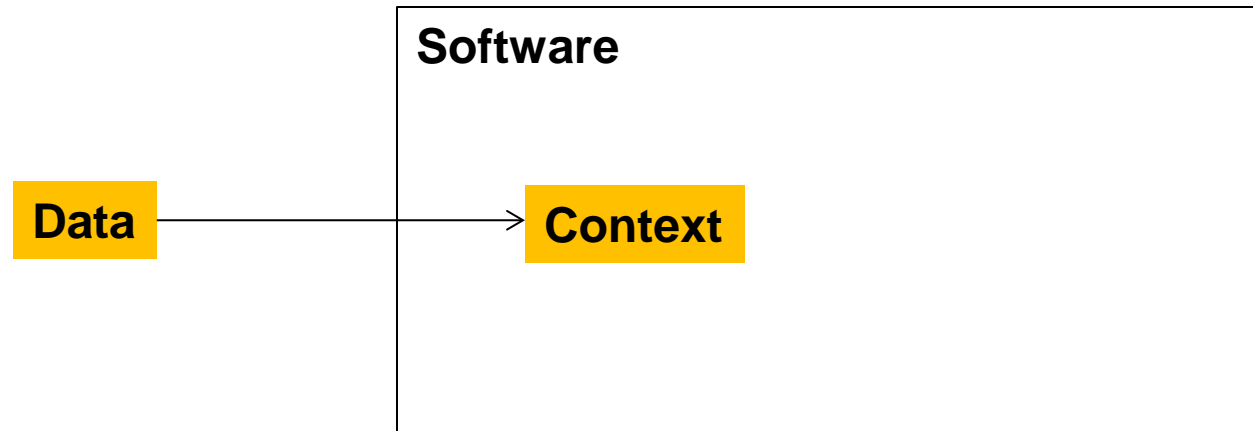
Data: Wind direction “north” at 10 km/h

Data

Depending on usage, you may need

- **is direction “to” or “from”?**
- **granularity of measurements**
- **provenance of this information**
- **information about the sensor device**
- **conditions in which measurements were taken**
- **etc.**

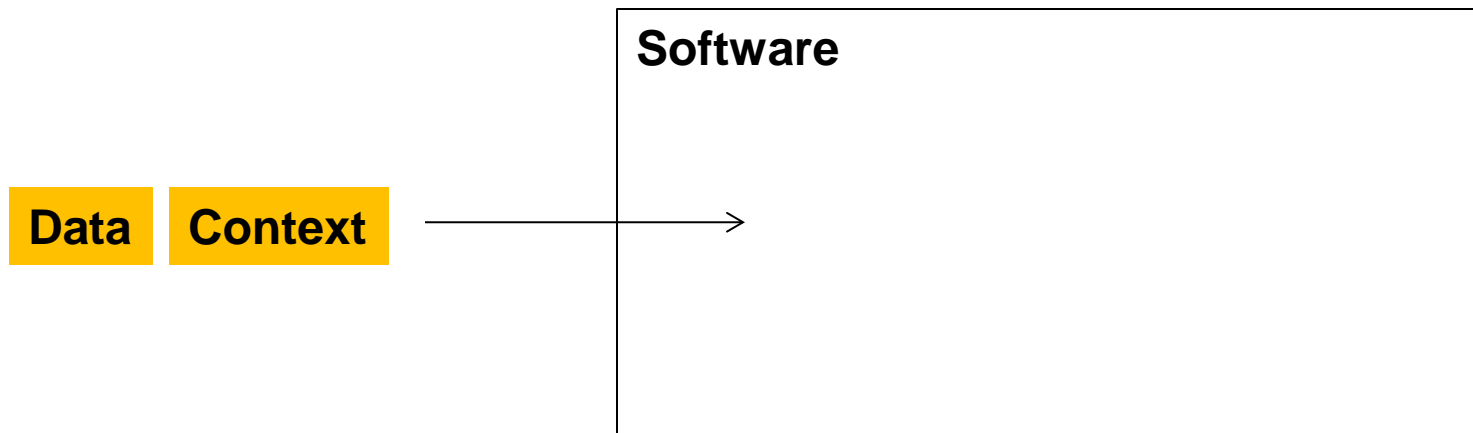
Context



Smart Software:

Context information is (implicit) in the code.

Where's your (meta)data?



