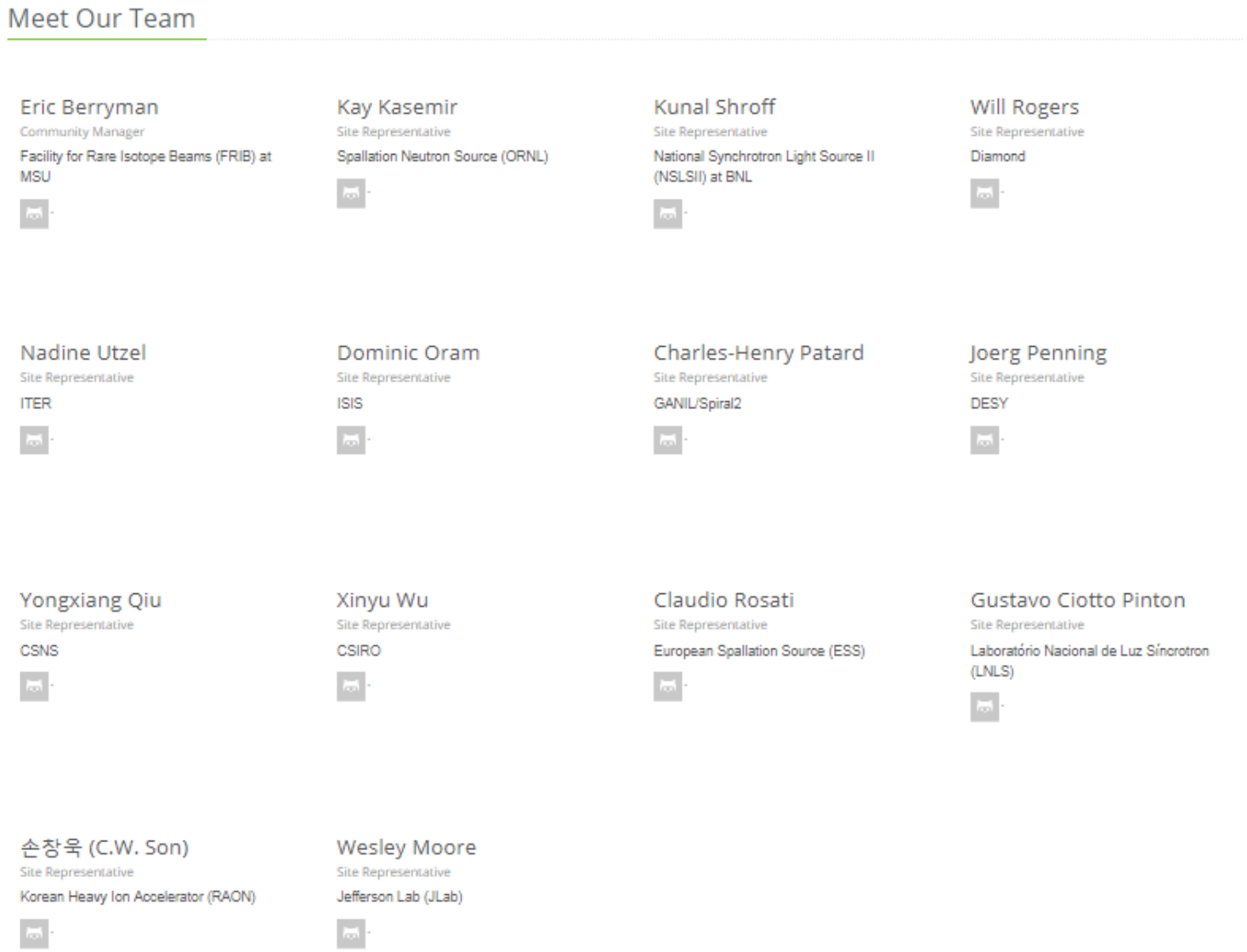
CS-Studio & Phoebus Status

control system studio

CS-Studio Collaboration

14 Sites which package site specific CS-Studio products

Additionally, many users who do not create their own products.



CS-Studio 4.6 requirements

“When it works, I like it.”

“right click -> send PV name to another plug-in saves me a lot of time”

“I like the concept of a well integrated set of tools that can share data.”

“Integration of the olog, channel navigator, and chart/archiver features are useful.”

“Everything in one place”

“Easy to create GUI's that interact with EPICS PV’s”

“When it does not work, I hate it.”

“slow, clumsy, hard to understand”

“BOY leads to crashes way too often”

“I am having real problems building our own CSS distribution starting from Eclipse Mars RC2”

“Big labs seem to have their experts but I'm under the impression that smaller labs are struggling and so am I when "my expert" is not available.”

“Spend a long time to start a product in Eclipse and Export it.”

Feedback link:

https://docs.google.com/spreadsheets/d/11_nwz0tiSJO4Zs71UI5vD-SRLrHvmd__NjbFEzk_6js/edit#gid=0

CS-Studio 4.6

Summer 2019

Upgrades to the underlying infrastructure

- OpenJDK 11.0.2
- OpenJfx
- Eclipse 2018-12

Phoebus framework

- Development of phoebus services and new core modules
- phoebus & eclipse integrations

New Application features and Bug fixes

“Phoebus”

- Phoebus (Greek for “bright”)
  As we step out of the shadow of

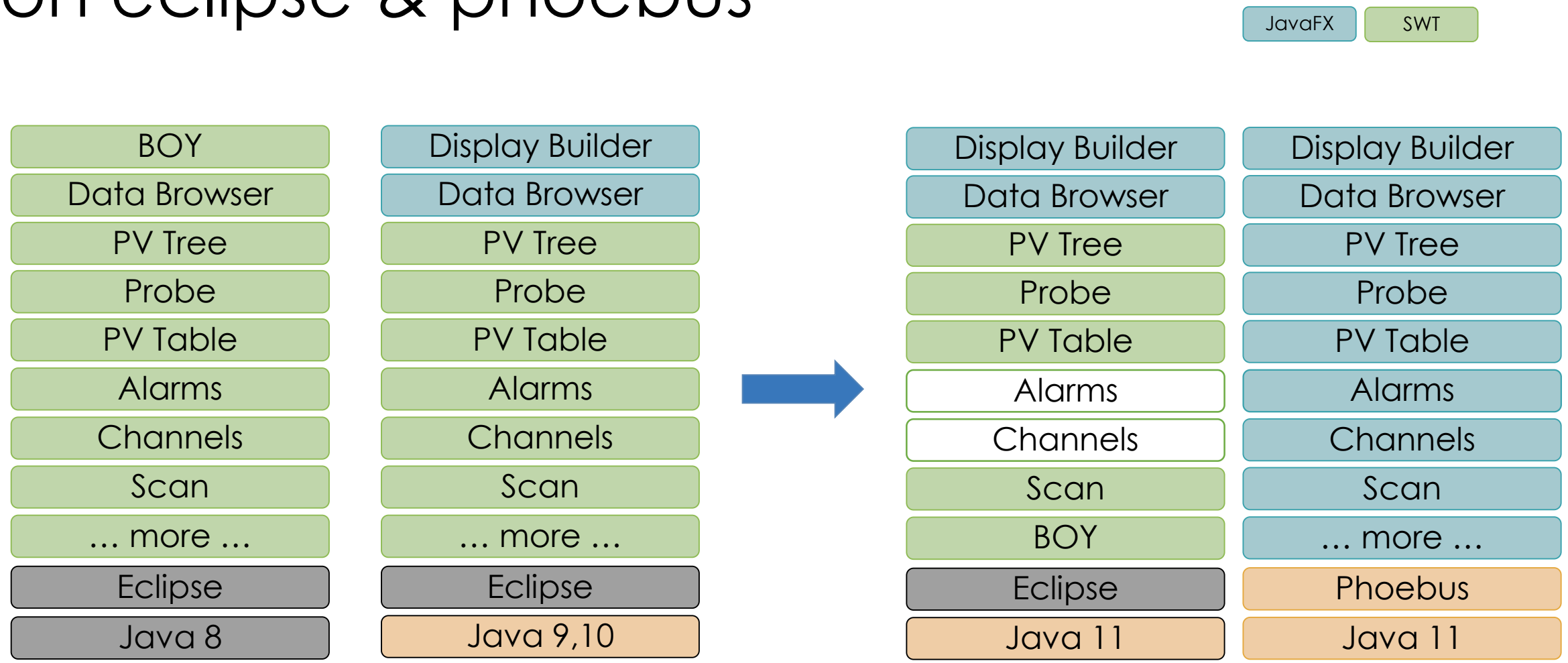
To improve user experience

- A framework for well integrated control system tools and software

To reduce the barrier of entry for new developers

- A simple Build
- A development environment that is easy to setup and use
- Use generic tools and technologies available as part of the java ecosystem

