

# Implementing CS-Studio at ReA3

## Strategies for a successful transition at an operating facility

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### Motivation

A transition to CS-Studio as the graphical user interface tool is underway to align ReA3 human-machine interfaces (HMIs) with the FRIB style – providing operators with a consistent, integrated control system environment.

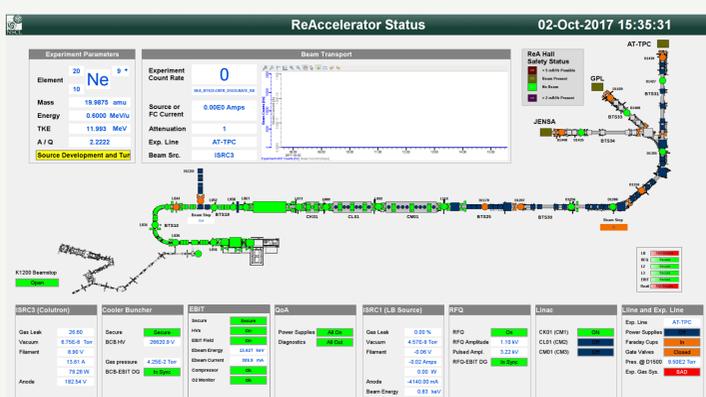
### Current Status

Over the past few years, many of ReA3's controls have been transitioned to CS-Studio. This includes operator interface pages (OPIs), live and archived data browsing, alarm handling, and save/restore functionality. The remaining interfaces are generally a mixture of local tools written in QT and Tcl/Tk.

### Strategies for overcoming the biggest challenges

There are two types of challenges in implementing new HMIs at any facility – changing the tools themselves, and changing people's behavior. Difficult at any time, this process is made more challenging due to the need to maintain an operational program with a high level of availability. Described below are four strategies to ease the transition and encourage users to want to use the new tools while minimizing disruption to operations.

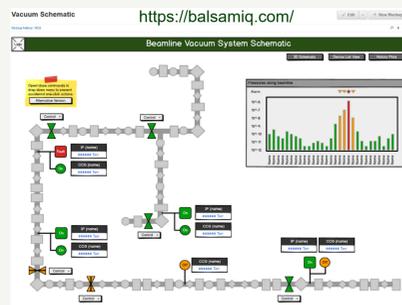
### 1. Capture interest with something new and exciting



#### Develop status pages for large-screen display TVs

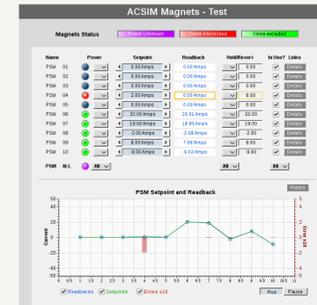
- beam information and a plot showing history of key performance data
- status of equipment and critical components
- summaries of important information for each section with focus on what's good for beam

### 3. Minimize risk with mockups and prototypes



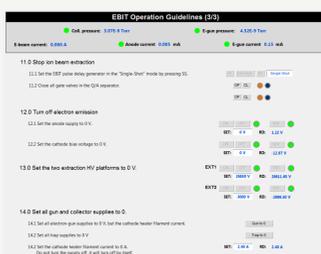
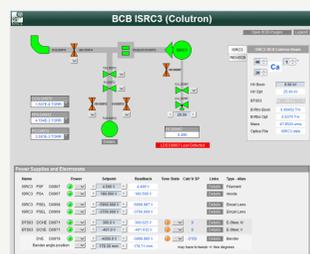
#### Create mockups

- quickly visualize layout and style
- test transitions and workflow
- get feedback early, waste less time later
- collaborate easily using online projects



#### Prototype pages

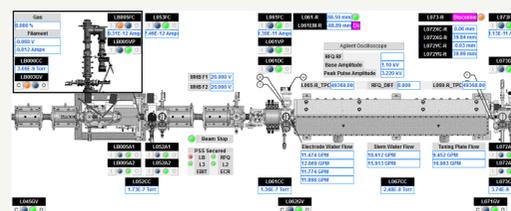
- explore design ideas with real CS-Studio pages
- simulate realistic devices in EPICS IOC
- develop status summaries and group commands
- test convenience controls, e.g. hold/revert setpoints



#### Create tailored control pages

- area overviews consolidating the most relevant information across various subsystems
- procedure walkthrough pages to guide operators through complex tasks

