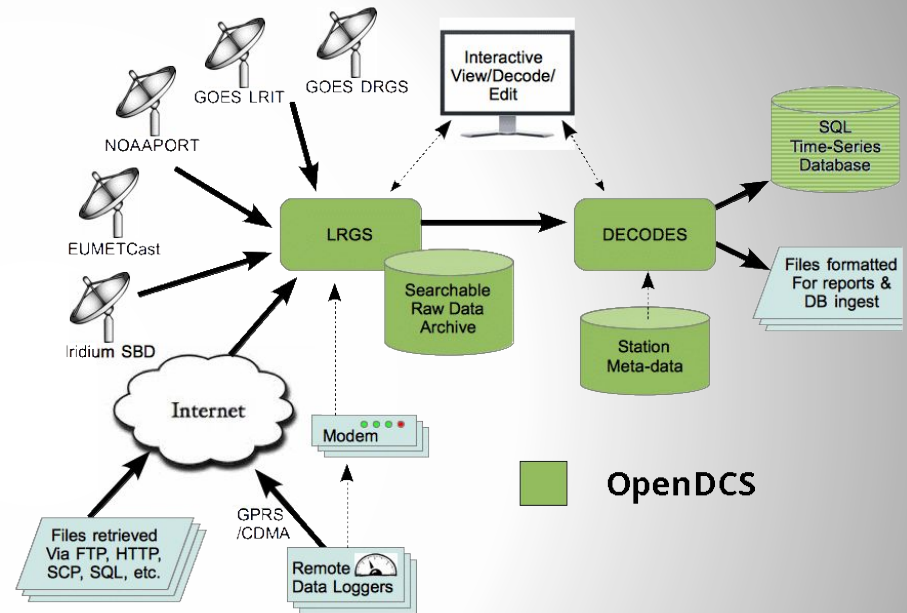


OpenDCS Training/Demos

Spring 2024 TWG Day Two
GOES DCS User Training
August 6, 2022

Andrew Gilmore
www.precisionwre.com



Presenter Bio: Andrew Gilmore

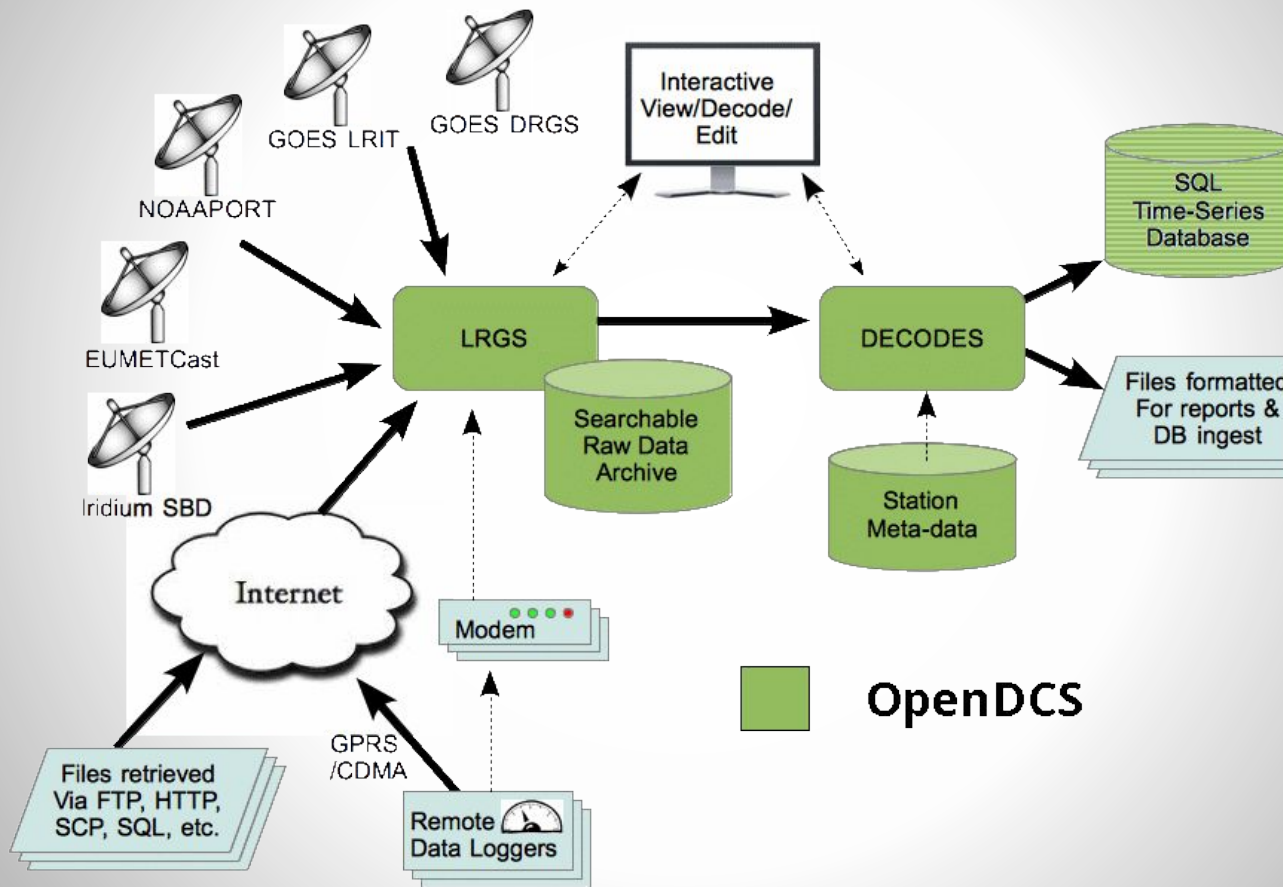
- Passionate about hydrologic data
- Water Resources Engineer/Linux Sysadmin
- PWRE Reclamation HDB Program Manager
- Reclamation HDB Team Lead 2002-2010
- DECODES contributor since ~2006
- OpenDCS development team