June 2019: CS-Studio on eclipse & phoebus



Fast & Simple Build

 # clone the sources
git clone https://github.com/shroffk/phoebus.git

 # build using maven
mvn clean install

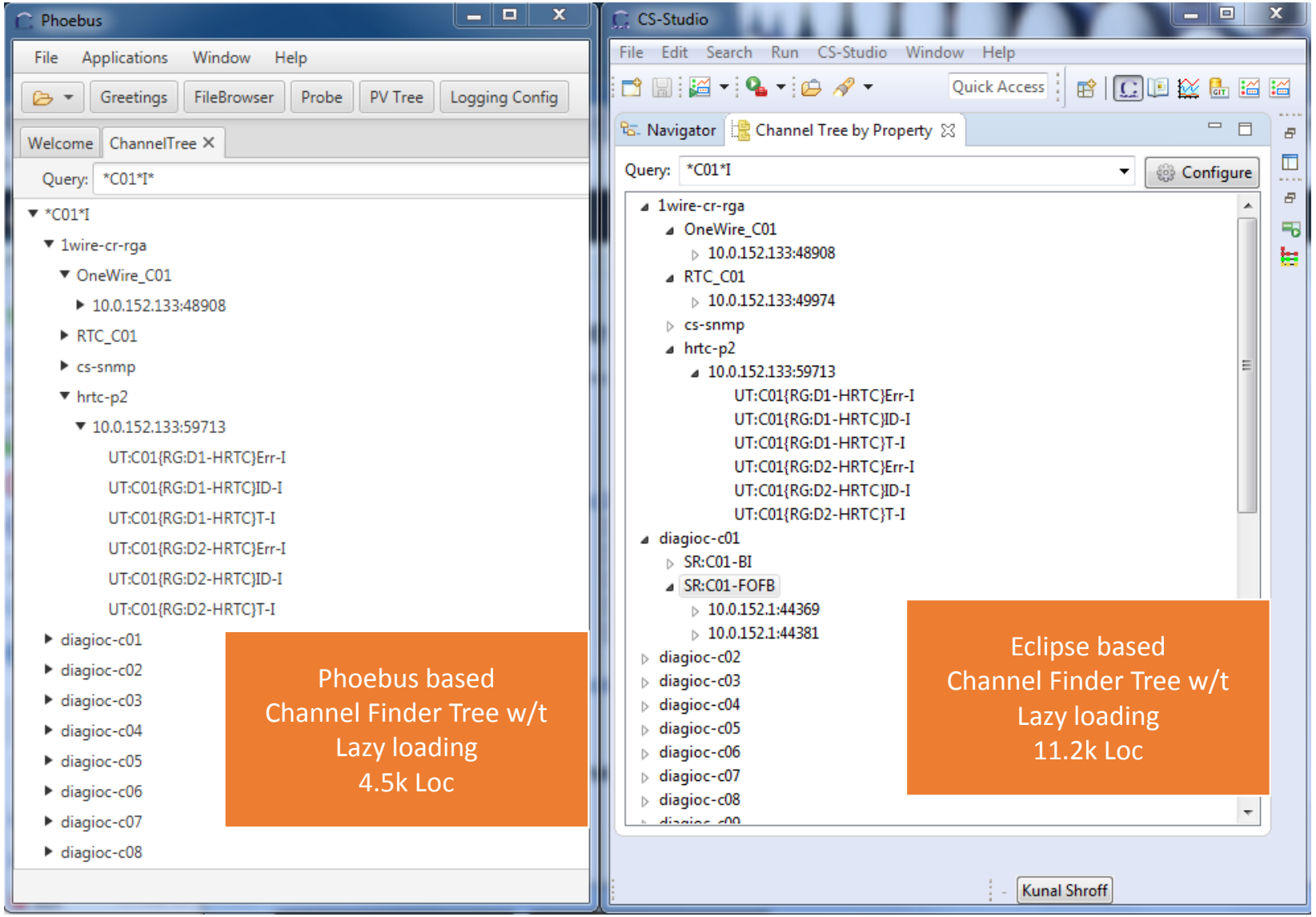
 # or build using ant
ant clean run

Eclipse build: 30+ mins

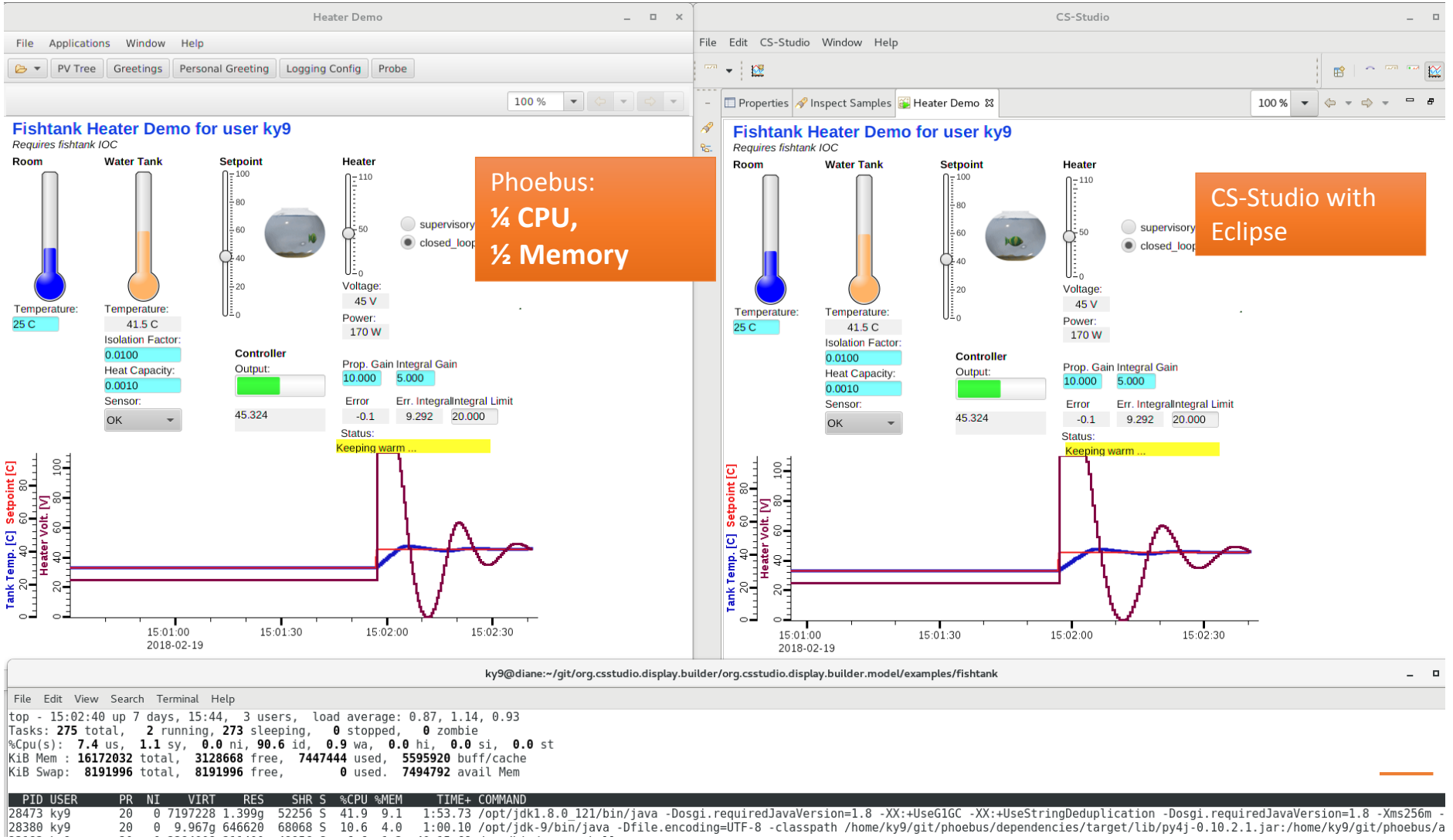
Phoebus build: ~3 mins

```
[INFO] app-channel-channelFinder ......................... SUCCESS [  0.577 s]
[INFO] app-channel-utility ............................... SUCCESS [  1.012 s]
[INFO] app-channel-views ................................. SUCCESS [  1.335 s]
[INFO] app-perfmon ....................................... SUCCESS [  0.542 s]
[INFO] app-pace .......................................... SUCCESS [  0.948 s]
[INFO] product ........................................... SUCCESS [  7.139 s]
[INFO] services .......................................... SUCCESS [  0.010 s]
[INFO] service-alarm-server .............................. SUCCESS [  2.052 s]
[INFO] service-archive-engine ............................ SUCCESS [  2.443 s]
[INFO] service-scan-server ............................... SUCCESS [  3.203 s]
[INFO] service-alarm-logger .............................. SUCCESS [  5.802 s]
[INFO] service-alarm-config-logger 0.0.1-SNAPSHOT ........ SUCCESS [  1.100 s]
[INFO] ------------------------------------------------------------------------
[INFO] BUILD SUCCESS
[INFO] ------------------------------------------------------------------------
[INFO] Total time: 01:41 min
[INFO] Finished at: 2019-06-04T05:35:57-04:00
[INFO] ------------------------------------------------------------------------
```

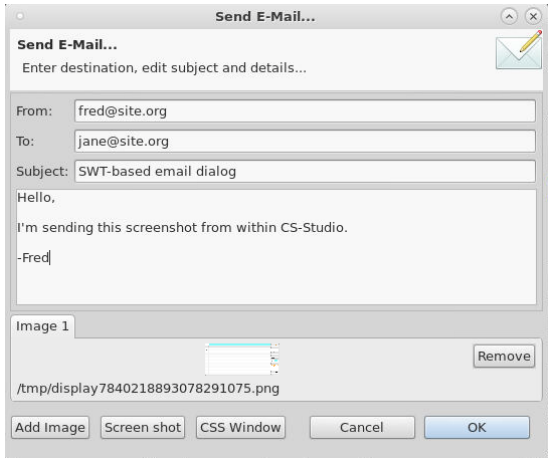
Less code


Phoebus
File Applications Window Help
Greetings FileBrowser Probe PV Tree Logging Config
Welcome ChannelTree
Query: *C01*I*
*C01*I
1wire-cr-rga
OneWire_C01
10.0.152.133:48908
RTC_C01
cs-snmp
hrtc-p2
10.0.152.133:59713
UT:C01{RG:D1-HRTC}Err-I
UT:C01{RG:D1-HRTC}ID-I
UT:C01{RG:D1-HRTC}T-I
UT:C01{RG:D2-HRTC}Err-I
UT:C01{RG:D2-HRTC}ID-I
UT:C01{RG:D2-HRTC}T-I
diagioc-c01
diagioc-c02
diagioc-c03
diagioc-c04
diagioc-c05
diagioc-c06
diagioc-c07
diagioc-c08
Phoebus based
Channel Finder Tree w/t
Lazy loading
4.5k Loc
CS-Studio
File Edit Search Run CS-Studio Window Help
Quick Access
Navigator
Channel Tree by Property
Query: *C01*I
Configure
1wire-cr-rga
OneWire_C01
10.0.152.133:48908
RTC_C01
10.0.152.133:49974
cs-snmp
hrtc-p2
10.0.152.133:59713
UT:C01{RG:D1-HRTC}Err-I
UT:C01{RG:D1-HRTC}ID-I
UT:C01{RG:D1-HRTC}T-I
UT:C01{RG:D2-HRTC}Err-I
UT:C01{RG:D2-HRTC}ID-I
UT:C01{RG:D2-HRTC}T-I
diagioc-c01
SR:C01-BI
SR:C01-FOFB
10.0.152.1:44369
10.0.152.1:44381
diagioc-c02
diagioc-c03
diagioc-c04
diagioc-c05
diagioc-c06
diagioc-c07
diagioc-c08
Eclipse based
Channel Finder Tree w/t
Lazy loading
11.2k Loc
Kunal Shroff