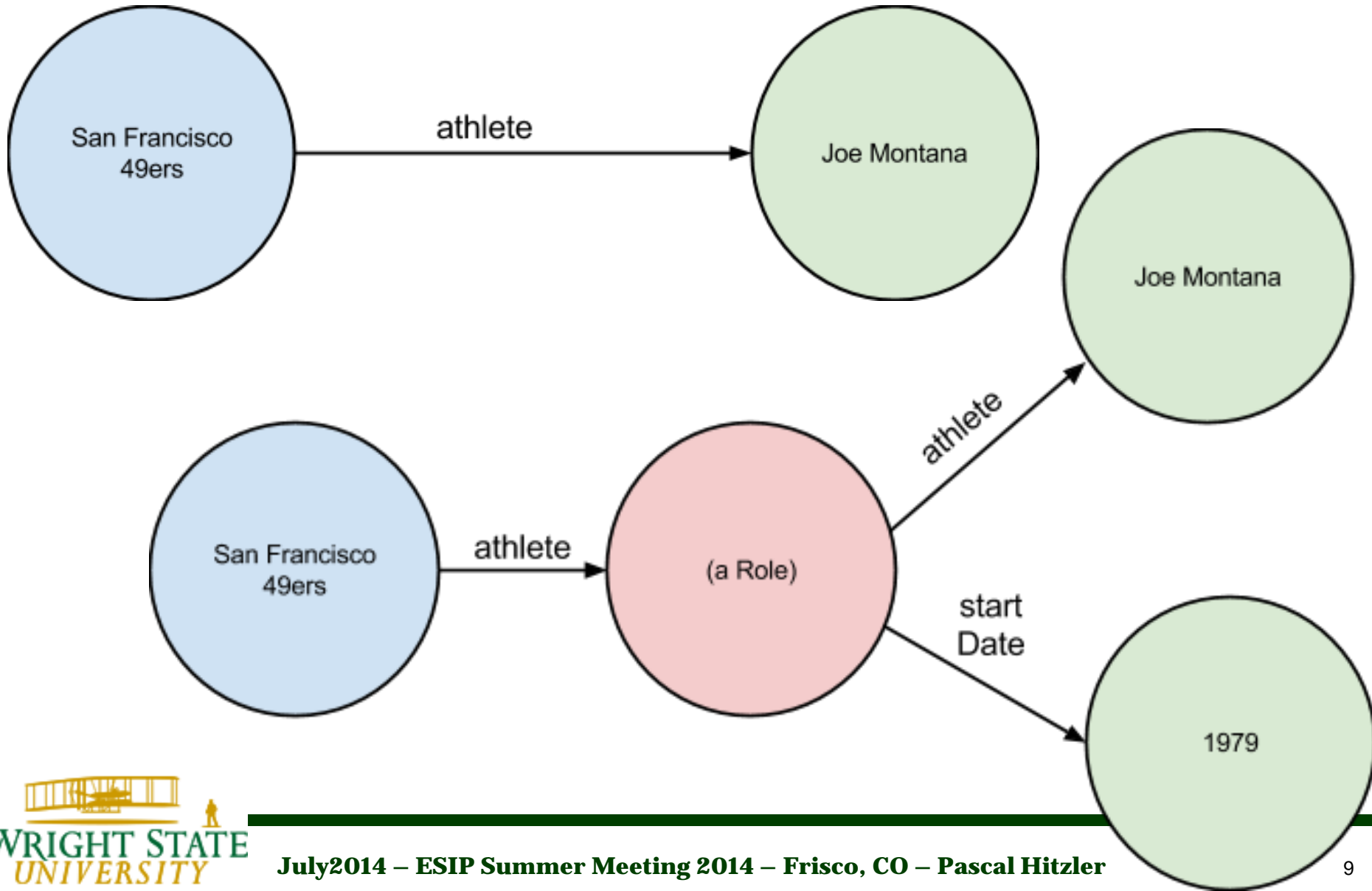
Smart Data:

**Context information is explicitly given
as metadata.**

- **Your metadata becomes somebody else's data.**
- **To be really useful, metadata needs to be well-constructed and well-documented.**

**“This example proves
that hammers are useless”**





- **paleologic age**
- **point of interest**
- **river**
- **sample**
- **location**
- **name**

