JAGIELLONIAN UNIVERSITY
IN KRAKOW

SOLARIS
NATIONAL SYNCHROTRON
RADIATION CENTRE

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Synoptic GUIs in NSRC SOLARIS for Beamlines and Accelerators Visualization and Control

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National Synchrotron Radiation Centre SOLARIS

SCADA systems play very important role in control systems

What should synoptic do?

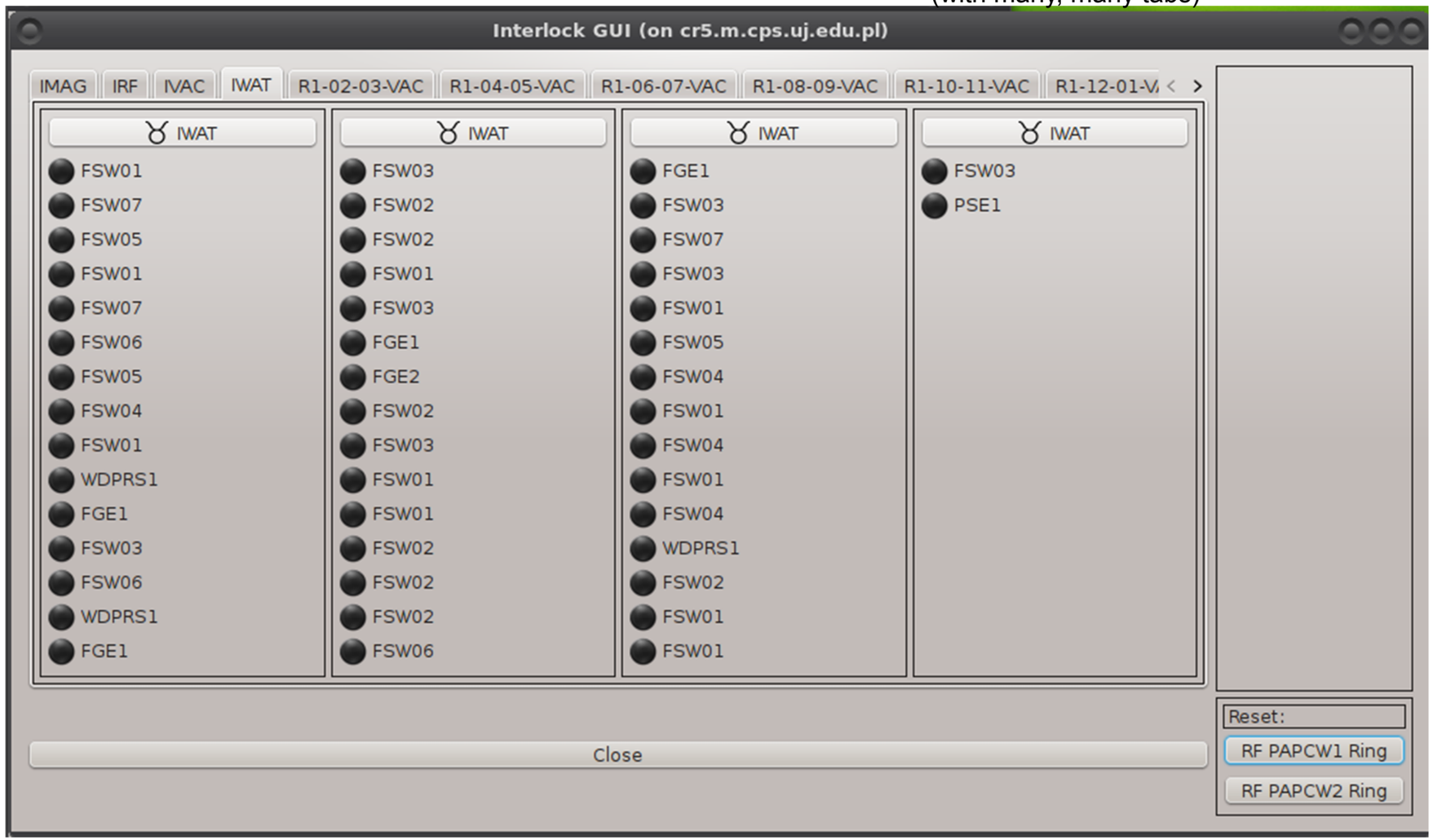
- Show control system clearly.
- Be reliable and stable.
- Show exactly what we need to see.
- And it should be intuitive.
- Or even allow to interact with devices and control them in easy way.

First there was a simple panel to control a beamline...

(actually there were few of them for one BL)

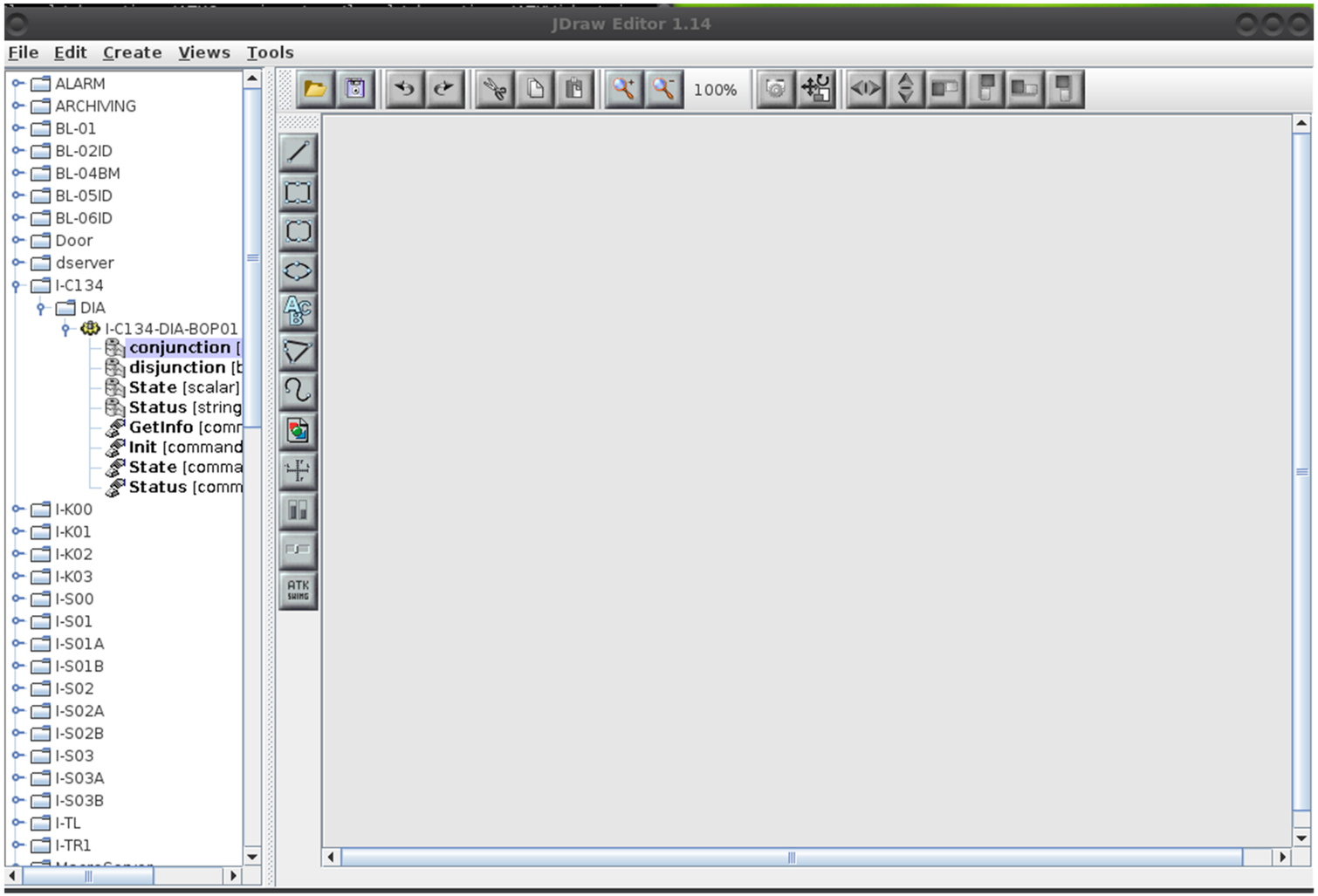
...and a simple panel to watch interlocks

(with many, many tabs)

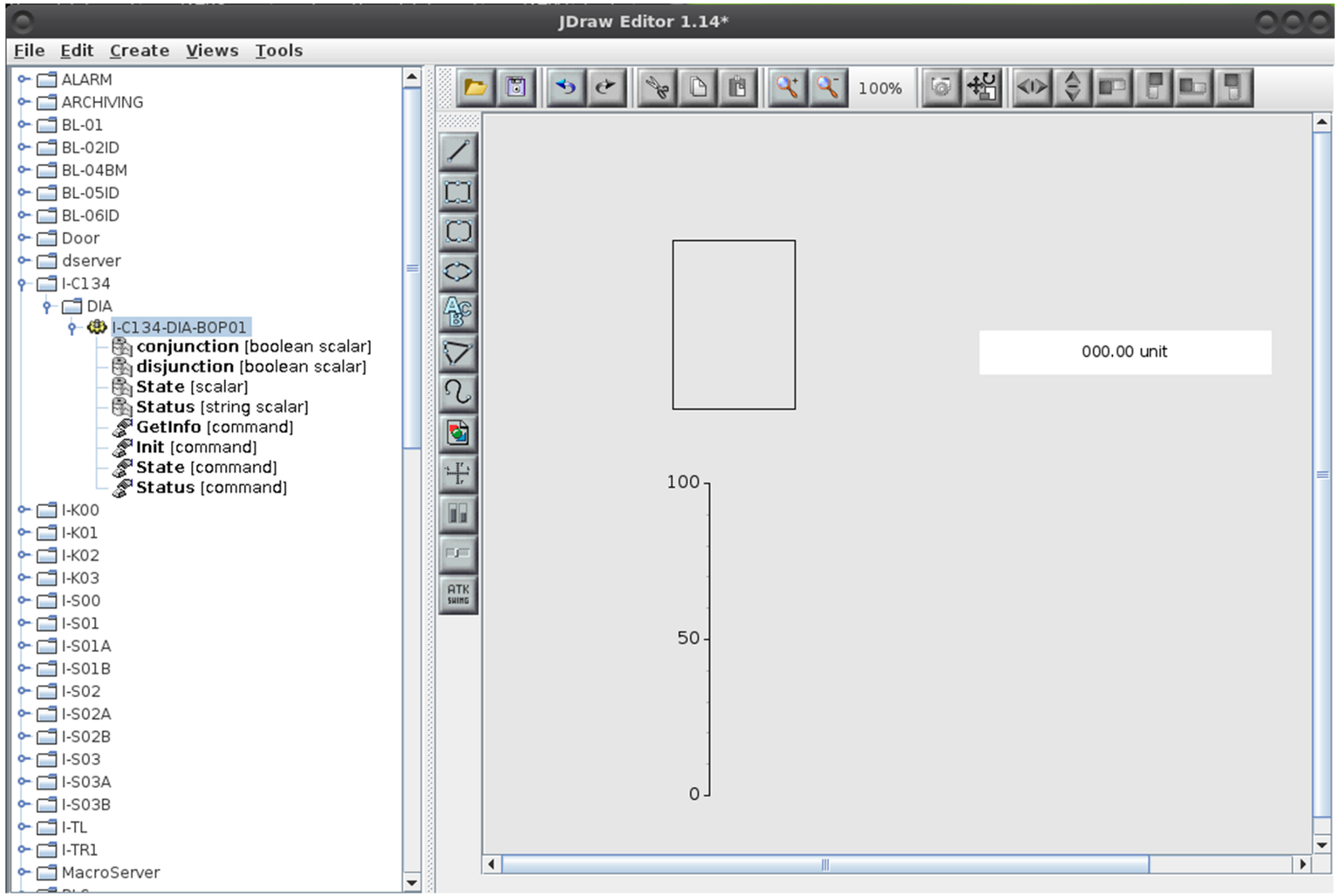


Conclusion was simple: we need synoptics

So we tried JDraw



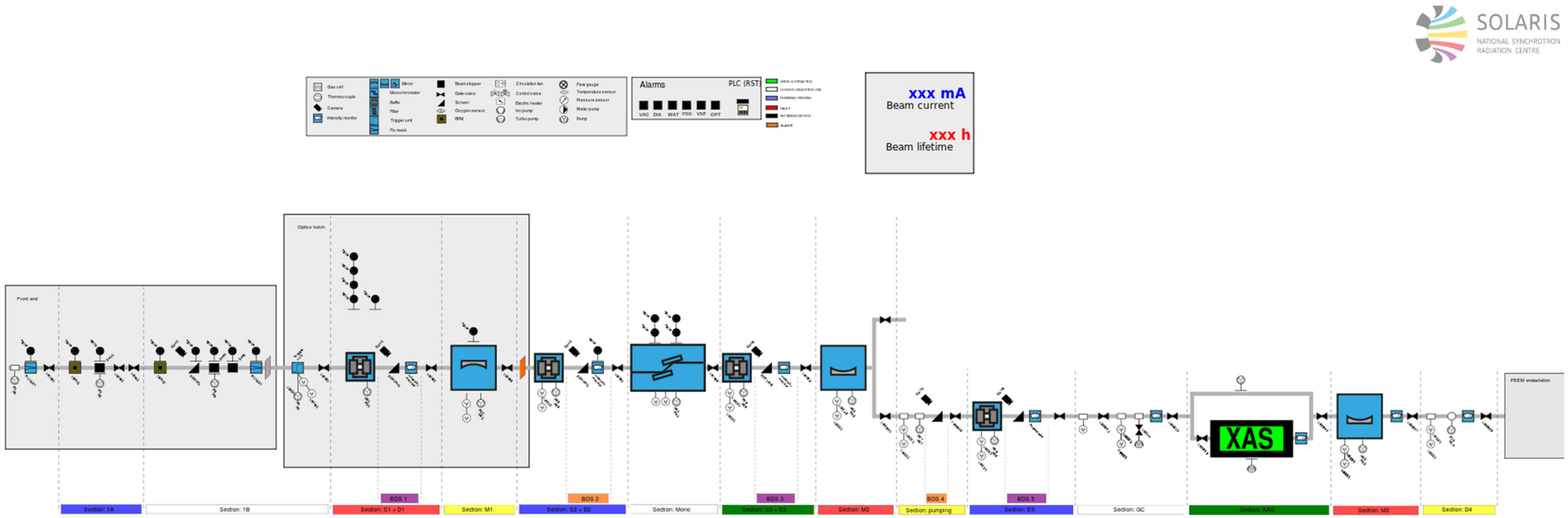
And after some time we got



But then MAX IV came with help

svgsynoptic2

With svgsynoptic we created this:

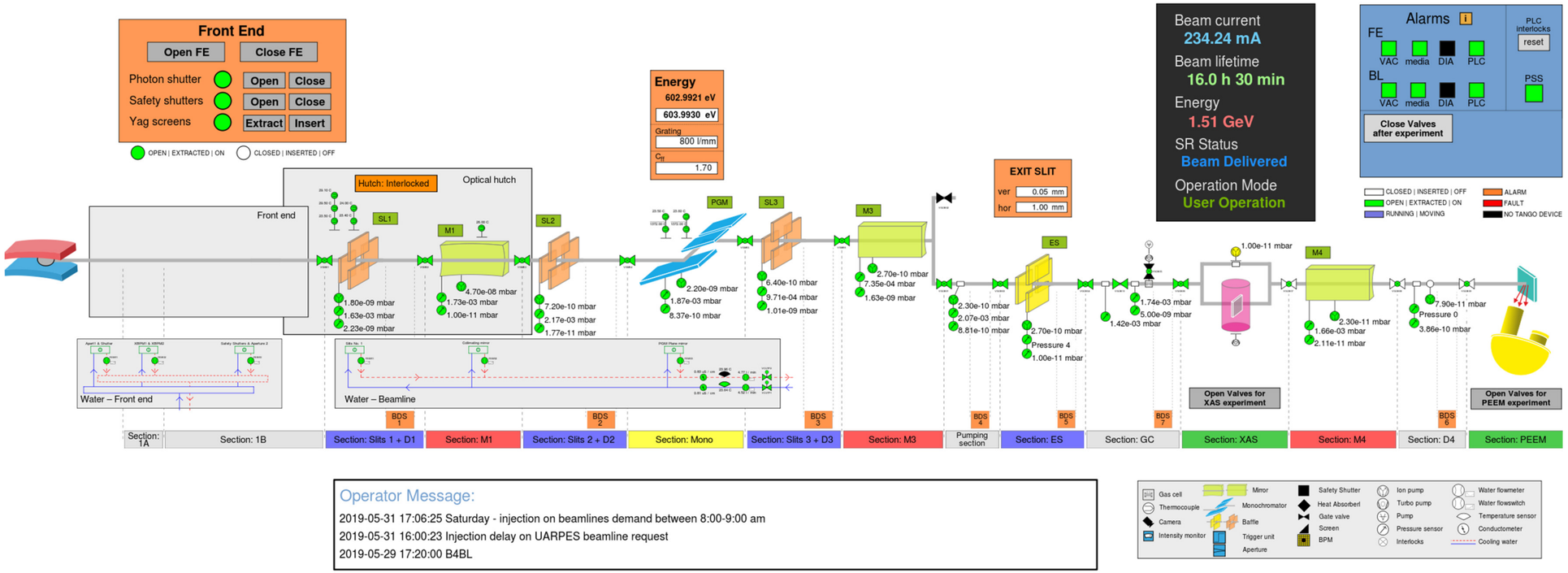


Cooling VAC DIA OPT

But that wasn't enough

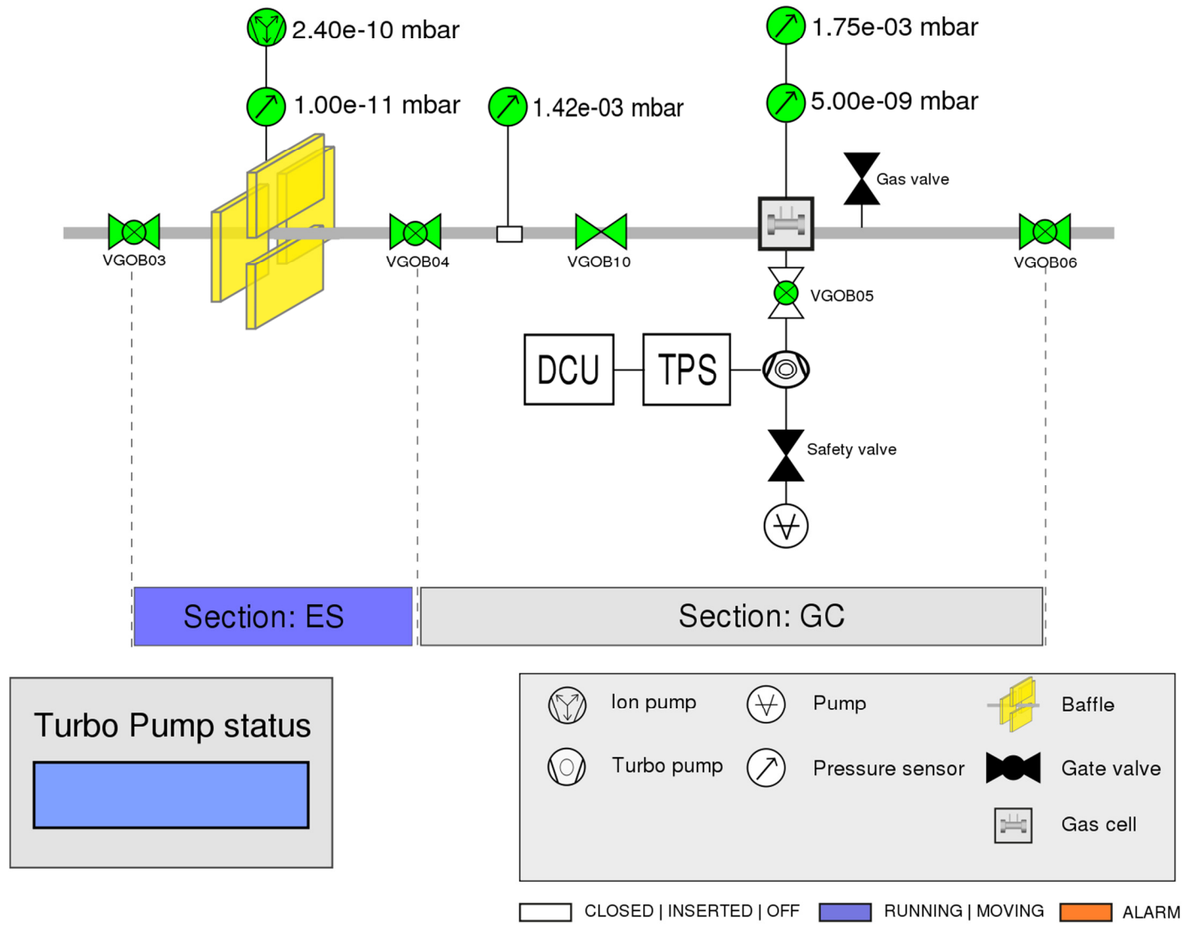
- It's too small.
- Elements are too archaic.
- We need more stuff there (like buttons, indicators etc).

