LESSONS LEARNED AFTER IMPLEMENTATION AND MANAGEMENT OF HALF OF THE SNS DIAGNOSTICS PC-BASED INPUT OUTPUT CONTROLLERS (IOCS)

Spallation Neutron Source

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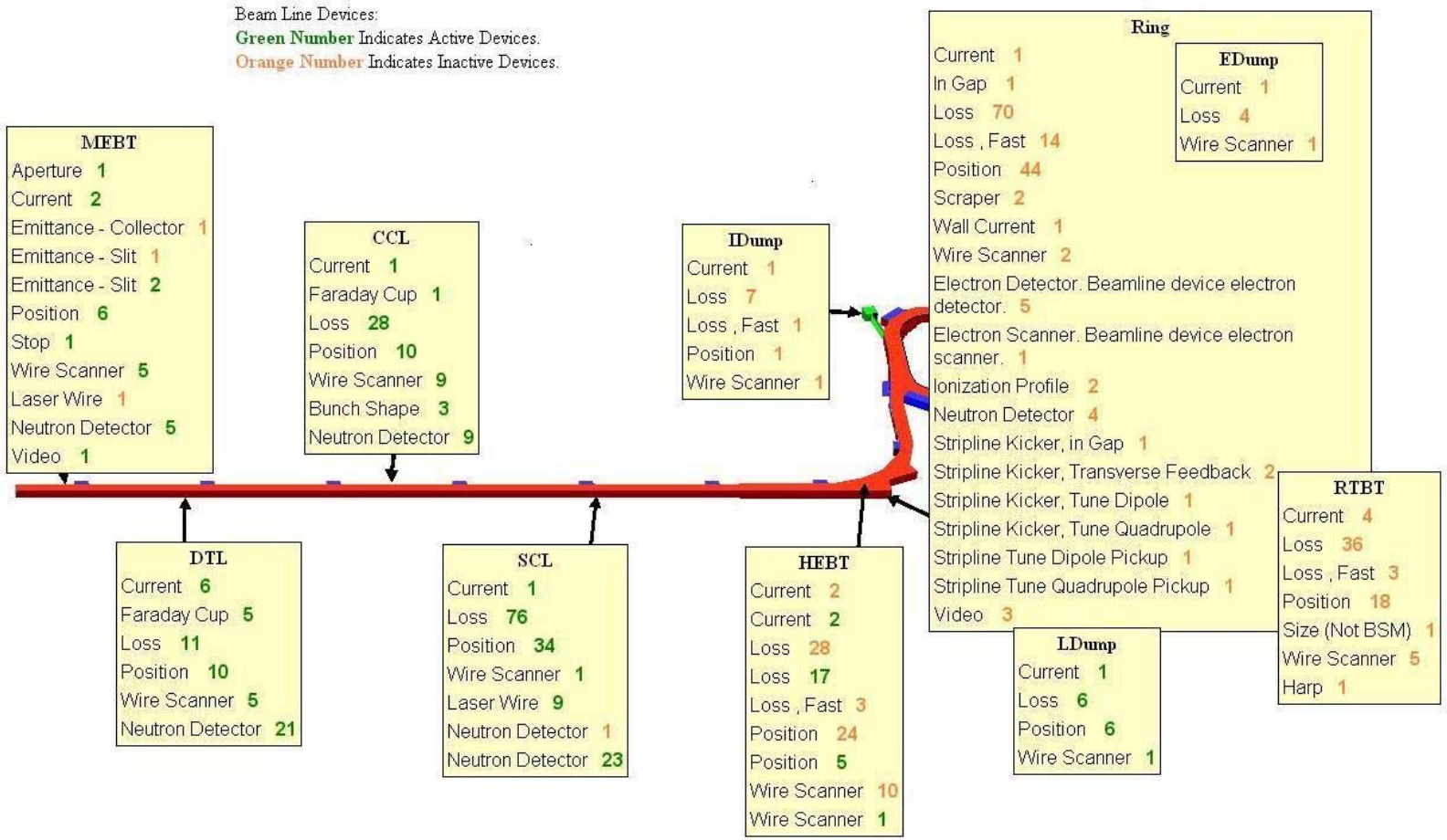
DIAGNOSTICS AT SNS

