UT-BATTELLE

Lessons Learned From The SNS Relational Database

Presented by David Purcell

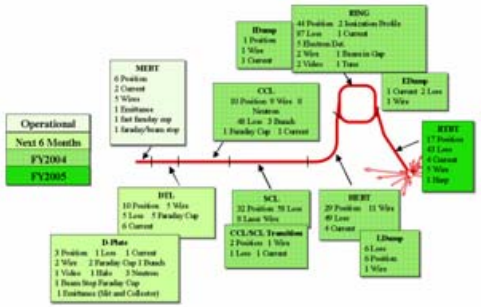
For David Purcell, Jeff Patton, and Katia Danilova

HFIR

SNS
SPALLATION NEUTRON SOURCE

OAK RIDGE NATIONAL LABORATORY
U. S. DEPARTMENT OF ENERGY

Future Plans - Central Role of Database From 2003 ICALEPCS (Gyeongju (Korea))

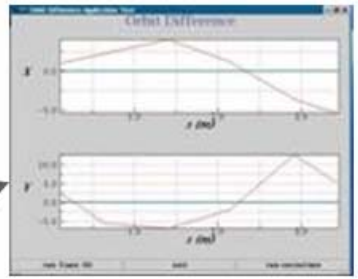


1. Design information:
names, locations, .db, .cmd, …

Oracle Server

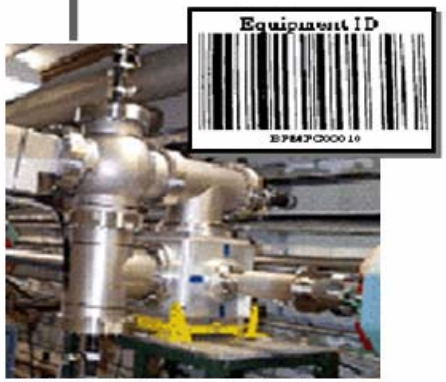
XML,
.db,
HTML

