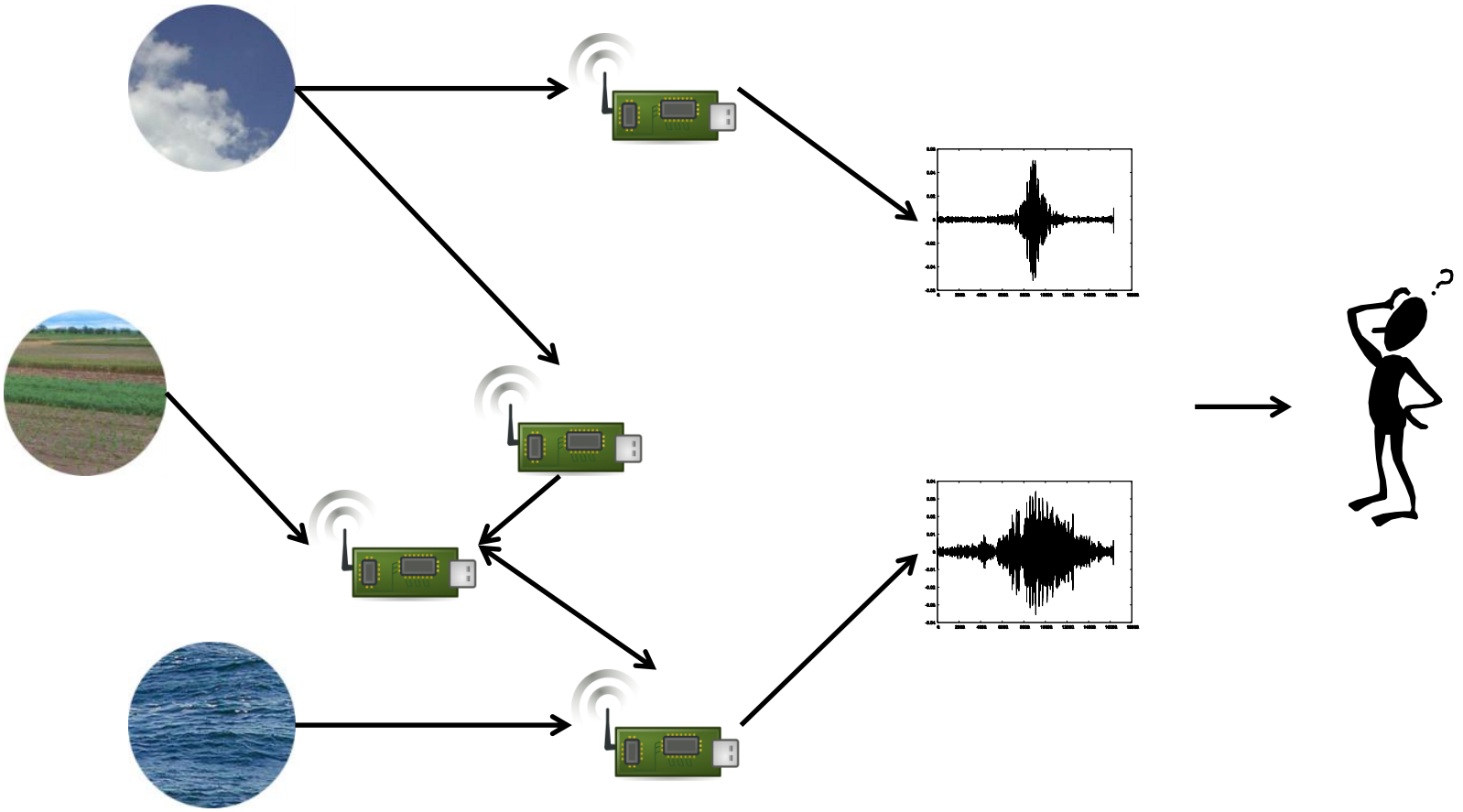
Markus Stocker

Journal Club in Biogeochemistry, Friday 3, 2012

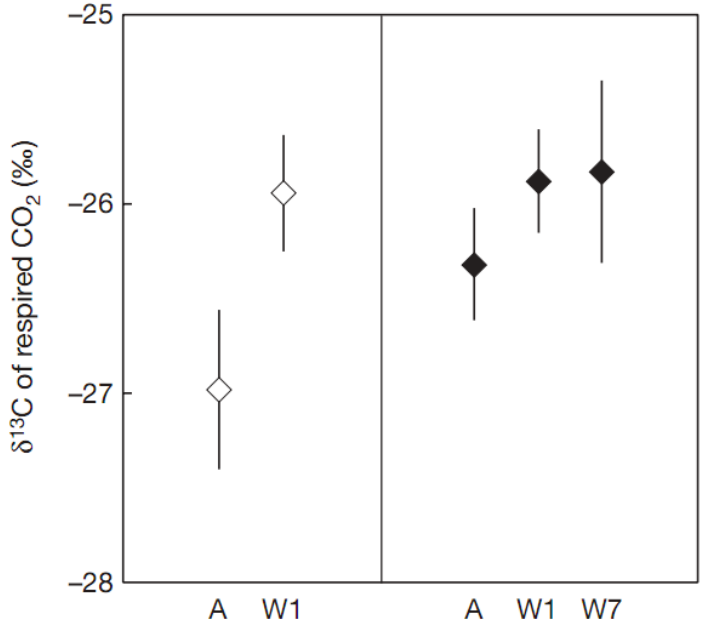
Too much data and not enough knowledge*: What to do with a 100 million data points

