Lessons Learned From The SNS Relational Database

Presented by David Purcell
For David Purcell, Jeff Patton, and Katia Danilova
Future Plans - Central Role of Database

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

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

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

4. Web-based reports,
   Initialization Files

5. Software in
   Network Attached
   Devices

6. Applications

Oracle Server

XML, .db, HTML

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Future Plans - Central Role of Database

Oracle Server

1. XML, .db, HTML
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Future Plans - Central Role of Database  From 2003 ICALPCS (Gyeongju, Korea)
And A Quick Look At The Numbers

<table>
<thead>
<tr>
<th>Database Tools</th>
<th>2003</th>
<th>2007</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>Oracle 9i Enterprise Edition RDMS</td>
<td>Oracle 10g Release 2</td>
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<tr>
<td></td>
<td>Client Tools Powered by 9i Application Server</td>
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<tr>
<td>Application Subject Areas</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Tables</td>
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<td>378</td>
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<tr>
<td>Device Records</td>
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<tr>
<td>Parameter Records</td>
<td>41,000</td>
<td>544,485</td>
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<tr>
<td>Construction / Database</td>
<td>40% vs. 30% Complete</td>
<td>100% vs. Unknown</td>
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</table>
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

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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

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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

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HFIR
SPALLATION NEUTRON SOURCE
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.
  - Disappointed in the lost opportunities.
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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.