4. Web-based reports,
Initialization Files

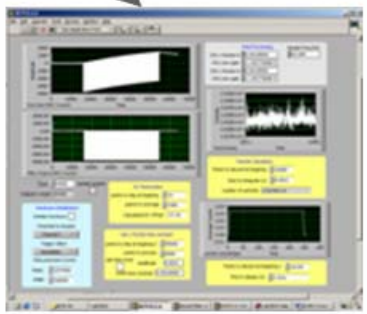


6. Applications

2. Equipment receiving,
acceptance test data:
tracked by barcode



3. Calibration/Maintenance
of installed devices:
tracked by barcode



5. Software in
Network Attached
Devices

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Weekly Highlights

SNS
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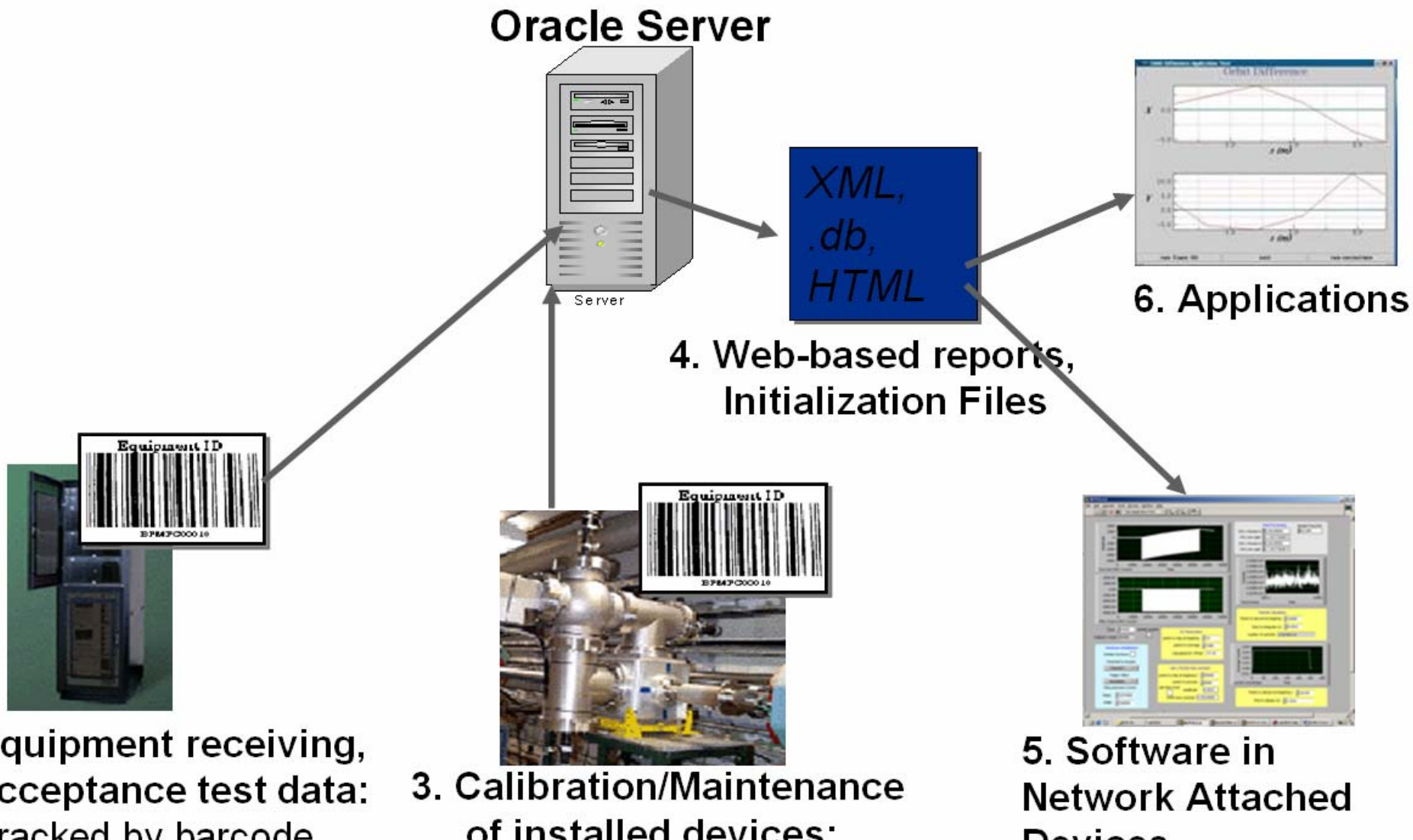

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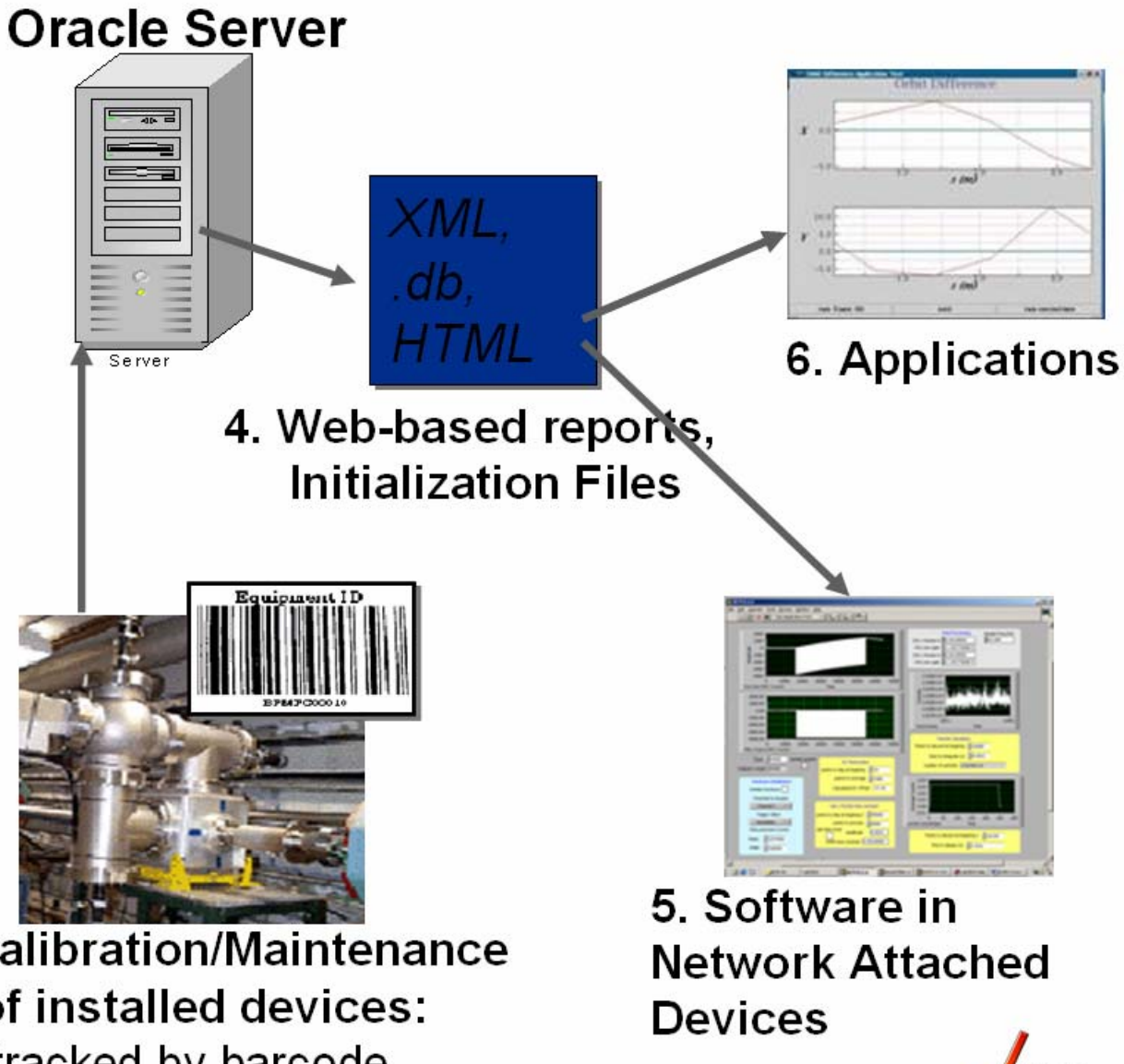

