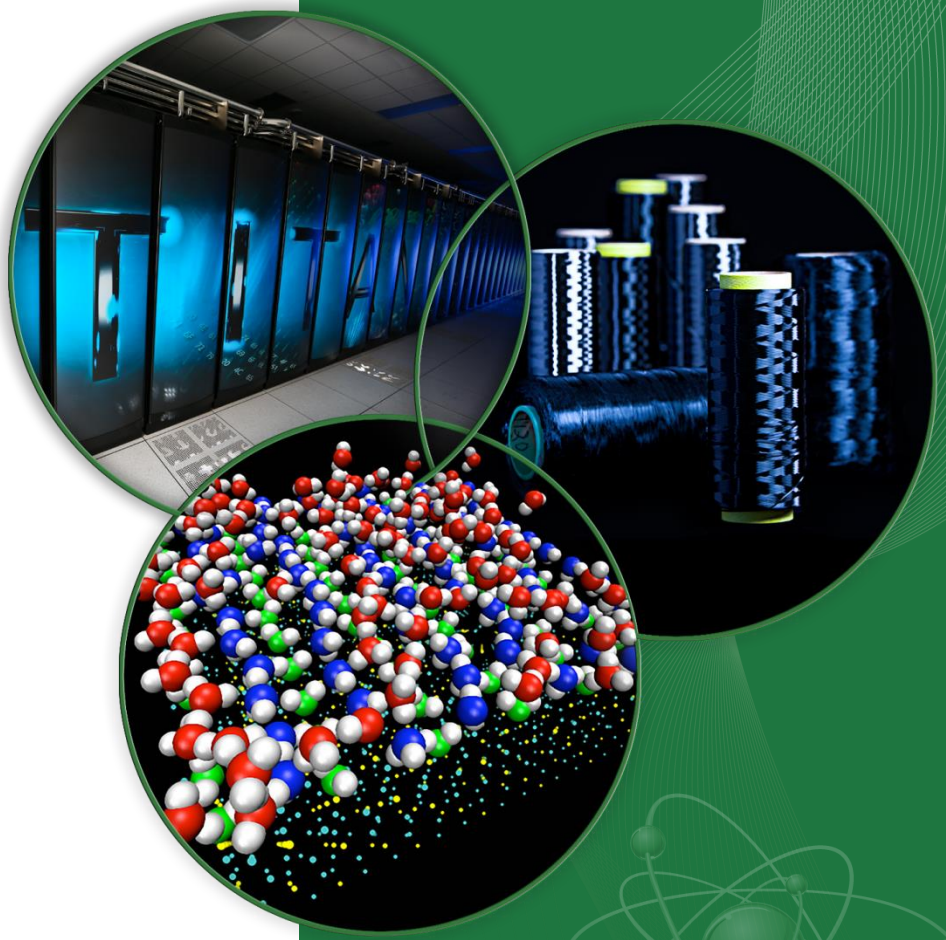
Control System Studio: Overview

Kay Kasemir,

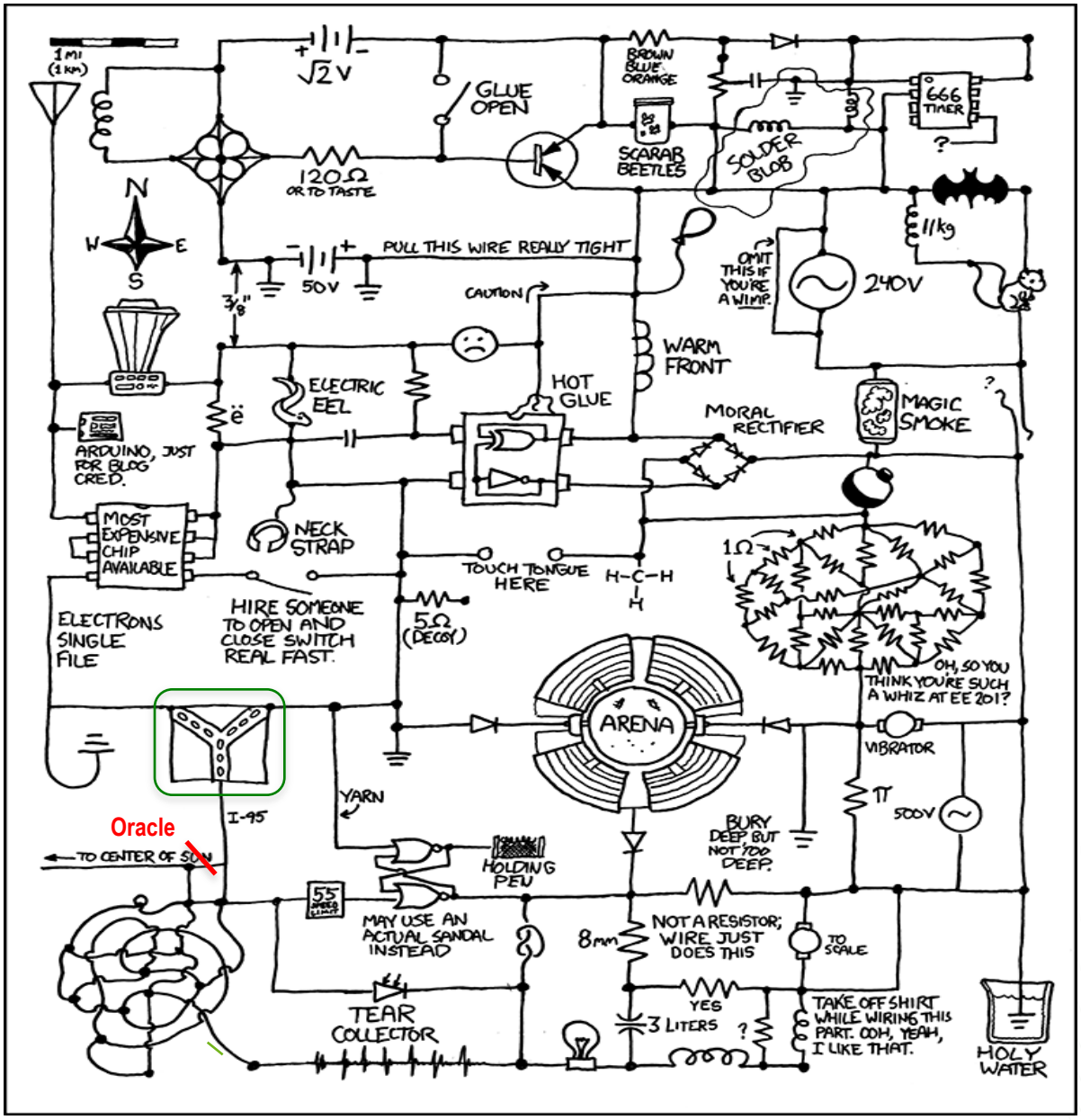
SNS/ORNL

June 2014



OAK RIDGE National Laboratory

What EPICS looks like



http://xkcd.com/730/

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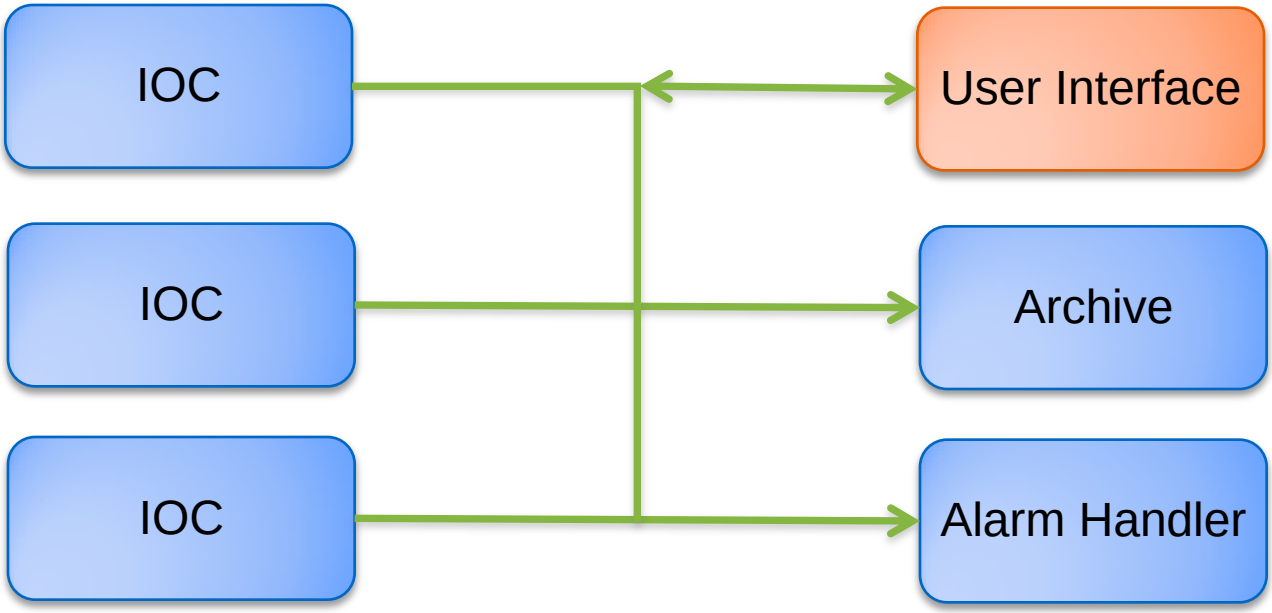
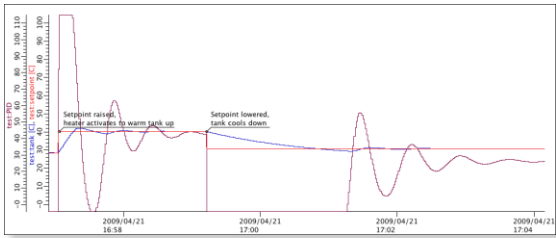
EPICS: Distributed System

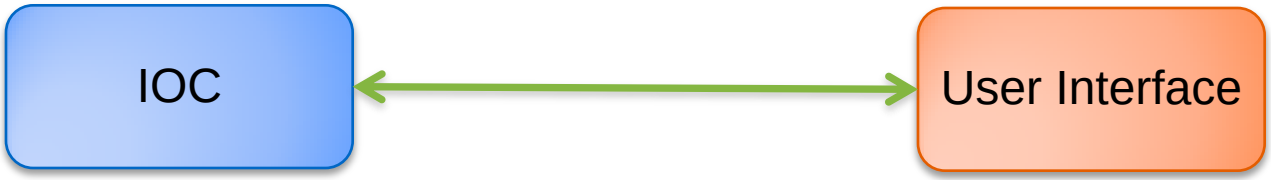
Servers

Clients





Over the years



Since ~1990:

```
record(ai, "my_record")
{
  field(DTYP, "MyDevice")
  field(INP , "@channel2")
  field(SCAN, "1 second")
  ...
```