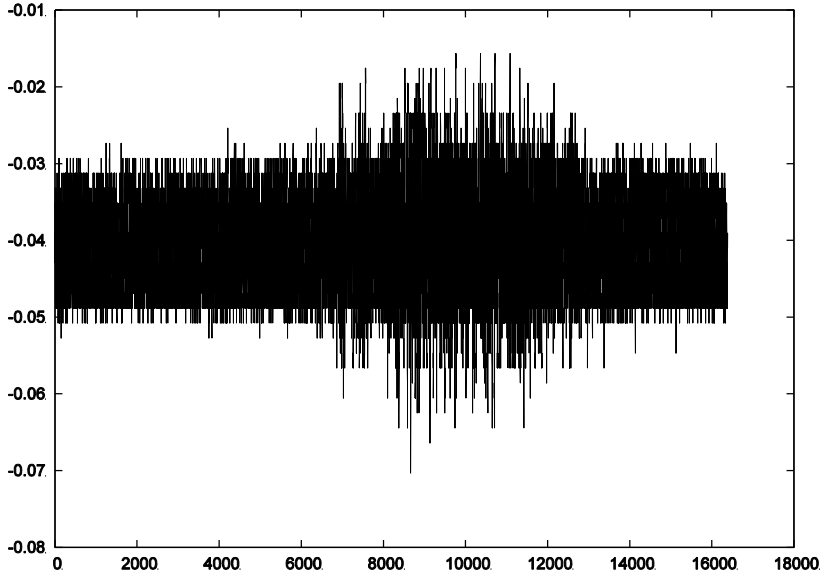
UNIVERSITY OF
EASTERN FINLAND

Domain



Domain (cont'd)



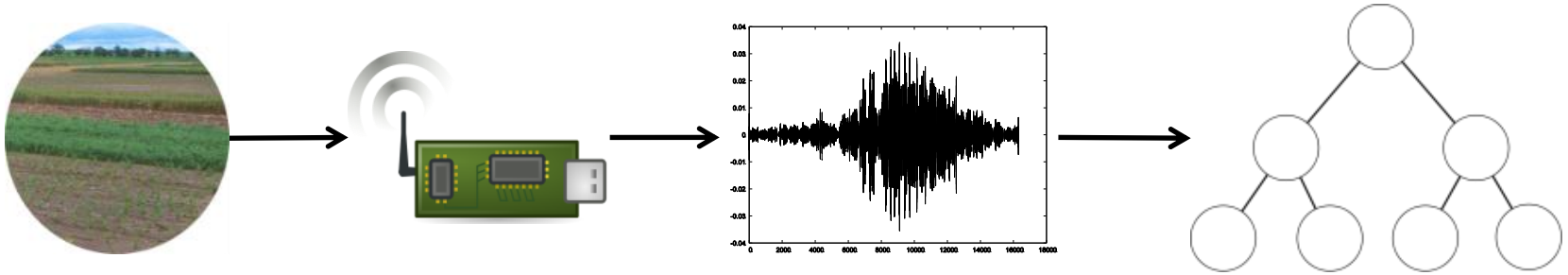


Two values in one year
Three values in seven years [1]

