A Best Practices Manual for Individual and Networked Sensors

- Purpose - Robust against staff turnover

- Format

    - Online guide which summarizes the group's collective knowledge

    - Divided into sections

    - Summary of topic

        - Cite other protocols from USGS, NOAA, NERRS, US Forest Service

        - A page "manager" is responsible for updating the summary 2x/yr (?)

    - Discussion blog beneath each summary

Sensor Data collection

Conceptually: when you get started, what do you need to consider to set up your system:

Considerations for choosing sensors

- Science question
- Precision
- Accuracy
- Cost
- Ease of installation, calibration
- Maintenance
- Compatibility, proprietary interface, open source accessible, management software available, turnkey system
- Longevity
- Power consumption

Power supply options

- Solar
- Wind
- wireless

Consideration for Sensor platforms

- Enclosure, security, field proofing (animals, elements)
- Height
- Size

- Visibility (public disturbance, vandalism)
- Permits
- Power supply
- Data logger options for smart sensing (two way communication, control based on conditions)

Considerations for sensor management

Sensor management systems

Tracking of calibration

Considerations for transport of data field to lab

- Power supply, reliability
- Reliability of mode of transport, bandwidth
- Buffer size
- Sampling frequency
- Communication distance (moats vs. radio, wavelength)
- Communication means (cable, wireless)
    - Cell phone
    - Radio
    - Satellite
    - Manual pick up
- Line of sight
- Repeater stations
- One way or two way communication

Considerations for Data Stream management (middleware)

- Monitor sensor health
- Software options
    - Open source
        - dataTurbine
        - Kepler
        - R
        - GCE data toolbox
        - Span
    - Proprietary
        - Matlab
        - Excel
        - Campbell loggernet
        - YSI econet

- o custom research applications (Python, PHP, etc.)
- Automated QA/QC on streams

Advanced QC

- Eyes on
- Long term data need for QC (drift etc.)
- Integration of several data streams (correlations, conditioning)

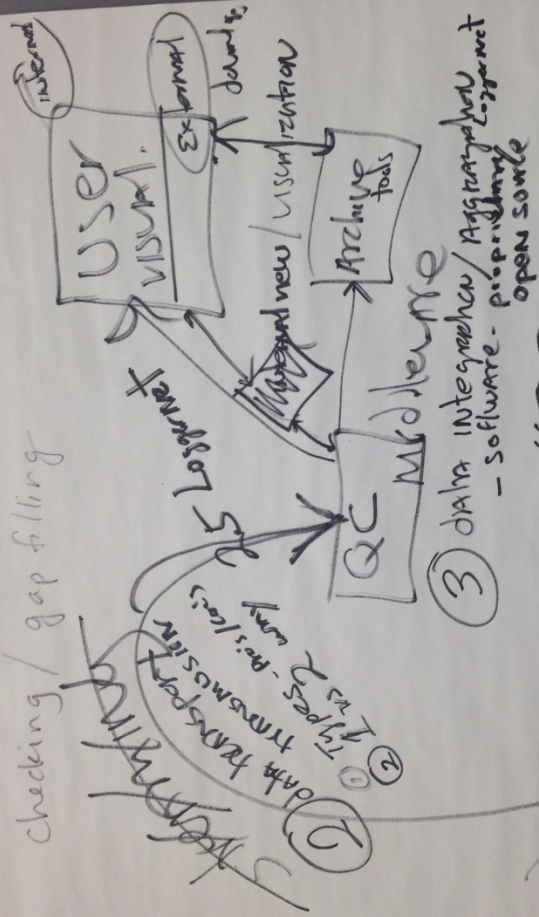## Considerations for archiving and publishing

- Provide different level data products
- Documentation of methods applied to data
- Data formats (netCDF, database)
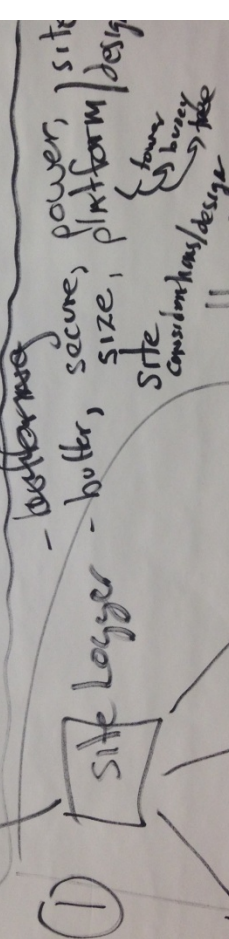- Publish streaming or

Glossary

- Terrestrial / Aquatic / Atmospheric / below ground sensors

  - Protocols for installation and calibration schedules

  - Identifying the appropriate sampling frequency

  - Sensor audits

    - Would require a designated staff person

    - Sensor leasing for QAQC

- Power sources / enclosures / towers

- Traceability of a particular sensor

  - Discussion of method options

    - PDA or an Android phone in concert with data turbine.

    - "Grape" boxes

    - Bar code on each sensor which could be photographed by a georeferenced camera and linked to observations later on

- Network level / process level design

wiki?

Book of algorithms for data
checking / gap filling

User visual.

3 panel — internet
dynamic

organise new / visualization

Archive tools

Moderne
QC

templates

② data transmission
types — proc/local

① data

③ data integration / aggregation
— software — proprietary
open source

— buffering
— buffer, size
— power, site
— secure, platform/design

Site
considerations/design

① Site Logger

Sensor

COLLECTION

＊ smart sensing
smart sensors