1. edd/dm 198x
2. medm 199x
3. edm 200x
4. CS-Studio 201x

Also:
tcl/tk/ca, python/qt/ca, ..

More supported platforms:
vxWorks, RTEMS, Linux, OS X, Windows, ..
68000, Intel, PPC, Arm, ..

Limited upward-compatibility.

Control System (CS) Studio

User Interface tools

- Display editor & runtime
- Strip Chart
- Channel Access utilities

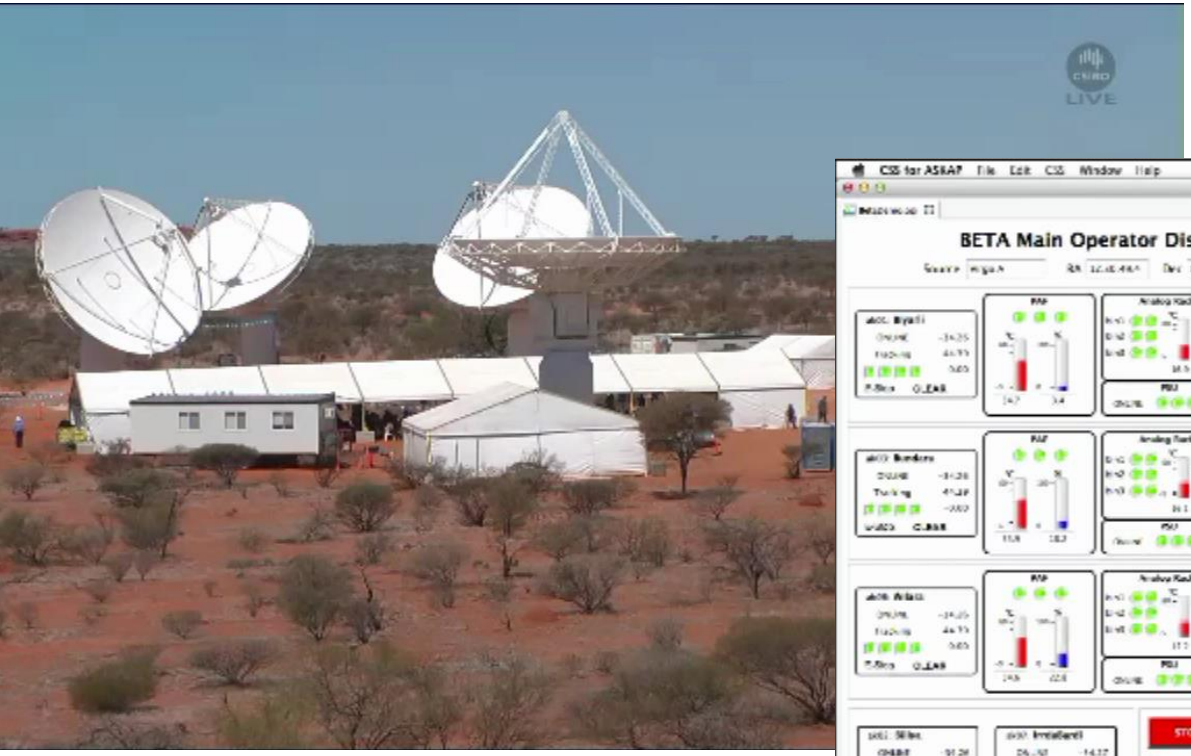
Also

- Archive system
- Alarm Handler
- Site-Specific support for logbook, IOC and channel information, ..

.. combined into an integrated, site-specific user-interface tool for Windows, Linux, OS X

What does CS-Studio look like?