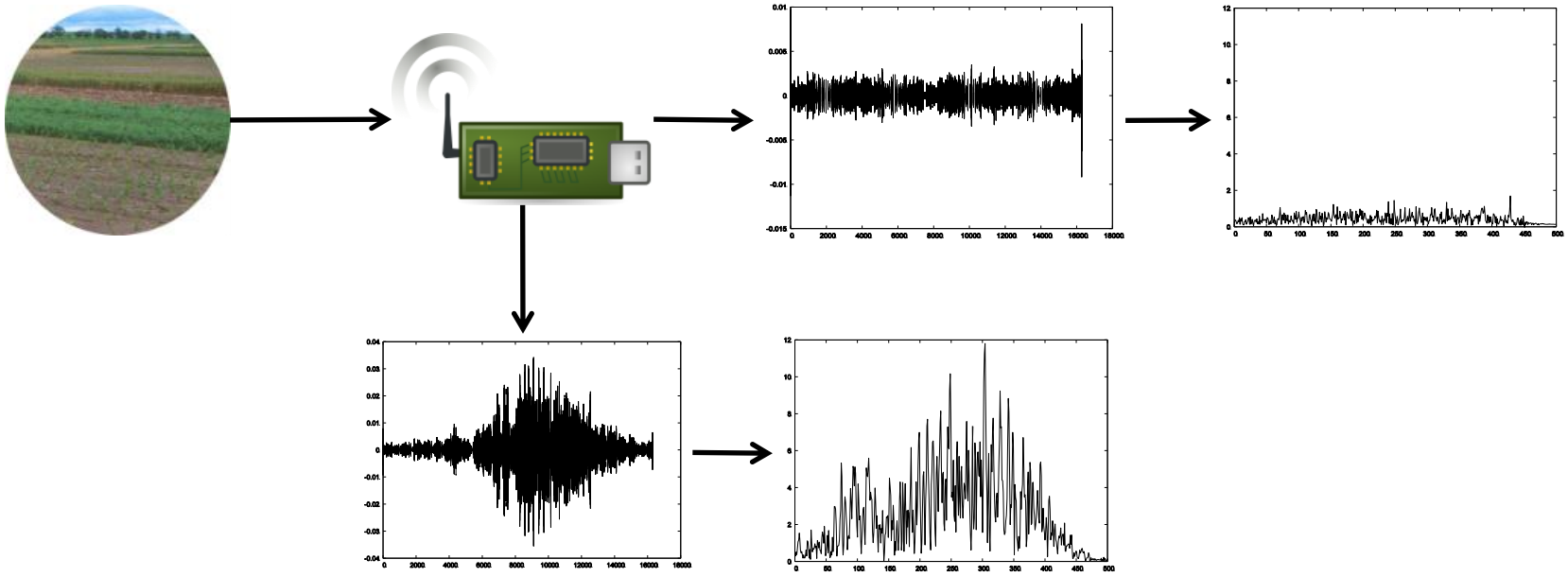
16'384 values in 8.192 seconds

Challenges

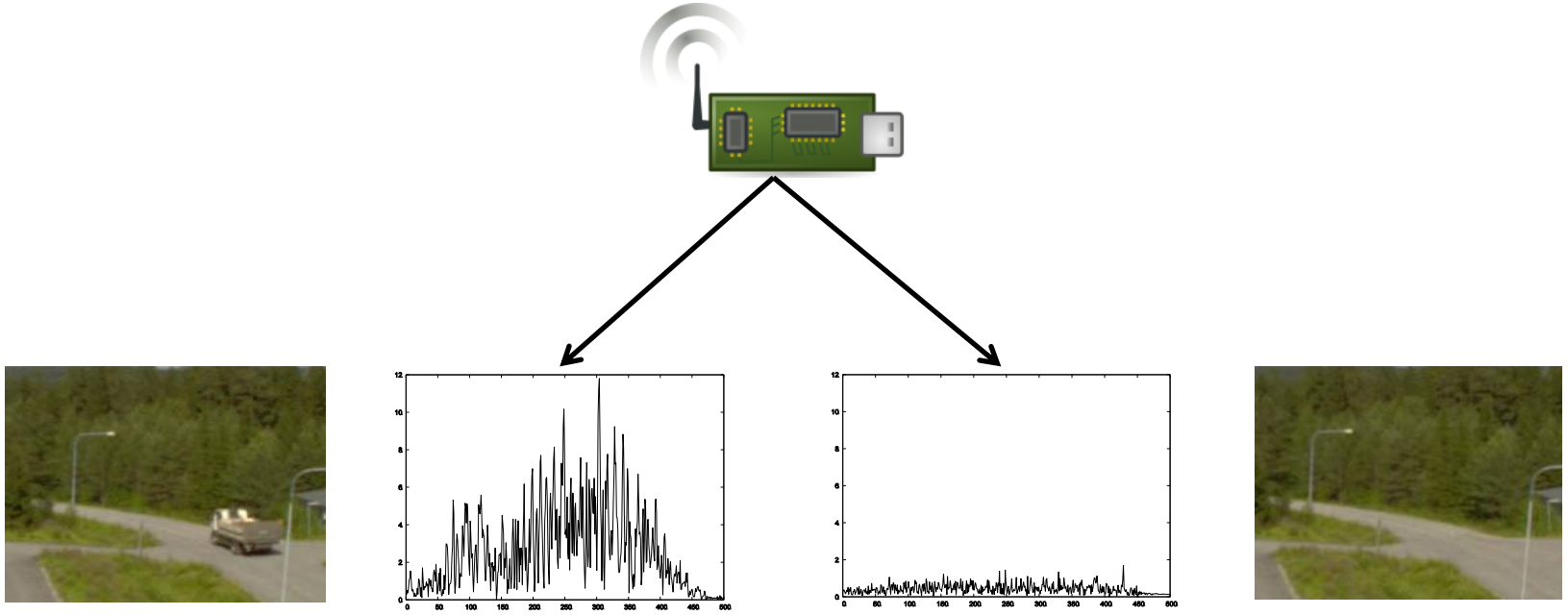
- Data acquisition, processing, and storage
- Making sense of sensor data [2]
  - How can knowledge be acquired
  - How can such knowledge be represented
- Due to the scale this should be automated