Better Performance



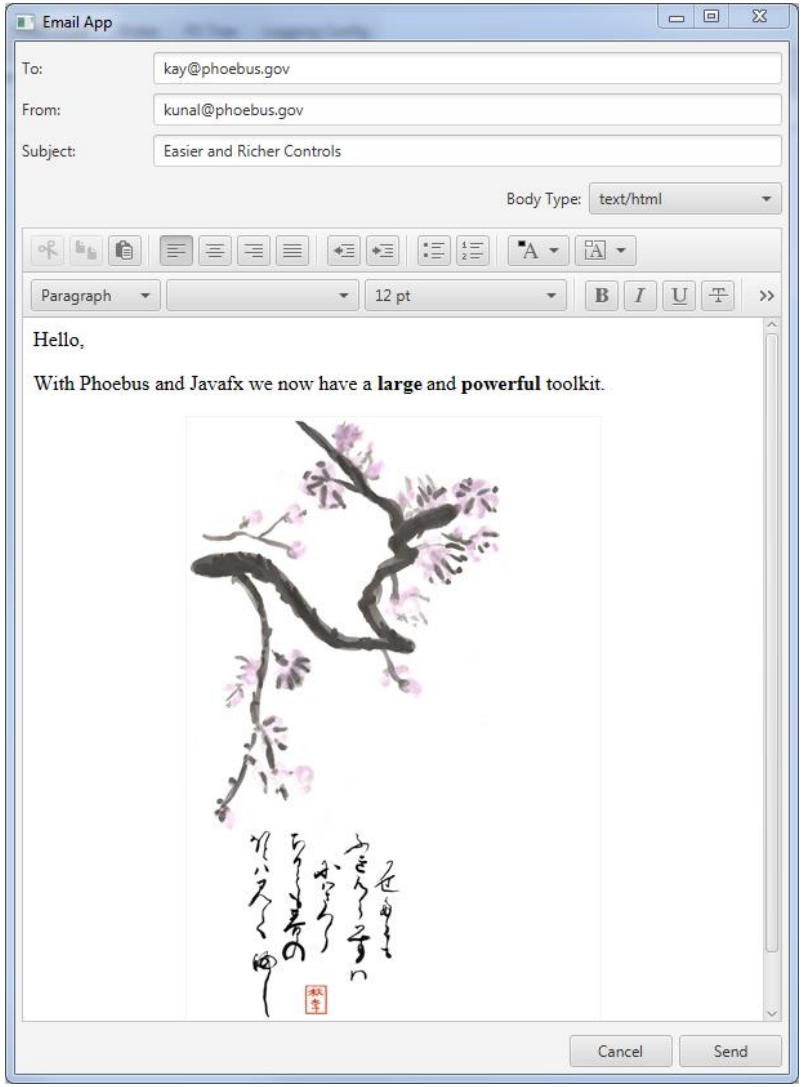
SWT vs. JavaFX



SWT used to be better than AWT

AWT/Swing caught up,
SWT now only used by Eclipse

➔ JavaFX is the latest Java-based UI



Development Activity

June 2018 to June 2019

https://github.com/ControlSystemStudio/cs-studio

- Issues 116 closed and 42 opened

https://github.com/shroffk/phoebus

- Issues 476 closed and 30 opened

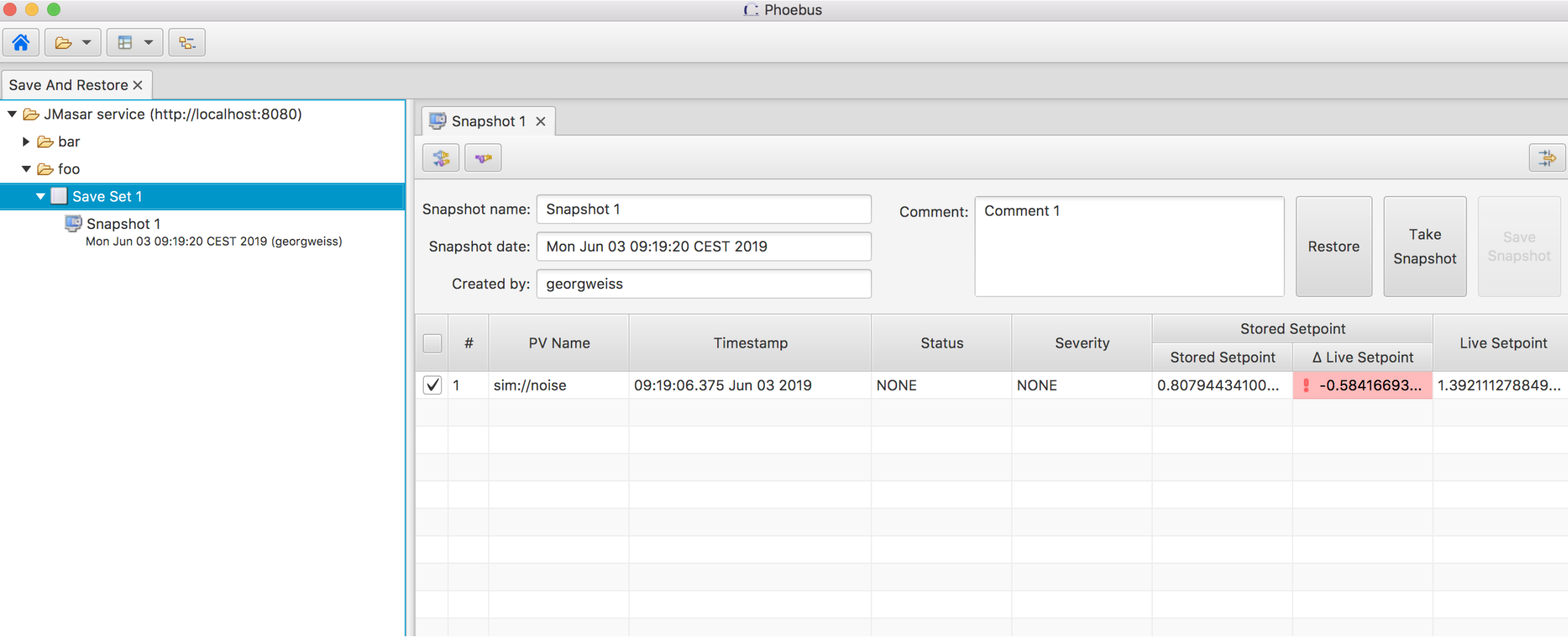
ITER

CAS
CSS
CODAC
CIS
Compressed Air
Helium Gas
Demineralized Water
Nitrogen Gas
Pulse ID 1289
SUP ###
ITER TOKAMAK MACHINE OVERVIEW
2016/02/04 15:30:50
Description
Legend
Invalid alarm state
Major alarm state
Minor alarm state
On - running state
OFF - stopped state
Flow
No Flow
HOME

European Spallation Source (ESS)

- Display Builder is the preferred OPI tool at ESS with existing BOY screens imported or manually upgraded.
- Display Builder essentially JavaFX-based.
  - Integration with SWT-based application like eclipse cs-studio has unwanted side effects.
- ESS will gradually migrate to Phoebus-based CS Studio applications, strong focus on Display Builder (edit mode and runtime).
  - Key driving factor is improved performance in Phoebus-based CS Studio applications.
- Current work includes migration of save-and-restore application to Phoebus
  - UI in Phoebus is a port of current save-and-restore in CS Studio, with some improvements and bug fixes. Adding a new Phoebus-based application is very easy.

