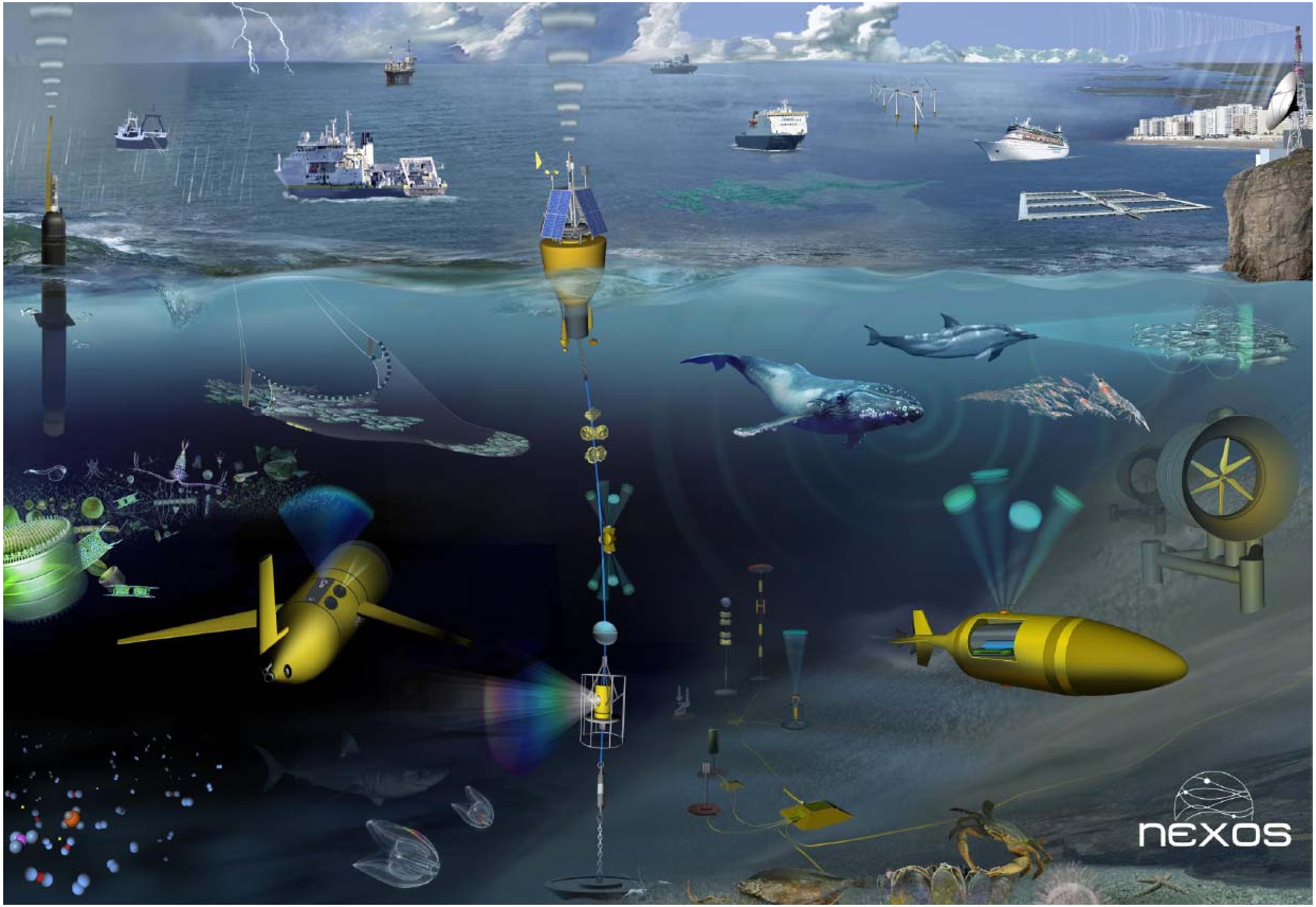
Implementing the OGC Sensor Web Enablement Standards for Marine Applications