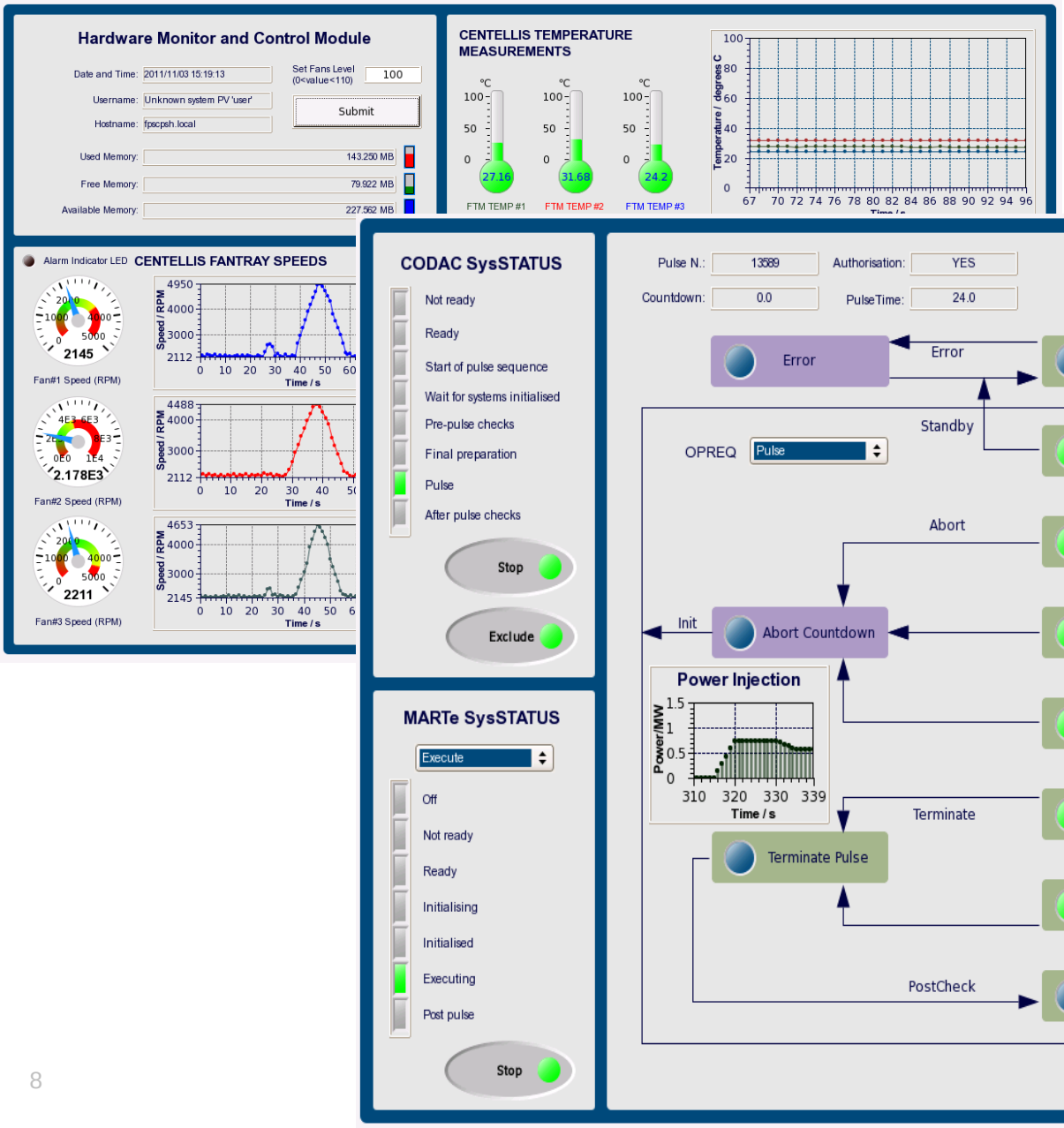
Australian Square-Kilometer Array Pathfinder (ASKAP)



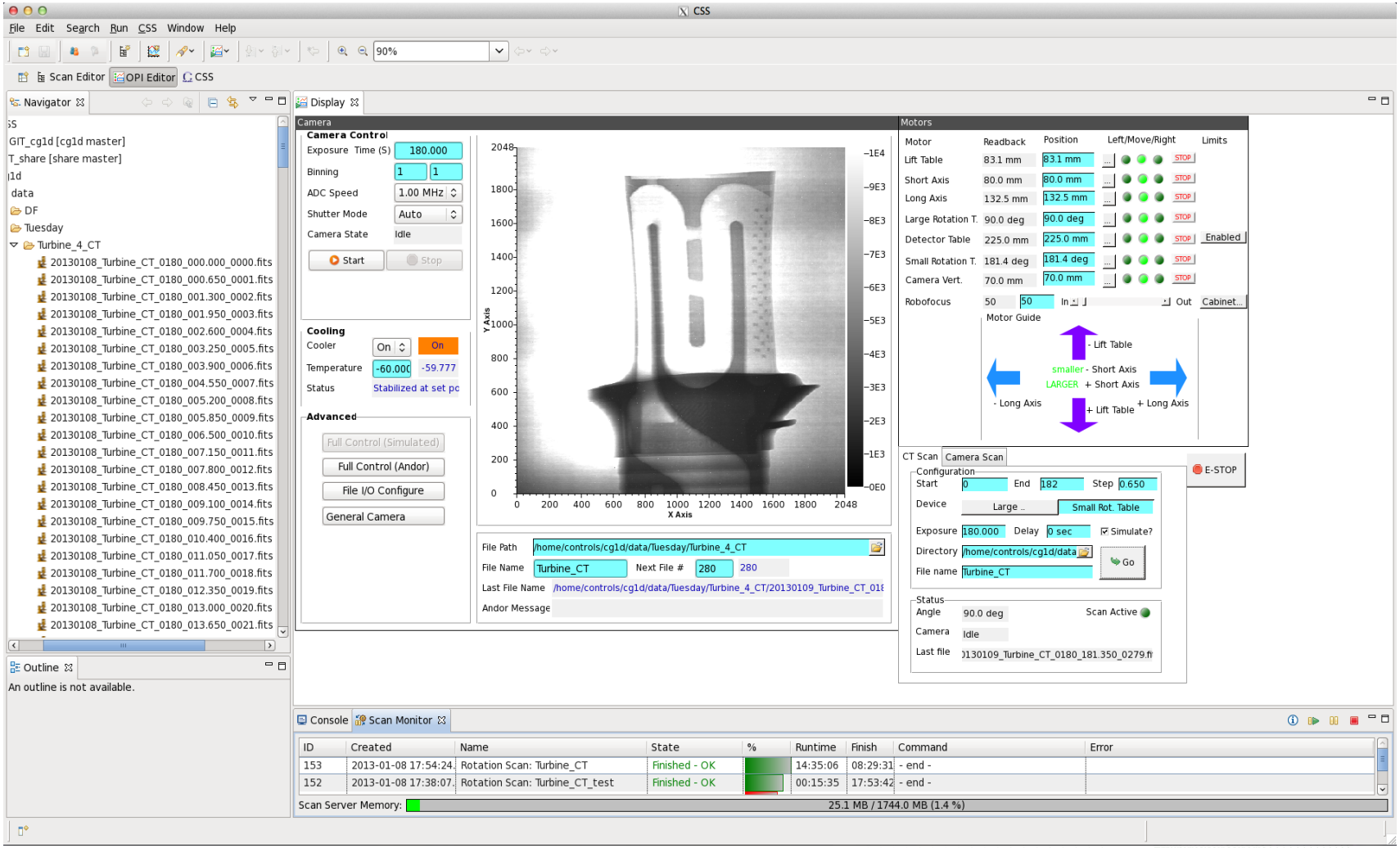
Oct. 2012, Juan Guzman, http://www.aps.anl.gov/epics/tech-talk/2012/msg02113.php