Agenda

- What is OpenDCS?
 - Installation Demonstration
- LRGS Usage/DCS Message Browser
 - Raw Data Demonstration
- Platform Configuration
 - Easy Mode (Platform Import e.g. USGS)
 - Manual Platform Creation
- Decoding Demonstration
- Data Retrieval Setup Demonstration
- Review/Conclusion

What is OpenDCS?

1. Data Acquisition and Decoding

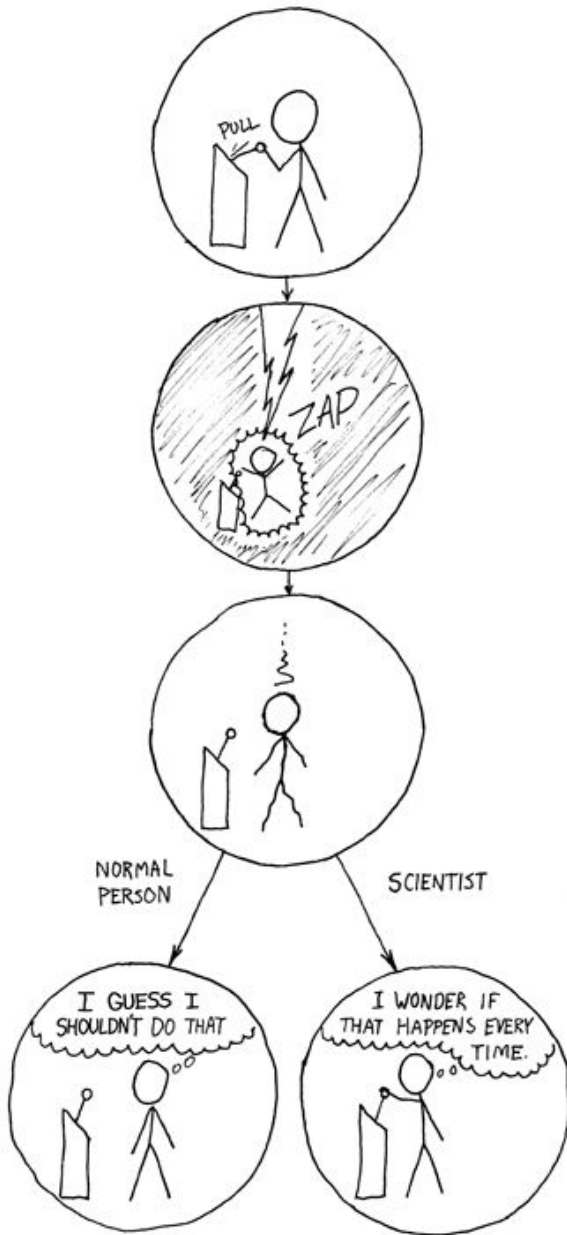


2. Computation Processor and Database - Out of scope for this training!

OpenDCS History

- 1999 – Java-based LRGS developed for USGS
- 2001 – Java-based DECODES developed for USGS and USACE
 - Database schema for XML and SQL
- 2004 – DCP Monitor Tomcat Web App funded by USACE MVR
 - Also DECODES in-line Rating Computations
- 2005 – Computation Processor Design funded by US Bureau of Reclamation and USGS
- 2007 – Computation Processor (CP) implemented for USBR Hydrologic Database (HDB)
- 2007 – Support for LRIT (now HRIT) added to LRGS
- 2008 – Iridium support added to LRGS
- 2008 – CP ported to USACE CWMS
- 2012 - "OpenDCS" released with several improvements to GUI design
- 2014 – OpenTSDB (Time Series Database) – a kind of "CWMS-Lite" implemented in PostgreSQL
- 2015 and later: Improvements to all modules.

Warning: Live Demonstrations Ahead



Installation Demo

Installer:

<https://github.com/opensdc/opensdc/releases>

Documentation installed as PDF, also online at:

<https://opensdc-env.readthedocs.io/en/latest/>

Local Readout Ground Station (LRGS)

- USGS 1999 development
- GOES DCS raw data access without big dish
- Now HRIT/DDS/IRIDIUM/EDL/Poll/FTP/Web
- Retention time dependent on disk space
- Offers local/backup copy of telemetry
- For setup, see documentation
- OpenDCS usage can leverage public LRGS
 - LRGS Installation NOT required
 - DDS logins required, request from Wallops

Raw Data Access Demo

- Launcher GUI Setup
- DCP Message Browser
- Search Criteria
 - Filters
 - Platform
 - Time Range
 - Quality
 - Channel
 - Others
- Raw/Decoded
- Formatting

LRGS Message Header

Before Message Display Format Hint:

NESDISIDYYDDDHHMMssCdbFOMQchnSCDTXLEN\n

3475742A22213210742G46+0NN172WUP00122<DCP message data>

DCP ID	Julian Date	Time	Failure?	Signal Strength	Freq. Offset	Modulation Quality	Data Quality	Channel	Spacecraft	Uplink Carrier Status	Message Length
NESDISID	YYDDD	HHMMss	C	db	F0	M	Q	chn	S	CD	TXLEN
3475742A	22213	210742	G	46	+0	N	N	172	W	UP	00122

More details in

[LRGS Message Header Reference](https://opendcs-env.readthedocs.io/en/latest/legacy-lrgs-userguide.html#dcp-message-content)

<https://opendcs-env.readthedocs.io/en/latest/legacy-lrgs-userguide.html#dcp-message-content>

Post Demo Questions?