save set application



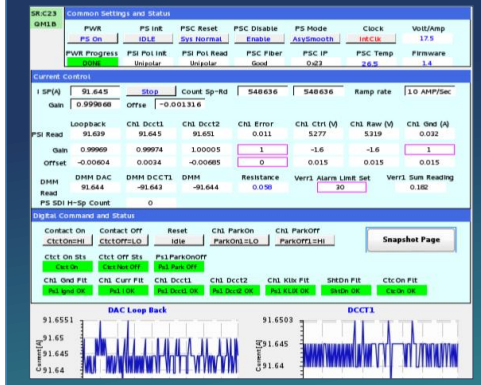
NSLS II

Engineering Controls

- Created by controls engineers, each working on a specific system

LN RF

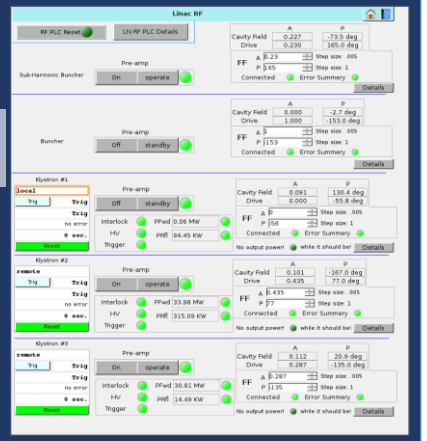
SR PS



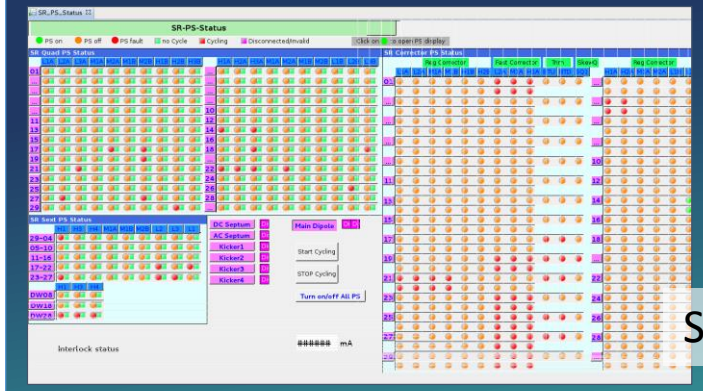
Physics Pages

- Designed by a small number of people, prior to commissioning

LN RF



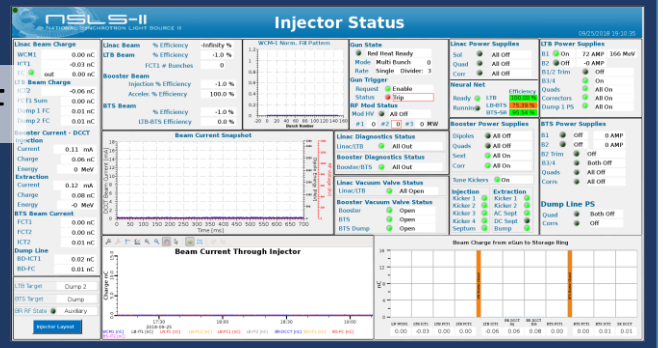
SR PS



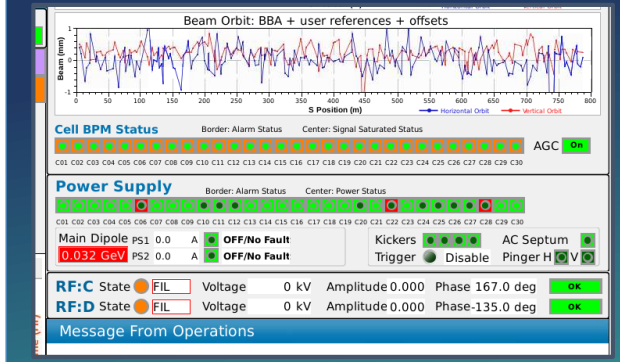
Operations Controls

- Created by ‘operations controls’ (former operators) and current operators

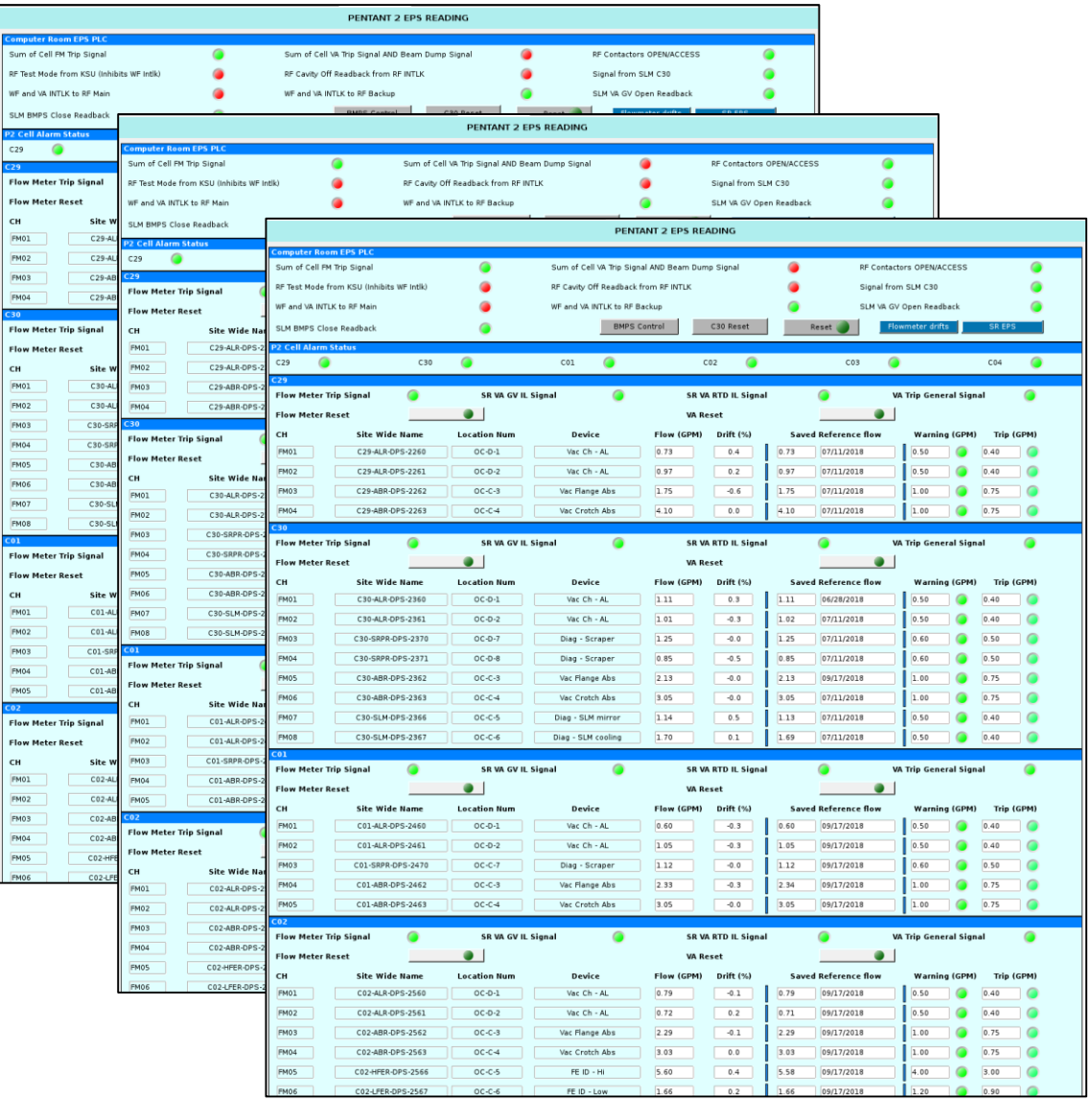
LN RF

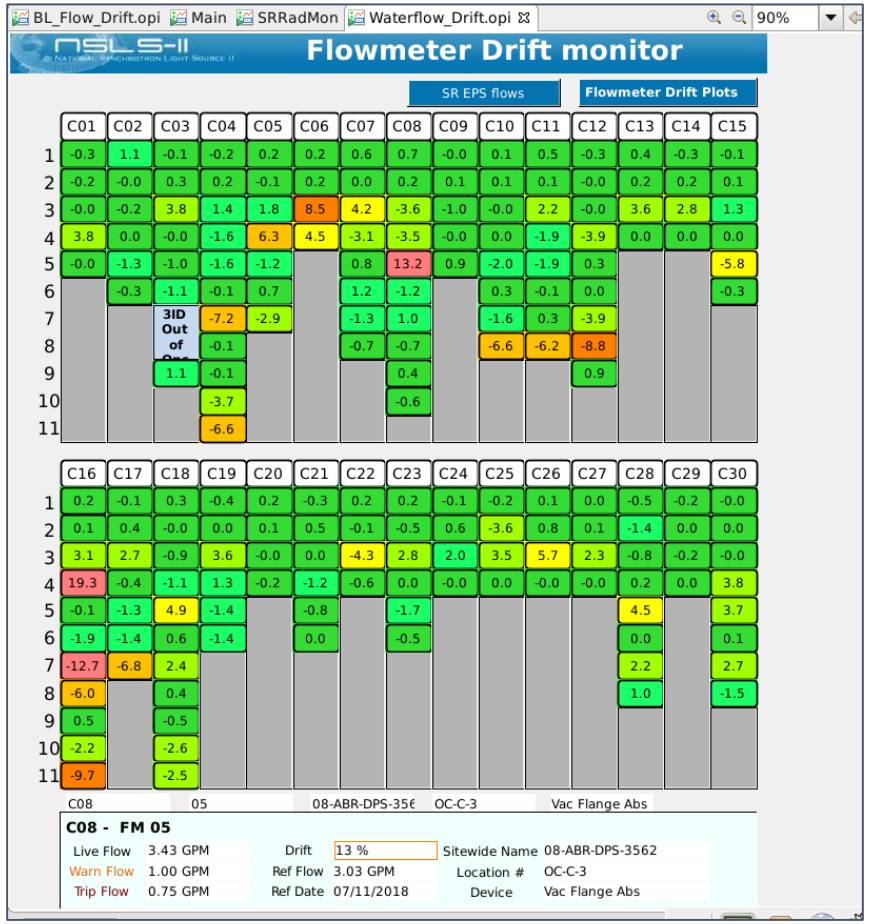


SR PS



NSLS II


PENTANT 2 EPS READING
Computer Room EPS PLC
Sum of Cell FM Trip Signal
Sum of Cell VA Trip Signal AND Beam Dump Signal
RF Contactors OPEN/ACCESS
RF Test Mode from KSU (Inhibits WF Intlk)
RF Cavity Off Readback from RF INTLK
Signal from SLM C30
WF and VA INTLK to RF Main
WF and VA INTLK to RF Backup
SLM VA GV Open Readback
SLM BMPS Close Readback
BMPS Control
C30 Reset
Reset
Flowmeter drifts
SR EPS
P2 Cell Alarm Status
C29
C30
C01
C02
C03
C04
Flow Meter Trip Signal
Flow Meter Reset
SR VA GV IL Signal
SR VA RTD IL Signal
VA Trip General Signal
VA Reset
CH
Site Wide Name
Location Num
Device
Flow (GPM)
Drift (%)
Saved Reference flow
Warning (GPM)
Trip (GPM)


BL_Flow_Drift.opi
Main
SRRadMon
Waterflow_Drift.opi
90%
Flowmeter Drift monitor
SR EPS flows
Flowmeter Drift Plots
C01 C02 C03 C04 C05 C06 C07 C08 C09 C10 C11 C12 C13 C14 C15
1 -0.3 1.1 -0.1 -0.2 0.2 0.2 0.6 0.7 -0.0 0.1 0.5 -0.3 0.4 -0.3 -0.1
2 -0.2 -0.0 0.3 0.2 -0.1 0.2 0.0 0.2 0.1 0.1 0.1 -0.0 0.2 0.2 0.1
3 -0.0 -0.2 3.8 1.4 1.8 8.5 4.2 -3.6 -1.0 -0.0 2.2 -0.0 3.6 2.8 1.3
4 3.8 0.0 -0.0 -1.6 6.3 4.5 -3.1 -3.5 -0.0 0.0 -1.9 -3.9 0.0 0.0 0.0
5 -0.0 -1.3 -1.0 -1.6 -1.2 0.8 13.2 0.9 -2.0 -1.9 0.3 -5.8
6 -0.3 -1.1 -0.1 0.7 1.2 -1.2 0.3 -0.1 0.0 -0.3
7 3ID Out of -7.2 -2.9 -1.3 1.0 -1.6 0.3 -3.9
8 -0.1 -0.7 -0.7 -6.6 -6.2 -8.8
9 1.1 -0.1 0.4 0.9
10 -3.7 -0.6
11 -6.6
C16 C17 C18 C19 C20 C21 C22 C23 C24 C25 C26 C27 C28 C29 C30
1 0.2 -0.1 0.3 -0.4 0.2 -0.3 0.2 0.2 -0.1 -0.2 0.1 0.0 -0.5 -0.2 -0.0
2 0.1 0.4 -0.0 0.0 0.1 0.5 -0.1 -0.5 0.6 -3.6 0.8 0.1 -1.4 0.0 0.0
3 3.1 2.7 -0.9 3.6 -0.0 0.0 -4.3 2.8 2.0 3.5 5.7 2.3 -0.8 -0.2 -0.0
4 19.3 -0.4 -1.1 1.3 -0.2 -1.2 -0.6 0.0 -0.0 0.0 -0.0 -0.0 0.2 0.0 3.8
5 -0.1 -1.3 4.9 -1.4 -0.8 -1.7 4.5 3.7
6 -1.9 -1.4 0.6 -1.4 0.0 -0.5 0.0 0.1
7 -12.7 -6.8 2.4 2.2 2.7
8 -6.0 0.4 1.0 -1.5
9 0.5 -0.5
10 -2.2 -2.6
11 -9.7 -2.5
C08 05 08-ABR-DPS-35€ OC-C-3 Vac Flange Abs
C08 - FM 05
Live Flow 3.43 GPM
Warn Flow 1.00 GPM
Trip Flow 0.75 GPM
Drift 13 %
Ref Flow 3.03 GPM
Ref Date 07/11/2018
Sitewide Name 08-ABR-DPS-3562
Location # OC-C-3
Device Vac Flange Abs