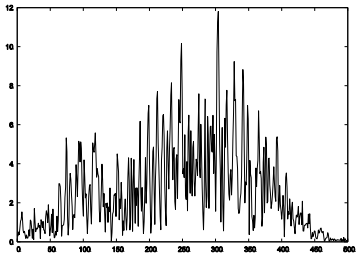
Data acquisition and processing

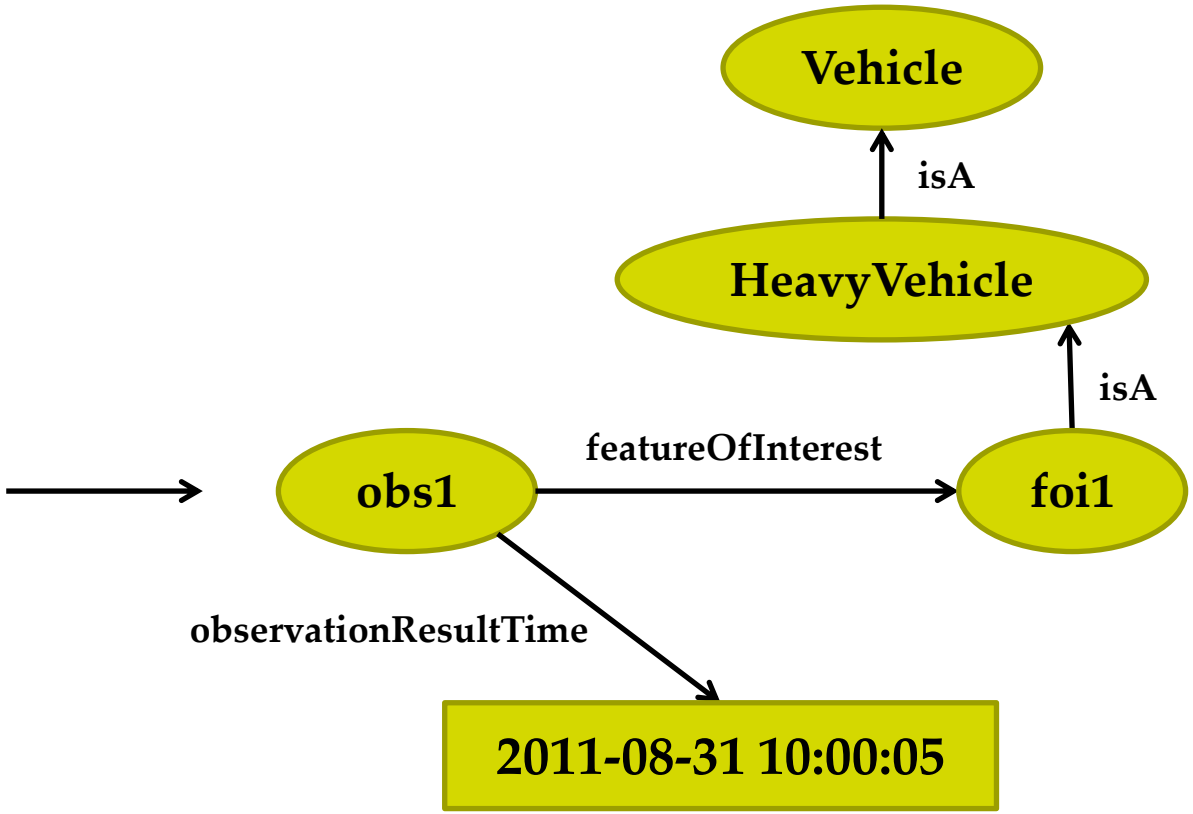


Patterns of interest in sensor data



Knowledge acquisition and representation





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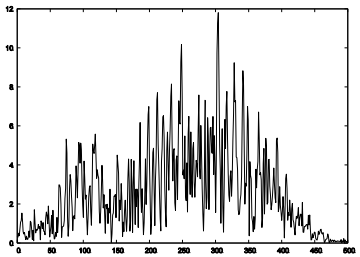