ITER

ITER-FPSC-vBetaVersionPanelsOPI-UserManual.doc, Nadine Utzel, 2011

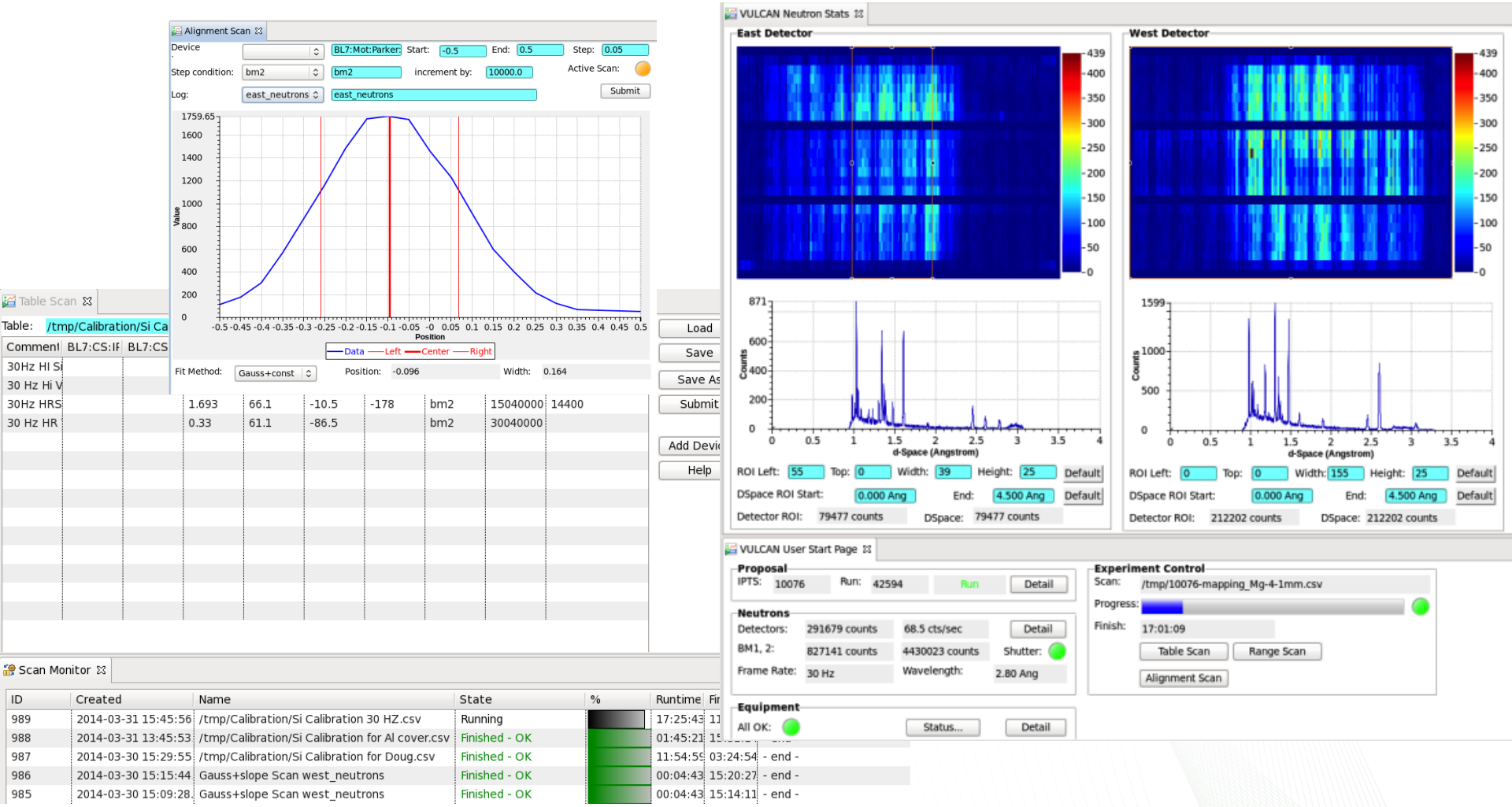


ORNL ‘CG-1D’ Beam Line



Neutron Tomography, EPICS/CSS since Jan. 2013

ORNL SNS ‘VULCAN’ Beam Line



Engineering Diffractometer, EPICS/CSS since March 2014

BNL NSLS2

Log Table | Log Tree

Log Query: Adv Search

Date	Description	Owner	Logbooks	Tags	A.
5/12/14 7:40 AM modified at: 5/13/14 11:32 AM	Systems are now shut down for SR, BTS, Booster, LBT, and Linac. Klystrons 1 and 3 were left on and in standby.	zeitler modified by: zitvogel	Operations		0
5/12/14 7:32 AM modified at: 5/13/14 11:32 AM	Pentant 3 would not open using normal access request, RCT had to hit emergency access button. At the time the SR RF was set to AUX state, the main dipole was off, BTS B2 was off, and BTS shutter was closed.	zeitler modified by: zitvogel	Operations		0
5/12/14 7:21 AM modified at: 5/13/14 11:32 AM	Linac is Off. Cathode is off. klystrons in standby.	rfiller modified by: zitvogel	Operations		1
5/12/14 7:19 AM modified at: 5/13/14 11:32 AM	Vertical Emittance Measurement epsy: 85.6 +/-3.8 nm betay=14.2 +/-0.63 m alphay=-1.67 +/-0.07	rfiller modified by: zitvogel	Operations		1
5/12/14 7:09 AM modified at: 5/13/14 11:32 AM	Horizontal Emittance Scan: epsx: 81+/-5nm betax: 14.3+/-0.6m alphax:-1.81 +/-0.08	rfiller modified by: zitvogel	Operations		1
5/12/14 7:00 AM modified at: 5/13/14 11:32 AM	Linac Status Page.	rfiller modified by: zitvogel	Operations		1
5/12/14 7:00 AM modified at: 5/13/14 11:32 AM	Starting to shut down the Storage ring and booster while Ray finishes some measurements on the Linac.	zeitler modified by: zitvogel	Operations		0
5/12/14 7:00 AM modified at: 5/13/14 11:32 AM	There are the 72 bunhces in all their glory. SAved the waveform to a text file.	rfiller modified by: zitvogel	Operations		1
5/12/14 6:55 AM modified at: 5/13/14 11:32 AM	72 bunhces in the booster! That is what the linac is making. GREAT! We have established that the linac can inject its bunch train into the booster.	rfiller modified by: zitvogel	Operations		1
5/12/14 6:52 AM	successfully restore machine with the snapshot #1164 and Conifg LTB_BR_BTS_20140421	rfiller	Machine Physics Operations	MASAR	0
5/12/14 6:52 AM	Succeed to save a snapshot #1165 to MASAR database using Conifg LN-LTB-All-20131219 with description: 200 MeV, 9.0nC at ICT1, 150 ns 0.3% energy spread. Comment: SAving best Beam Loading Compensation with 9nC at ICT1, 150 ns	rfiller	Machine Physics Operations	MASAR	0
5/12/14 6:50 AM modified at: 5/13/14 11:32 AM	This is the best beam loading compensation to date with a 150 ns pulse. 9nC at ICT1. 7.4 nC at FCT1.	rfiller modified by: zitvogel	Operations		1
5/12/14 6:23 AM modified at: 5/13/14 11:32 AM	Booster extraction kicker 1 pulse is still erratic.	zeitler modified by: zitvogel	Operations		1