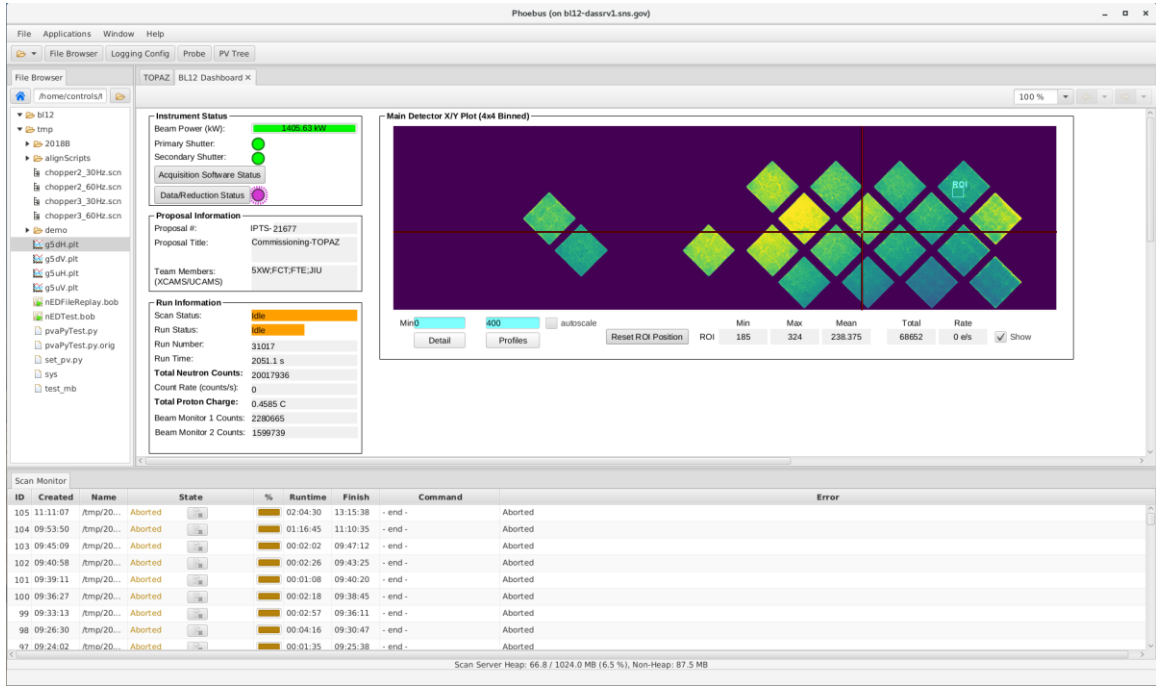
ORNL

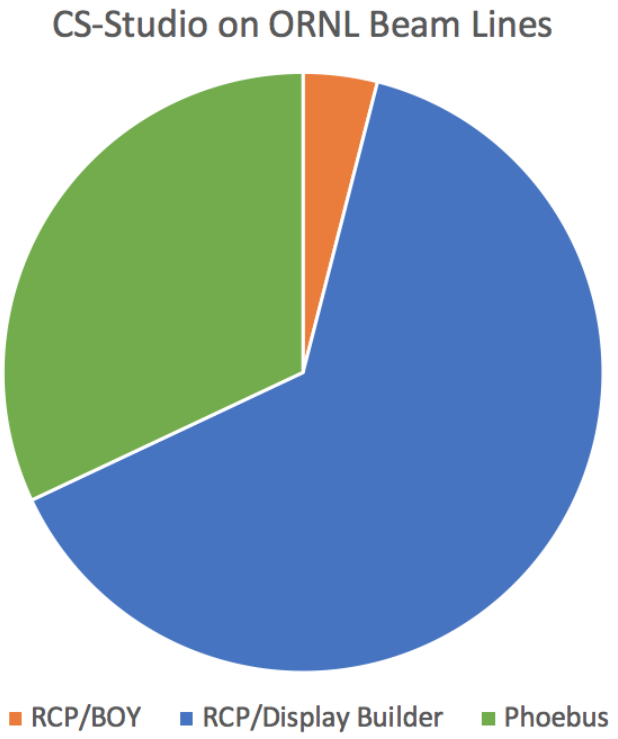
SNS Accelerator

- RCP CS-Studio on 32 bit Linux for alarms & archive access (Displays: EDM)

SNS & HFIR Beamlines

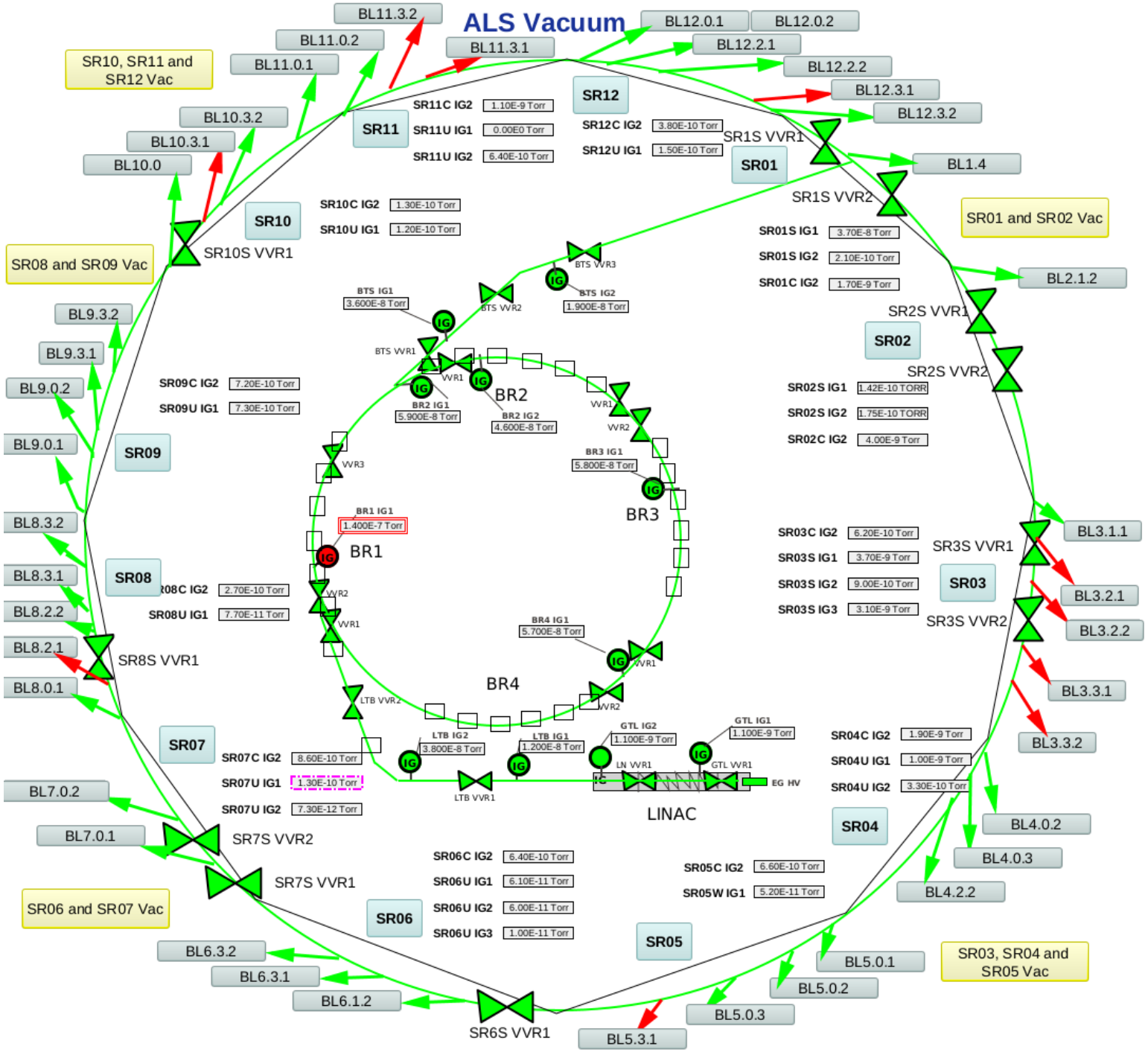
- 21 Beam lines on CS-Studio for displays, archive, alarms, automation