ROBEX Sensor Workshop, Vienna, 27th April 2017

Simon Jirka, 52°North GmbH, jirka@52north.org



nexos

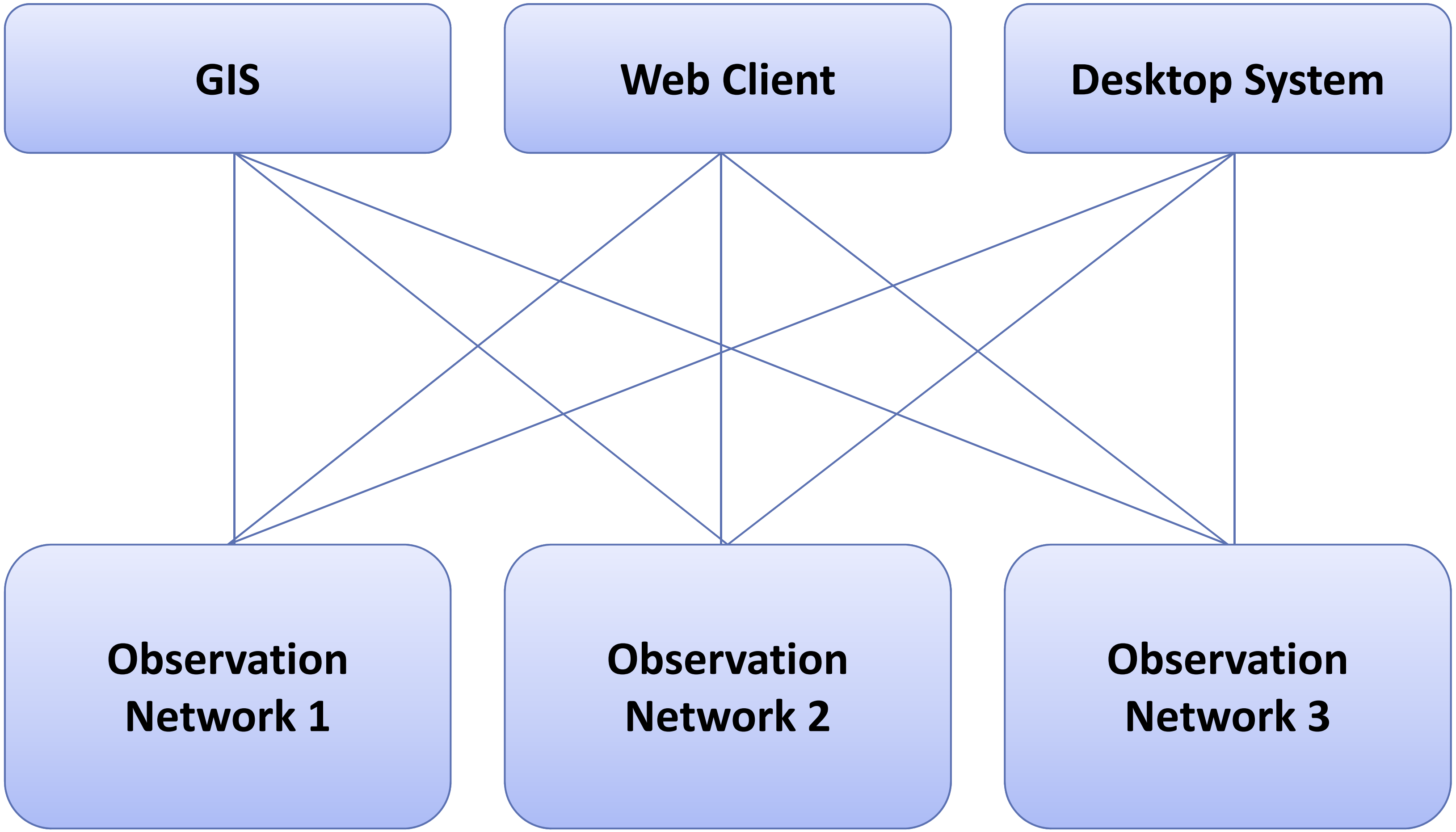
Motivation

- Existing earth observation networks deliver a multitude of in-situ data capturing the state of the earth
- Data sets are of high value for scientists and other stakeholders
- Different data delivery methods and formats