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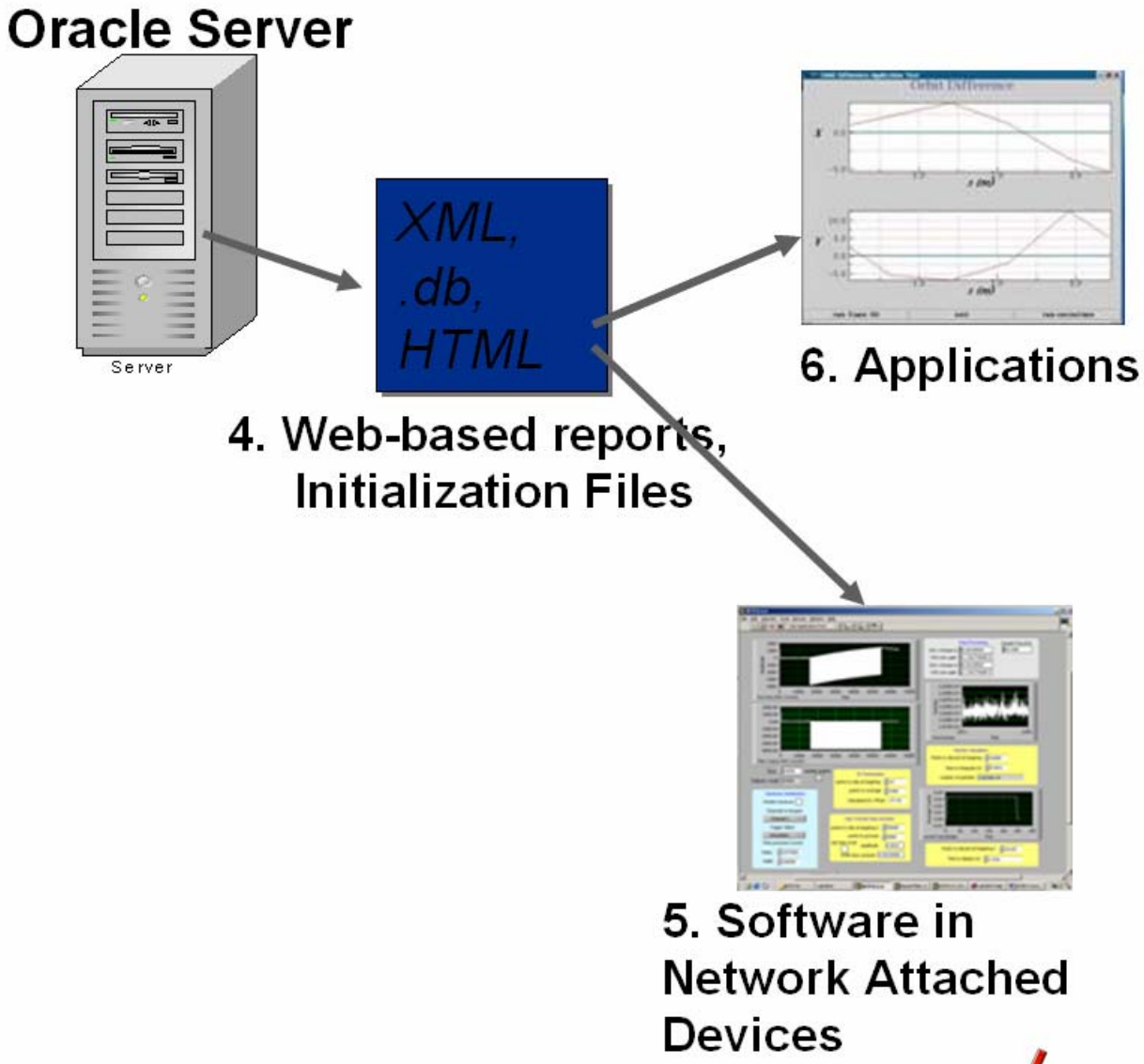