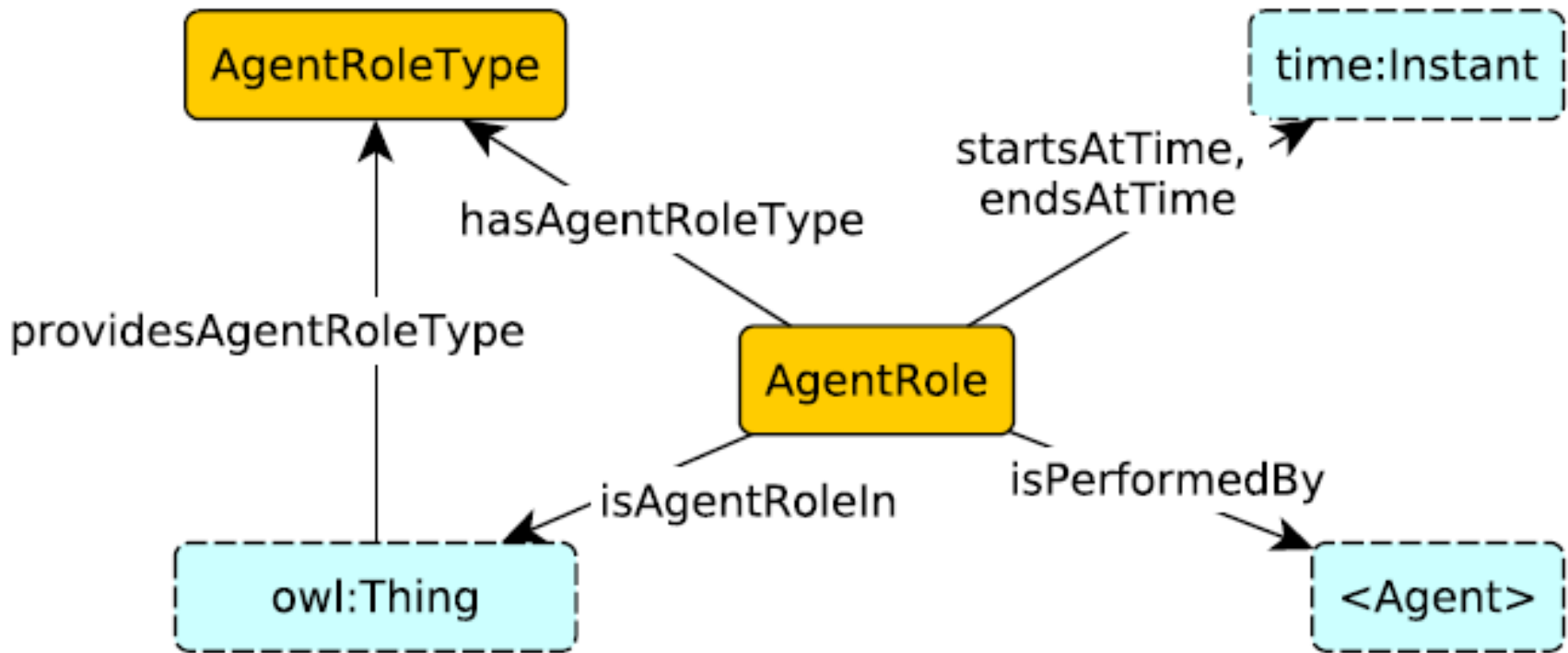


Figure 2.1: \langle AgentRole \rangle pattern



BCO-DMO

Peter Wiebe was found to have the following roles

Vessel	Cruise	Program	Role
Albatross IV	AL9404	Hydrography	Chief Scientist
Albatross IV	AL9508	Hydrography	Chief Scientist
Albatross IV	AL9906	Hydrography	Chief Scientist
Atlantis II	AT85	Cold Core Rings	Chief Scientist
Endeavor	EN261	Hydrography	Chief Scientist
Nathaniel B. Palmer	NBP0103	U.S. GLOBEC Southern Ocean	Chief Scientist
Nathaniel B. Palmer	NBP0104	U.S. GLOBEC Southern Ocean	Chief Scientist
Nathaniel B. Palmer	NBP0202	U.S. GLOBEC Southern Ocean	Chief Scientist
Nathaniel B. Palmer	NBP0204	U.S. GLOBEC Southern Ocean	Chief Scientist

Put the smartness in the (meta)data.

Make smart software which can ingest the metadata and adapt to it.

Smart data enables smart software!

Put the smartness in the (meta)data.

Make smart software which can ingest the metadata and adapt to it.

Smart data enables smart software!

- Pascal Hitzler, Frank van Harmelen, A reasonable Semantic Web. *Semantic Web 1 (1-2)*, 39-44, 2010.
- Prateek Jain, Pascal Hitzler, Peter Z. Yeh, Kunal Verma, Amit P. Sheth, Linked Data is Merely More Data. In: Dan Brickley, Vinay K. Chaudhri, Harry Halpin, Deborah McGuinness: *Linked Data Meets Artificial Intelligence*. Technical Report SS-10-07, AAAI Press, Menlo Park, California, 2010, pp. 82-86. ISBN 978-1-57735-461-1. Proceedings of LinkedAI at the AAAI Spring Symposium, March 2010.
- Pascal Hitzler, Krzysztof Janowicz, *What's Wrong with Linked Data?* <http://blog.semantic-web.at/2012/08/09/whats-wrong-with-linked-data/> , August 2012.
- Pascal Hitzler, Markus Krötzsch, Sebastian Rudolph, *Foundations of Semantic Web Technologies*. Chapman and Hall/CRC Press, 2009.