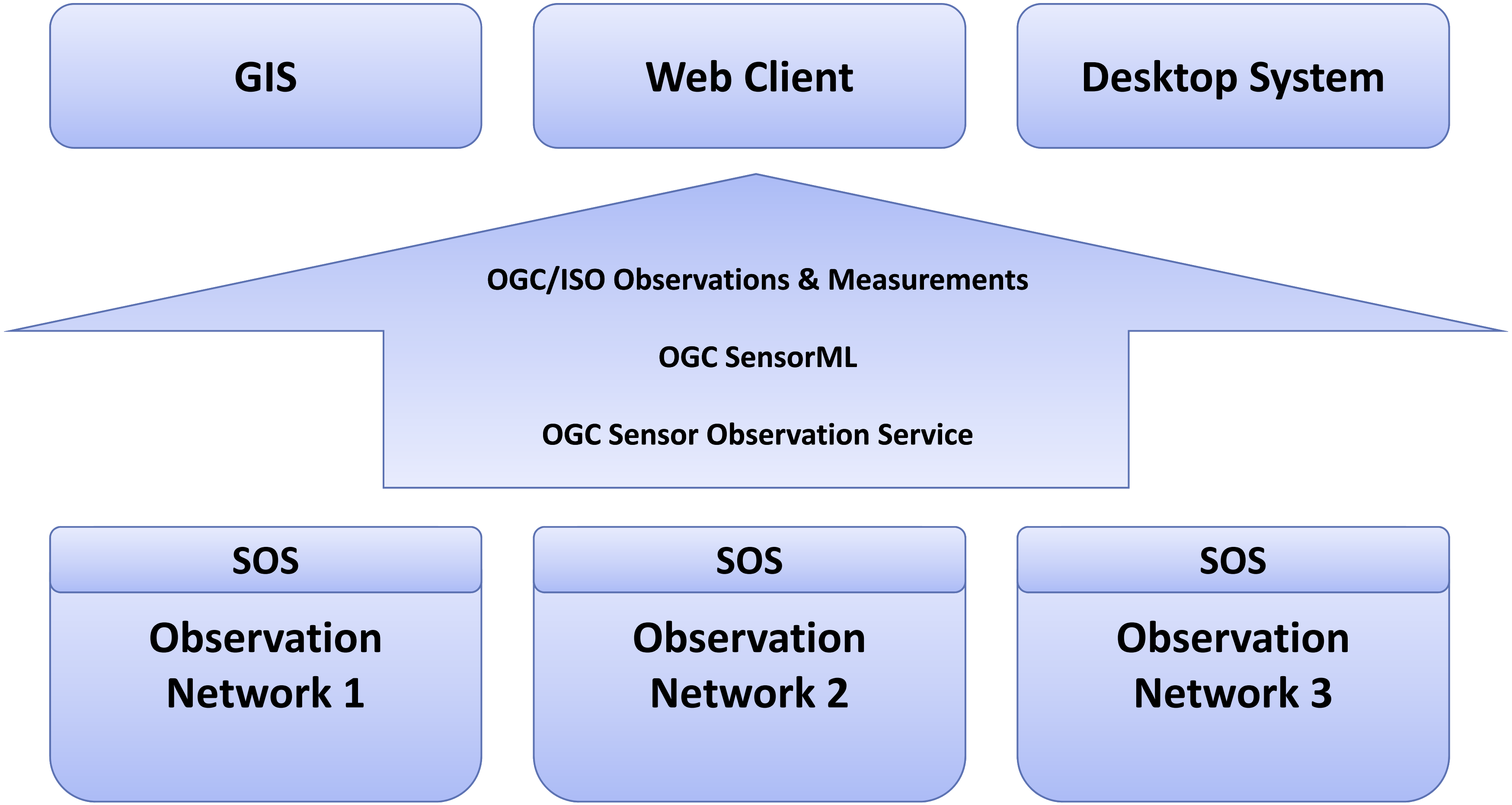
nexos

52north
exploring horizons

Motivation


GIS
Web Client
Desktop System
Observation Network 1
Observation Network 2
Observation Network 3