Future Plans - Central Role of Database From 2003 ICALEPCS (Gyeongju (Korea))

And A Quick Look At The Numbers

	2003	2007
Database Tools	Oracle 9i Enterprise Edition RDMS Client Tools Powered by 9i Application Server	Oracle 10g Release 2
Application Subject Areas	6	10
Tables	161	378
Device Records	5,700	39,710
Parameter Records	41,000	544,485
Construction / Database	40% vs. 30% Complete	100% vs. Unknown

Let's Compare

2003

- Database Applications
  - LabVIEW
  - XAL
  - Rack Profile
  - Web PV Data Applications
  - Electronic Logbook
  - JERI (Java EPICS RDB Interface)
  - Bypass Request System
  - Equipment Tracking System
  - Web Reports (Discoverer)
  - Commercial Products (ProjectWise, DataStream)

2007

- Database Applications
  - DB 2 XAL
  - DB Browser
  - Data Queries
  - From Alarm Log To Oracle
  - From Error Log To Oracle
  - IOC Health to RDB
  - PS Report
  - PV Log Browser
  - SS Loader
  - Spline Fit
  - Trip Monitor
  - Trip Viewer
  - IOC Report Tab
  - Diagnostics IOC configuration
  - Bypass Request
  - Data search and archive
  - DataStream
  - Datastream Reports
  - Document Number Reservation
  - Electronic Logbook
  - Equipment Tracking
  - Equipment Receiving
  - ICS NetReg
  - JACoW SPMS (ICALEPCS07)
  - Jeri
  - MPS Trips
  - MPS Audits
  - ODBC users
  - Operations Administration
  - Power Outage Report
  - Power Updates
  - Primavera
  - Projectwise
  - PSSO Wireless Meter Entry
  - PSSO Meter readings Report
  - Certain Physics applications
  - Power Supply configuration generation
  - PV Crawler
  - PV Logger
  - RF Cavity trips
  - SCORE
  - SNS channels 22,32,96,97,98
  - SNS Service Request Web Interface
  - SNS Work Order Closeout
  - Web reports including ROCS

Who are "We"

- Band of merry database professionals.

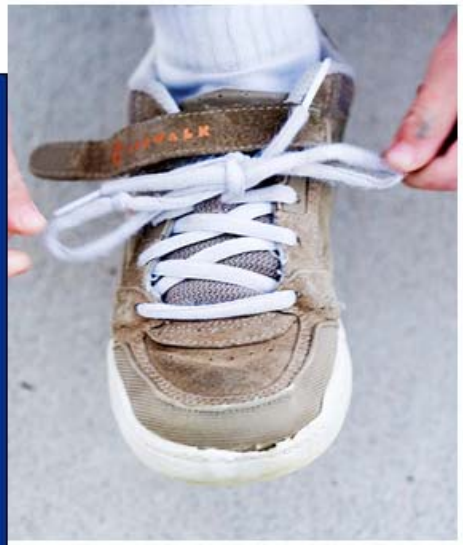
Lost Opportunities?

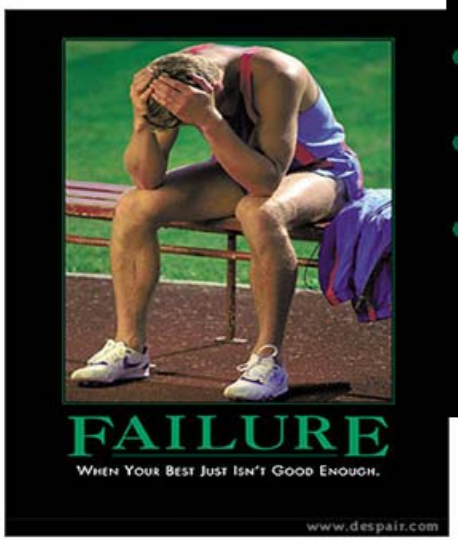
- SNS has been successful
- Many good things done without using the SNS RDB.
- "We" have learned a lot.
  - Lost opportunities caused disappointment but increased ability to produce later on.

What Did We Learn.

Reasons for Success

- Good Schema
- Project Champion
- Historic Reference
- Real Need
- Code Stealing





Lost Opportunities

- Deadlines
- User/Client Expectations
- Data In Versus Out
- Good Schema
- Data Maintenance

Some Examples - Configuration

MPS

(Provide database derived configuration files to MPS IOCs)

- Strong Leader or "Champion"
- Set Procedure
- Existing Usable GUI
- Standard Accepted Tool

PC Based IOCs

(Provide database derived configuration files to PCs)

- Management Request
- No Leader or "Champion"
- No Long-term Plan or Procedure
- Complex GUI

BLM IOCs

(Provide database derived configuration files to BLM IOCs)

- "Champion" Left Project.
- Database Developer Within BLM Group.
- No Set Procedure.
- GUI built as Part of Project BUT Not Completed.
- RDB Control Developed to Replace Existing Hand Entry.

Power Supply

(Provide database derived configuration files to power supplies)

- Multiple Leaders
  - Multiple Scopes
- Good Plan and Procedure
- Functioning Application
- Schema Required Data From Others

Some More Examples

Electrical Power Project
(RPPA13)

(Manage and Report on Electrical Power Routing)

- Management Driven
- Strong Leader or "Champion"
- Procedure Built Into Project
  - Created GUI at Start of Project
- Standard Accepted Tool
- QA of Data
- Data Ownership

Diagnostics RDB Reports

(Accessible data summary reports specific to the Diagnostics Group)

- Group Leader Implemented
- Database Developer within group acting as "Champion"
- Data Ownership
- Standard Toolset
- Leader and developer have left group.

General RDB Reports

- Simple is better.
- Require Easy Access (web or email)
- Alternative not available.
- Clients are necessary

Final Examples

Equipment

(use of DataStream to track equipment maintenance)

- Management Mandate
- Strong Leader or "Champion"
- Takes advantage of complex SNS schema.
- COTS (DataStream)
  - Ready to Use System?
  - SNS RDB developers not able to work with data.
  - GUIs are available but do not meet client requirements.
- Overwhelming
  - No Implementation Strategy.
  - Too Much Work and Not Enough Support Personnel.
  - Extra Unplanned Work for Technical Groups.
- Introduced Work-a-rounds
- No Tools.
- No Maintenance plan.

Electronic Logbook

(Electronic Logbook)

- SNS Wide Requirement.
- Non-Restrictive Timeframe.
- No RDB Restrictions on Data.
- Easy to Use GUI.
- The Wrench that Pounds the Nail.

Who thinks what?

- **Database Developers (Glad and Sad)**
  - Glad we have helped in the ways we have.
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- **Management (Apathetic)**
  - Good idea, Use it if you can.
  - Don't let it slow you down.
  - Still Not High Priority

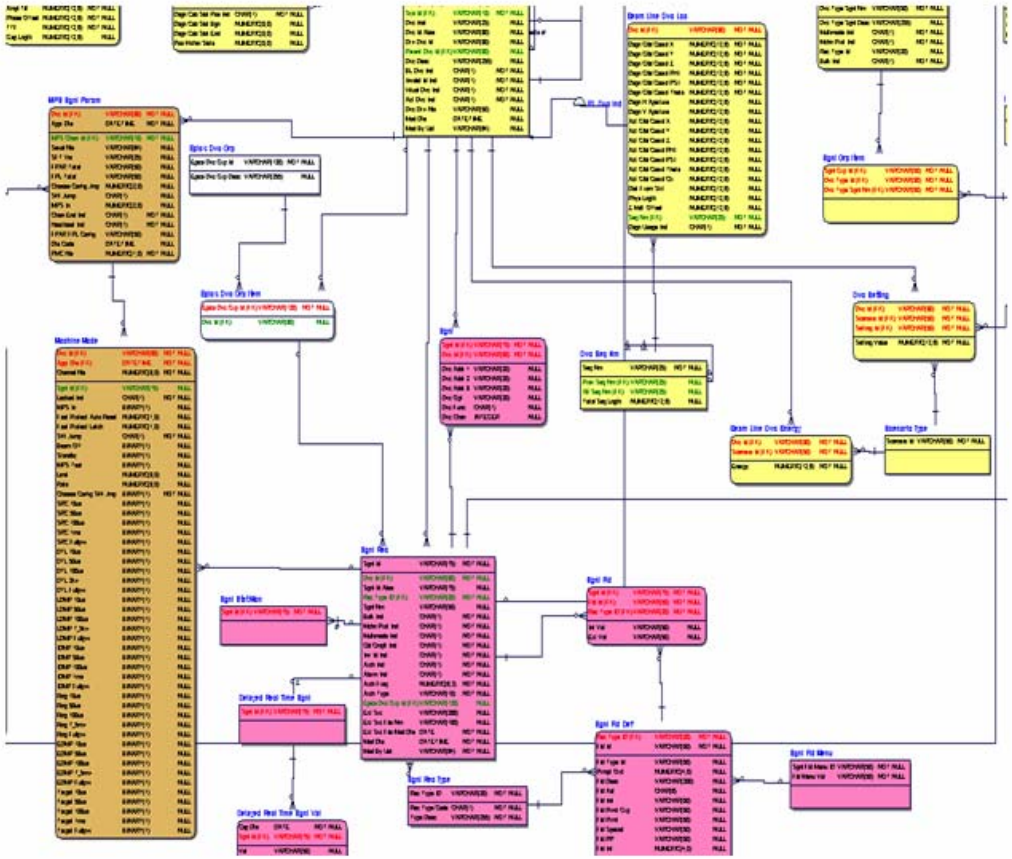
What Does SNS Need To Do?

NOTHING.

- The overall goals of the project continue to be realized.

BUT…

- Goals may be easier to reach with a stronger RDB implementation.



SNS Summary

Did Well

- **Schema**
  - Complex but serves most project needs.
- **RDB was emphasized from beginning of project in a couple of groups.**
  - I was first hired in Diagnostics group and did all sorts of stuff. It became personal.
- **Enthusiastic Champions**
- **Some Groups Implemented directed use of RDB.**
  - Managers of the Physics and Diagnostics directed members RDB final resting place for data.
- **Some Great applications and Reports**
  - ELog, JERI, …

SNS Summary Cont.

Could have done better.

- Management support.
- Procedures and Standards
- More RDB development personnel.
- Standardize the RDB use for all of project.
  - Access, Oracle, MySQL, etc are still in use.
- GUI - Standardized toolset for data entry and reporting.
  - Entry GUIs Especially Bad or Absent.
- Eliminate Telepathic Requests
- Give tools to users as soon as possible.
- Plan on how to deal with short cuts that were allowed.
  - Incorrect RDB use
    - Engineers admit to entering data just to get it in. Now it's embedded and hard to fix.

Advice:

- Start thinking RDB from start – a mind set
  - Unofficial part of mission statement.
  - Sooner or later it will go in.
- Get support
  - Hire Database Developers as soon as possible
    - Help them understand their role.
  - Multi-task RDB developers as technicians (or vice versa)
    - Embrace Project Champions
- Take advantage of what is available.
  - Settle on one project-wide toolset.
  - SNS Schema or IRMIS …
  - Use common reporting and input tools
- Project-wide use of agreed upon RDB
- Try to eliminate allowance of shortcuts.
  - Non-standard is bad and will probably become permanent.
- Make Use of RDB Applications a No-Brainer
- Don't Mandate but proceduralize – Procedures and Standards.