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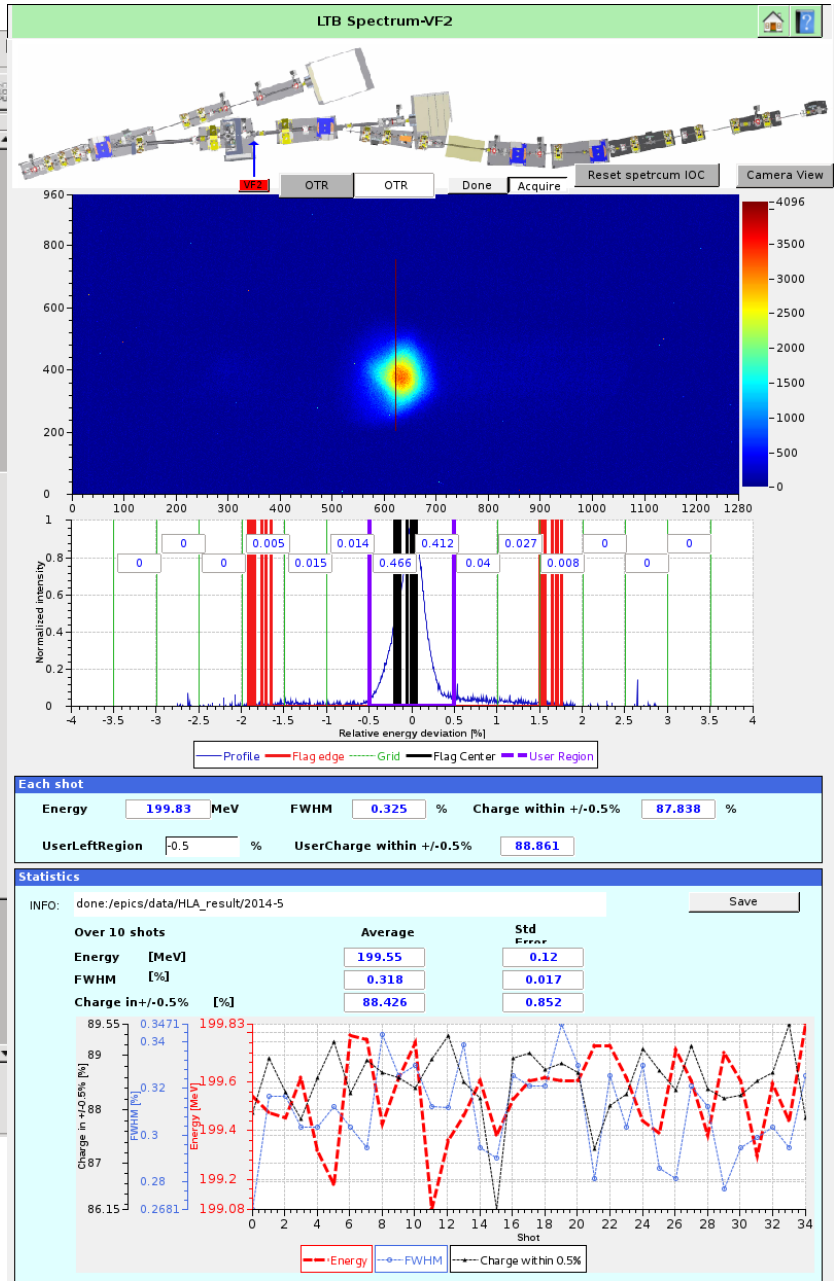
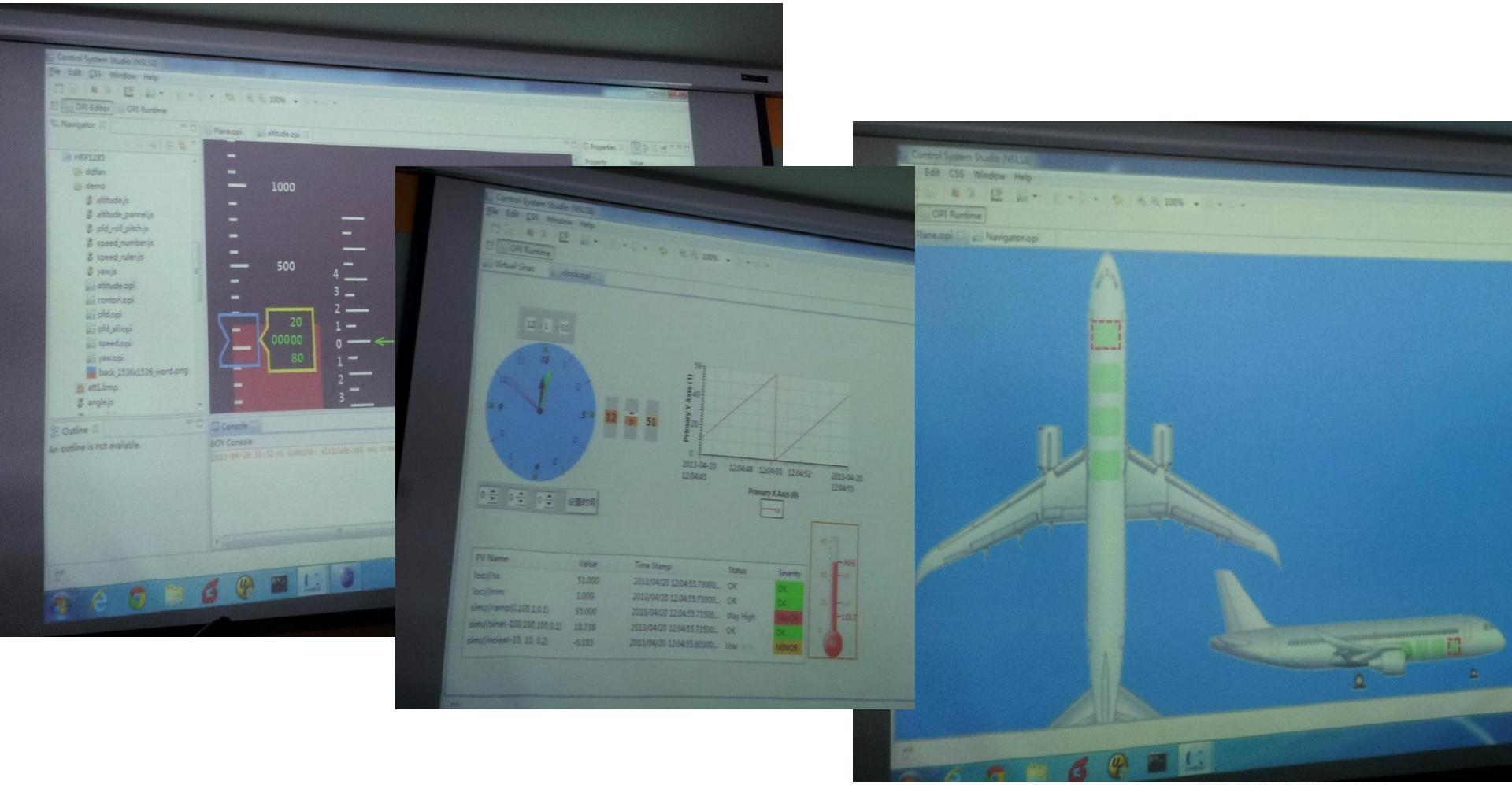


Kunal Shroff, May 2014

Airplane Simulator/Test



Somewhere in China …

What is CS-Studio?

CS-Studio Components

Common Use

- BOY Display Builder
- Data Browser
- Probe
- PV Table
- EPICS PV Tree
- Channel Access
- PV Autocomplete from History