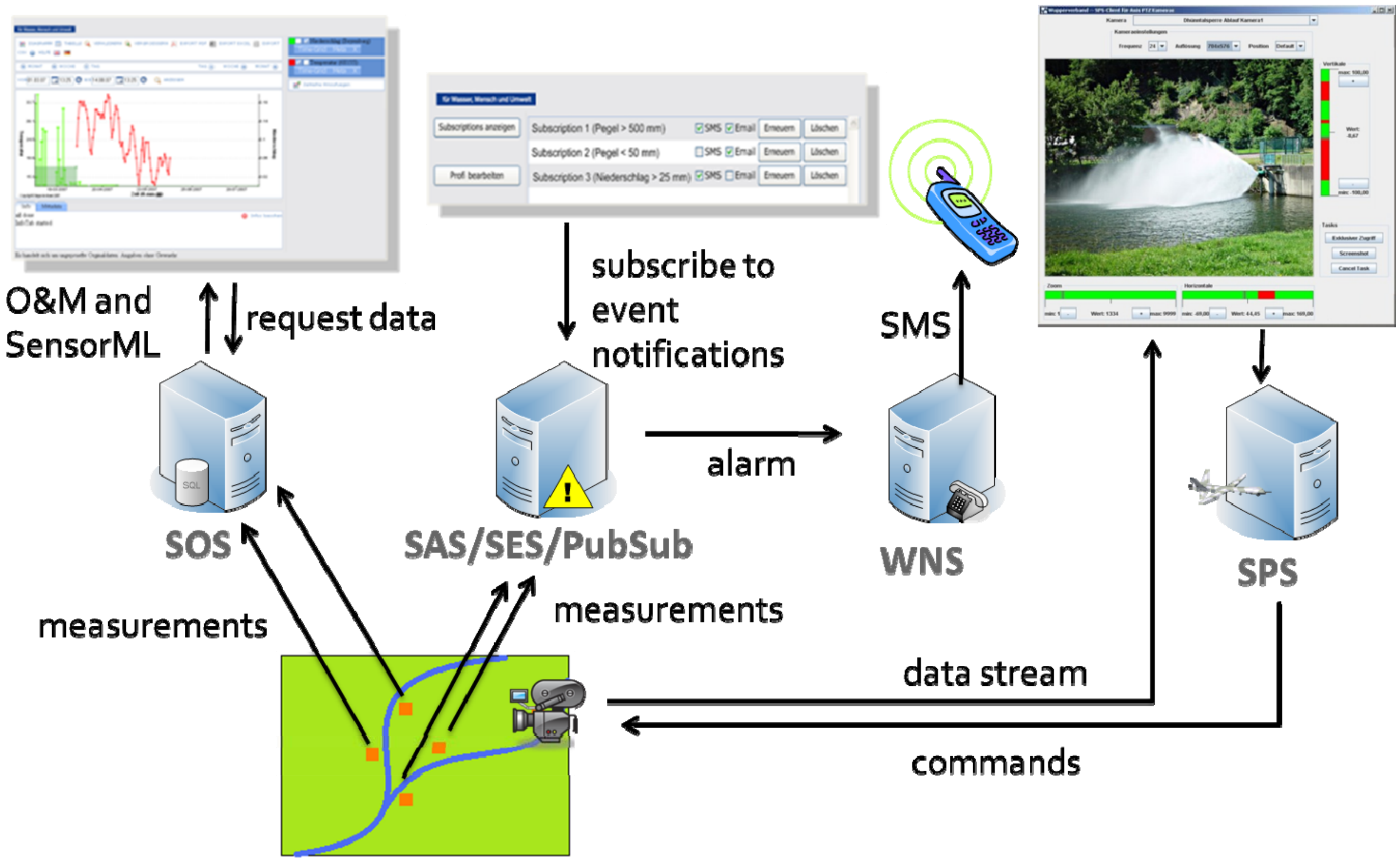
Motivation



nexos

52north exploring horizons

OGC Sensor Web Enablement



nexos

52north
exploring horizons

Sensor Web Developments in NeXOS

- Sensor Plug & Play
  - Cover the full path from sensor to application
  - Self description of sensors
- Automatic connection and data publication
  - Based on OGC PUCK, SensorML, SOS, EXI
- Sensor Web Infrastructure
  - Open source SWE implementations
  - Data viewer
- Demonstrate interoperability
- Efficient data transmission (EXI)

Idea

- Facilitate the integration of instruments on platforms
- Provide an universal instrument driver → no instrument-specific driver code
- Use OGC PUCK protocol to read SensorML from device
- SensorML describes manufacturer's command protocol
- Use manufacturer protocol to configure, initialize instrument and acquire its data
- Automatic configuration of the full sensor data flow → from the sensor to Web applications