SNS Diagnostics Deployment

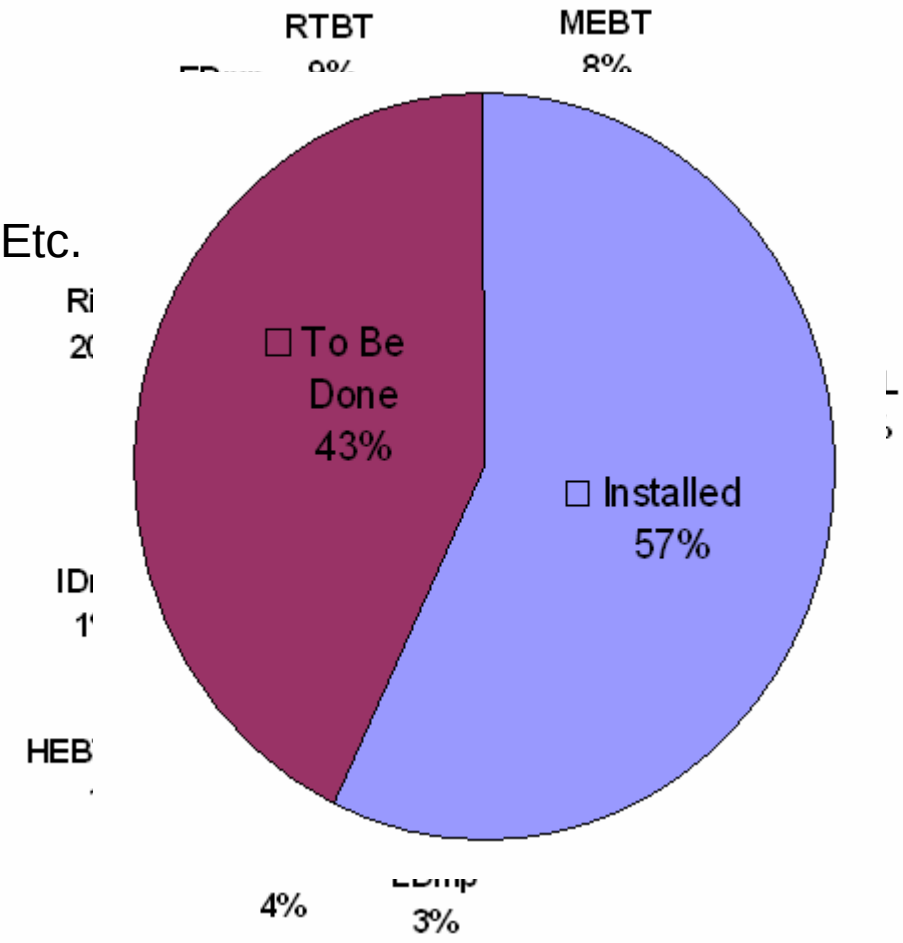


What Have We Got Left

638 Total Diagnostic Beam Line Devices
-VME Based
  -283 Loss Monitors
  -50 Neutron Detectors
-PC Based
  -305 BPMs, BCM, Laser Wire, Etc.

321 Planned IOCs
  -14 VME Crates
  -307 PCs

  Of the PCs
    -175 Installed
    -132 To Be Done



Our Deployment Tools

- Basic Tool Set
  - Rack Mount PC.
    - 2.4 GHz and up Processor.
    - 40 GB Hard Drives.
    - 512 MB RAM.
  - Windows XP Embedded.
    - Relatively Small OS
      - (300 MB XPe Vs. 1 GB for XP Pro)
    - Control of OS Make-up via Components.
  - Altiris Deployment Solution.
    - Client/Server Application
  - Windows Server 2003 (required by Altiris).
  - Microsoft SQL Server (required by Altiris),

History of Our Operational Transparency

What is a Network Attached Device?

- **Avoid single point of failure as compared to VME.**
- **Each beam line device is stand alone with its own resources, including timing, data acquisition and PC.**

Why PC and Windows?

- **Multiple embedded operating systems available.**
- **Wide range of hardware and software tools (e.g. EPICS) available.**
- **LabVIEW: data-acquisition, analysis, and graphical debugging.**
- **The resources available for use with Windows.**
- **Longevity of off-the-shelf hardware and software that complies with the standards we use.**
- **The broad range of migration paths to deal with evolving software and hardware standards.**

XP Embedded

- **Allows flexibility of standard XP Pro and increase in security.**

Cost?