Selected Use

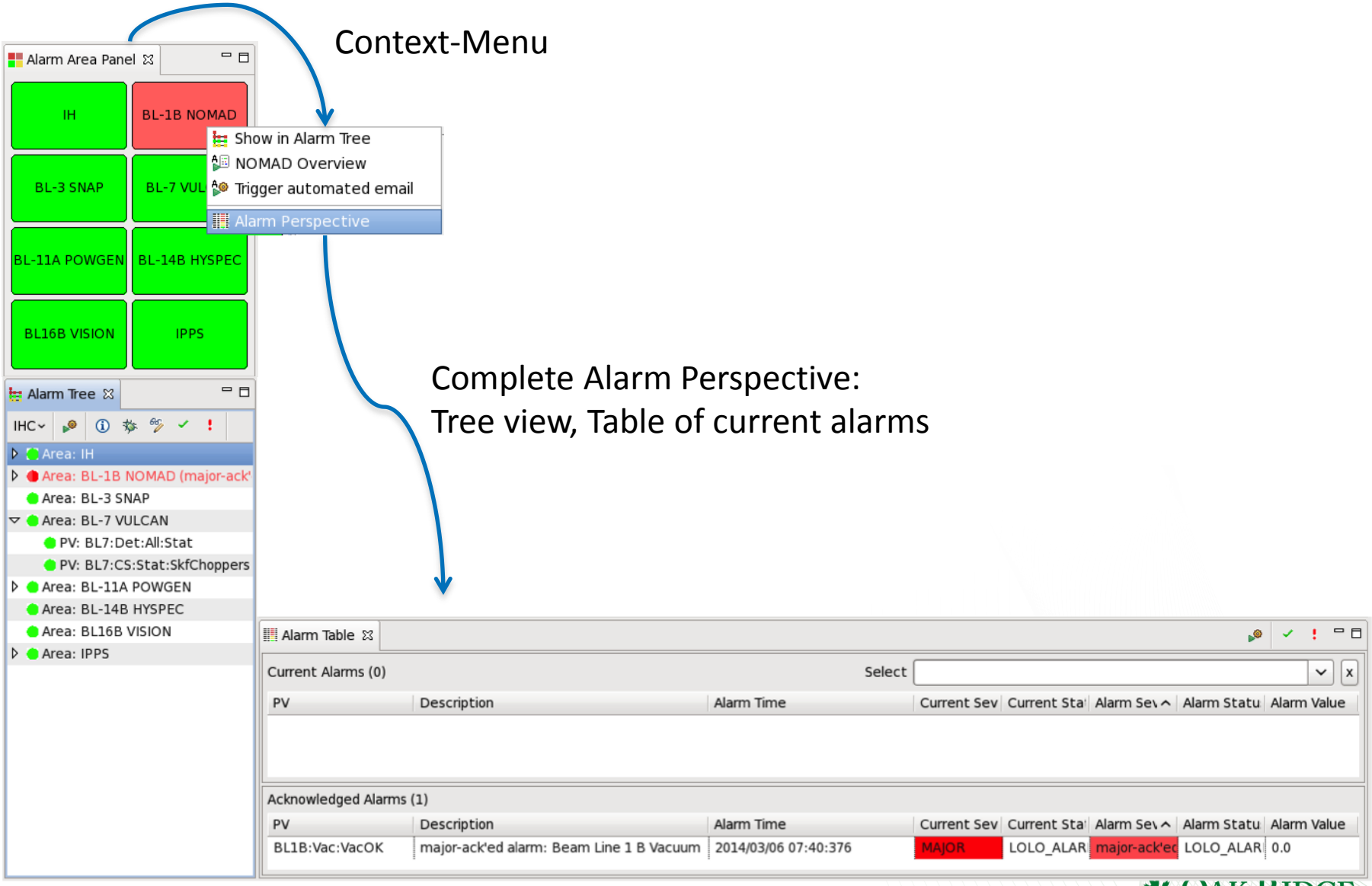
- Alarm System
- Channel Archiver, RDB Archiver, Archive Appliance
- ChannelFinder
- Olog, SNS ELog
- DDS, EPICS V4 PVA
- Autocomplete from Channel Finder, SNS PV database, Archive
- Scan Server
- SNS MPS Bypass Table
- Therapist, Clock, …

Not all components are "visible"!

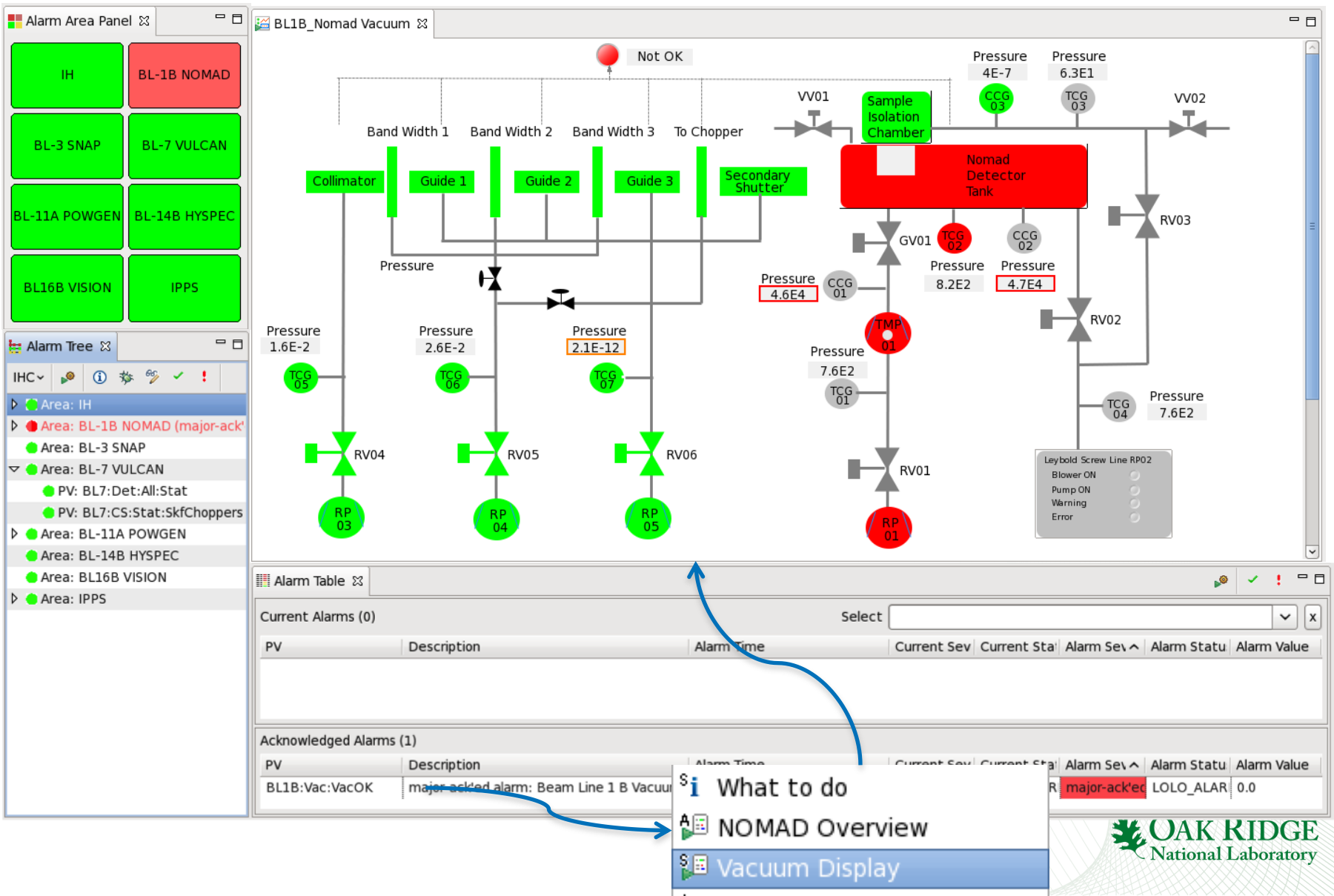
Technically…

- CS-Studio is an “Eclipse RCP” application
  - Rich Client Platform
- Eclipse RCP is based on Java
  - Windows, Linux, OS-X
- CS-Studio components are “Eclipse Plugins”
  - Fundamentally, supports install/uninstall