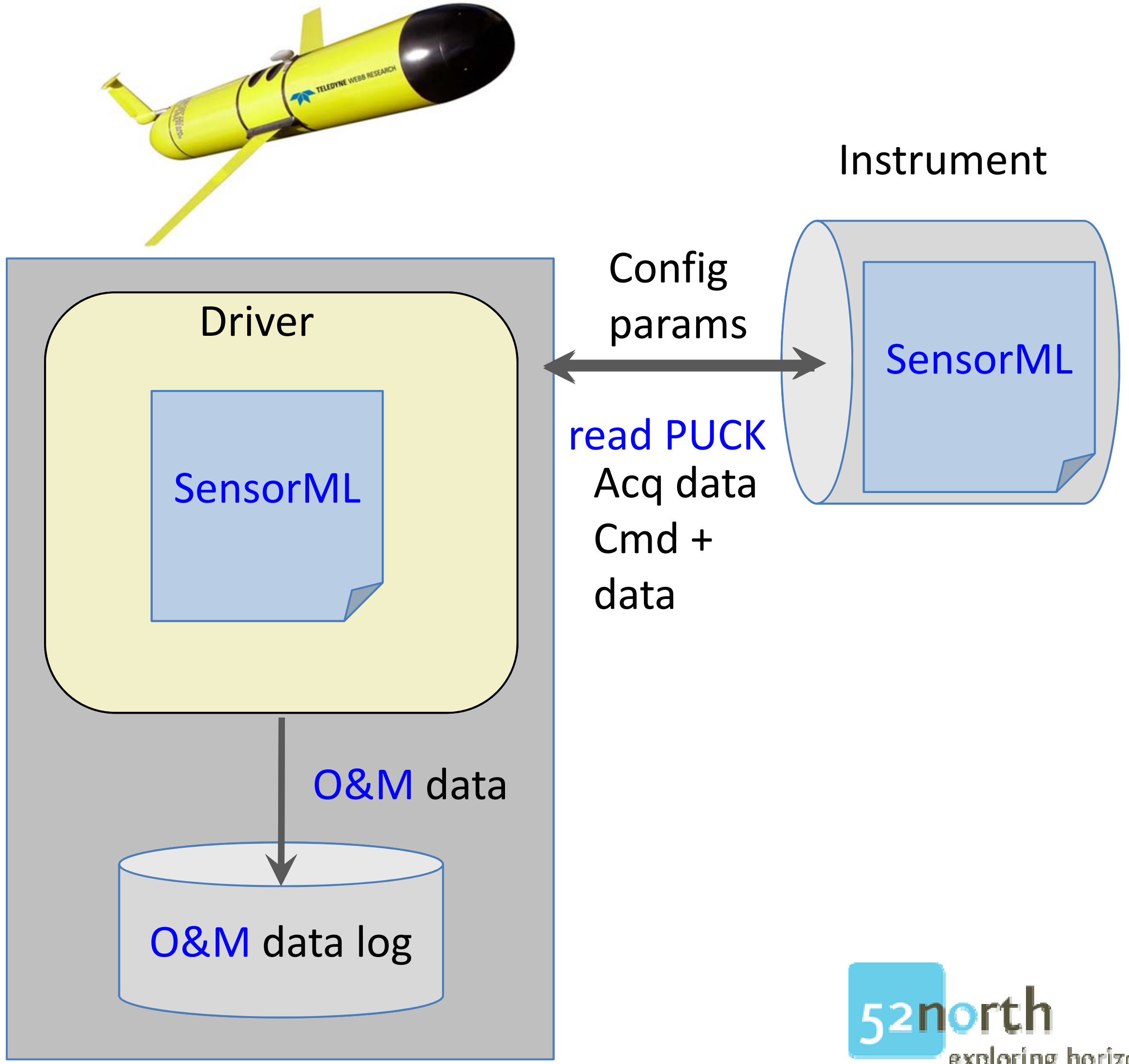
SWE Bridge Instrument Driver

Retrieve SensorML from instrument, w/ PUCK protocol

Read instrument cmd protocol, config params from SensorML

Issue configuration commands

Issue data acquisition command, log as O&M records



SWE Bridge Instrument Driver