We have improved



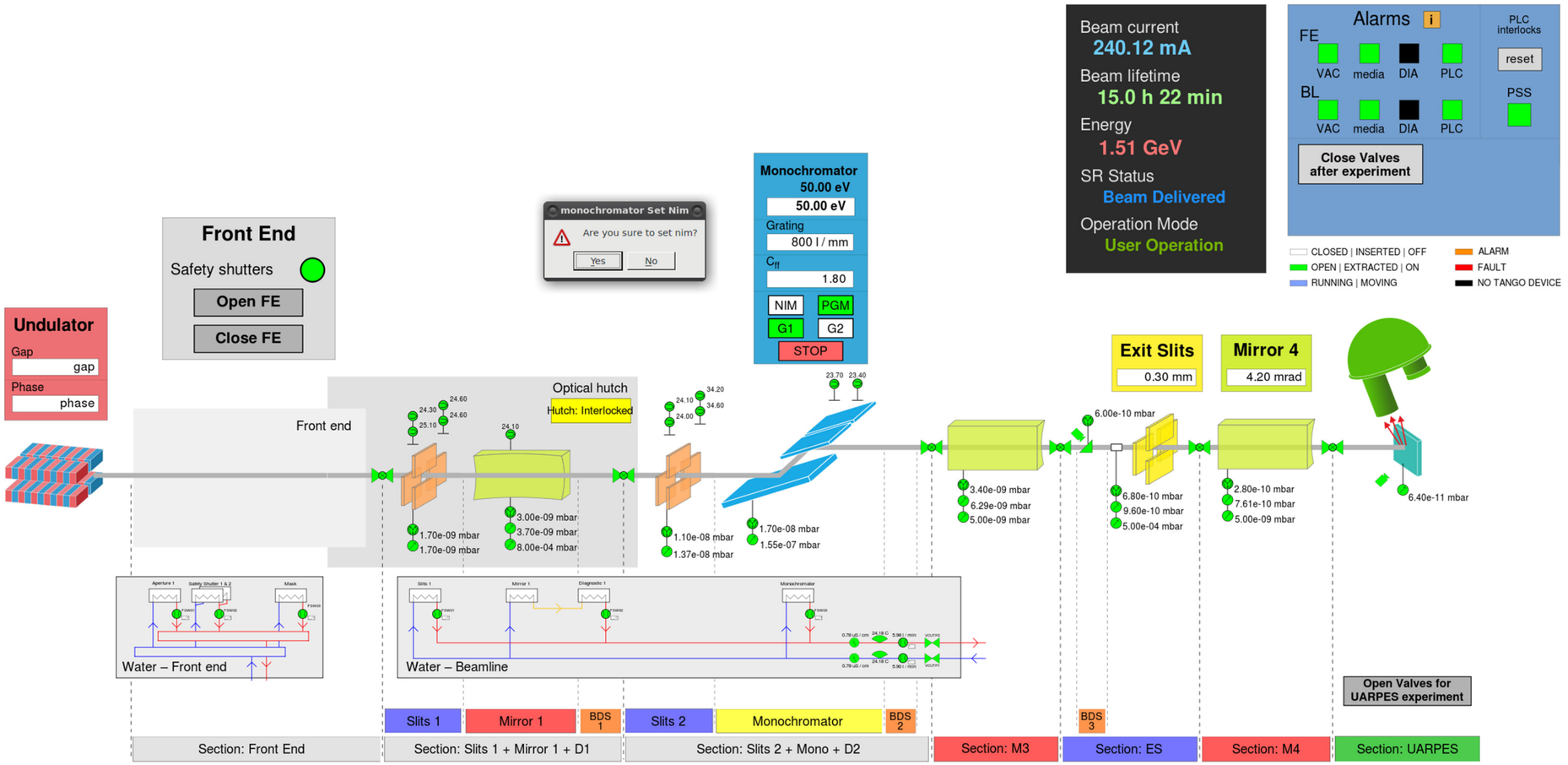
PEEM/XAS beamline

And created more of them



Gas Cell on
PEEM/XAS beamline

It was quite simple



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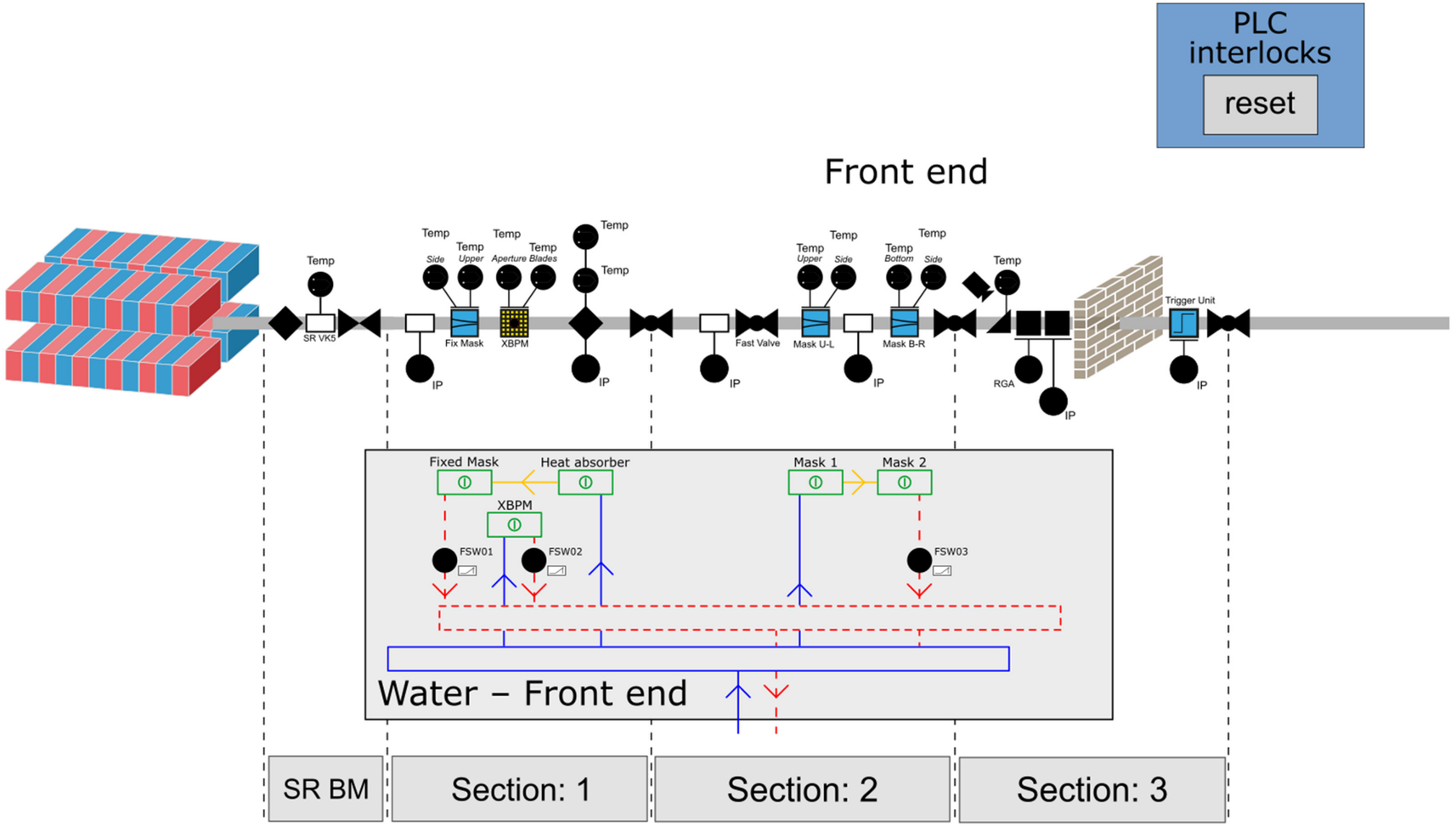
WAT media/DIA VAC

UARPES beamline

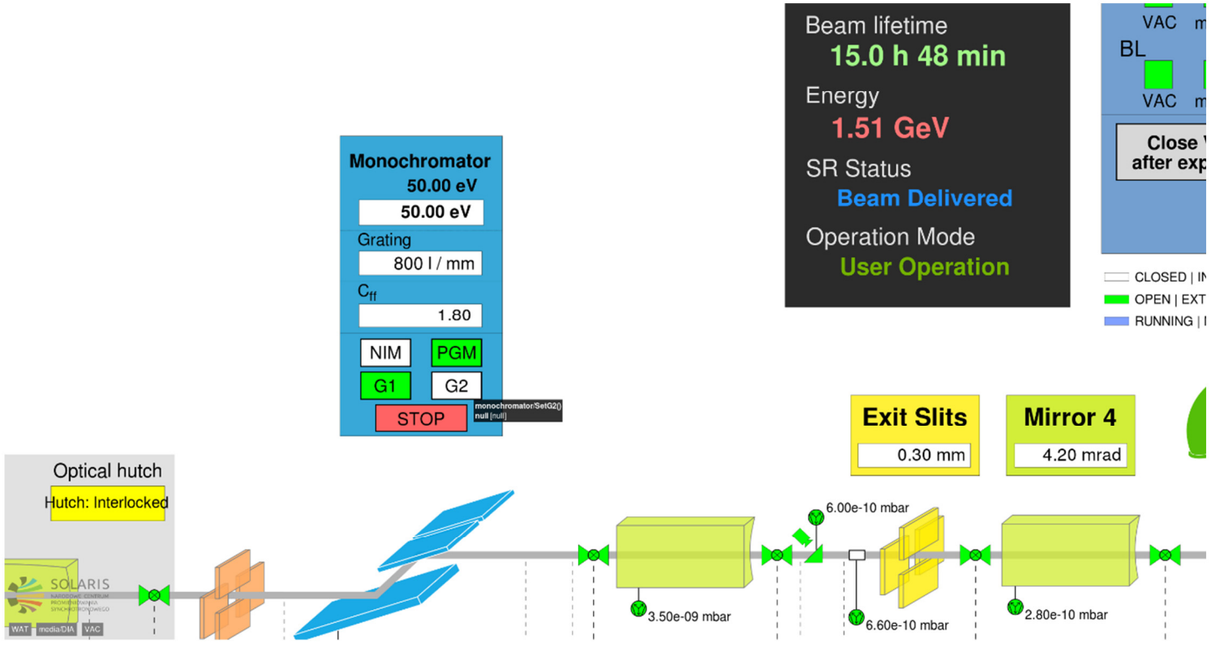
And fast



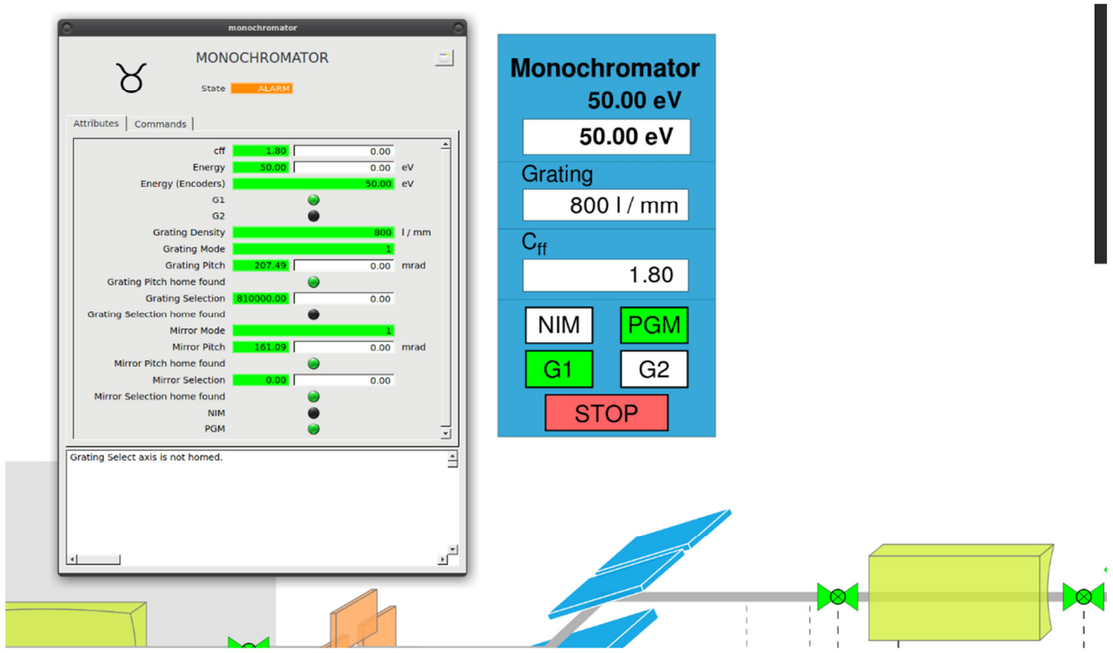
PHELIX beamline frontend

They have some nice functions

Moving and zooming to sections

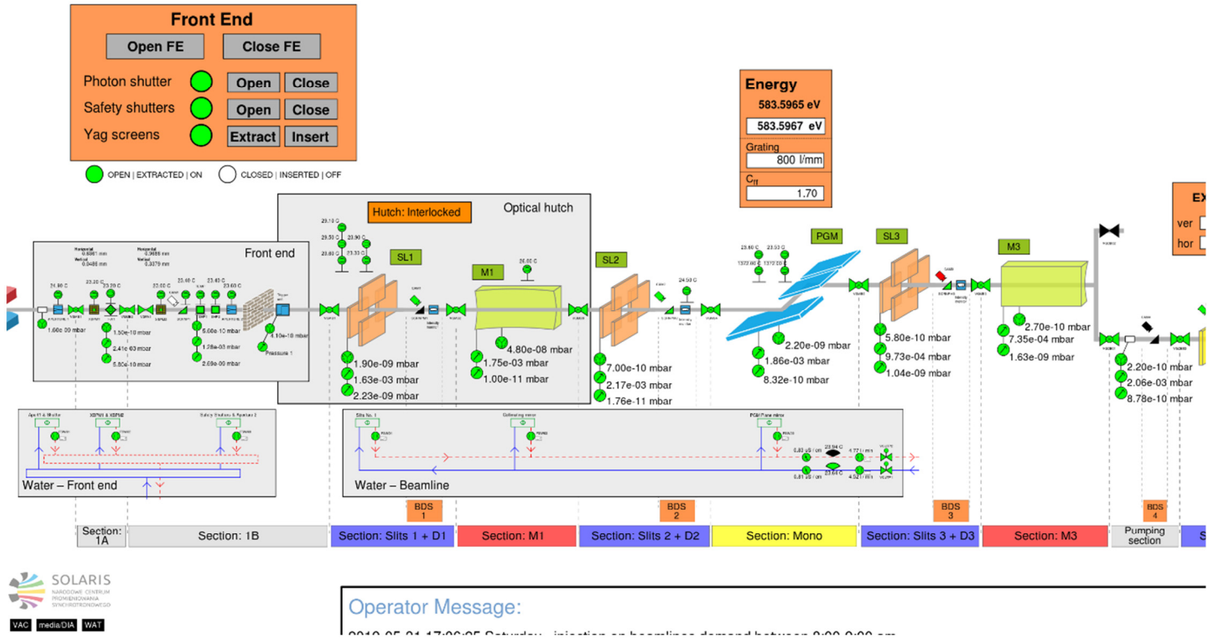


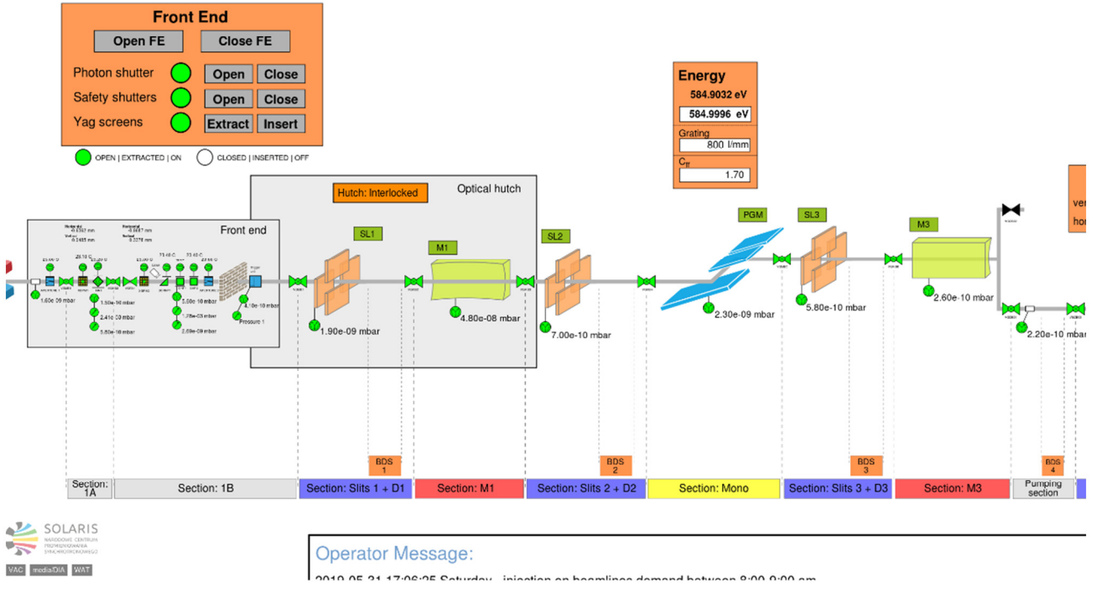
Opening Device Widgets (Taurus Device Panels)



They have some nice functions

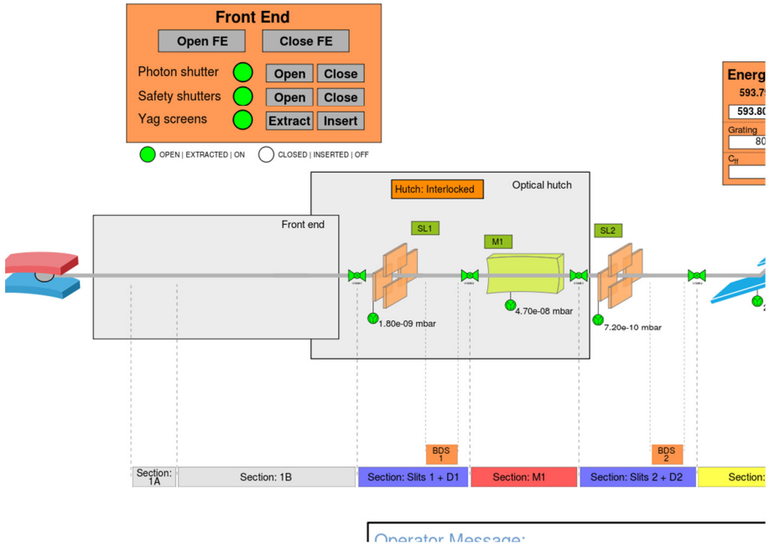
Hiding some layers

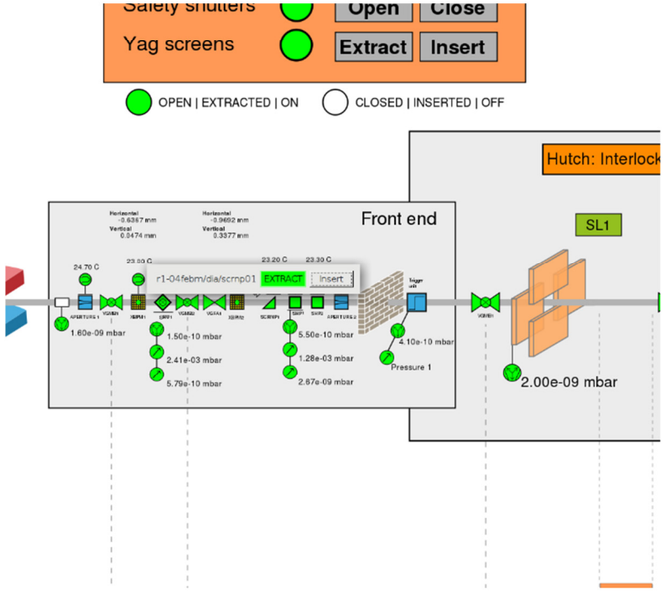




They have some nice functions

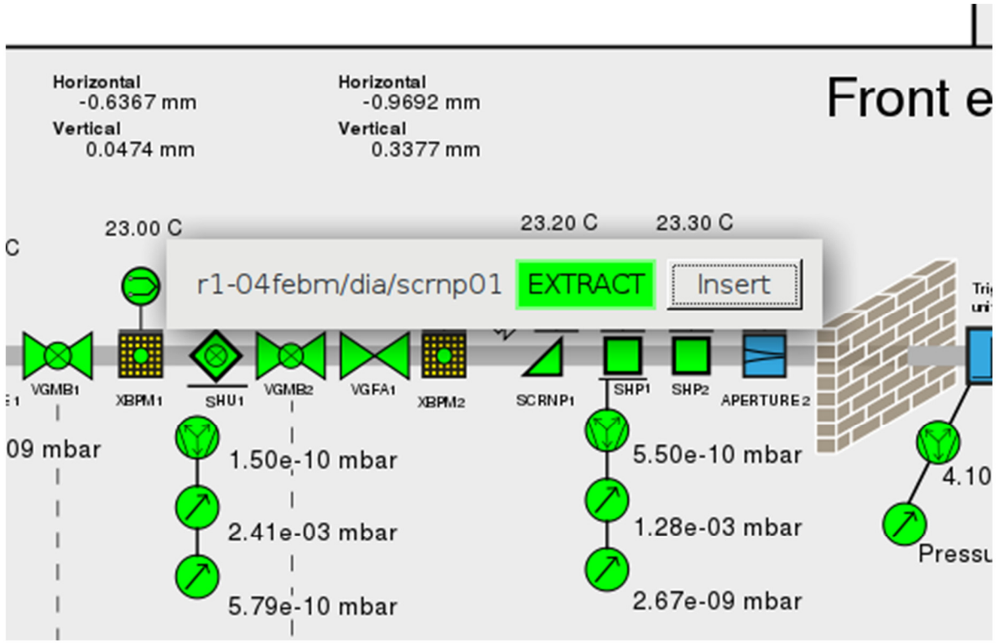
Zoom levels

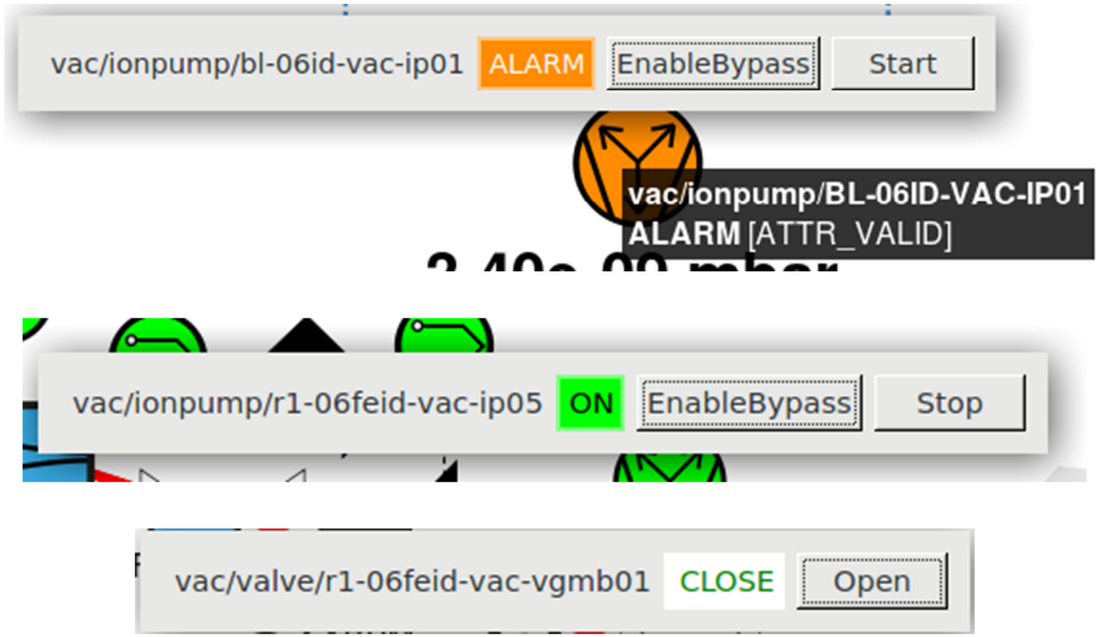




We added more through our common library (some function based on MAX IV code)

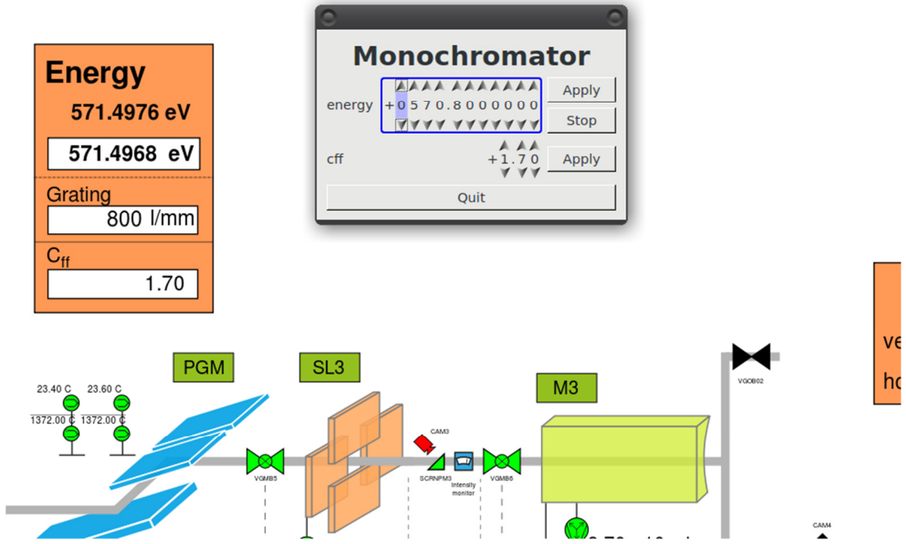
Specific commands for classes

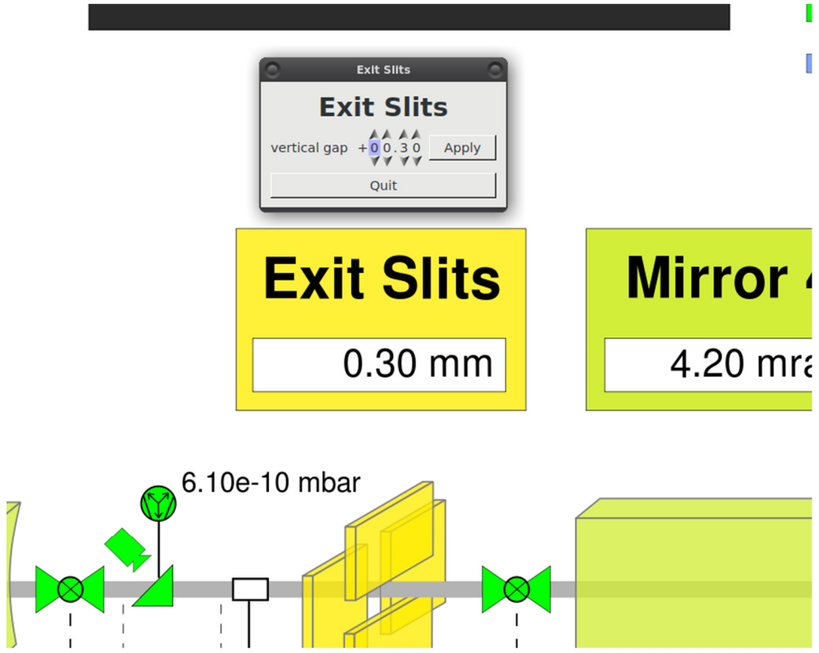




We added more through our common library

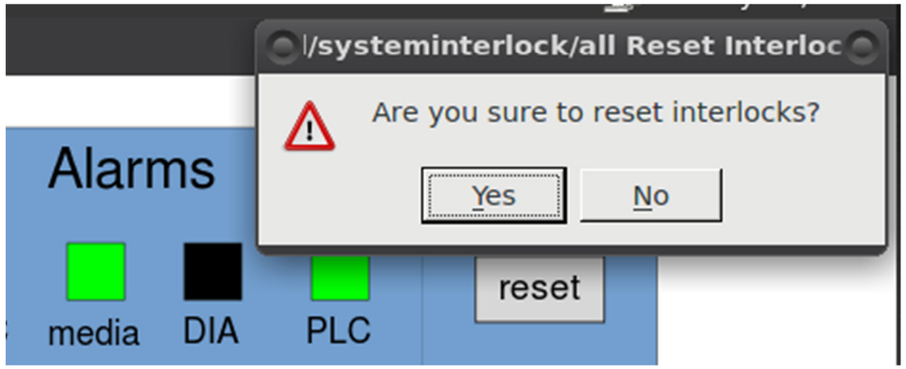
Opening panels for sets of attributes

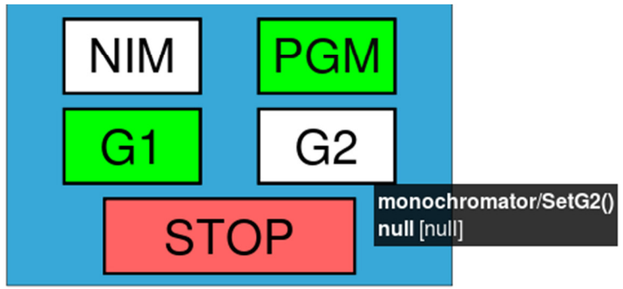


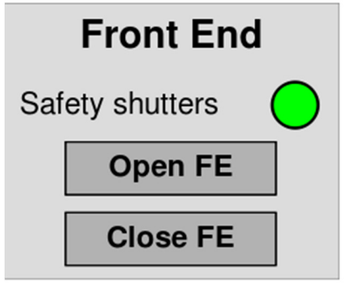


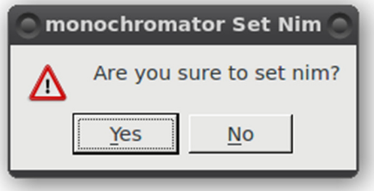
We added more through our common library

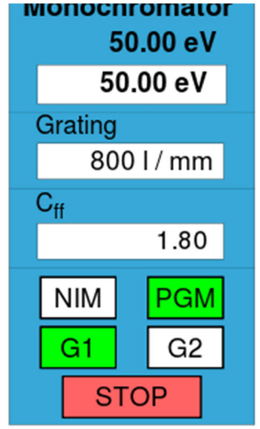
Run specific command for device





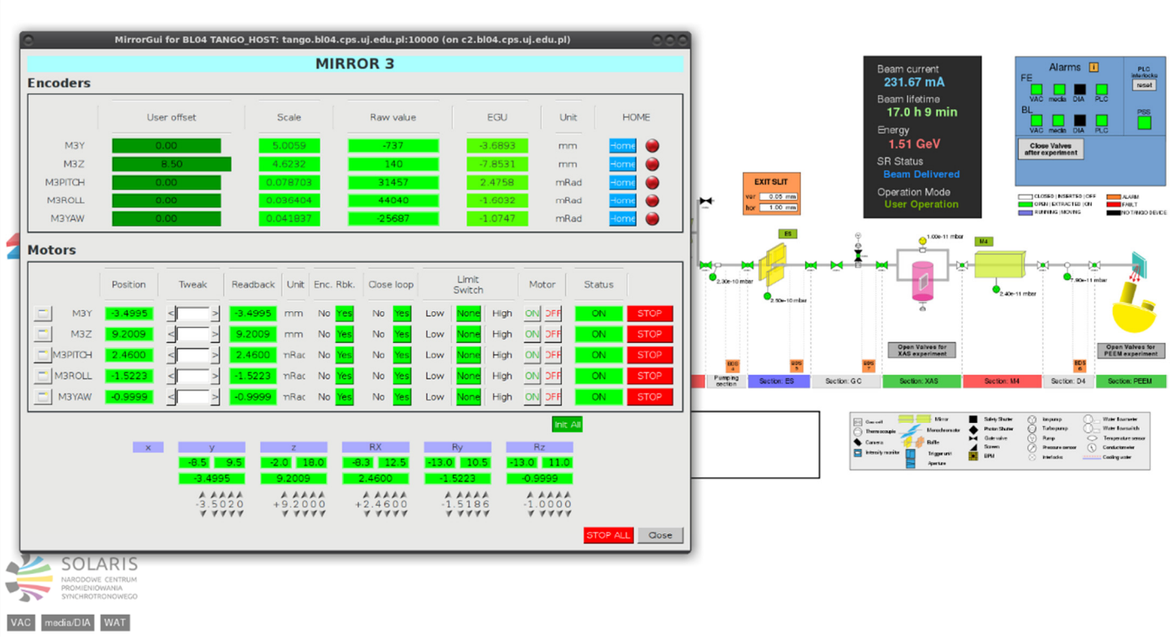


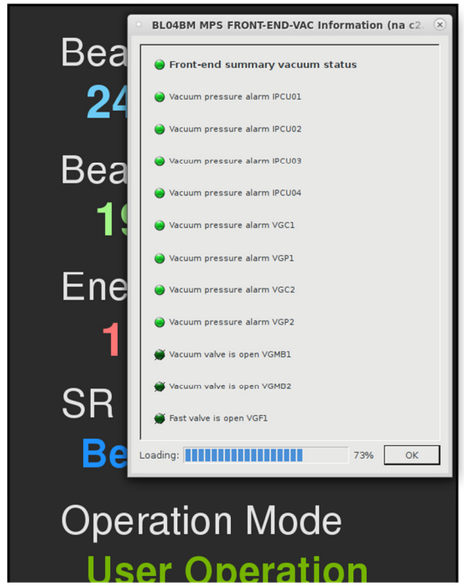


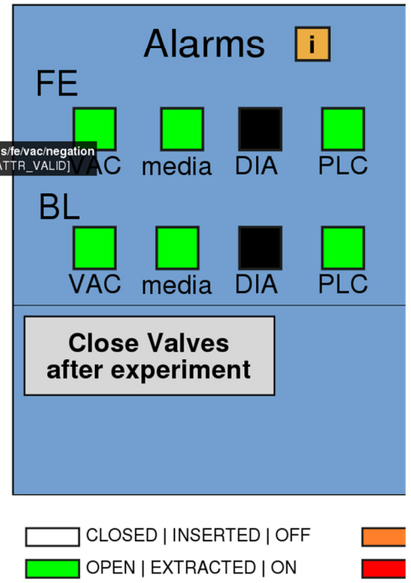


We can also

Open different applications



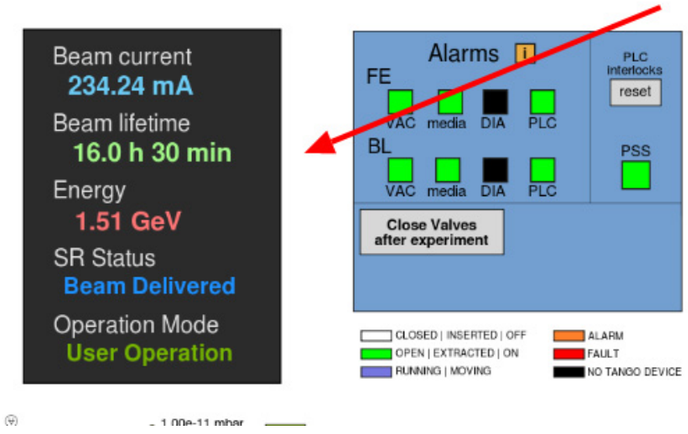


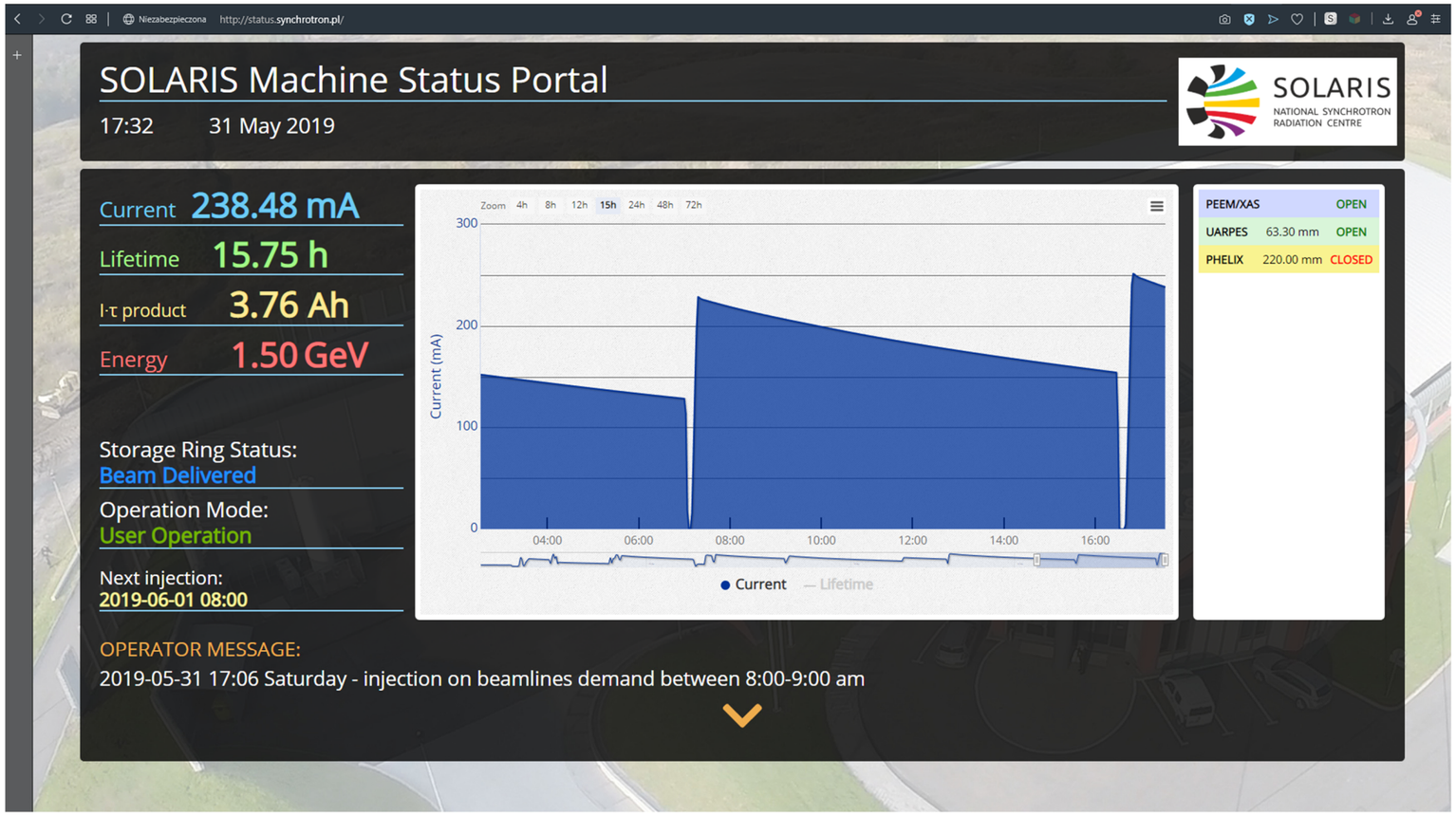


Unfortunately, it can’t be too easy

- Every scientist wants different functions.
- And different symbols.
- And different colours.
- And panels similar with other applications

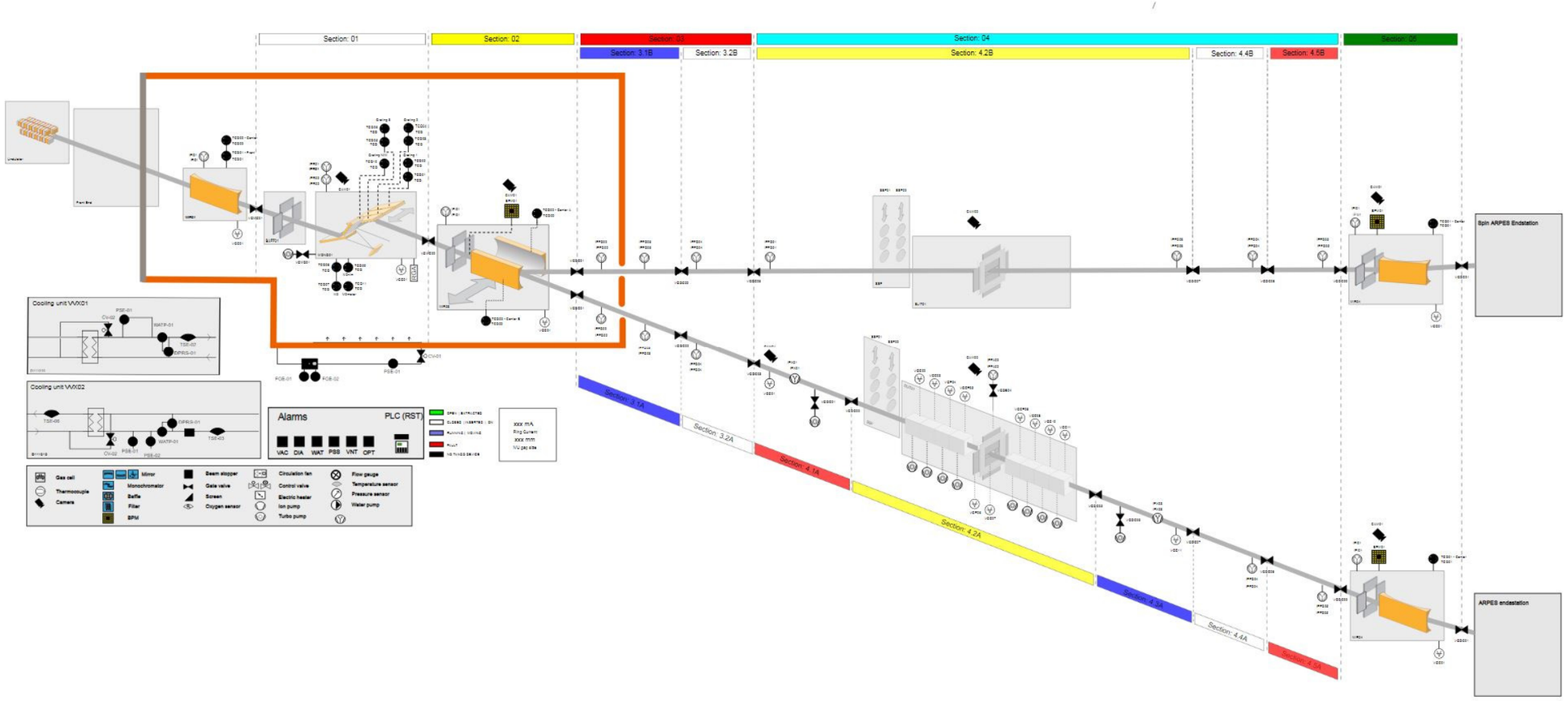
Like this


Beam current
234.24 mA
Beam lifetime
16.0 h 30 min
Energy
1.51 GeV
SR Status
Beam Delivered
Operation Mode
User Operation
Alarms
FE
VAC media DIA PLC
BL
VAC media DIA PLC
PLC interlocks
reset
PSS
Close Valves after experiment
CLOSED | INSERTED | OFF
OPEN | EXTRACTED | ON
RUNNING | MOVING
ALARM
FAULT
NO TANGO DEVICE


Niezabezpieczona http://status.synchrotron.pl/
SOLARIS Machine Status Portal
17:32 31 May 2019
SOLARIS NATIONAL SYNCHROTRON RADIATION CENTRE
Current 238.48 mA
Lifetime 15.75 h
I·τ product 3.76 Ah
Energy 1.50 GeV
Storage Ring Status:
Beam Delivered
Operation Mode:
User Operation
Next injection:
2019-06-01 08:00
Zoom 4h 8h 12h 15h 24h 48h 72h
Current (mA)
300
200
100
0
04:00 06:00 08:00 10:00 12:00 14:00 16:00
Current Lifetime
PEEM/XAS OPEN
UARPES 63.30 mm OPEN
PHELIX 220.00 mm CLOSED
OPERATOR MESSAGE:
2019-05-31 17:06 Saturday - injection on beamlines demand between 8:00-9:00 am

And for the scientists the role model was

MAX IV's Bloch beamline

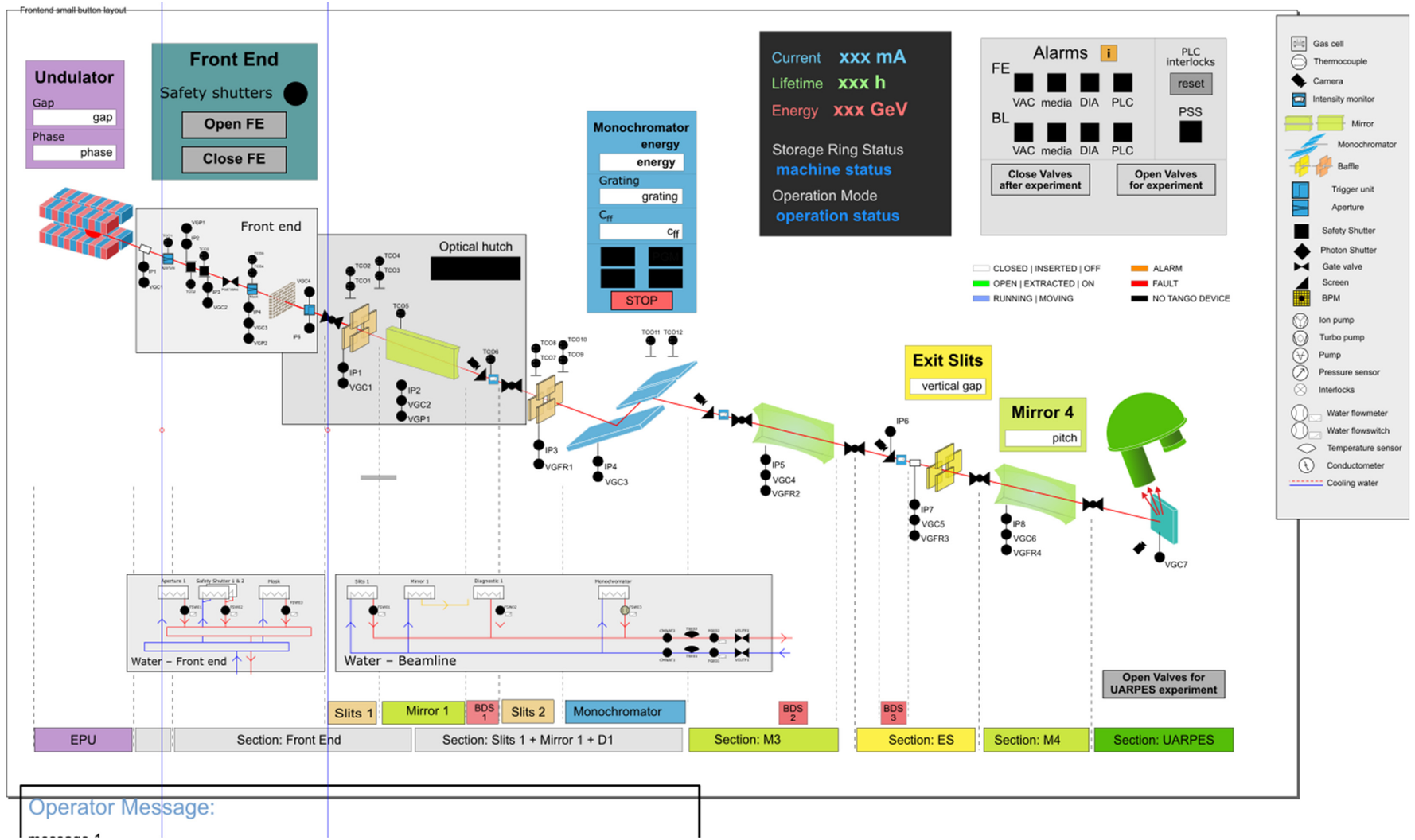


We decided with scientists and technical department to set standard for

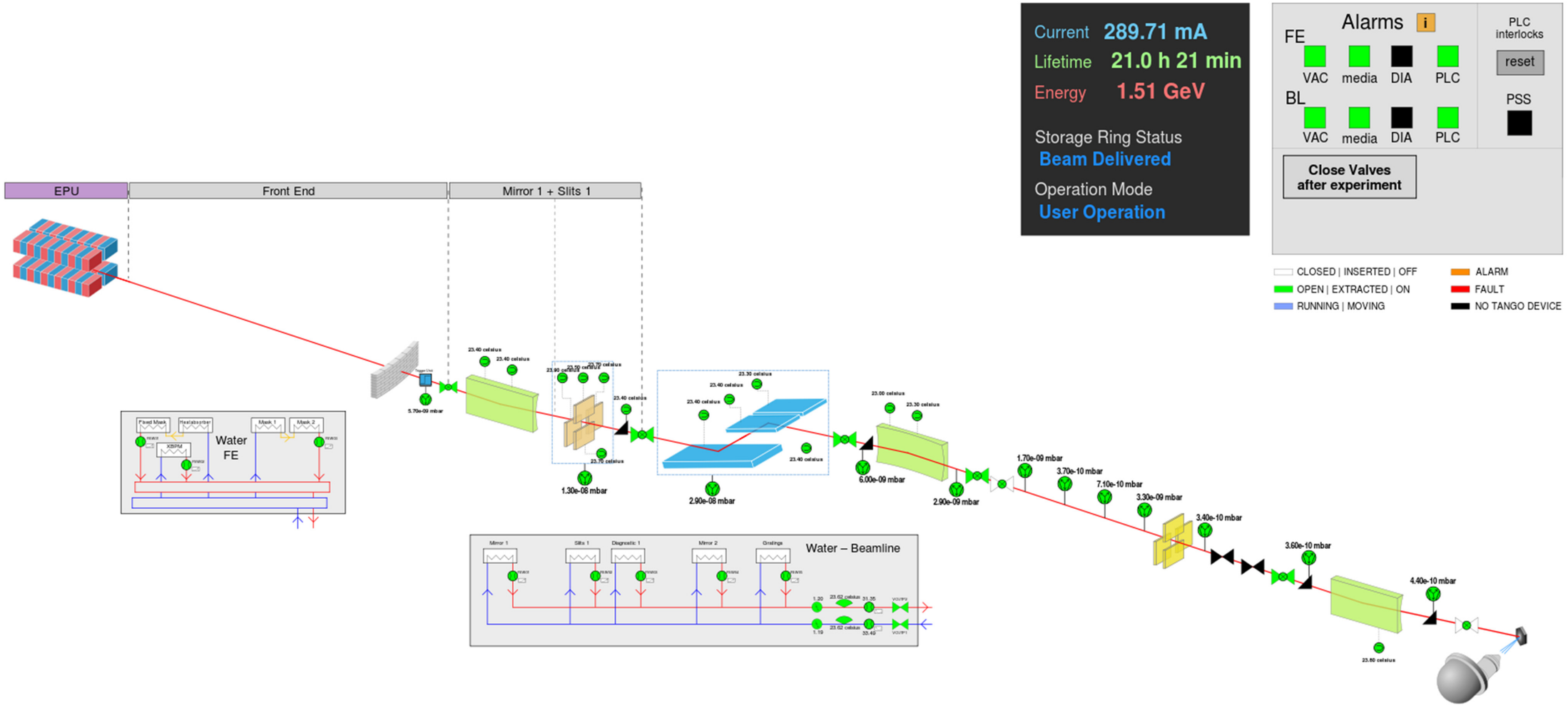
- colours,
- basic functions,
- mouse actions,
- main panels and view schemes
- similarities between other applications,
- symbols and elements also used in technical drawings.

It’s all for users and scientists, so they can be more familiar, especially if they will work on many beamlines. In addition, it allows technical department to use them easily.

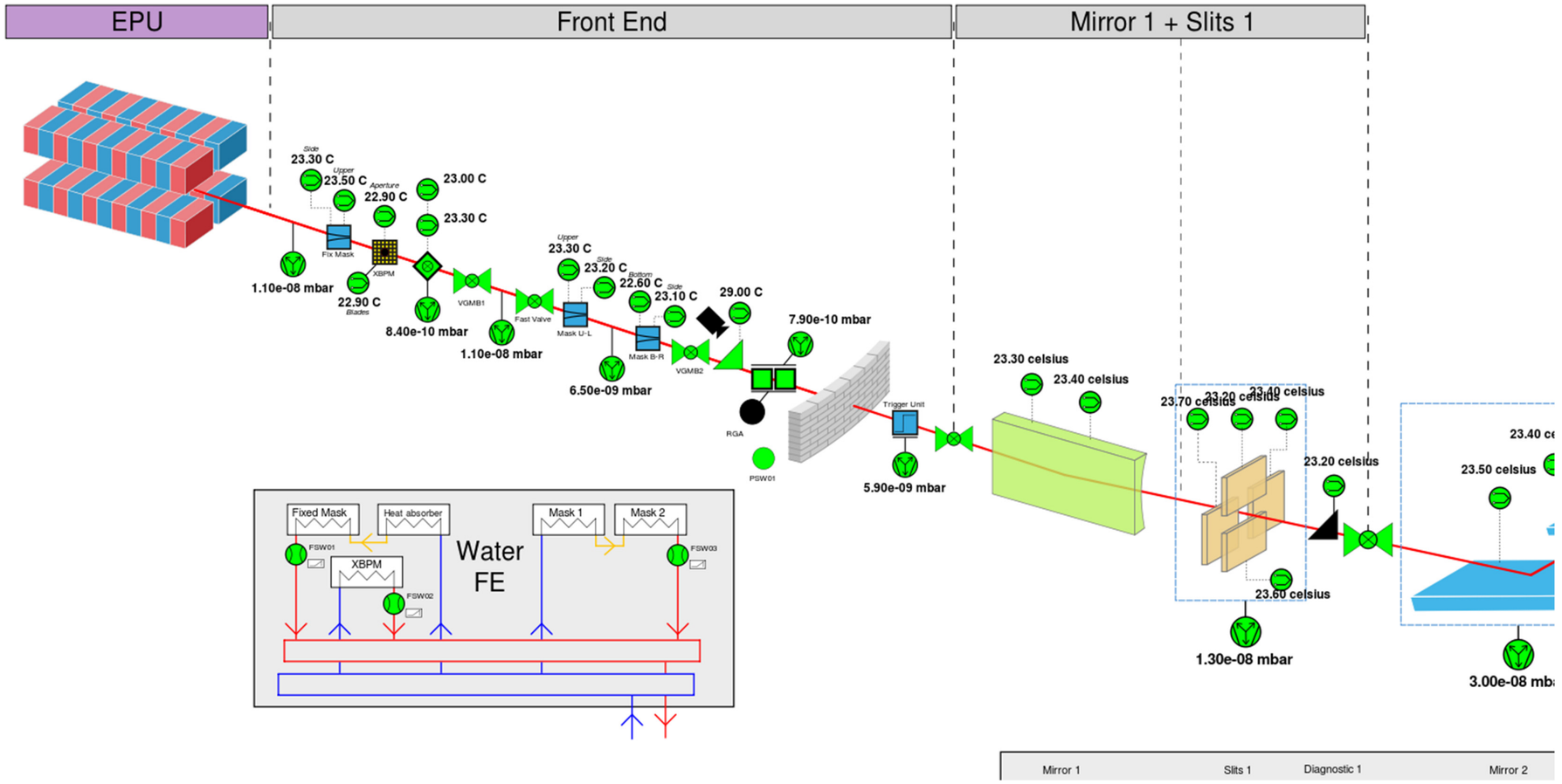
And we end up with this



New beamline in new standard (under construction)



New beamline in new standard (under construction)

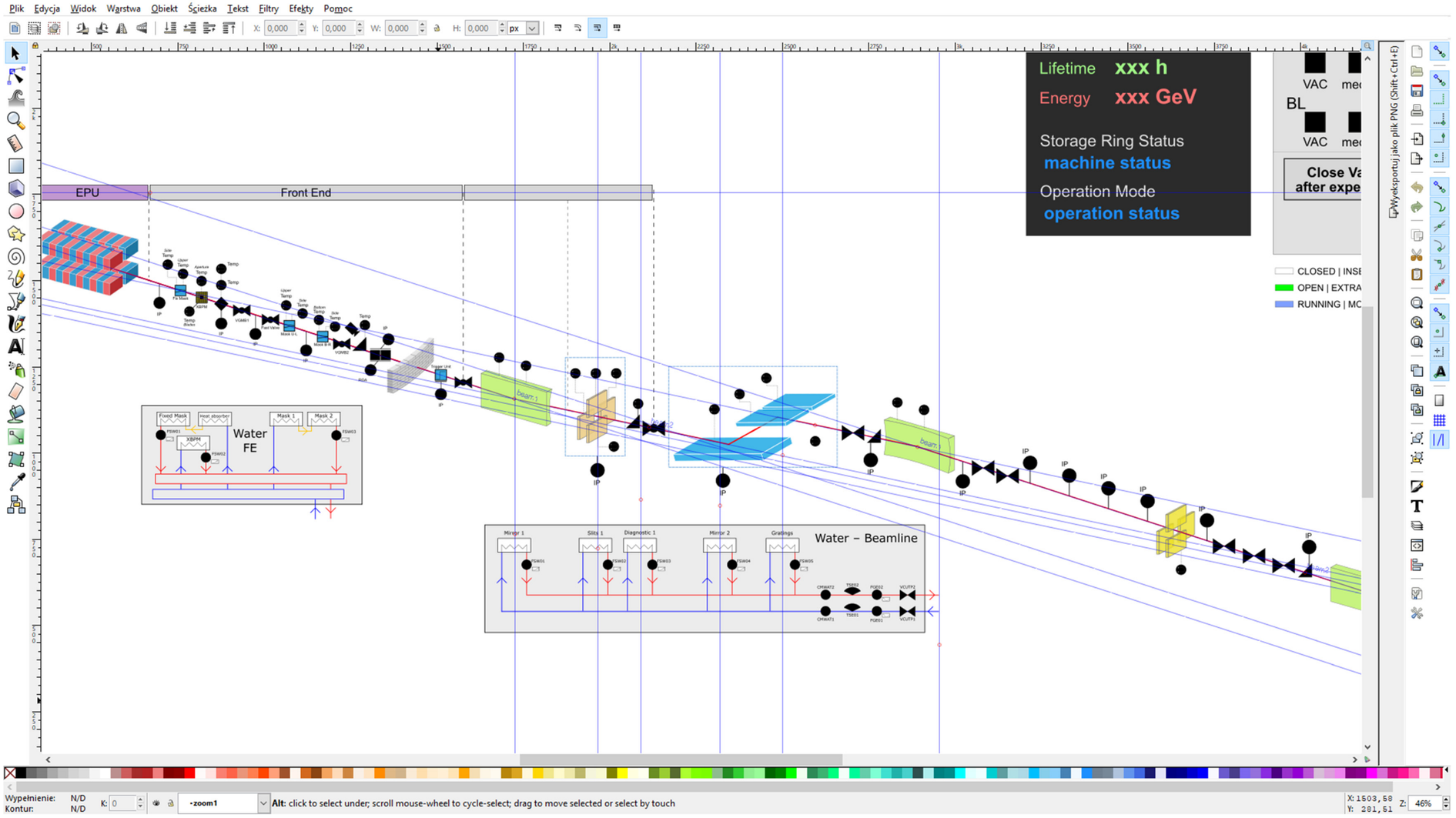


What are we using?

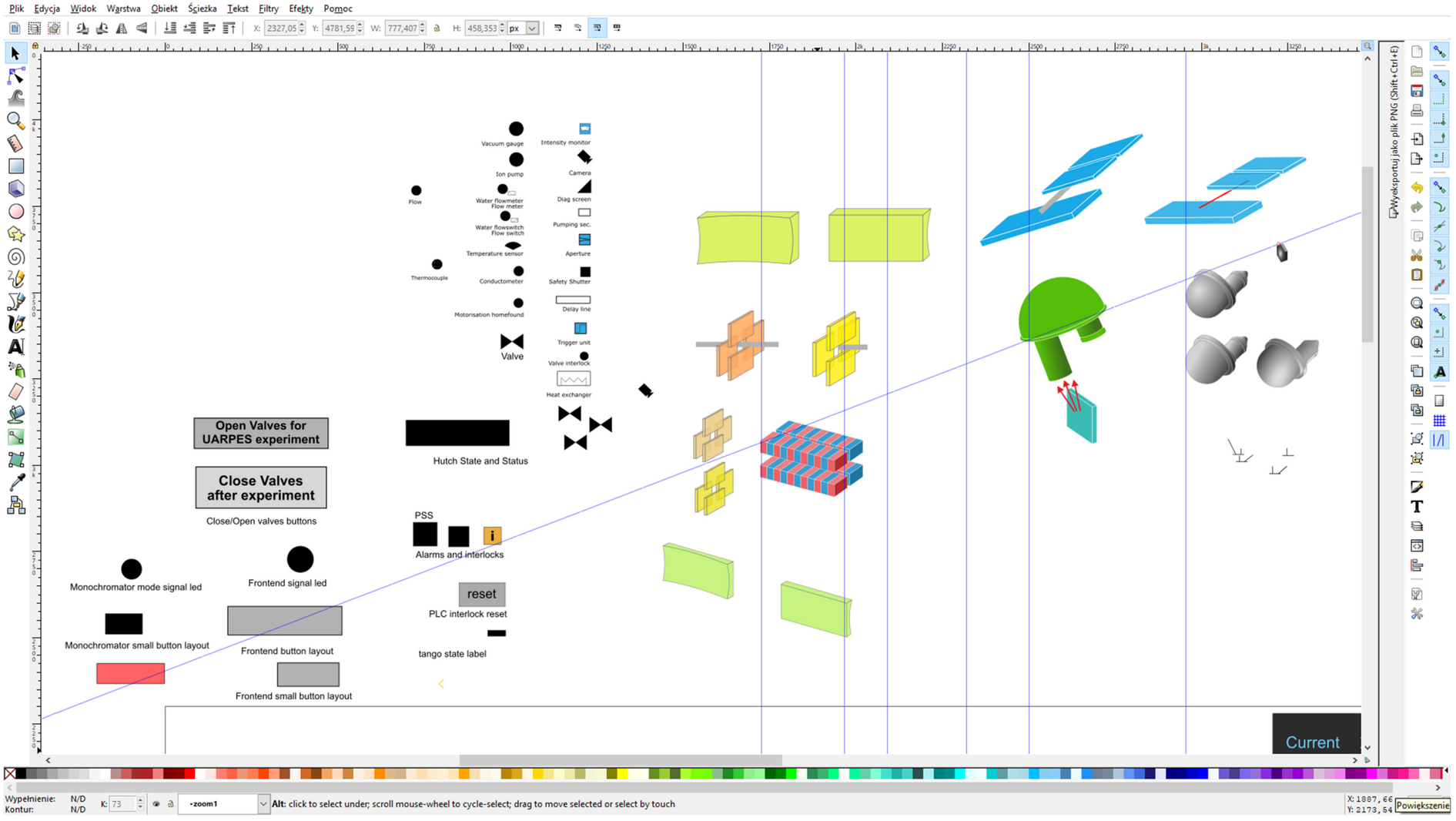
Tools

- svgsynoptic2,
- Taurus,
- TANGO controls,
- facadedevice (very useful for creating high level devices used for better views),
- some basic javascript,
- Inkscape.

Inkscape workflow

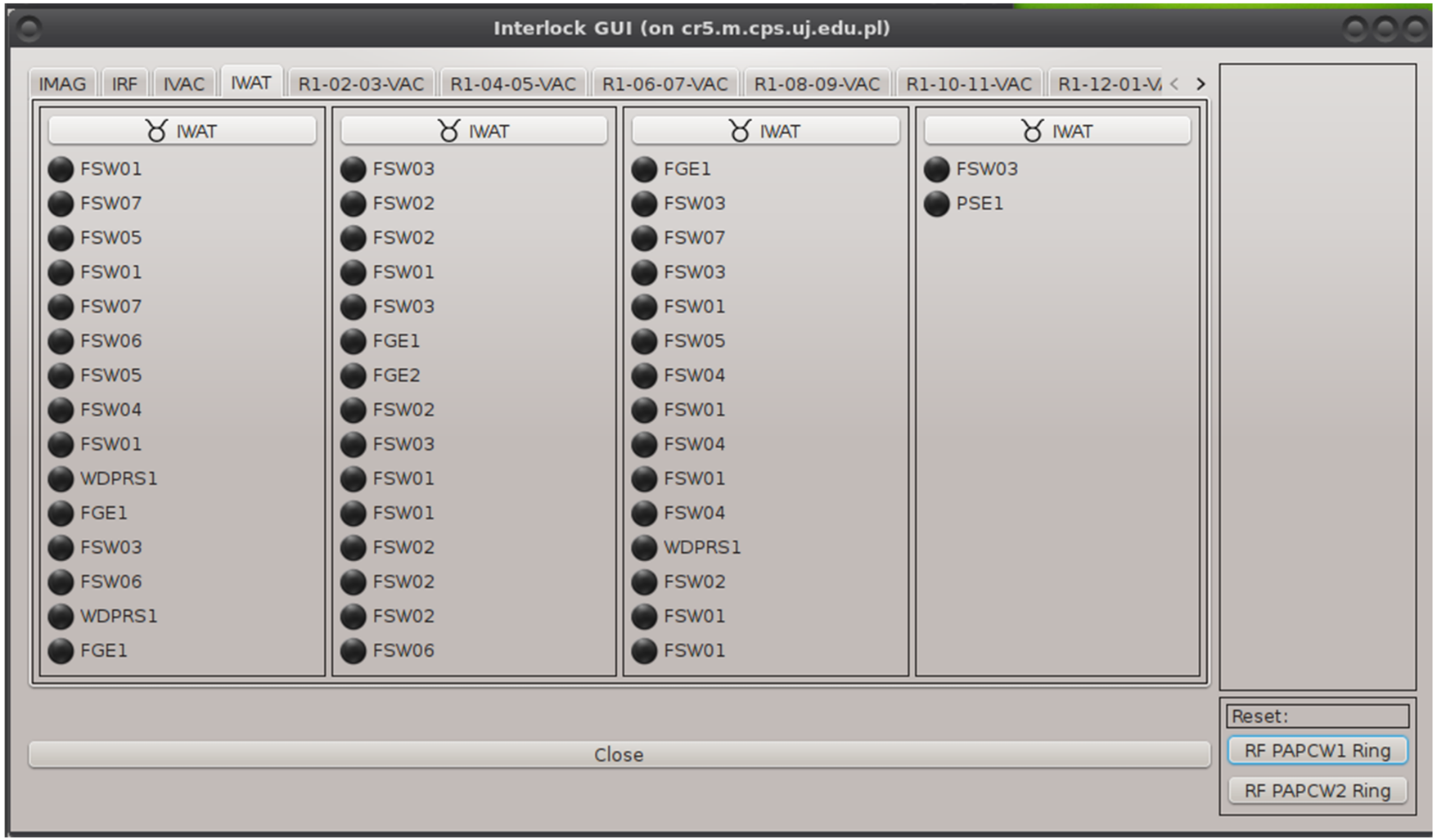


Inkscape workflow (symbols)



Bonus synoptic

What happened to this?

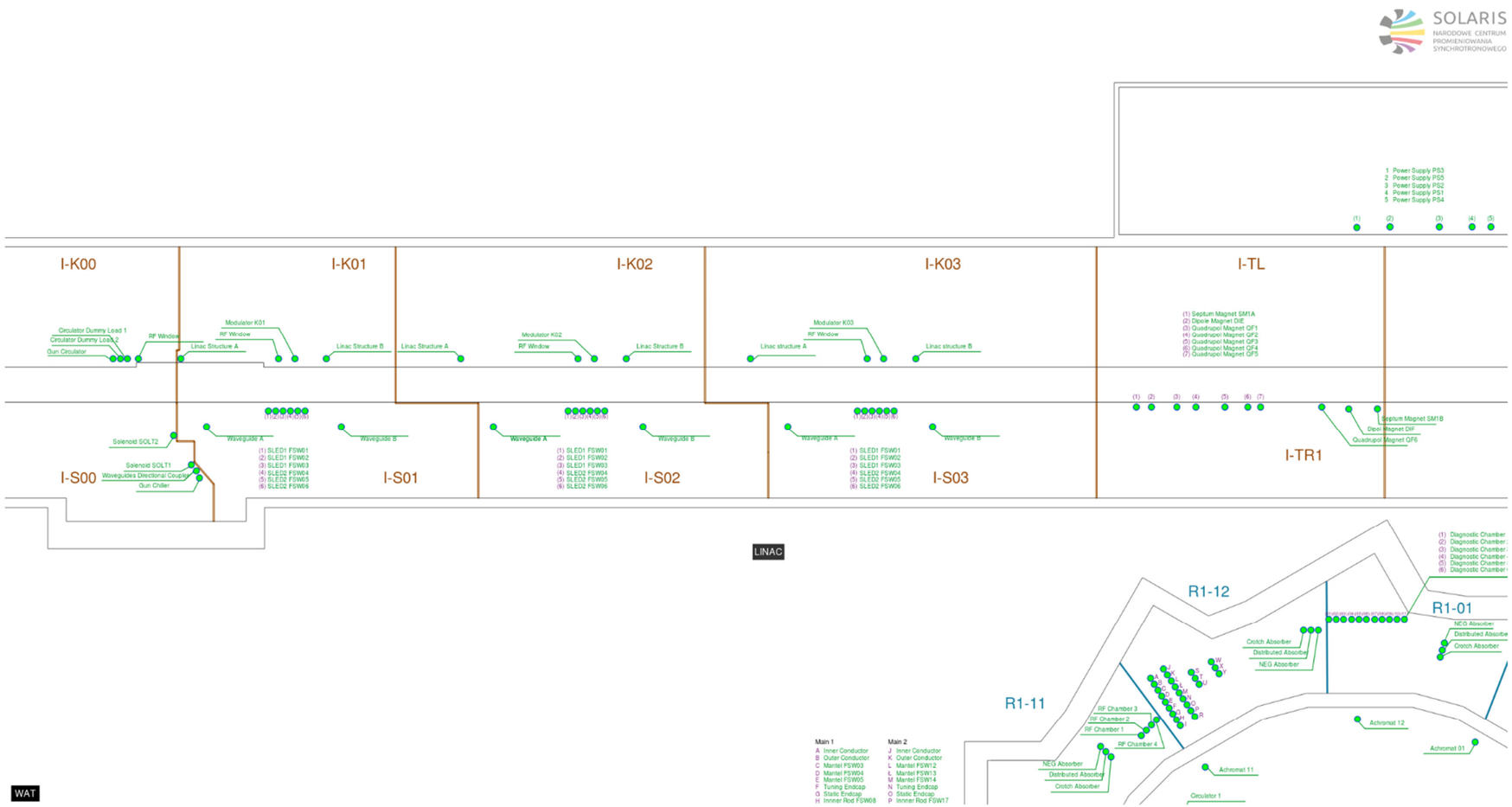


We created this panel (there are only water interlocks)

LINAC RING

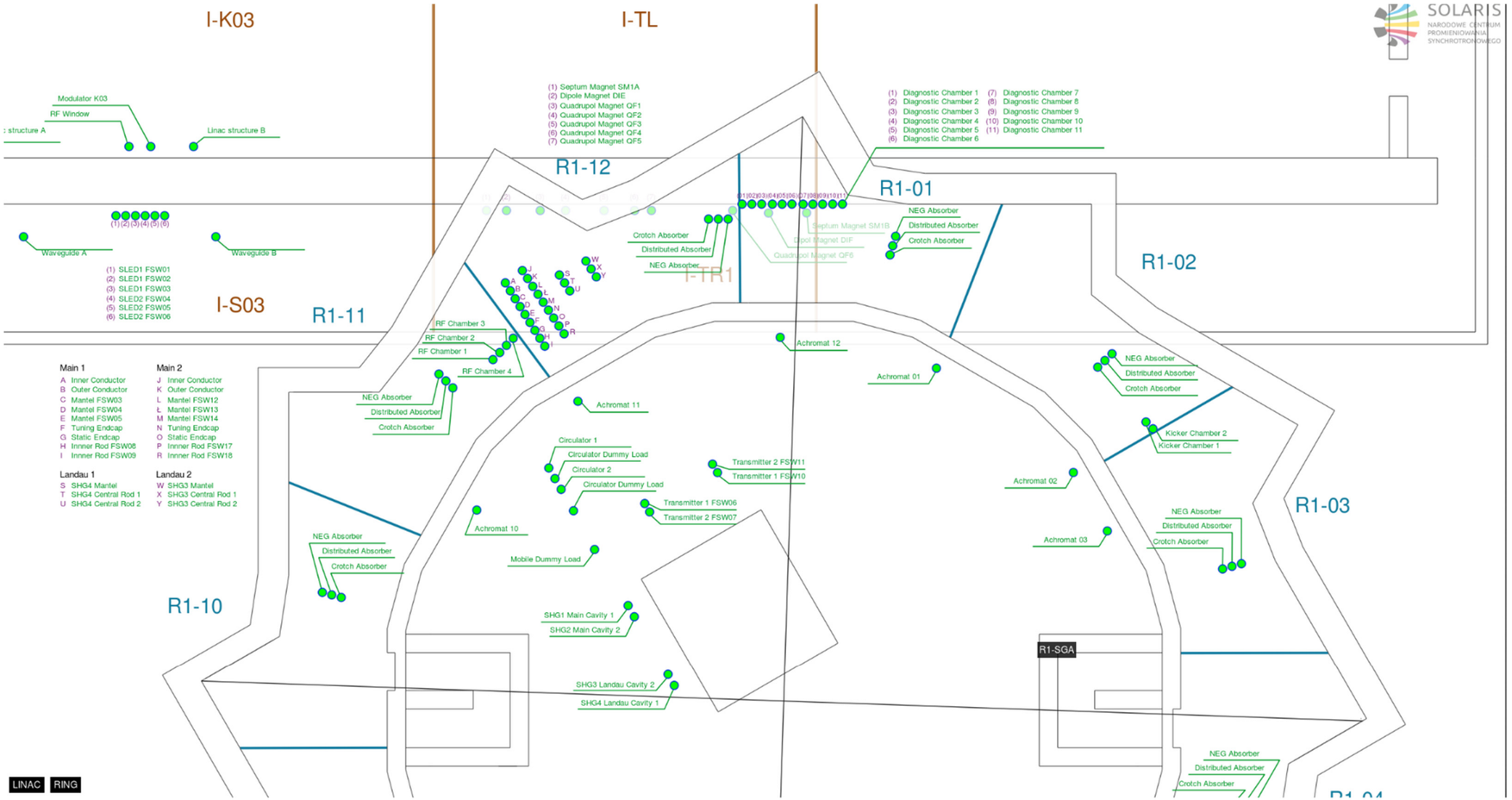
Water interlocks

We created this panel (there are only water interlocks)



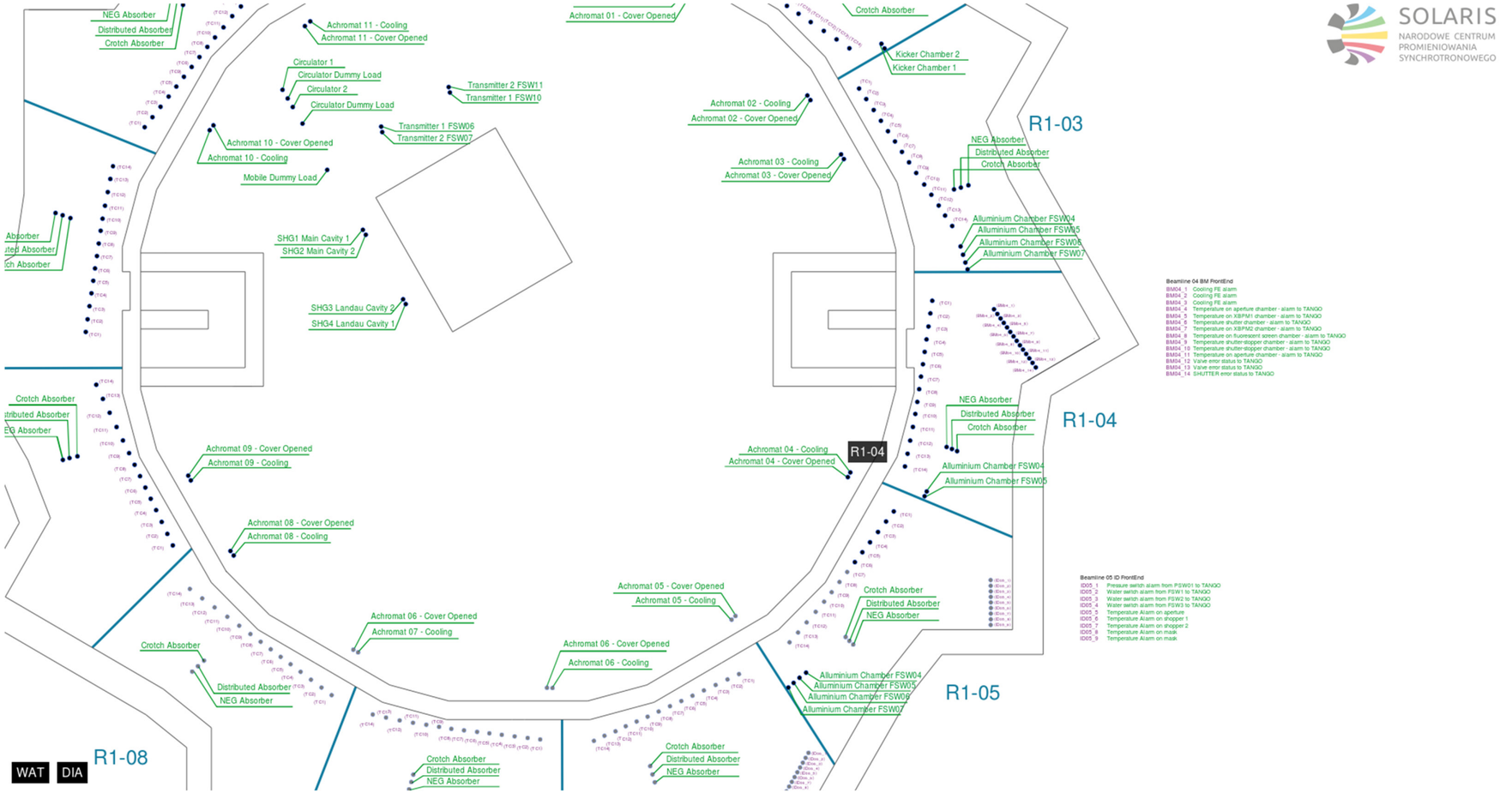
Water interlocks

We created this panel (there are only water interlocks)



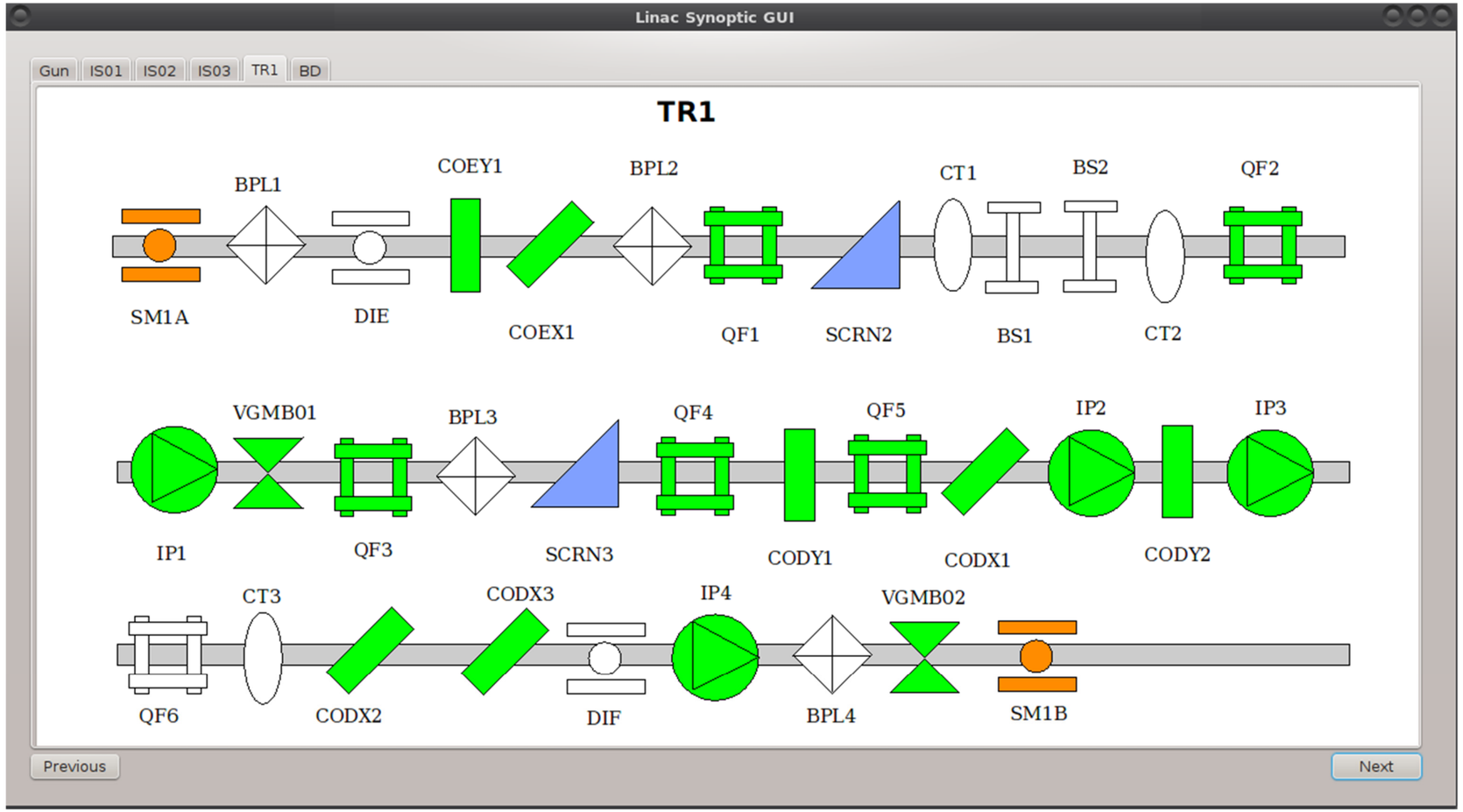
Water interlocks

After adding additional elements



Machine interlocks (partial)

We also have this



And this is our try to replace it

Conclusion

- Now we can quickly create clear synoptics.
- And create more of them.
- Allowing scientists and operators to react quickly.
- And control the accelerators and the beamlines directly.
- It’s very helpful to meet with users and decide on standards and vision we want to follow.

It is still a lot to do

It is still a lot to do

- We still need to visualize entire system and its subsystems.
- We should allow to directly modify values, not through popup widgets.
- Adding animation would improve visibility.
- Scientists want to have more control and more things on their synoptics.
- Display synoptics in web browser (MAX IV is close)