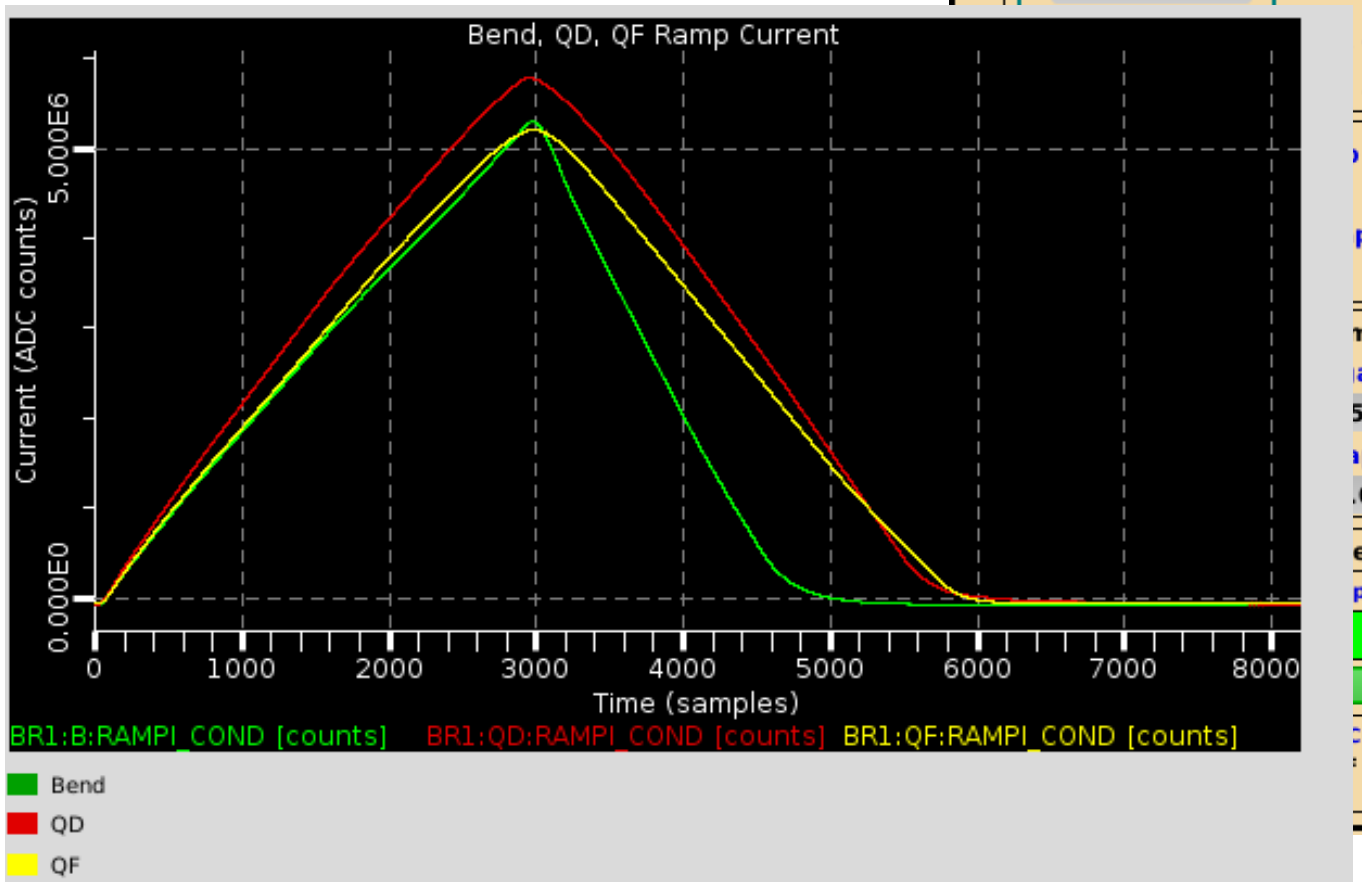


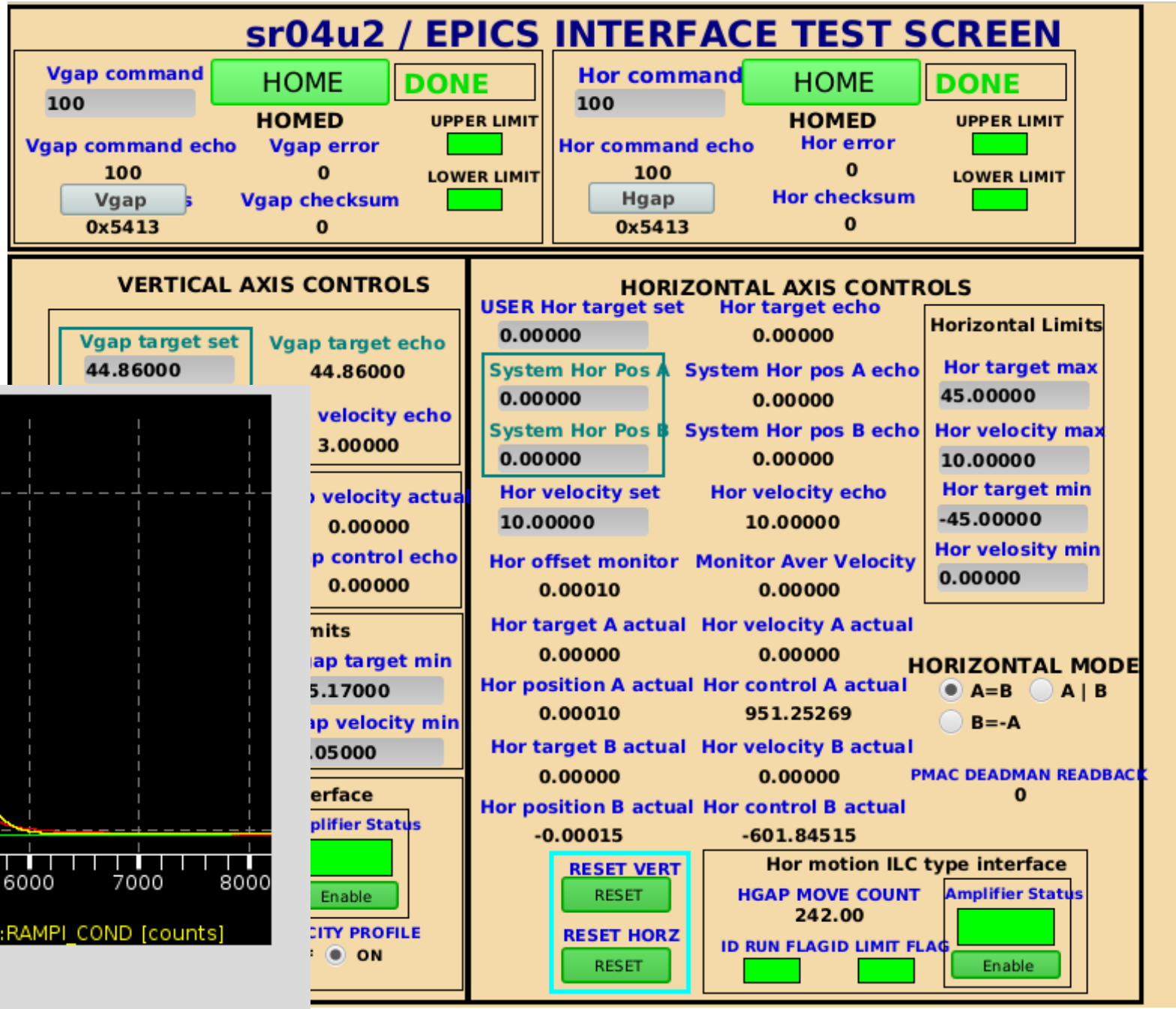
ALS at LBL

- Building an ALS phoebus product
- Converting edm screens and created new opi screens using phoebus



ALS at LBL


Bend, QD, QF Ramp Current
Current (ADC counts)
5.000E6
0.000E0
0
1000
2000
3000
4000
5000
6000
7000
8000
Time (samples)
BR1:B:RAMPI_COND [counts]
BR1:QD:RAMPI_COND [counts]
BR1:QF:RAMPI_COND [counts]
Bend
QD
QF


sr04u2 / EPICS INTERFACE TEST SCREEN
Vgap command
100
HOME
DONE
HOMED
UPPER LIMIT
LOWER LIMIT
Vgap command echo
100
Vgap error
0
Vgap checksum
0
Vgap
0x5413
Hor command
100
HOME
DONE
HOMED
UPPER LIMIT
LOWER LIMIT
Hor command echo
100
Hor error
0
Hor checksum
0
Hgap
0x5413
VERTICAL AXIS CONTROLS
Vgap target set
44.86000
Vgap target echo
44.86000
velocity echo
3.00000
velocity actua
0.00000
p control echo
0.00000
nits
ap target min
5.17000
ap velocity min
.05000
erface
plifier Status
Enable
CITY PROFILE
ON
HORIZONTAL AXIS CONTROLS
USER Hor target set
0.00000
Hor target echo
0.00000
System Hor Pos A
0.00000
System Hor pos A echo
0.00000
System Hor Pos B
0.00000
System Hor pos B echo
0.00000
Hor velocity set
10.00000
Hor velocity echo
10.00000
Horizontal Limits
Hor target max
45.00000
Hor velocity max
10.00000
Hor target min
-45.00000
Hor velosity min
0.00000
Hor offset monitor
0.00010
Monitor Aver Velocity
0.00000
Hor target A actual
0.00000
Hor velocity A actual
0.00000
HORIZONTAL MODE
A=B
A | B
B=-A
Hor position A actual
0.00010
Hor control A actual
951.25269
Hor target B actual
0.00000
Hor velocity B actual
0.00000
PMAC DEADMAN READBACK
0
Hor position B actual
-0.00015
Hor control B actual
-601.84515
RESET VERT
RESET
RESET HORZ
RESET
Hor motion ILC type interface
HGAP MOVE COUNT
242.00
Amplifier Status
ID RUN FLAGID LIMIT FLAG
Enable

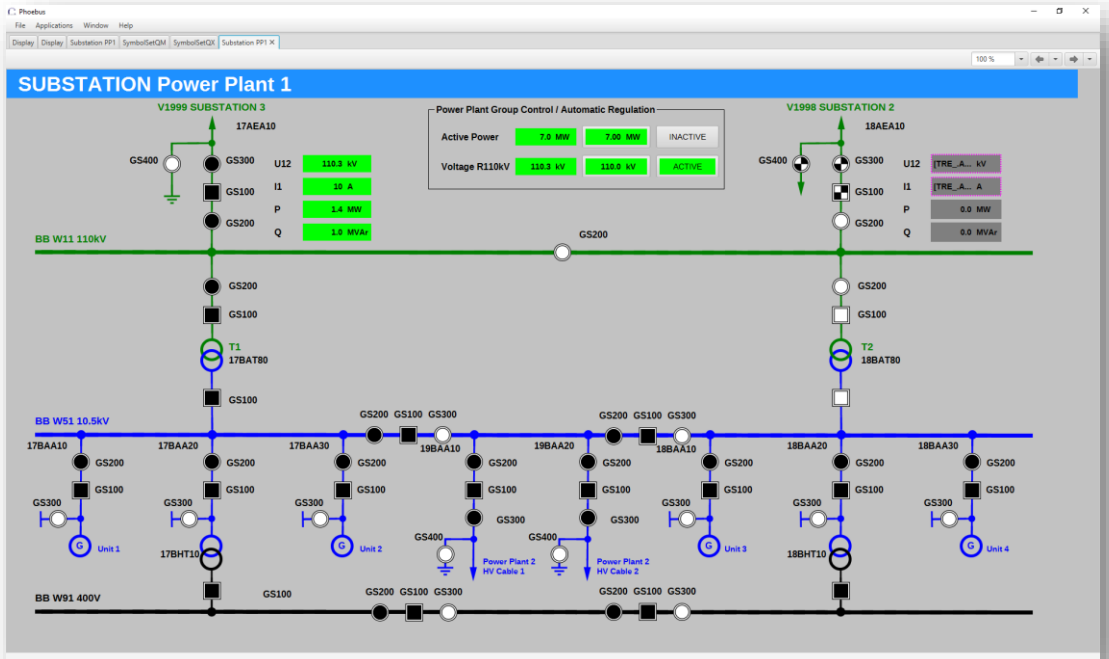
Phoebus beyond EPICS

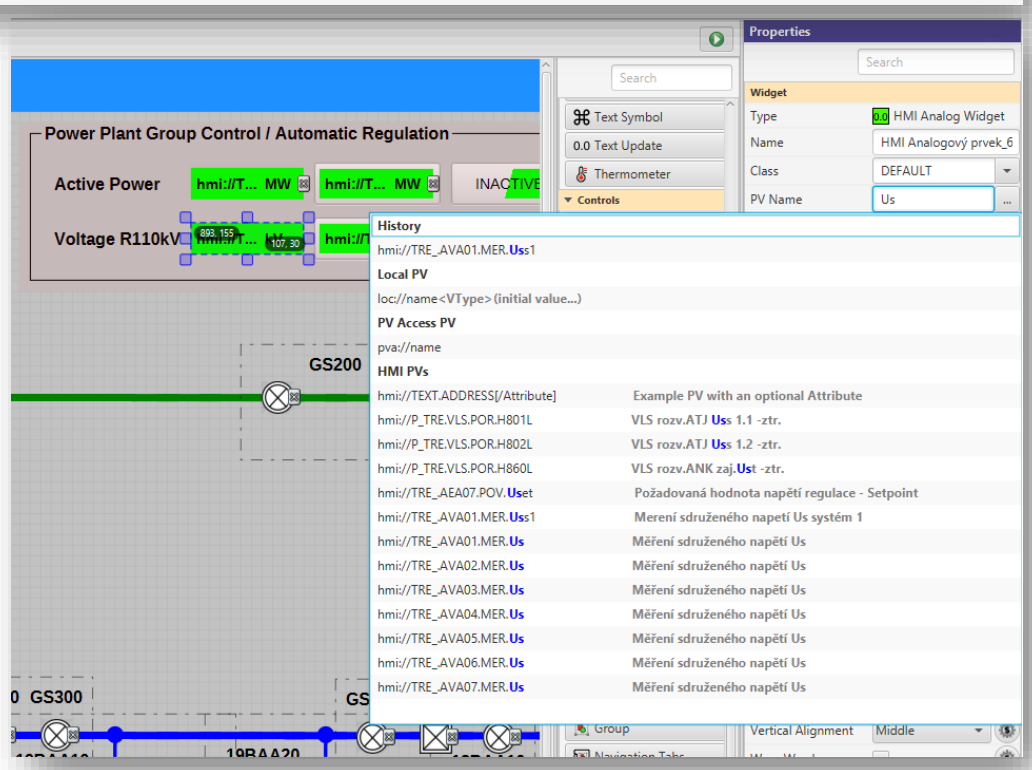
- Builds on MQTT support
- Custom Additions:
  - PV Name Completion
  - Context menu entries
  - Widgets

- Contributed numerous bug fixes to common repository!