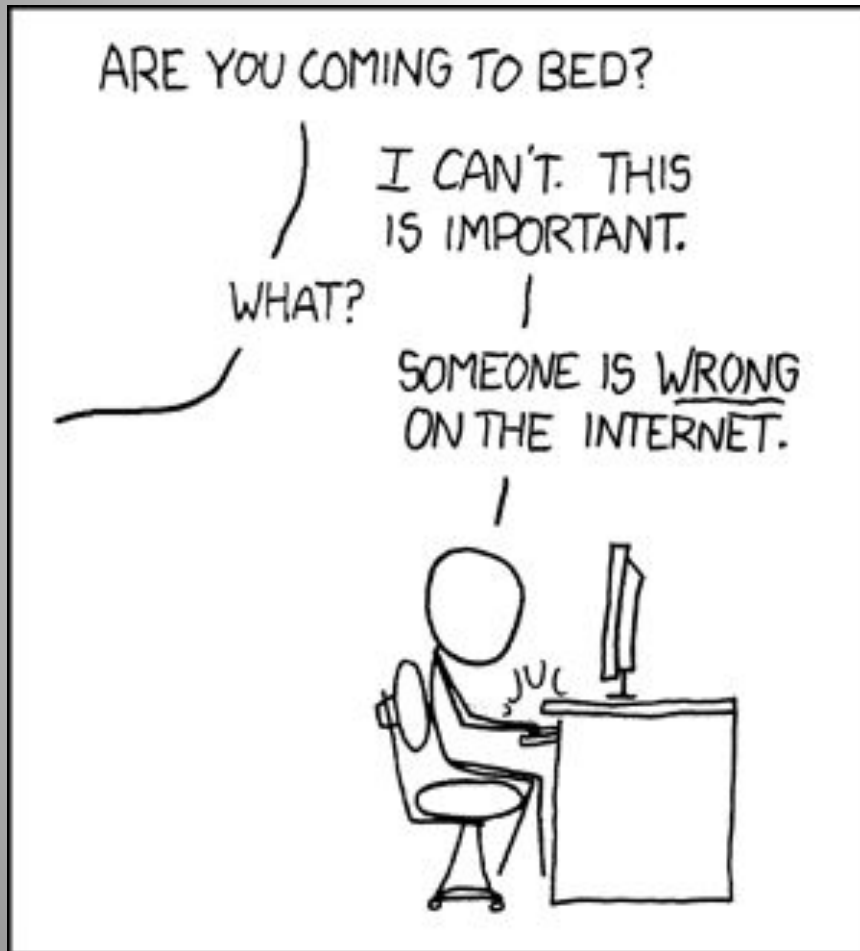
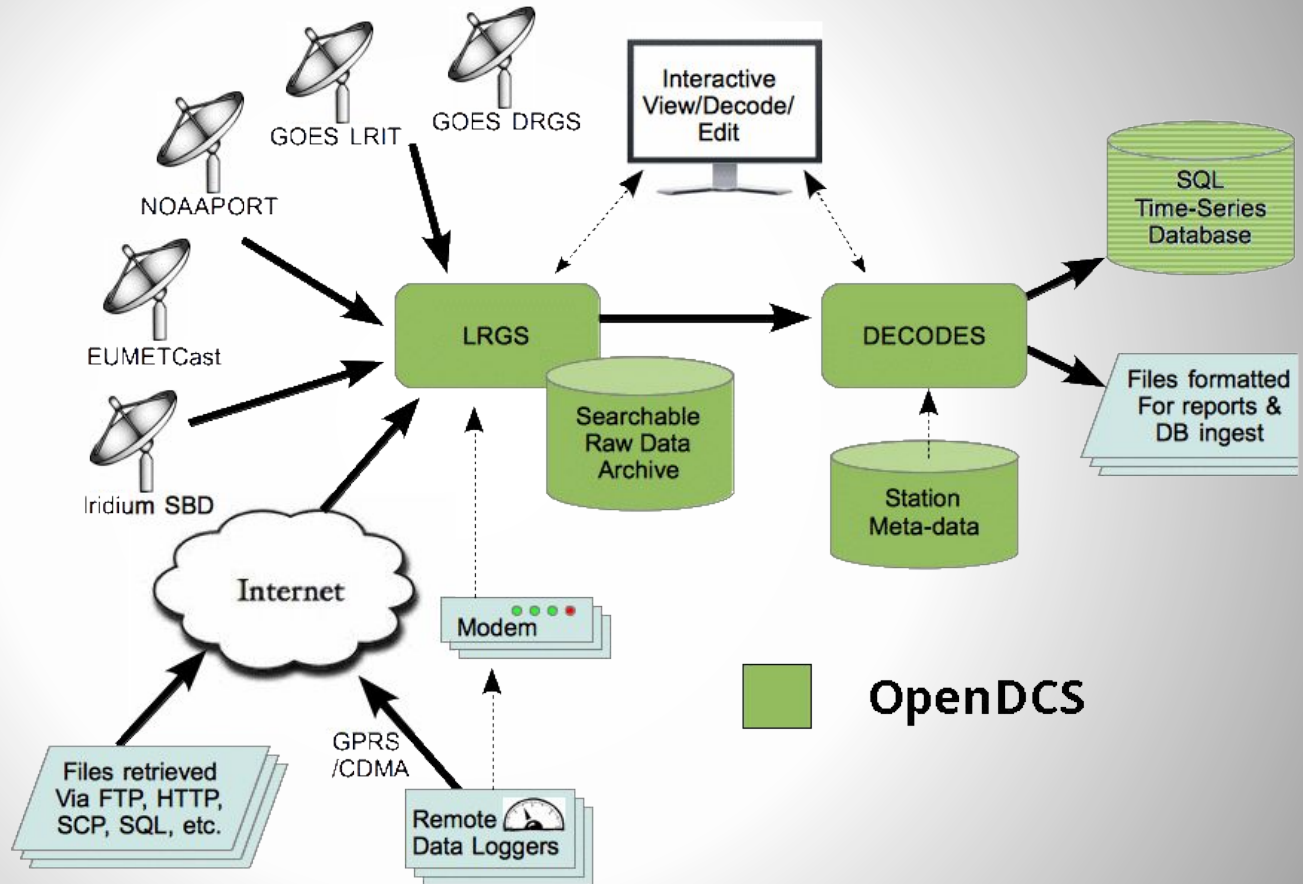
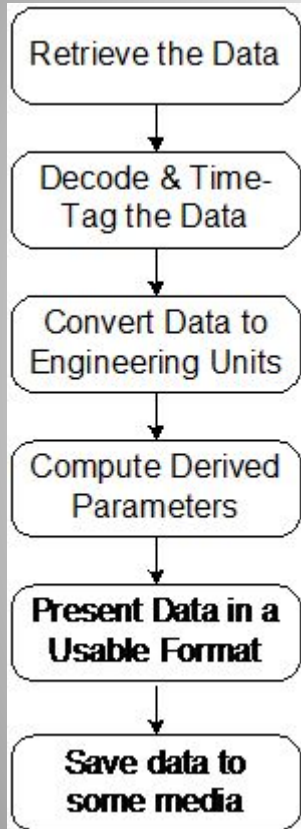