- **Change from VXI to PC has slightly decreased total system cost.**
- **Hard to determine currently.**
    - **$1500/PC plus cards, electronics, etc per device.**
        - **But development to deployment time is minimal.**


Asta la Vista baby...
A fatal exception 0E has ocurred at 0028: C001E36 in VXD VMM(01) +
00010E36. The current application will be terminated.
* Press any key to terminate the current application.
* Pres CTRL+ALT+DEL again to restart your computer. You will
lose any unsaved information in all applications.
Press any key to continue but... ...I will back _

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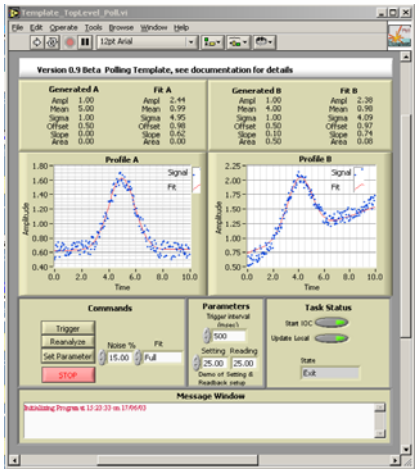
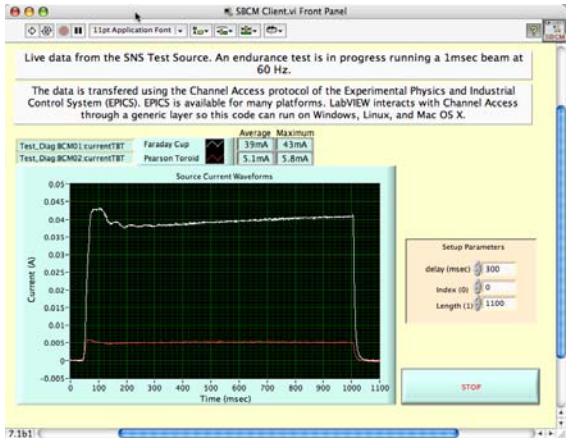
Instrument Program Development

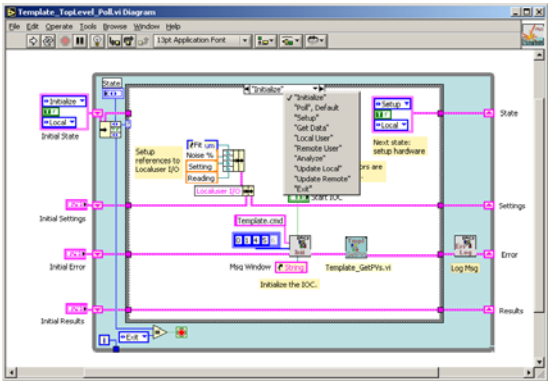
http://www.sns.gov/diagnostics/documents/epics/LabVIEW/SNS_LabVIEWEPICS.html



PCs serves as instrument IOC with LabVIEW through the Shared Memory Interface

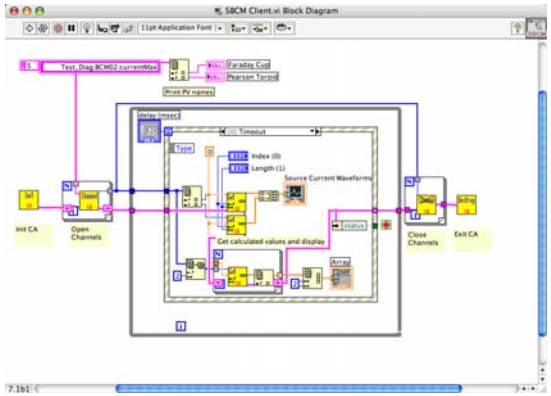


Channel Access Client interface for LabVIEW to serve as data client for console applications



Templates and code management tools for program development:

BPM, BCM, ES, BSM, EDFC, WS, Laserwire, Beamstop, etc



Issues – Planned and Discovered

Configuration
- •Expected chore but under control
  - •Altiris simplifies control of the configurations.
  - •Database maintains configuration files (and rollback capability).
  - •Development machines usually have most up-to-date applications.
  - •In-situ updates not totally controlled.

Errors Unique to single deployment.
- •Process to find errors isn't defined.
- •Global errors have been eliminated.

Infrastructure for many IOCs not anticipated by support groups.
- •Rack space, cooling requirements, power needs have all been updated for remaining installation.

Concerns from colleagues
- •Construction continues but experience of 7 commissioning runs.
  - •1,124,200 system hours of experience.
  - •6 PCs running for 25,550 hours. (35 months).
- •Our success has increased acceptance of PCs.
- •Long-term reliability (> 3yrs) must be demonstrated.

Future Looks Bright

- 180 IOCs currently installed. 160 IOCs to be installed . Our deployment strategy and tool set can easily handle the increase in IOCs.
- IOC up-time should become relevant as software development slows and project construction ends.
- 175 days remaining until target commissioning.