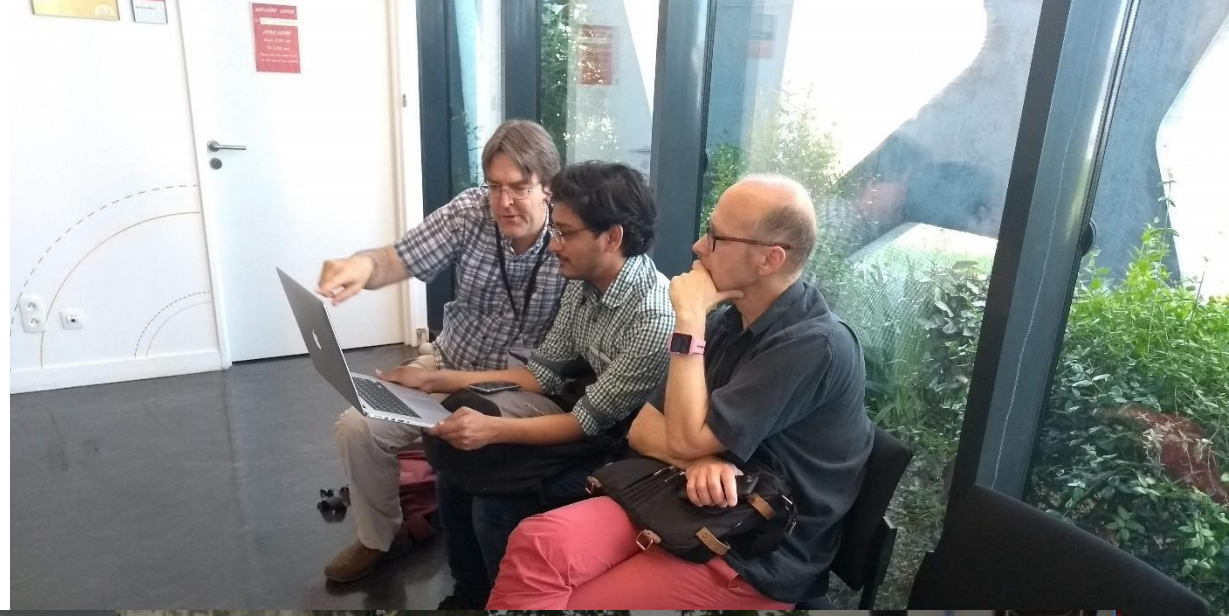
Status: Evaluating, ~10 000 PVs

Pavel Charvat,
https://sourceforge.net/u/pavel-ch/profile/
https://github.com/pavel-ch





CS-Studio Developers meeting Aix-en-provence 2019



- Meeting Highlights
  - *UI testing using Testfx*
  - *Java modules*
  - *Cs-studio product packaging*
    - embedded jdk
    - eclipse + phoebus applications
  - *EPICS 7 support*
    - handling structured data
    - epicsJava libraries
- Meeting Minutes :
  https://docs.google.com/document/d/1lyfA1ZaLIxfFpJ972TTl_2r_n4--V7tJuzLhp53ZOOg/edit#heading=h.7jjdypgltu4f

C-Studio using Eclipse & Phoebus

Minimize the disruption

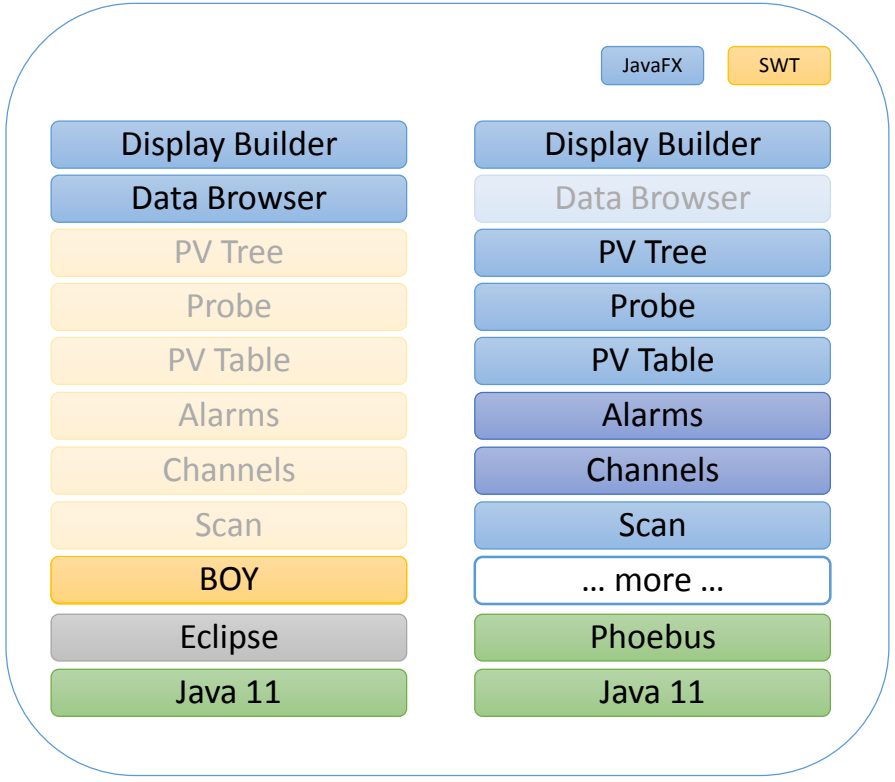
- The migration from eclipse to Phoebus will be a multi year process
  - Each application will be migrated individually.
  - Both the eclipse and phoebus based applications will be supported by the cs-studio community.
  - Each site will have the flexibility to define their time lines

Moving from Eclipse to Phoebus

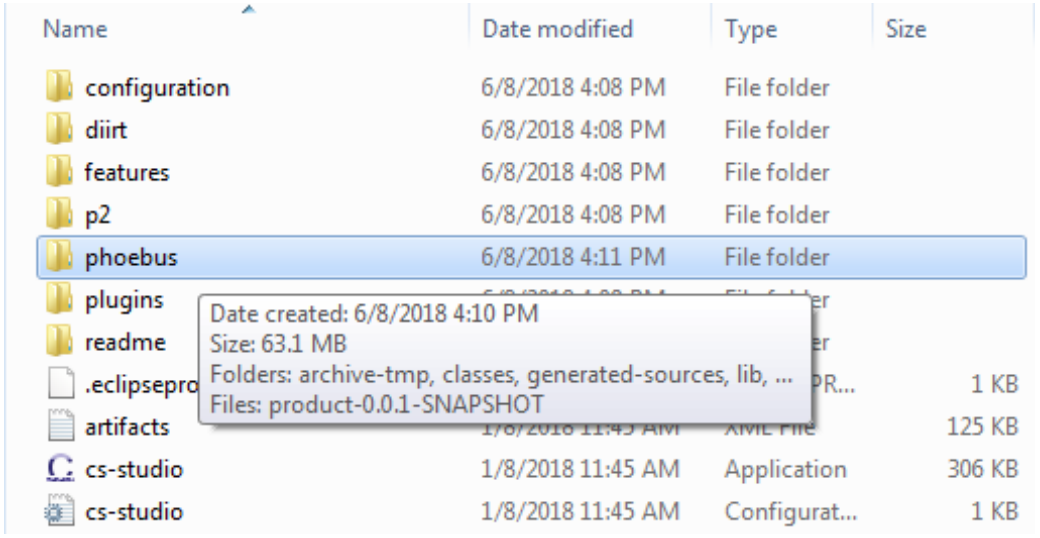
A easy transition

The Phoebus applications can be packaged with the existing eclipse applications into a single CS-Studio product

Developers can package the appropriate versions of each application to satisfy their site needs