image source: XKCD, <https://xkcd.com/386/>

DECODES



Station Metadata Creation

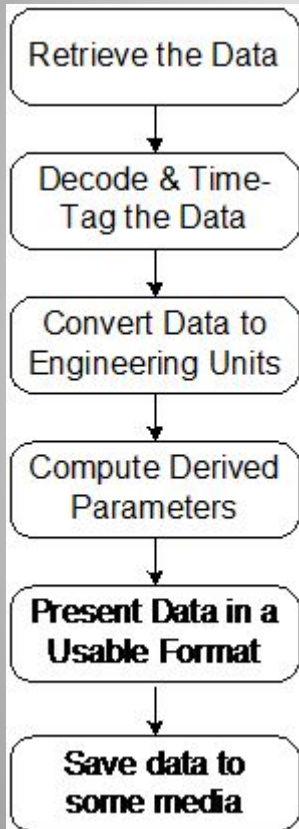
- Easy Method:
 - Platform import:
 - Was USGS Config Repository - now JSON format!
 - Export file from anyone using OpenDCS
 - Key Win: Decoding Scripts from the owners!
- Manual creation
 - [Decoding Script Format Language](https://opendcs-env.readthedocs.io/en/latest/legacy-decoding-guide.html#the-decodes-format-language)

<https://opendcs-env.readthedocs.io/en/latest/legacy-decoding-guide.html#the-decodes-format-language>

Configure Decoding

- Database Editor
 - Data storage in XML files or SQL databases
 - Sites - Metadata including Lat/Long/Elevation
 - Platforms - Can be aggregate of sites
 - Config - Can be shared between Platforms
 - Decoding Scripts - Specific to Config
 - Should be tested

