



# Born Semantic:

## Linking data from sensors to users and balancing hardware limitations with data standards

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+ acknowledging the work of Janet Fredericks  
and the Qartod project

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**British Oceanographic  
Data Centre**  
NATURAL ENVIRONMENT RESEARCH COUNCIL



**National  
Oceanography Centre**  
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*Marine Institute*  
*Foras na Mara*



# Goals

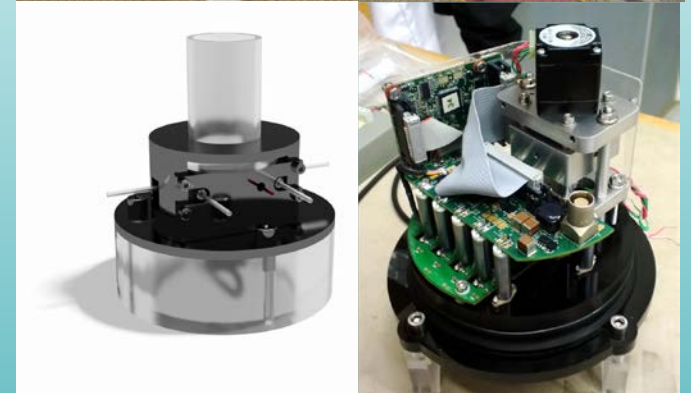


Autonomous ocean observation is massively increasing the number of sensors in the ocean.

Data practices need to evolve at the same time:

- Ensure key metadata and technical data from novel sensors are never lost
- Efficient data processing
- Efficient data archival
- Seamless data delivery

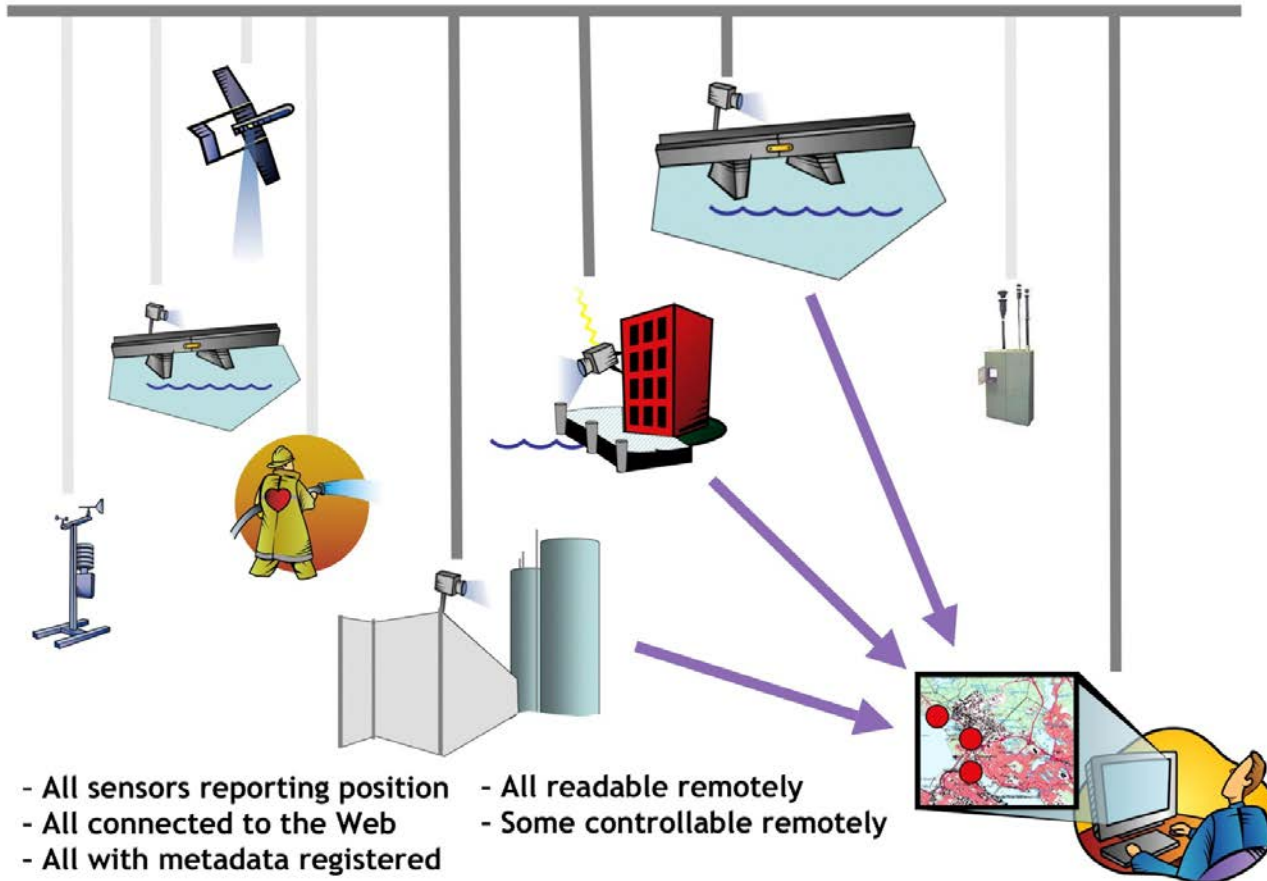
Solution ... apply data standards from sensor through to delivery



# OGC SWE



<http://www.opengeospatial.org/ogc/markets-technologies/swe>



OGC standards applicable to this work:

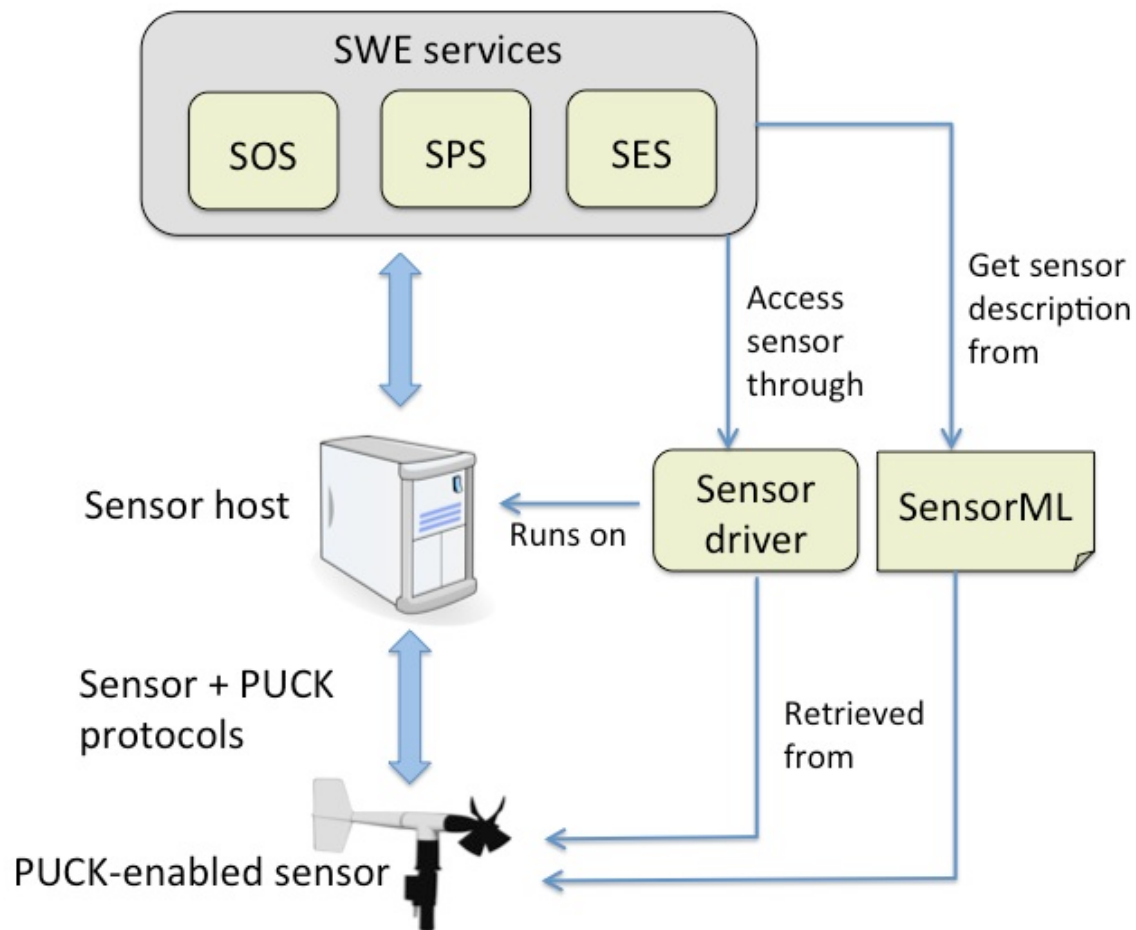
- [Observations & Measurements \(O&M\)](#)
- [PUCK Protocol Standard Sensor Model Language \(SensorML\)](#)
- [Sensor Observation Service \(SOS\)](#)



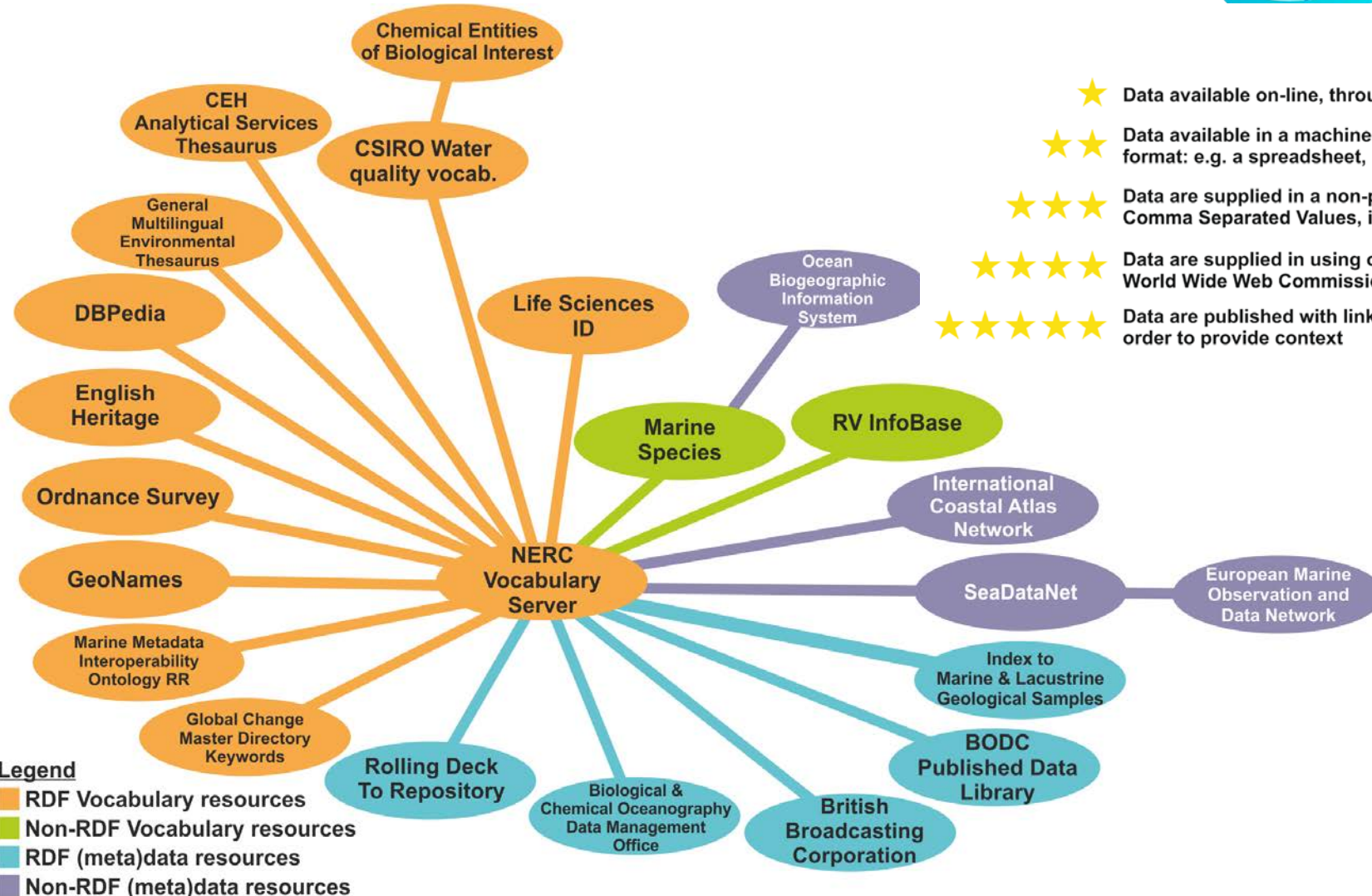
# OGC SWE PUCK



<http://www.opengeospatial.org/ogc/markets-technologies/swe>



# W3C Linked Data



- ★ Data available on-line, through the World Wide Web
- ★★ Data available in a machine readable, structured format: e.g. a spreadsheet, not an image of a table
- ★★★ Data are supplied in a non-proprietary format, e.g. Comma Separated Values, instead of MS Excel
- ★★★★ Data are supplied in using open standards from the World Wide Web Commission
- ★★★★★ Data are published with links to other datasets in order to provide context



# Practicalities



## Legacy hardware

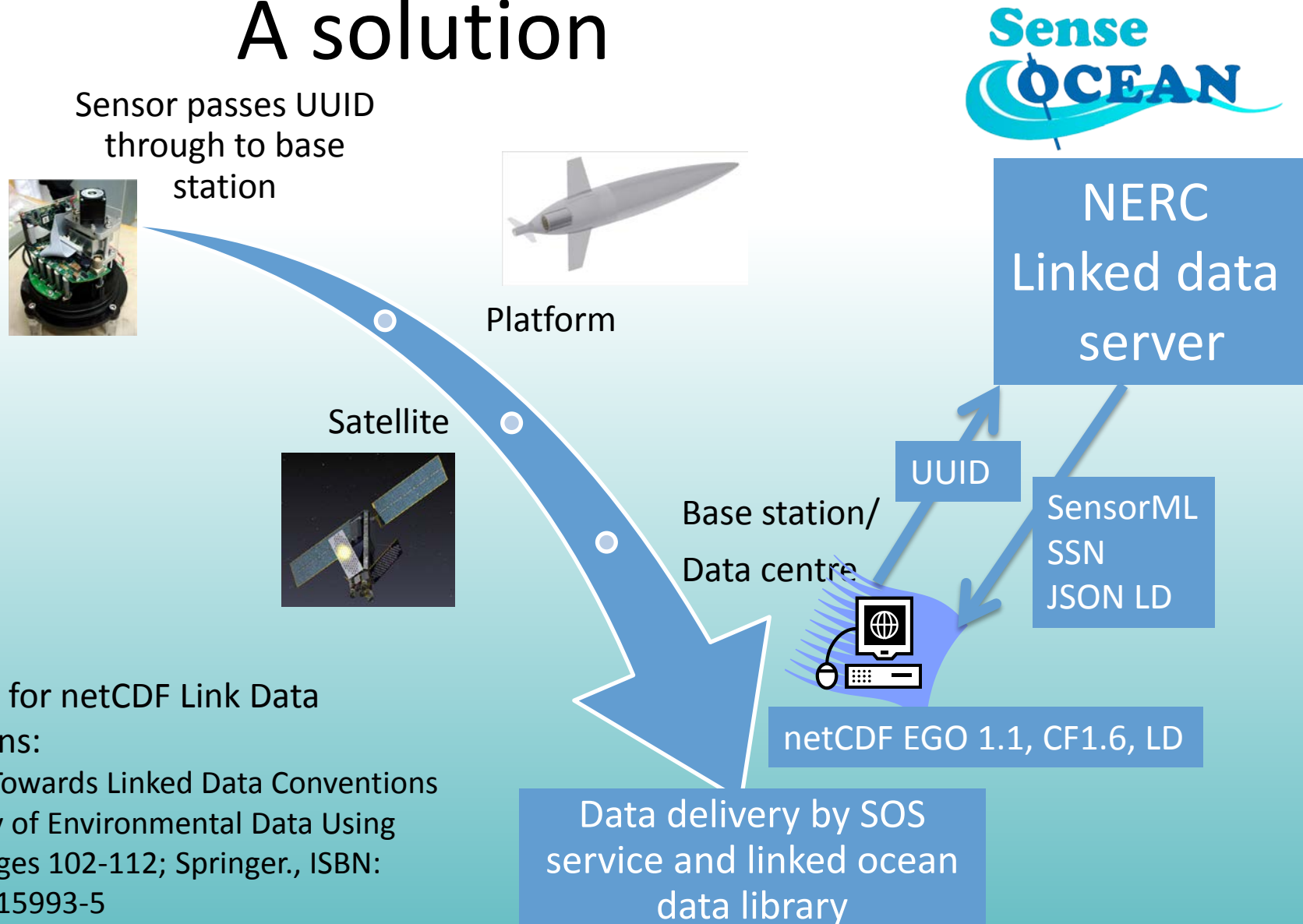
- Bandwidth limitations between sensor and control board
- Limited processing power on control board

## Cost:

- Using XML based syntax e.g. SensorML significantly increases cost of transmission



# A solution



Reference for netCDF Link Data conventions:

Yu J. et al. Towards Linked Data Conventions for Delivery of Environmental Data Using netCDF: pages 102-112; Springer, ISBN: 978-3-319-15993-5



# Summary



- OGC Standards becoming common practice
  - However legacy hardware and cost of data transmission is constraining implementation
- Solution proposed that creates minimal extra transmission costs
  - Uses NERC linked data service to serve sensor metadata in a variety of formats
- Solution allows delivery of data by both W3C Linked Data and OGC SWE standards