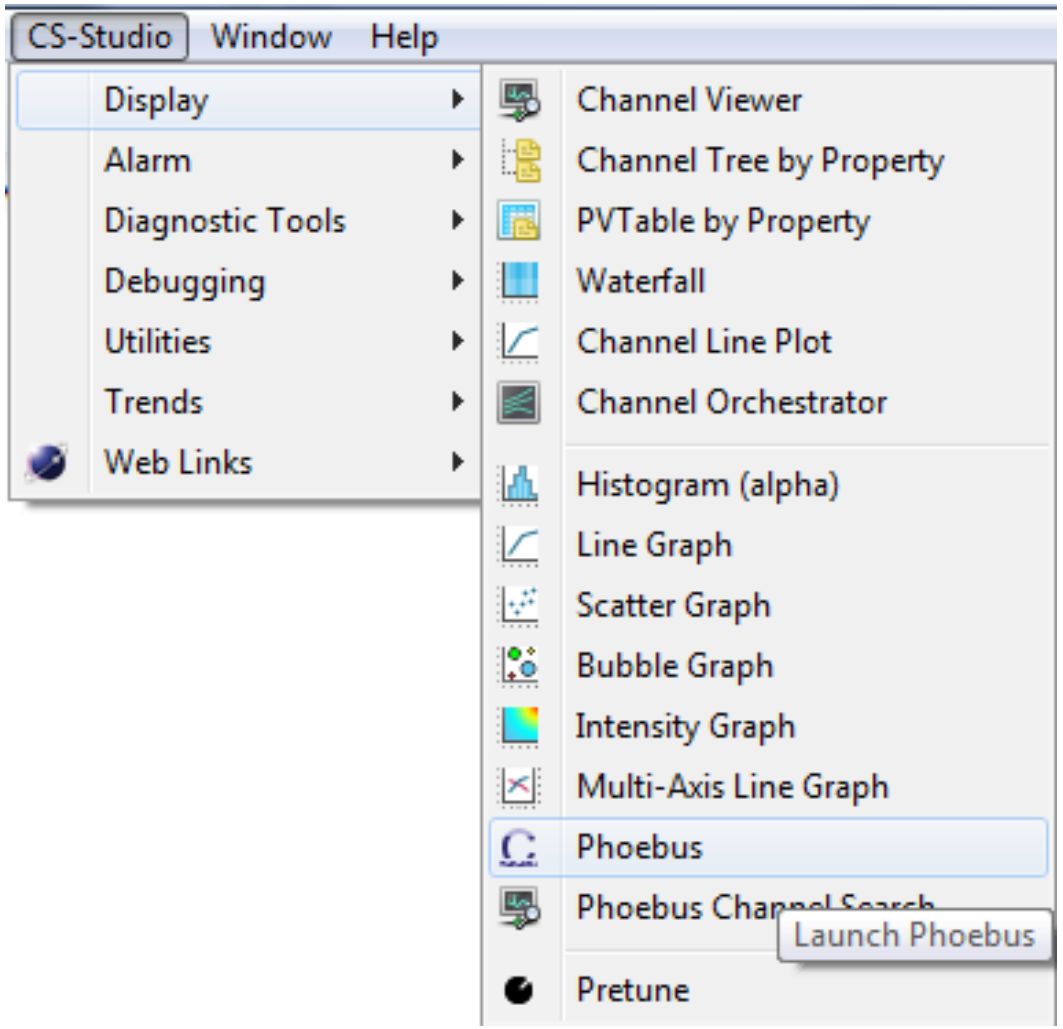
Composite Product CS-Studio 4.6



Phoebus Integration
in
Existing eclipse products

Launch various phoebus applications via

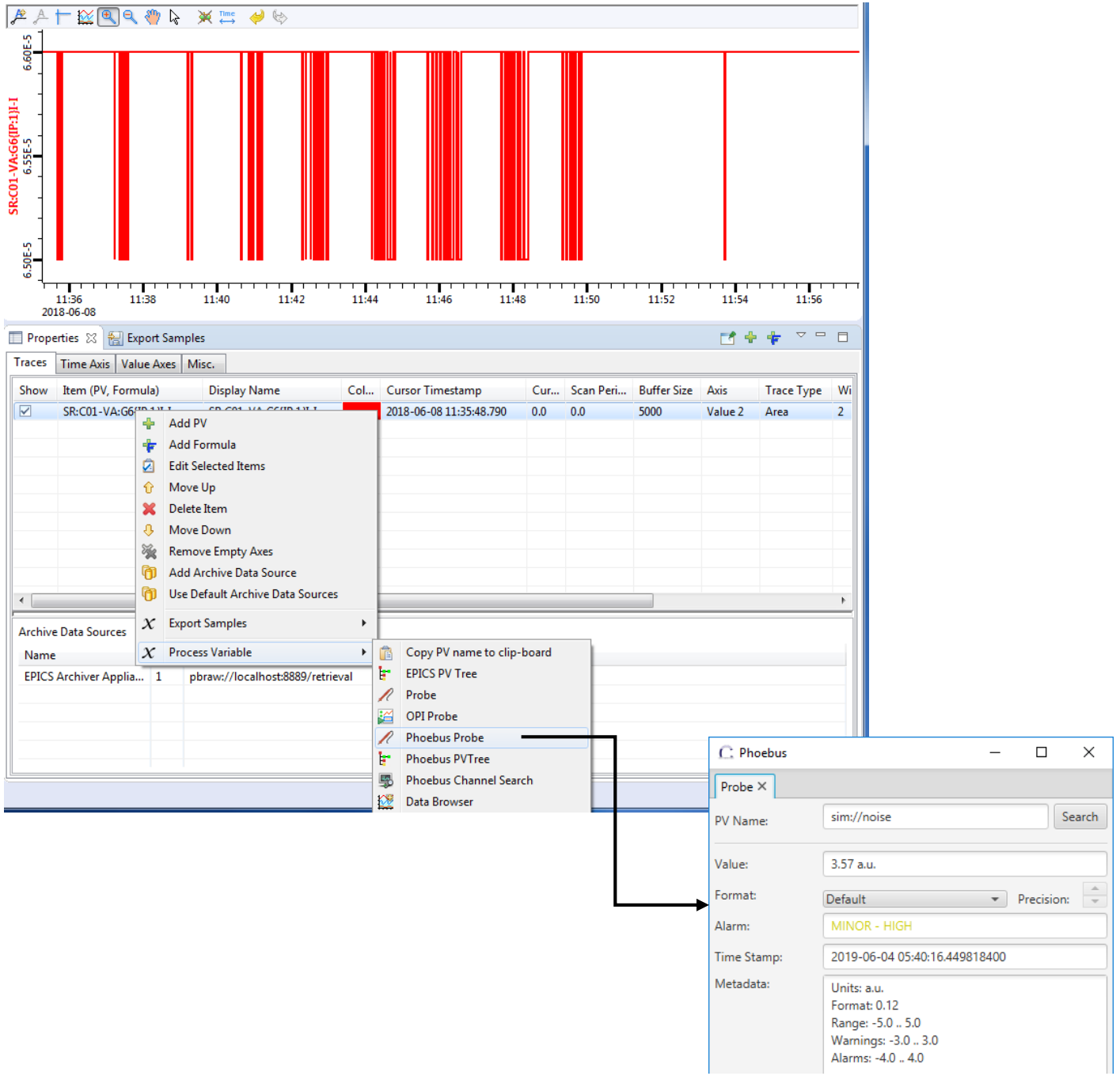
CS-Studio menu or toolbar actions



Phoebus Integration in Existing eclipse products

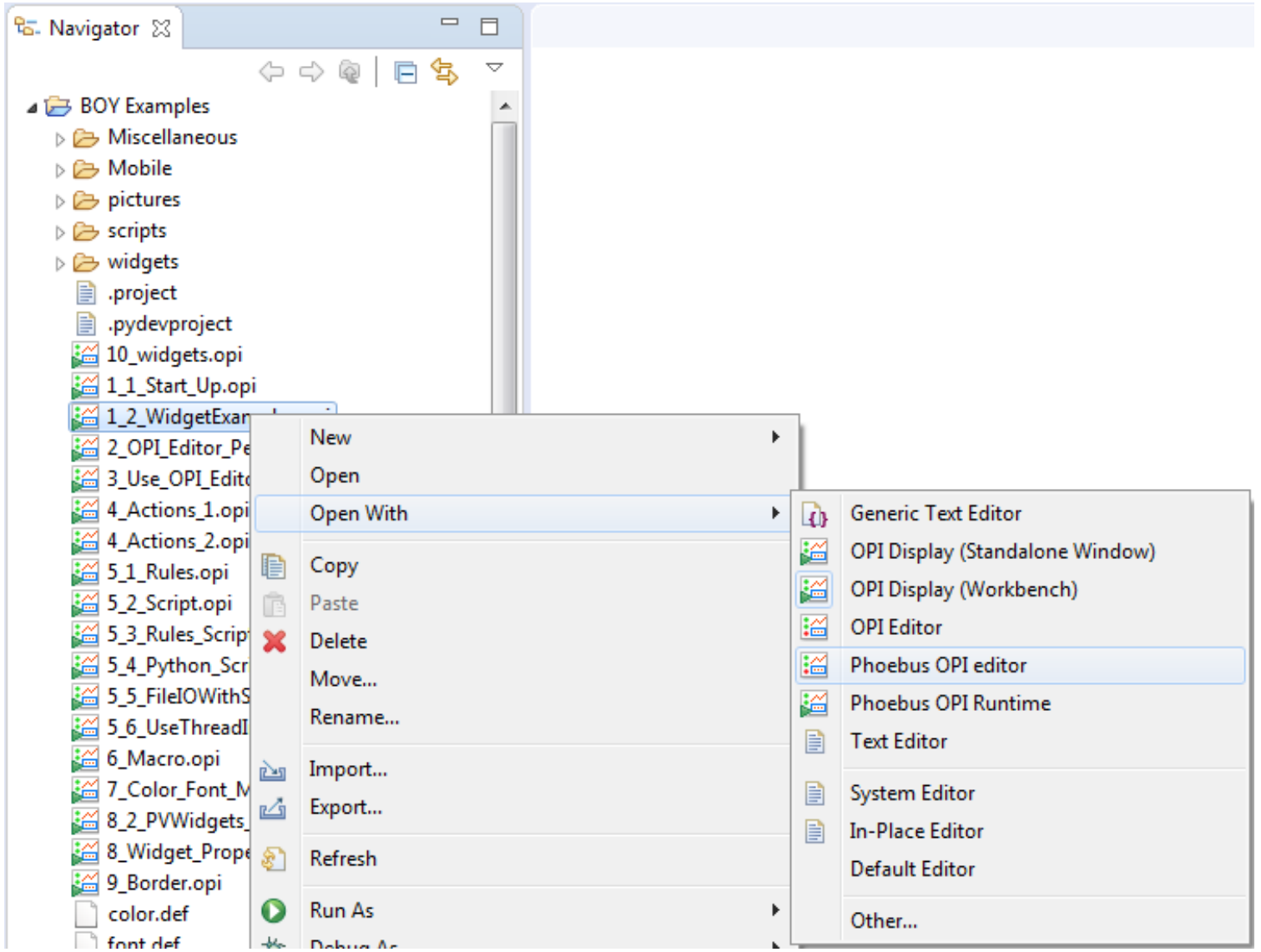
Launch various phoebus applications via CS-Studio context menu

The phoebus application is launched with the selection data.



Phoebus Integration in Existing eclipse products

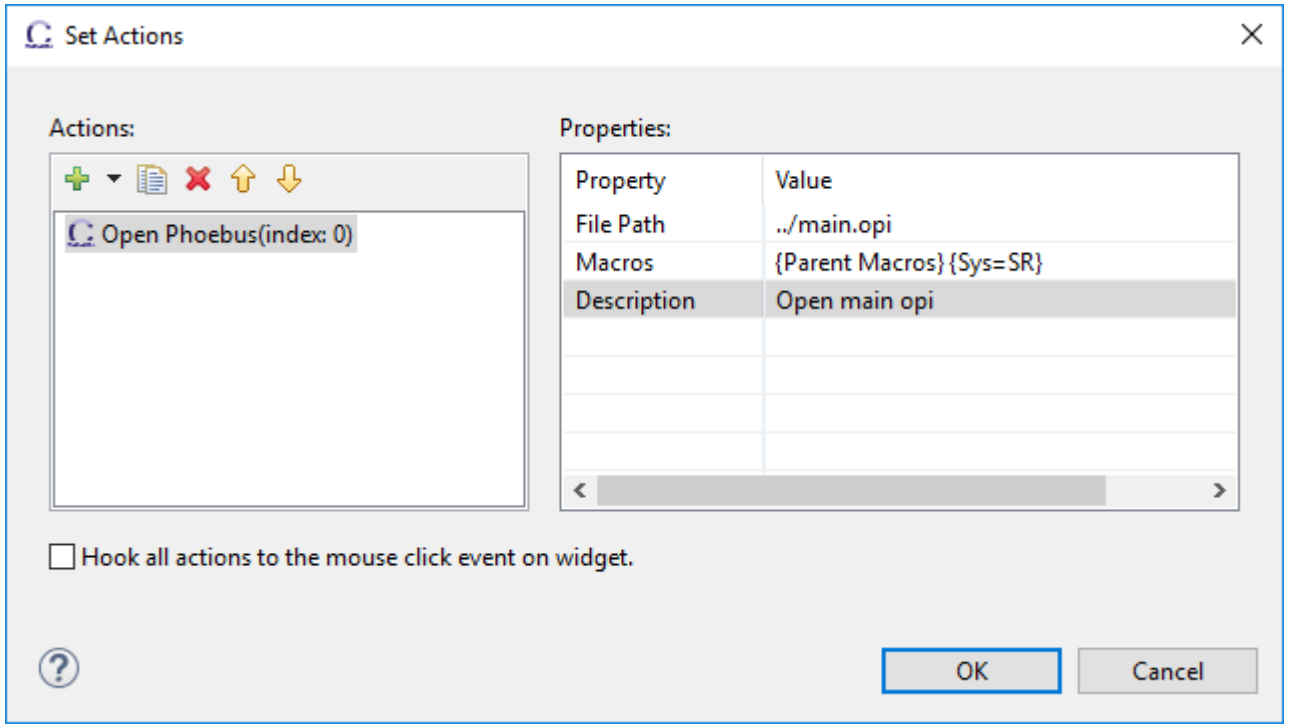
phoebus applications can be registered as the editors for cs-studio configuration files like .opi, .bob, .plt



Phoebus Integration
in
Existing eclipse products

"Open Phoebus" action

BOY actions buttons, menu buttons, other widgets can open resources in cs-studio phoebus applications.



Phoebus Integration

Under the hood

- ***org.csstudio.phoebus.integration***

A plugin which provides a service with methods for launching CS-Studio phoebus applications from inside existing CS-Studio/eclipse products

How to Contribute

- Fork us on Github
  - https://github.com/ControlSystemStudio/cs-studio
- Create Issue tickets for feature request / bugs
- Point out missing documentation

How to get free Beer

- Pick an issue/feature or make one
  - https://github.com/ControlSystemStudio/cs-studio/issues
- Create a branch in your fork with the fix or feature
- Make a Pull Request with the issue number in the title
- Attend meetings, know the release schedule, subscribe to mailing list

Attend Meetings

- We use Google Hangouts to share our progress and discuss issues
  - Meetings are posted (viewable after being added to group)
  - First Wednesday of the month (9am EST)
  - Project groups meet once a week when actively developing

Useful links

CS-Studio

- https://github.com/ControlSystemStudio/cs-studio
- https://github.com/shroffk/phoebus
- http://phoebus-doc.readthedocs.io/en/latest/

CS-Studio Phoebus Integration

- https://github.com/ControlSystemStudio/cs-studio/issues/2437

Questions?

CSS
control system studio