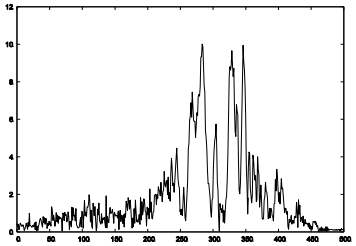

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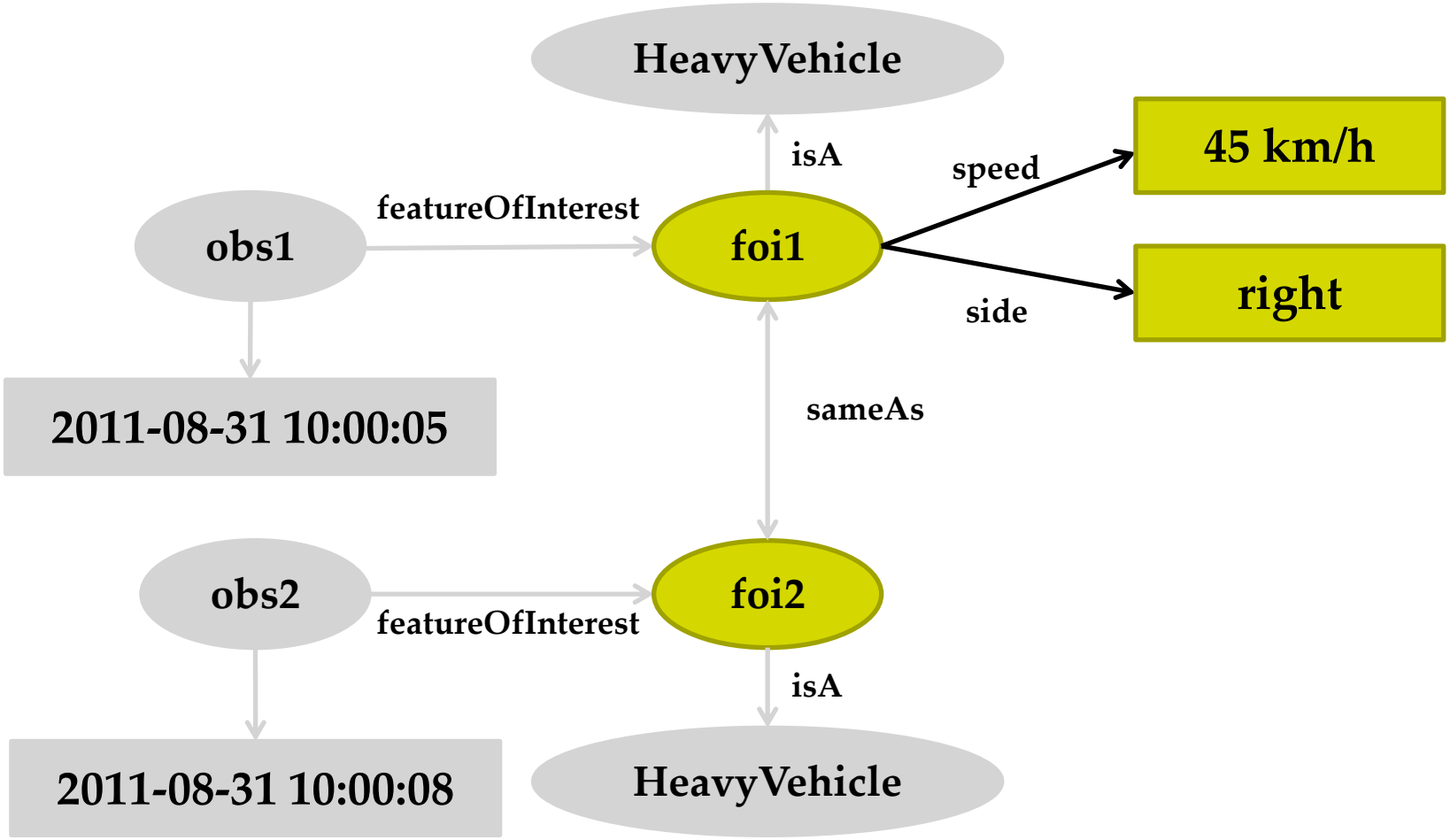

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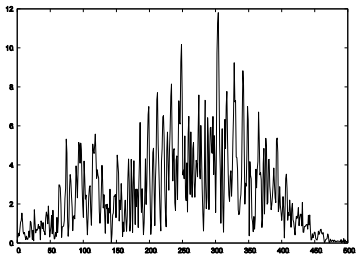

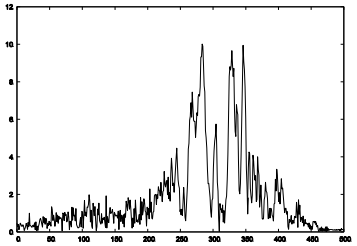

Conclusions

- Sensors measure the signal of phenomena in the environment
  - Hence, we operate in a specific domain, an area of interest
- Sensors and sensor networks can produce a lot of data
  - We are typically not interested in such data, but what does tell
  - Due to the scale, manual processing and analysis difficult
  - Hence, automatic methods are needed
- Automated workflow
  - Sensor data acquisition and processing
  - Knowledge acquisition and representation
- Knowledge represented formally may lead to
  - Benefits such as inference, consistency checking, query, visualization

References

(*) Sheth, A., C. Henson, and S. Sahoo (2008). Semantic Sensor Web. Internet Computing, IEEE, 12(4):78-83.

[1] Dorrepaal, E., et al. (2009). Carbon respiration from subsurface peat accelerated by climate warming in the subarctic. Nature 460: 616-619.

[2] http://www.nature.com/news/2011/110809/full/476135a.html

[3] Finkelstein, L. Theory and Philosophy of Measurement. In Sydenham, P. and Thorn, R., Handbook of Measurement Science, Volume 1, Theoretical Fundamentals, pages 1-30. John Wiley & Sons, 1982.