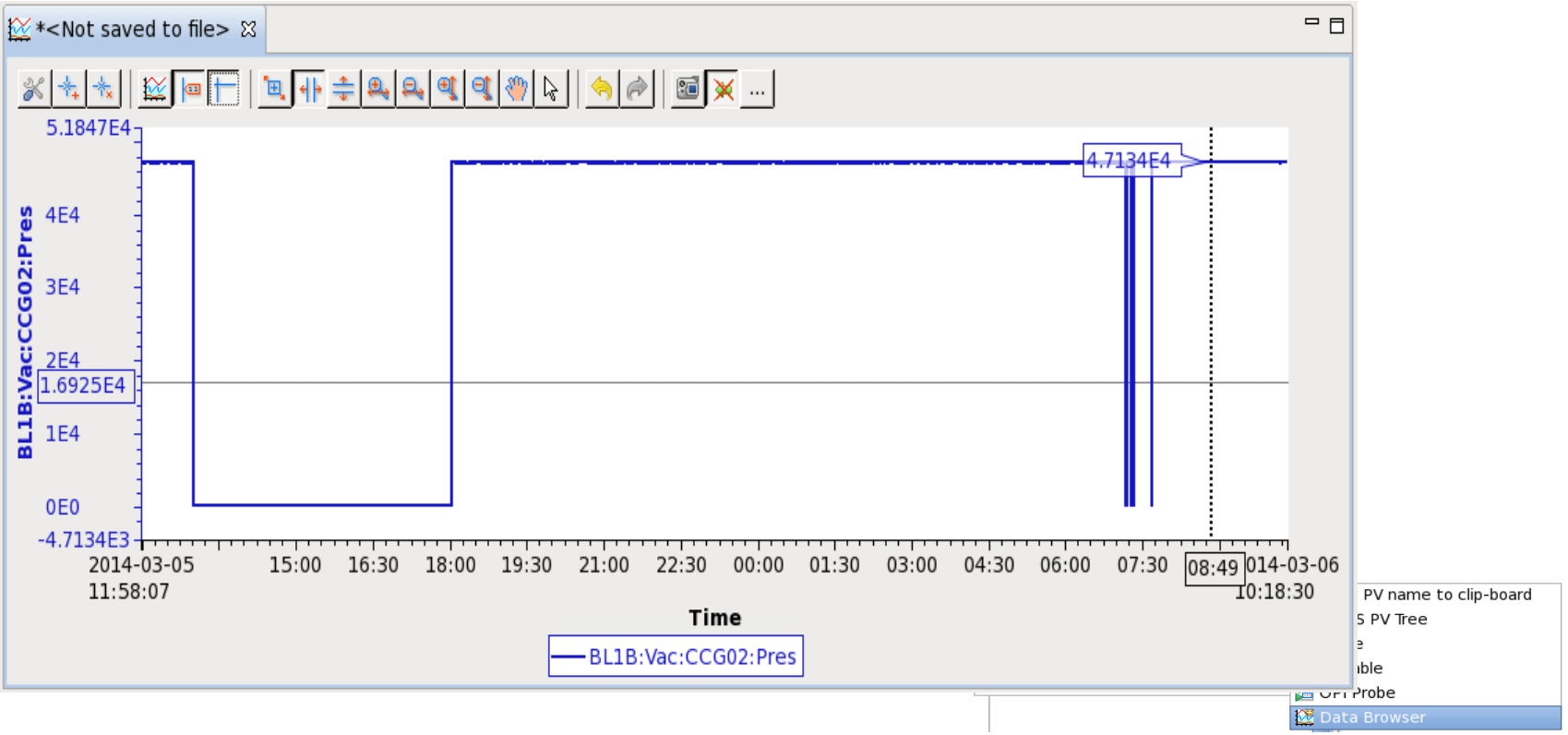
Integration: Alarm…



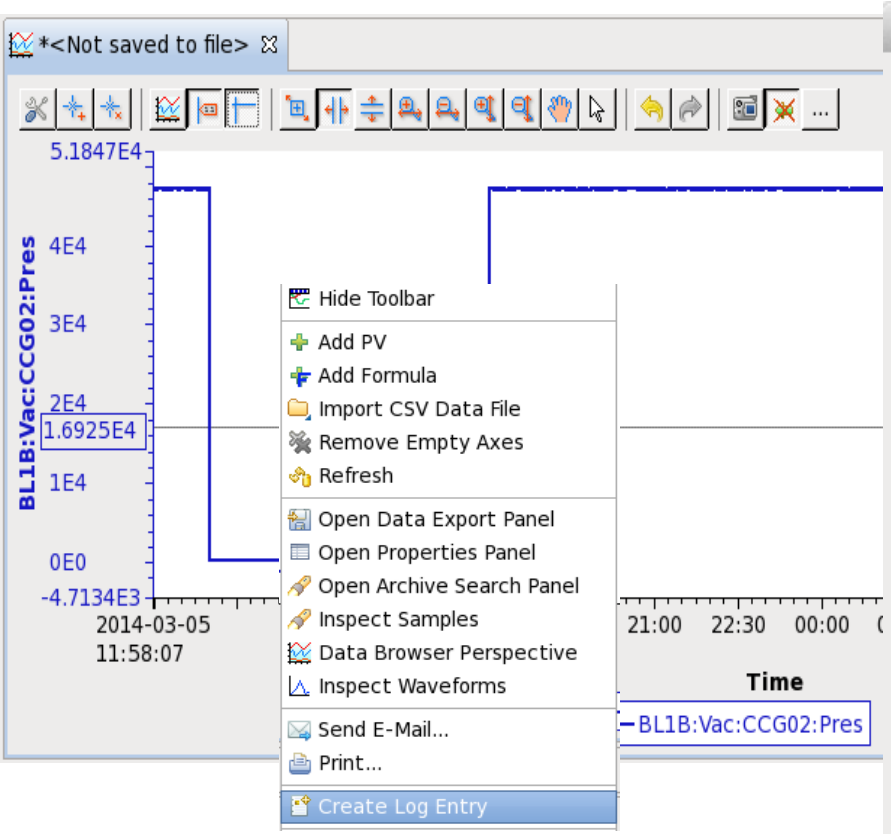
Integration: Alarm…

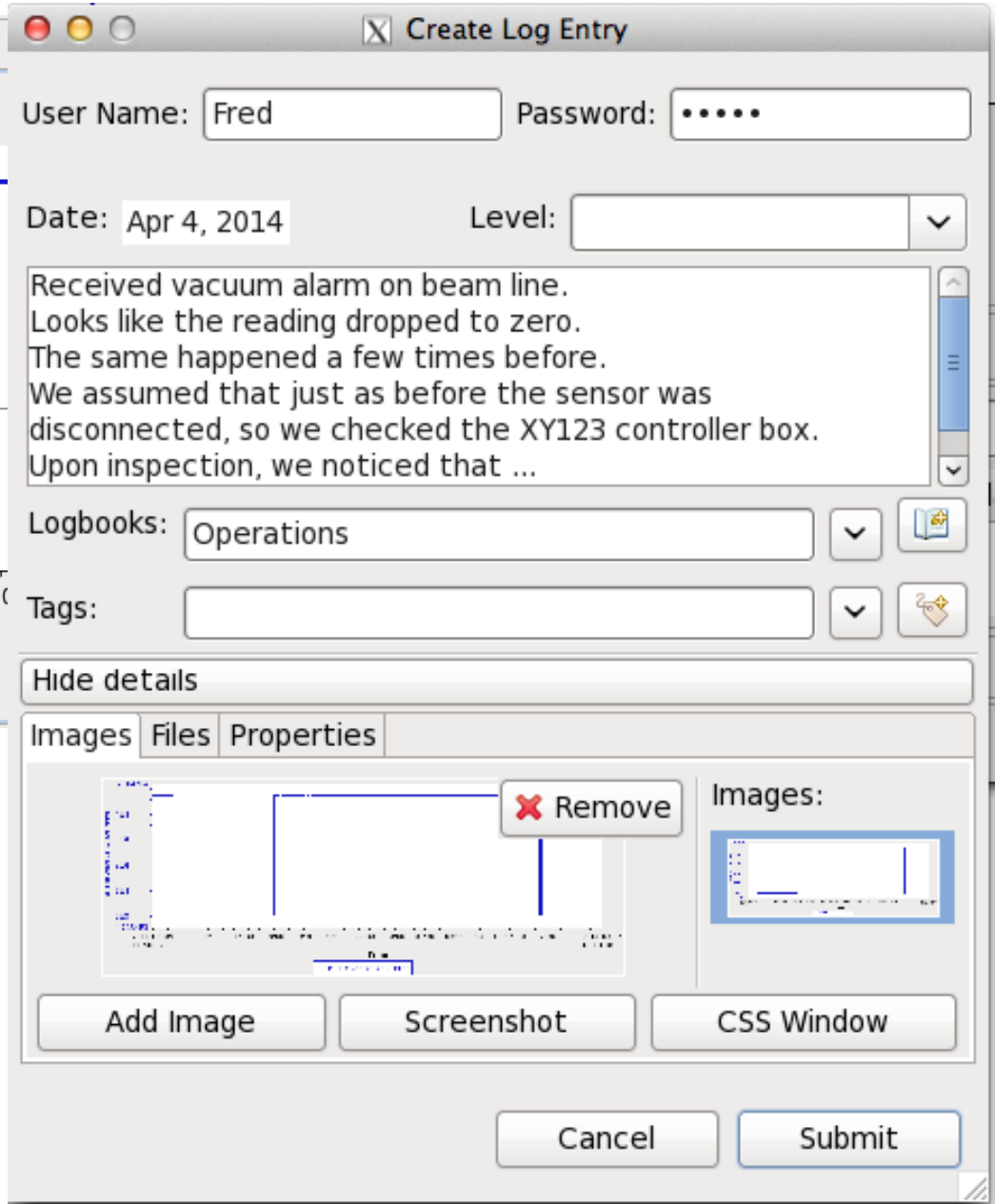


Integration: Alarm...