### 4. Reduce stress by providing a familiar experience

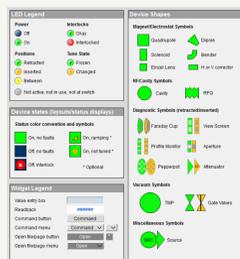


#### Create area overviews in the style of the previous tool

- reduces learning time for staff
- can migrate the style at a later time

### 2. Maintain consistency with a defined plan and style

Top-level launch/status pages	<ul style="list-style-type: none"> <li>Simple launch page</li> <li>Status page – big picture: "Is everything good for delivering beam?"</li> <li>Safety page – separate from status page to highlight important info</li> </ul>
Area/subsystem overviews	<ul style="list-style-type: none"> <li>Accelerator area pages – status/controls from various subsystems</li> <li>Subsystem pages – status/controls for devices: RF, PS, vacuum, diag</li> <li>Task pages – large or complex tasks such as injection setup</li> </ul>
Equipment/Task detail	<ul style="list-style-type: none"> <li>Details pages relating to individual devices or tasks</li> <li>Linked from area/subsystem overviews</li> <li>Used for troubleshooting or setup, operators use infrequently</li> </ul>
Detail support	<ul style="list-style-type: none"> <li>Device full details if relevant – calibration/configuration</li> <li>Made by engineers to get full details and control</li> <li>Operators typically use very infrequently or not at all</li> </ul>



#### Conventions and legend

- from official style guide

#### Overall plan for interface types and content

- Focus on first 2 levels where operators spend most time

Device Name	Value	Unit	Setpoint	Alarm	Control	Links
WEP_P1_D0851_AMPL	0.000	20.000	0.000	OK	OFF	LINK
WEP_P1_D0851_PHA	0.000	20.000	0.000	OK	OFF	LINK
WEP_P2_D0851_AMPL	0.000	20.000	0.000	OK	OFF	LINK
WEP_P2_D0851_PHA	0.000	20.000	0.000	OK	OFF	LINK
WEP_P3_D0851_AMPL	0.000	20.000	0.000	OK	OFF	LINK
WEP_P3_D0851_PHA	0.000	20.000	0.000	OK	OFF	LINK
WEP_P4_D0851_AMPL	0.000	20.000	0.000	OK	OFF	LINK
WEP_P4_D0851_PHA	0.000	20.000	0.000	OK	OFF	LINK
WEP_P5_D0851_AMPL	0.000	20.000	0.000	OK	OFF	LINK
WEP_P5_D0851_PHA	0.000	20.000	0.000	OK	OFF	LINK
WEP_P6_D0851_AMPL	0.000	20.000	0.000	OK	OFF	LINK
WEP_P6_D0851_PHA	0.000	20.000	0.000	OK	OFF	LINK
WEP_P7_D0851_AMPL	0.000	20.000	0.000	OK	OFF	LINK
WEP_P7_D0851_PHA	0.000	20.000	0.000	OK	OFF	LINK
WEP_P8_D0851_AMPL	0.000	20.000	0.000	OK	OFF	LINK
WEP_P8_D0851_PHA	0.000	20.000	0.000	OK	OFF	LINK
WEP_P9_D0851_AMPL	0.000	20.000	0.000	OK	OFF	LINK
WEP_P9_D0851_PHA	0.000	20.000	0.000	OK	OFF	LINK
WEP_P10_D0851_AMPL	0.000	20.000	0.000	OK	OFF	LINK
WEP_P10_D0851_PHA	0.000	20.000	0.000	OK	OFF	LINK

#### A new 'tuner' application in CS-Studio

- provides functionality of the previous tool
- use keyboard to select devices and step setpoints
- group devices for coordinating adjustments
- local snapshot/restore

Device Name	Value	Unit	Setpoint	Alarm	Control	Links
RF01_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF02_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF03_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF04_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF05_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF06_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF07_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF08_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF09_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF10_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF11_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF12_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF13_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF14_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF15_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF16_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF17_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF18_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF19_D0851	0.000	10.000	0.000	OK	OFF	LINK
RF20_D0851	0.000	10.000	0.000	OK	OFF	LINK

#### 'Engineering-style' device pages

- device lists in sequential order
- links to detail screens
- at-a-glance state of subsystem

ReA3 is the rare isotope beam (RIB) reaccelerator at the Michigan State University's National Superconducting Cyclotron Laboratory (NSCL).

ReA3 is currently reaccelerating RIBs produced by the Coupled Cyclotron Facility (CCF), and in the future, by the Facility for Rare Isotope Beams (FRIB) which is currently under construction and initial commissioning.

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