- **Pascal Hitzler, Krzysztof Janowicz, Linked Data, Big Data, and the 4th Paradigm. Semantic Web 4 (3), 2013, 233-235.**
- **Krzysztof Janowicz, Pascal Hitzler, The Digital Earth as Knowledge Engine. Semantic Web 3 (3), 213-221, 2012.**
- **Gary Berg-Cross, Isabel Cruz, Mike Dean, Tim Finin, Mark Gahegan, Pascal Hitzler, Hook Hua, Krzysztof Janowicz, Naicong Li, Philip Murphy, Bryce Nordgren, Leo Obrst, Mark Schildhauer, Amit Sheth, Krishna Sinha, Anne Thessen, Nancy Wiegand, Ilya Zaslavsky, Semantics and Ontologies for EarthCube. In: K. Janowicz, C. Kessler, T. Kauppinen, D. Kolas, S. Scheider (eds.), Workshop on GIScience in the Big Data Age, In conjunction with the seventh International Conference on Geographic Information Science 2012 (GIScience 2012), Columbus, Ohio, USA. September 18th, 2012. Proceedings.**
- **Krzysztof Janowicz, Pascal Hitzler, Thoughts on the Complex Relation Between Linked Data, Semantic Annotations, and Ontologies. In: Paul N. Bennett, Evgeniy Gabrilovich, Jaap Kamps, Jussi Karlgren (eds.), Proceedings of the 6th International Workshop on Exploiting Semantic Annotation in Information Retrieval, ESAIR 2013, ACM, San Francisco, 2013, pp. 41-44.**

- Prateek Jain, Pascal Hitzler, Amit P. Sheth, Kunal Verma, Peter Z. Yeh, Ontology Alignment for Linked Open Data. In P. Patel-Schneider, Y. Pan, P. Hitzler, P. Mika, L. Zhang, J. Pan, I. Horrocks, B. Glimm (eds.), *The Semantic Web - ISWC 2010. 9th International Semantic Web Conference, ISWC 2010, Shanghai, China, November 7-11, 2010, Revised Selected Papers, Part I. Lecture Notes in Computer Science Vol. 6496.* Springer, Berlin, 2010, pp. 402-417.
- Amit Krishna Joshi, Prateek Jain, Pascal Hitzler, Peter Z. Yeh, Kunal Verma, Amit P. Sheth, Mariana Damova, Alignment-based Querying of Linked Open Data. In: Meersman, R.; Panetto, H.; Dillon, T.; Rinderle-Ma, S.; Dadam, P.; Zhou, X.; Pearson, S.; Ferscha, A.; Bergamaschi, S.; Cruz, I.F. (eds.), *On the Move to Meaningful Internet Systems: OTM 2012, Confederated International Conferences: CoopIS, DOA-SVI, and ODBASE 2012, Rome, Italy, September 10-14, 2012, Proceedings, Part II. Lecture Notes in Computer Science Vol. 7566,* Springer, Heidelberg, 2012, pp. 807-824.
- Yingjie Hu, Krzysztof Janowicz, David Carral, Simon Scheider, Werner Kuhn, Gary Berg-Cross, Pascal Hitzler, Mike Dean, Dave Kolas, A Geo-Ontology Design Pattern for Semantic Trajectories. In: Thora Tenbrink, John G. Stell, Antony Galton, Zena Wood (Eds.): *Spatial Information Theory - 11th International Conference, COSIT 2013, Scarborough, UK, September 2-6, 2013. Proceedings. Lecture Notes in Computer Science Vol. 8116,* Springer, 2013, pp. 438-456.

- **Adila Krisnadhi, Robert Arko, Suzanne Carbotte, Cynchia Chandler, Michelle Cheatham, Timothy Finin, Pascal Hitzler, Krzysztof Janowicz, Thomas Narock, Lisa Raymond, Adam Shepherd, Peter Wiebe, An Ontology Pattern for Oceanographic Cruises: Towards an Oceanographer's Dream of Integrated Knowledge Discovery. OceanLink Technical Report 2014.1.**
- **York Sure, Pascal Hitzler, Andreas Eberhart, Rudi Studer, The Semantic Web in One Day. IEEE Intelligent Systems 20 (3), 85-87, May 2005.**
- **Krzysztof Janowicz, Pascal Hitzler, Benjamin Adams, Dave Kolas, Charles Vardeman II, Five Stars of Linked Data Vocabulary Use. Semantic Web 5 (3), 2014, 173-176.**