

OGC PUCK standard: Some lessons learned

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Necessary but not sufficient for standard adoption

- User demand
 - Must address significant problem (e.g. data quality)
 - Must make things easier/cheaper/better
- Manufacturer supply
 - Feasible and economical to implement
 - Sufficient user demand to generate profit

OGC PUCK

- Originally developed by MBARI to address sensor integration issues
- Protocol to get instrument UUID, metadata and related info (“payload”) from device itself
 - 96-byte “data sheet” includes UUID, manufacturer/model ID
 - Payload can include SensorML metadata, driver code, etc...
- Observing platform automatically retrieves & utilizes sensor metadata and payload when device is plugged in
 - Automated driver installation, configuration, metadata/data logging...

A brief history of PUCK

- 2005: MBARI develops PUCK protocol, early device prototypes
- 2005-2011
 - MBARI works closely with NSF OOI project, which informally announces intention to require PUCK in all its instruments
 - Five companies implement PUCK protocol for evaluation
 - Smart Oceanographic Sensors Consortium established
 - MBARI works with OGC, manufacturers, developers to draft OGC standard
 - Multiple evaluations, demonstrations, field exercises with collaborators/users/manufacturers
 - ESONET identifies PUCK as a best practice for ocean observatories



Axys buoy controller



RBR Data Logger



Nortek
Aquadopp



WETLabs
Triplet



Sea-bird *SBE-37, SBE-16 plus*

A brief history of PUCK

- 2011: Formally accepted by Open Geospatial Consortium (OGC) as SWE standard (with SensorML, SOS, SPS, O&M)
- 2013: OOI project seriously over-budget, greatly de-scoped, reorganized - now OOI instrument RFPs do not require OGC PUCK
- 2014 – today
 - OGC PUCK being evaluated by various projects
 - NeXOS EC project develops low-cost web-enabled sensors that incorporate OGC PUCK.
- Today just a few commercial PUCK implementations are available



What limits OGC PUCK adoption?

- Do users view plug-and-work, auto-configuration, auto-metadata-tracking as important? Do they prefer to use present manual methods?
 - PUCK likely most useful when managing large numbers of diverse instruments
- User demand limited when OGC PUCK standard is only part of “plug and work” solution
 - PUCK is a “container”, contents defined by others
 - Data layer issues still must be resolved/harmonized
- Further consensus needed on best approach, more community demonstrations/evaluations needed
 - E.g. see SenseOcean’s PUCK-like identifiers
- Focus on oceanographic sensors too narrow?
 - Ocean observing community relatively small, broaden effort to environmental sensing
- A project-mandated standard increases demand, incentive for manufacturers

Extra slides



Leading to PUCK standardization...

- Several manufacturers implemented protocol
- Numerous discussions, demos for OOI CI, which planned to require PUCK for sensors
- OGC Ocean Science Interoperability Experiment (2011)
 - multiple PUCK demonstrations, deployments among multiple groups
- ESONET identifies PUCK as best practice (2010)
- Peer-reviewed publication in IEEE JOE
- OGC/IEEE OES discussions to harmonize with IEEE 1451

Limited OGC PUCK adoption

- NSF OOI project ran into major budgetary difficulties, abandoned many early goals including PUCK requirement
- Sensor standard development not MBARI priority
- Small oceanographic sensor market
- OGC PUCK only part of driver/configuration/metadata solution – most users want total solution; data formats, data distribution mechanisms still under discussion

Standards adoption

- Engage users and manufacturers in standard definition, implementation, evaluation
- Evaluate through demonstrations, field exercises; refine standard as needed

OGC PUCK

- Serial instrument protocol enables self-describing instruments, reduces software development, simplifies configuration – information retrieved from device itself
- Developed at MBARI as part of ocean observatory efforts; deployed on MBARI observatories (MARS, MOOS)
- Multiple evaluations, field exercises with collaborators/users/manufacturers
- Standardized by Open Geospatial Consortium (OGC) 2011
- NSF OOI project intended to require PUCK in sensor networks – hundreds of instruments
- Four instrument manufacturers, mooring manufacturer implemented PUCK
- Smart Oceanographic Sensors Consortium established
- **Today just a few commercial PUCK implementations – most “experimental” - what happened?**

- Feasible/economic to manufacture - yes
- Engage users/manufacturers to define/refine standard, field exercises, demonstrations
- Solves significant problem
 - WHOI: periodically replace entire mooring instead