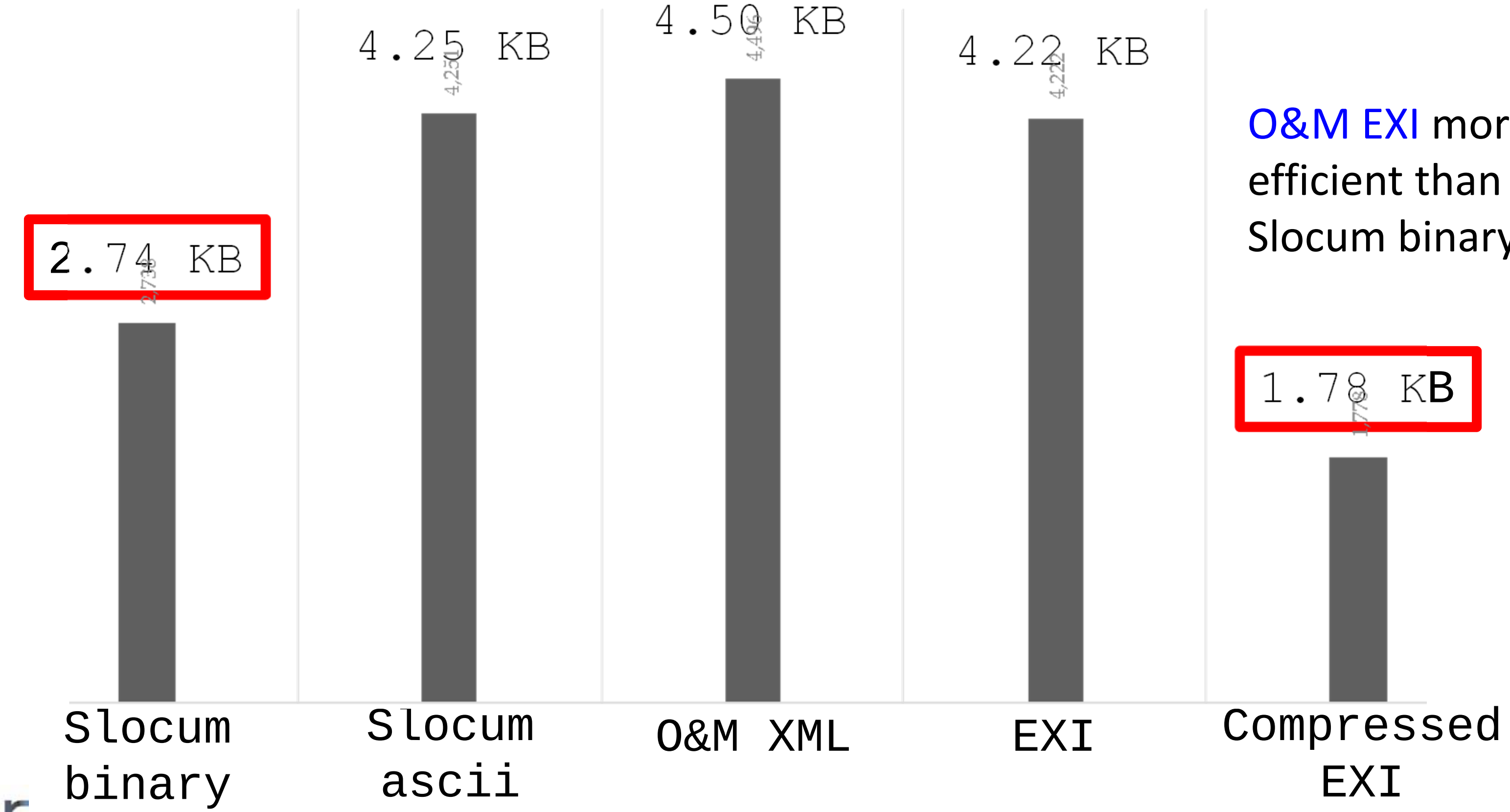
- Written in ‘C’
- Developed by UPC
- No reliance on operating system → portable to “bare metal” systems
- Developers must write instrument-specific protocol description in SensorML
  - SensorML can be utilized anywhere it can be parsed

Low Bandwidth

- Many platforms use Iridium for commands and telemetry
  - 2400 bps data rate
  - Short burst messages < 2kB
  - Airtime is not cheap, modem consumes power
- SensorML and O&M are XML-based, notoriously verbose

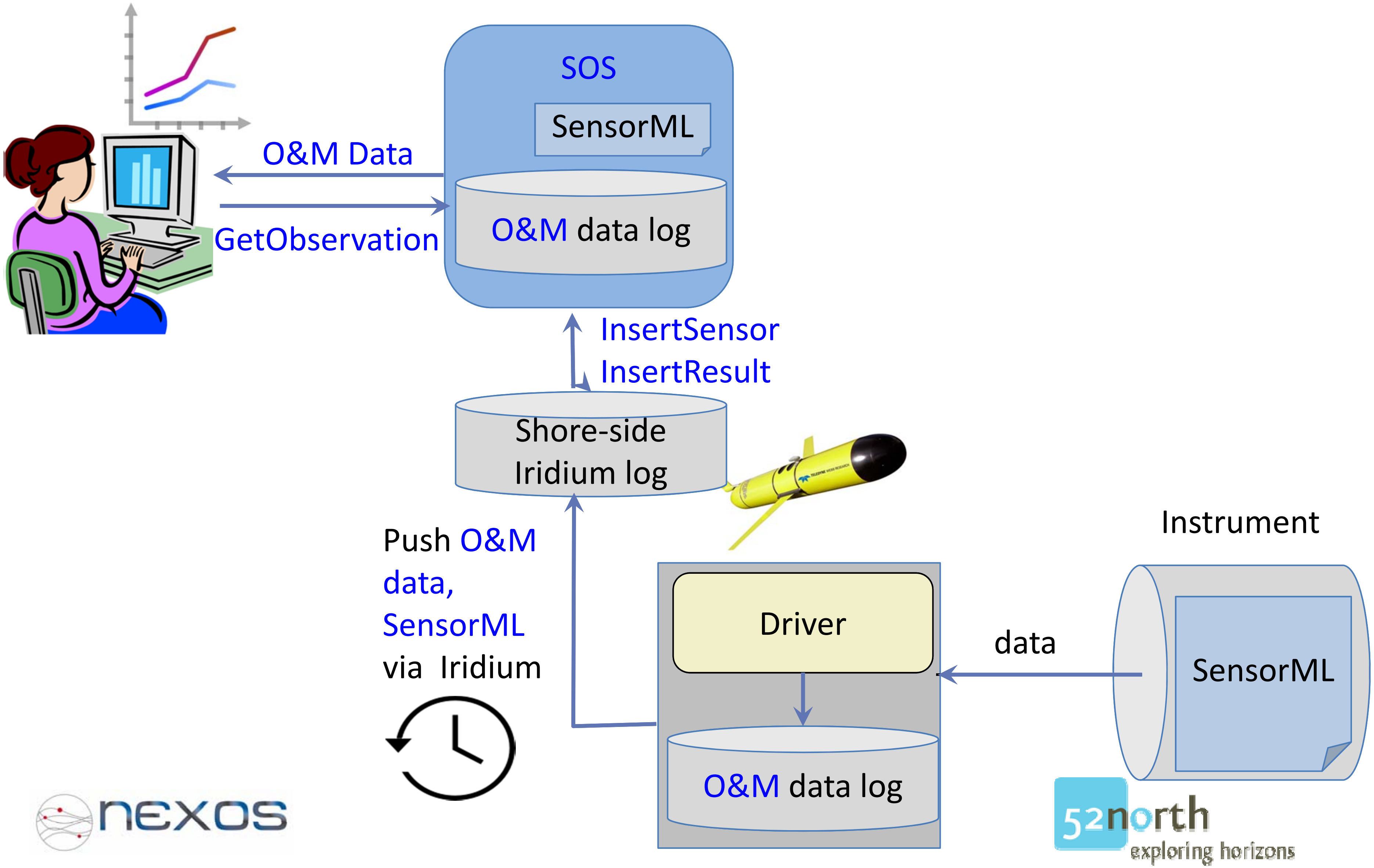
Low Bandwidth

- SensorML, O&M converted to compressed binary (EXI format); enables high throughput/processing on small controllers
- E.g. Slocum Glider CTD data file (105 samples)



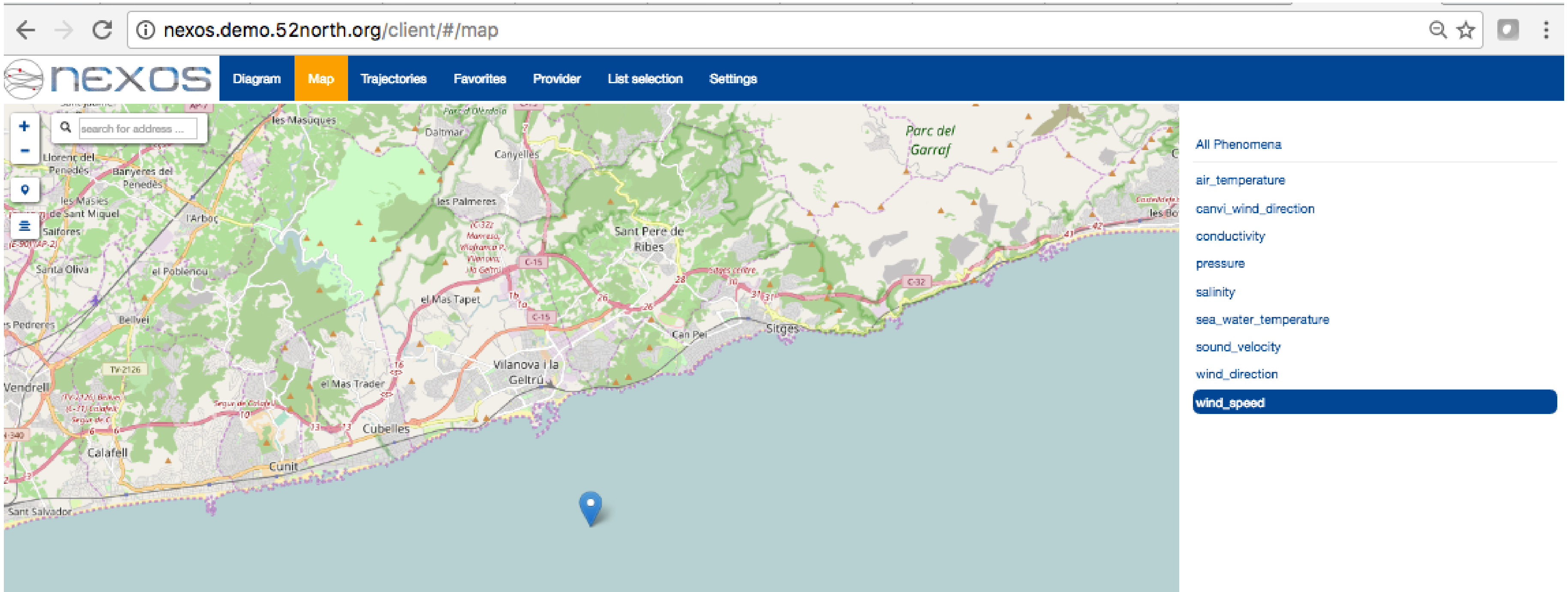
O&M EXI more efficient than Slocum binary!

Instrument Data Access



Instrument Data Access

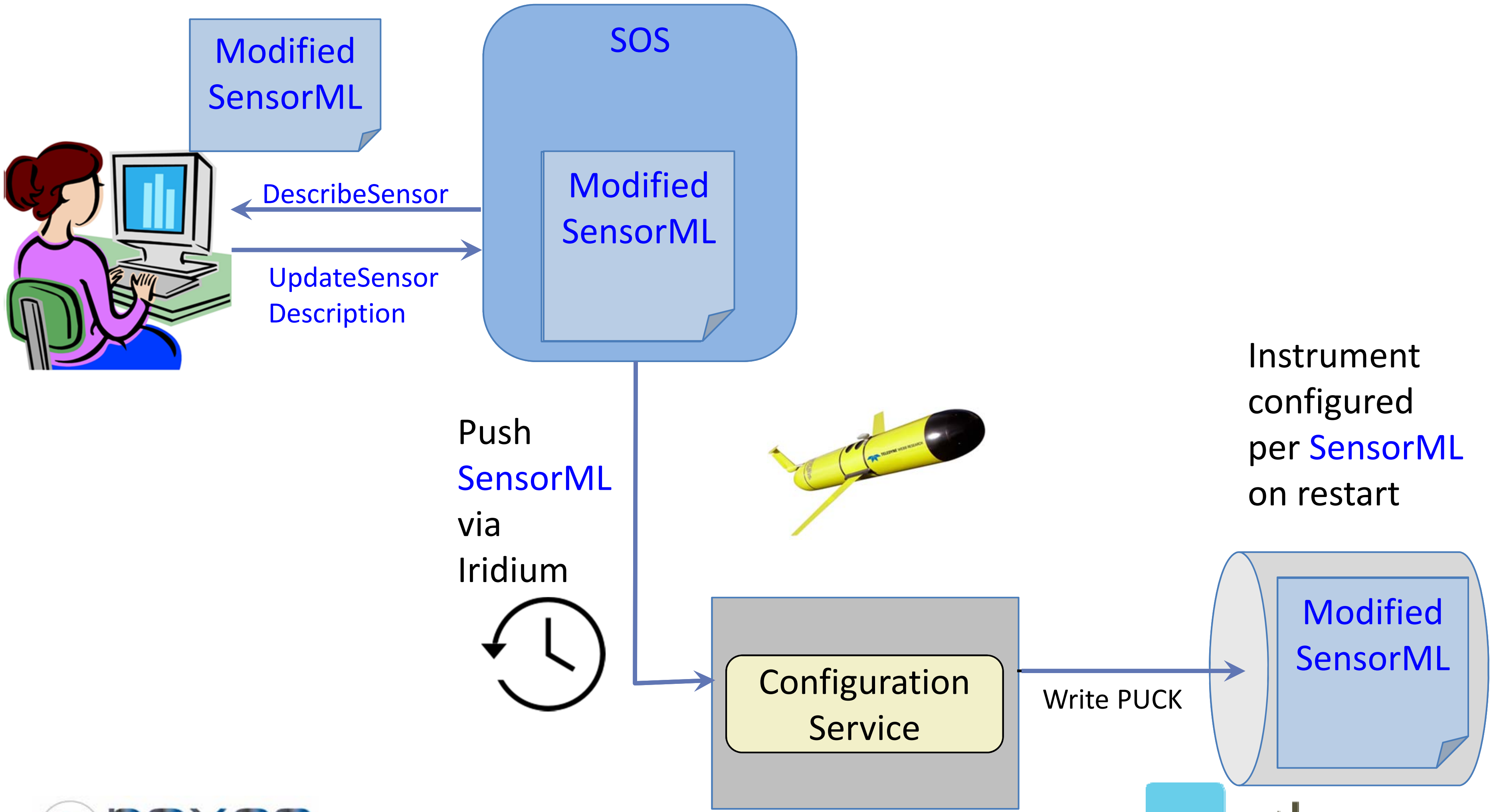
- “52°North Helgoland”: Web-based Sensor Web viewer displays any O&M formatted data



nexos

http://nexos.demo.52north.org/client/#/

Instrument Configuration



nexos

52north exploring horizons

Conclusion and Next Steps

- Marine observatories benefit from the use of standards
  - Interoperability
  - Data re-use
- Sensor Web allows a full plug-and-play chain from the instrument to Web applications
- Support of constrained communication links
- Many results available as open source software
- Contribution to marine SWE profile development activities
- Cooperation with further projects: BRIDGES, $FixO^3$, ODIP 2, SeaDataCloud
- NeXOS ends in October 2017 → current activities:
  - Final integration steps
  - Demonstration activities

www.nexosproject.eu

jirka@52north.org