Metadata and Decoding Demo



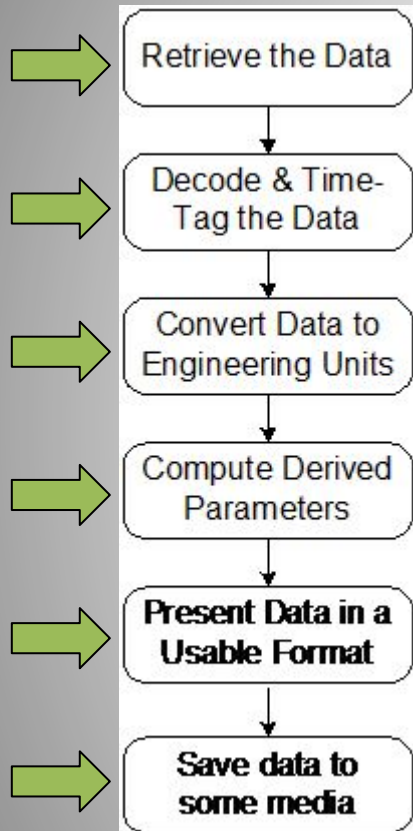
Raw:

```
DD71A01E22211075154G47-3NN164WXW00078  
BST@Du@HYAUZ@Du@HYAUb@Du@HYAR{@Du@HYATp@Du@HYATz@Du@HYAWt@Du@HYAYe@Du@HYAN|h
```

Decoded:

```
Message for Platform 06620000-SU8200D-1  
  
          | STAGE | BATVT | Precip | ATemp |  
          | 00065 | 70969 | 72192  | 00021 |  
UTC       | ft   | volt  | in    | deg F |  
07/30/2022 06:00:00 | 3.09 |      | 5.37  | 50.52 |  
07/30/2022 06:15:00 | 3.09 |      | 5.37  | 57.33 |  
07/30/2022 06:30:00 | 3.09 |      | 5.37  | 56.2  |  
07/30/2022 06:45:00 | 3.09 |      | 5.37  | 54.34 |  
07/30/2022 07:00:00 | 3.09 | 12.8 | 5.37  | 54.24 |  
07/30/2022 07:15:00 | 3.09 |      | 5.37  | 53.07 |  
07/30/2022 07:30:00 | 3.09 |      | 5.37  | 54.74 |  
07/30/2022 07:45:00 | 3.09 |      | 5.37  | 54.66 |
```

Routing Spec Demo



- Connects everything

- *Data Source*
- *Network List* Filters
- *Config* Decodes
- *Presentation Group*
- *Output Format*
- *Consumer*

- Run manually or automatically

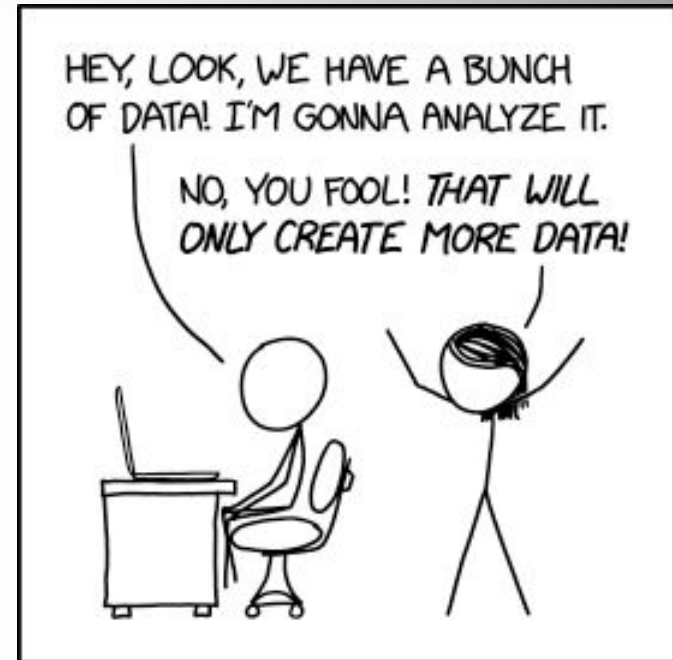


image source: XKCD, <https://xkcd.com/2582/>

Conclusion

- OpenDCS
 - Heavily used in many forms
 - Computation Processor and SQL Database storage
 - Open Source project
 - Community support and contributions welcome
 - Decoding scripts can be challenging
- Demo heavy training - hope it was useful

Questions?

- OpenDCS mailing list:
 - <https://www.freelists.org/list/opendcs>
- GitHub for code and issues
 - <https://github.com/opendcs/opendcs>
- andrew[@]precisionwre.com