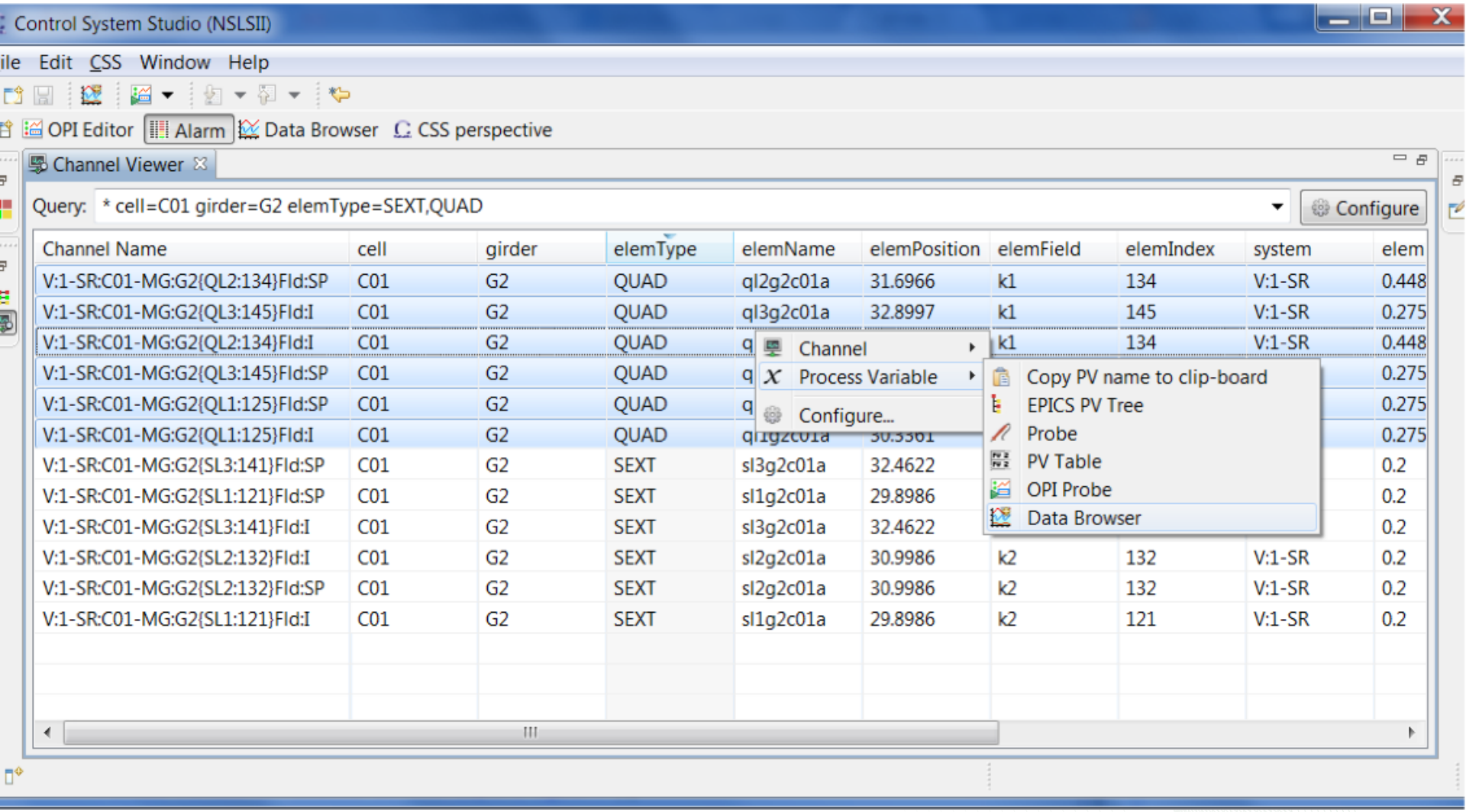


Integration: Alarm...



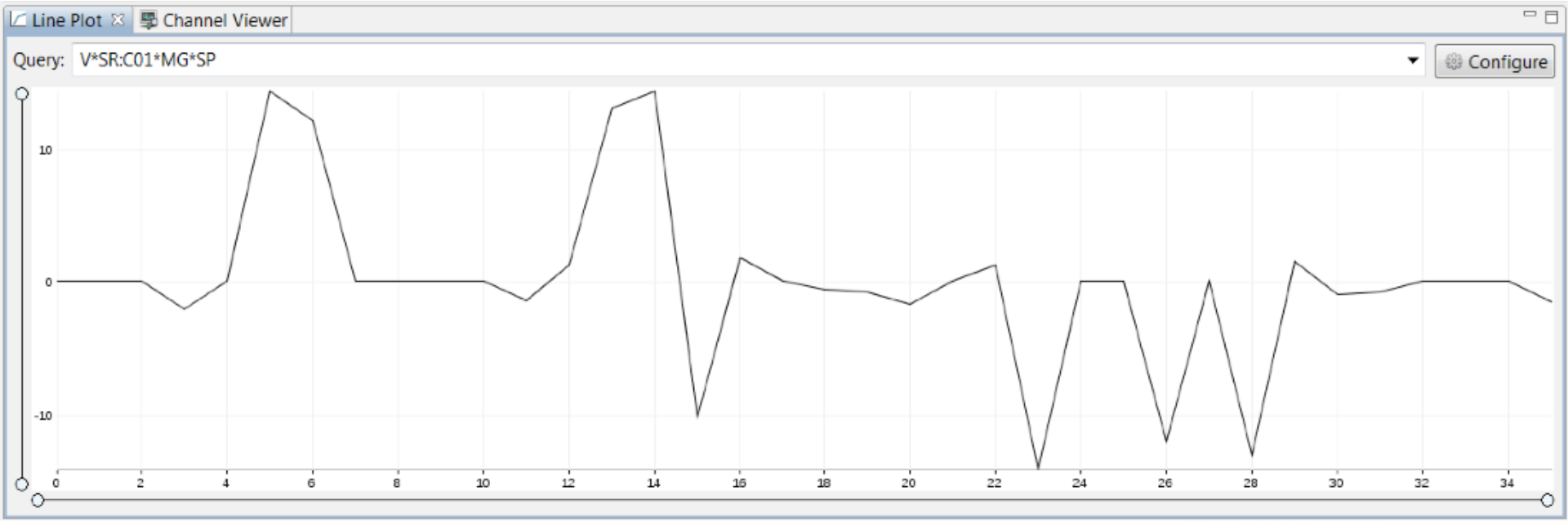


Integration: Channel Finder



"All 6- and 4- pole magnets in cell 1.."

Integration: Plot for Channel Finder Query



"All PVs that match 'V*..'"

CS-Studio

is a collection of components.

Many of them. Confusing to get started as a developer/integrator.

To end user:
One tool, integrated Workflow

- Alarm display
- BOY Displays (Channel Access)
- Data Browser (with RDB Archive)
- Logbook (SNS Elog)

Result: