EPICS on the Web:
Modernizing graphical user interfaces

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Agenda

- Introduction
- Vision: EPICS for the Web
- Architecture Overview
- Tech-stack
- Examples
- Future
- Conclusion

Introduction

- HMIs as an essential component for successful operation
- Current situation at ELI – Beamlines
- Motivation for change

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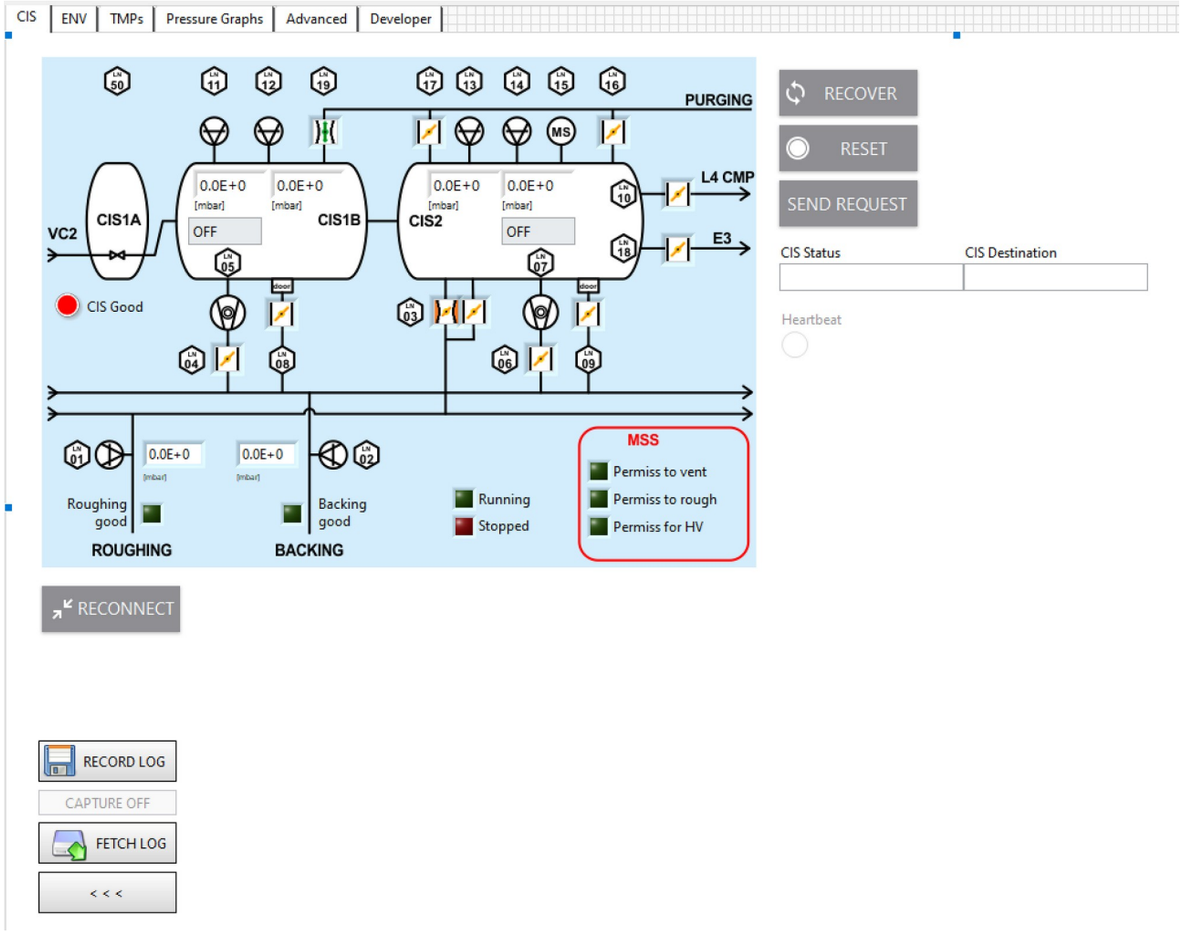
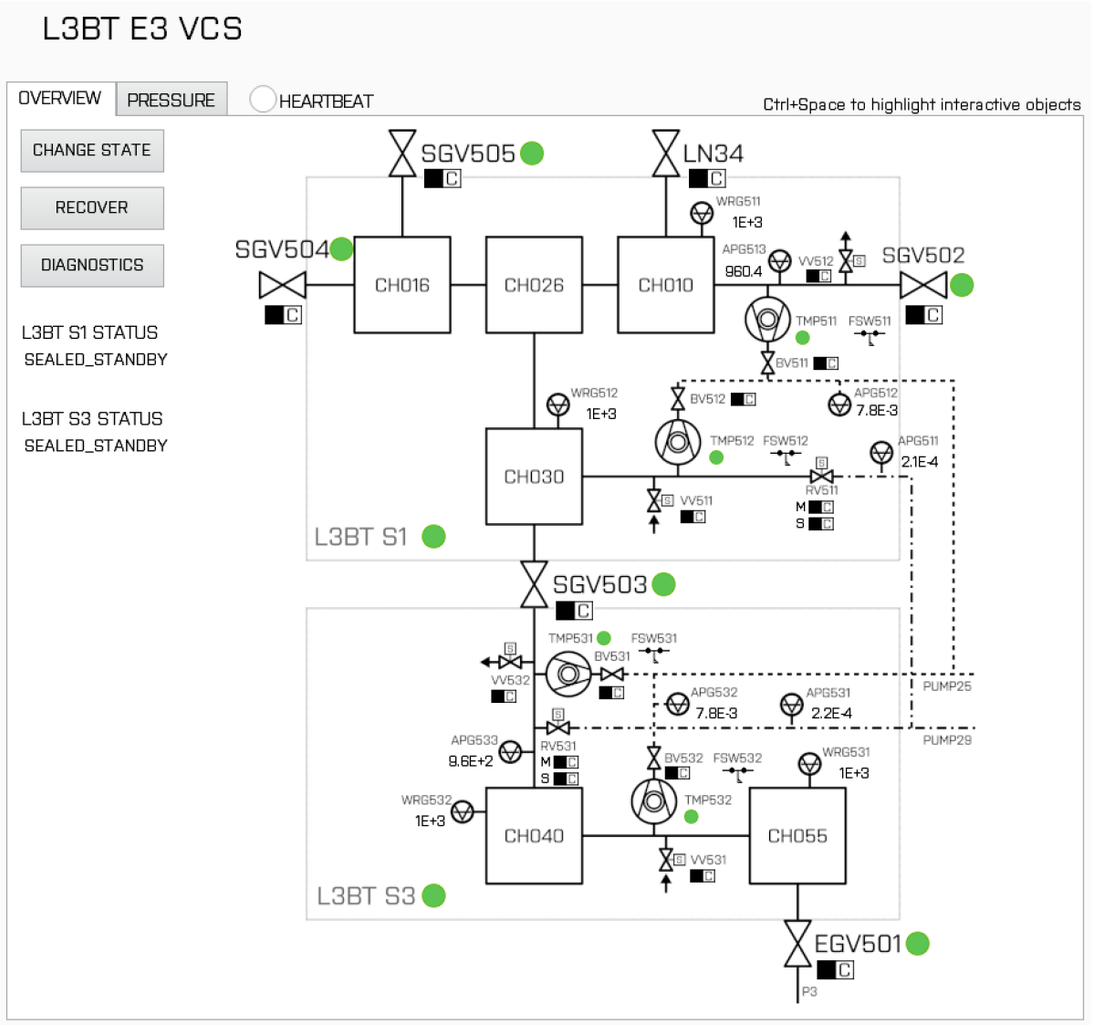
Current situation at ELI – Beamlines





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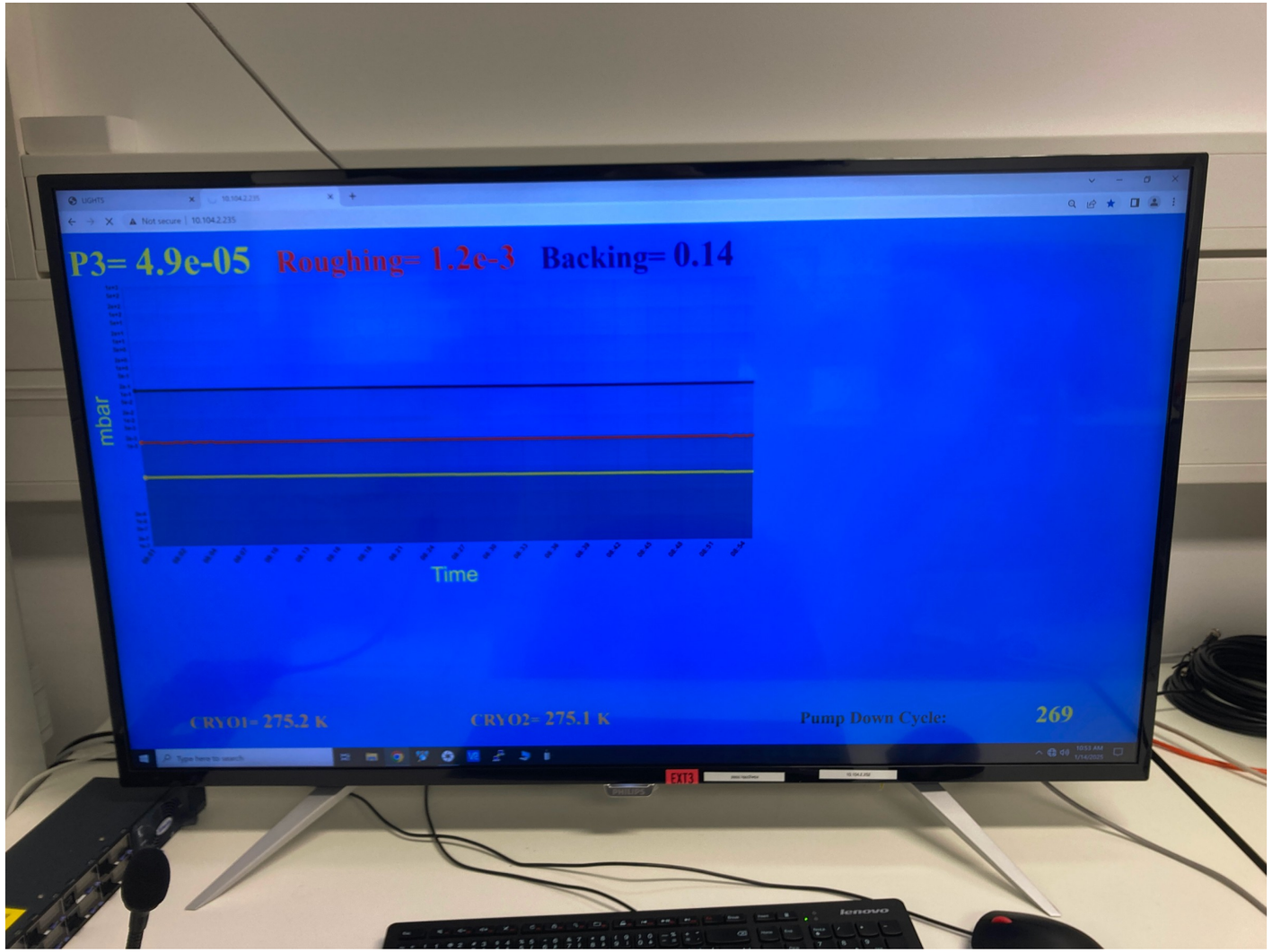

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Motivation for change

- Standardisation
- LabView limitations
- Deployment process
- Authentication
- Limitation of control from multiple locations at once
- UX Designer

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Vision: EPICS for the Web

- Use modern web technologies
- Web Server as an EPICS Web Gateway
- Web Client as a lightweight HMI
- Easy deployment

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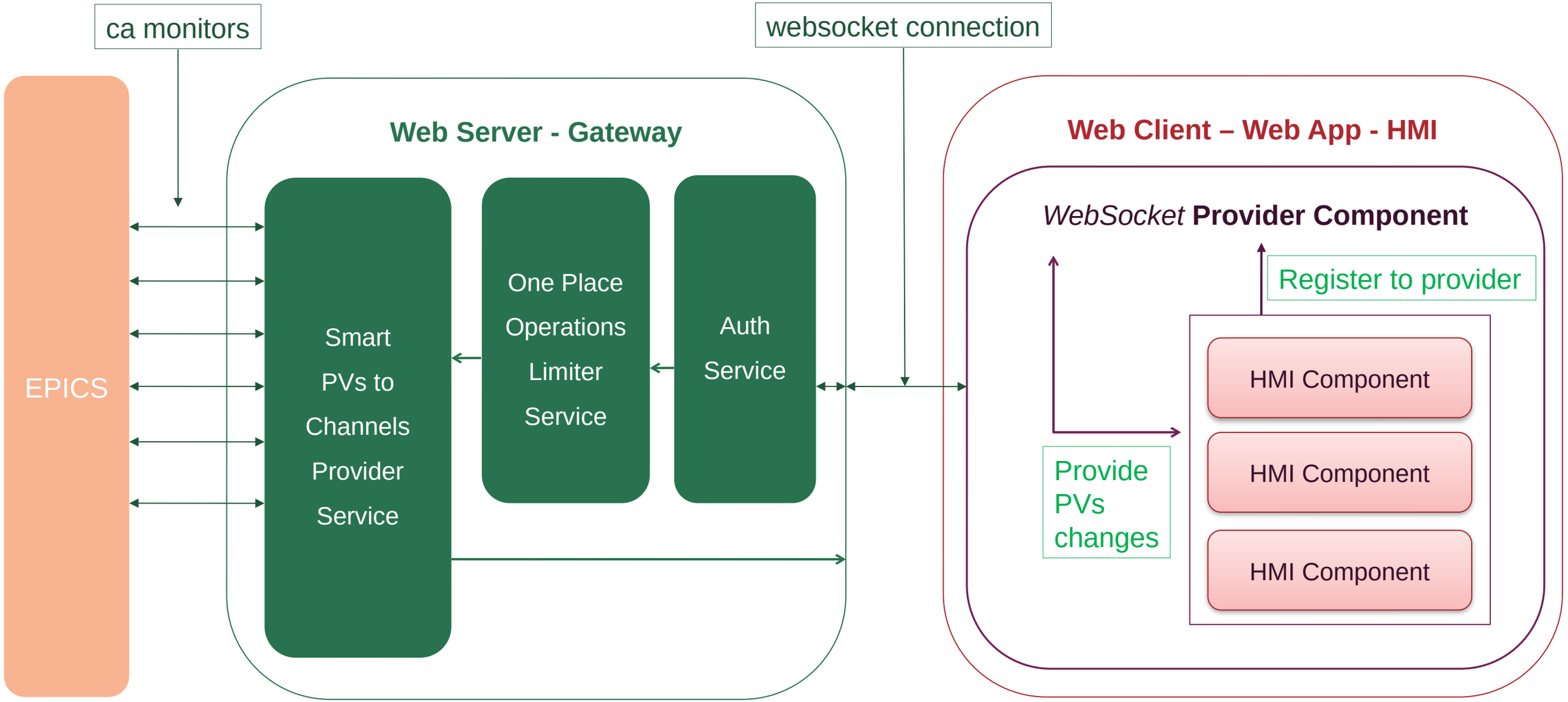
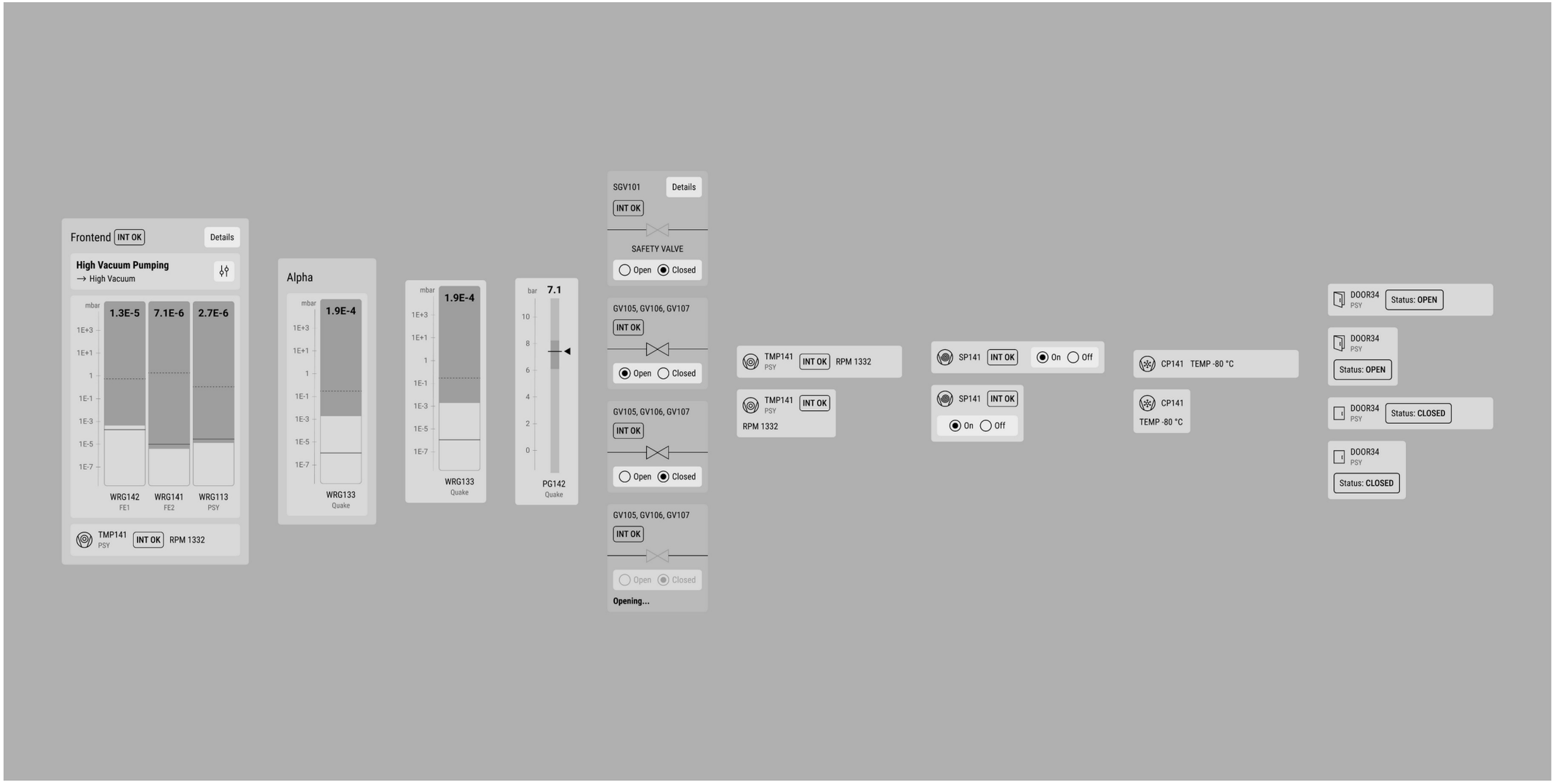
Architecture Overview



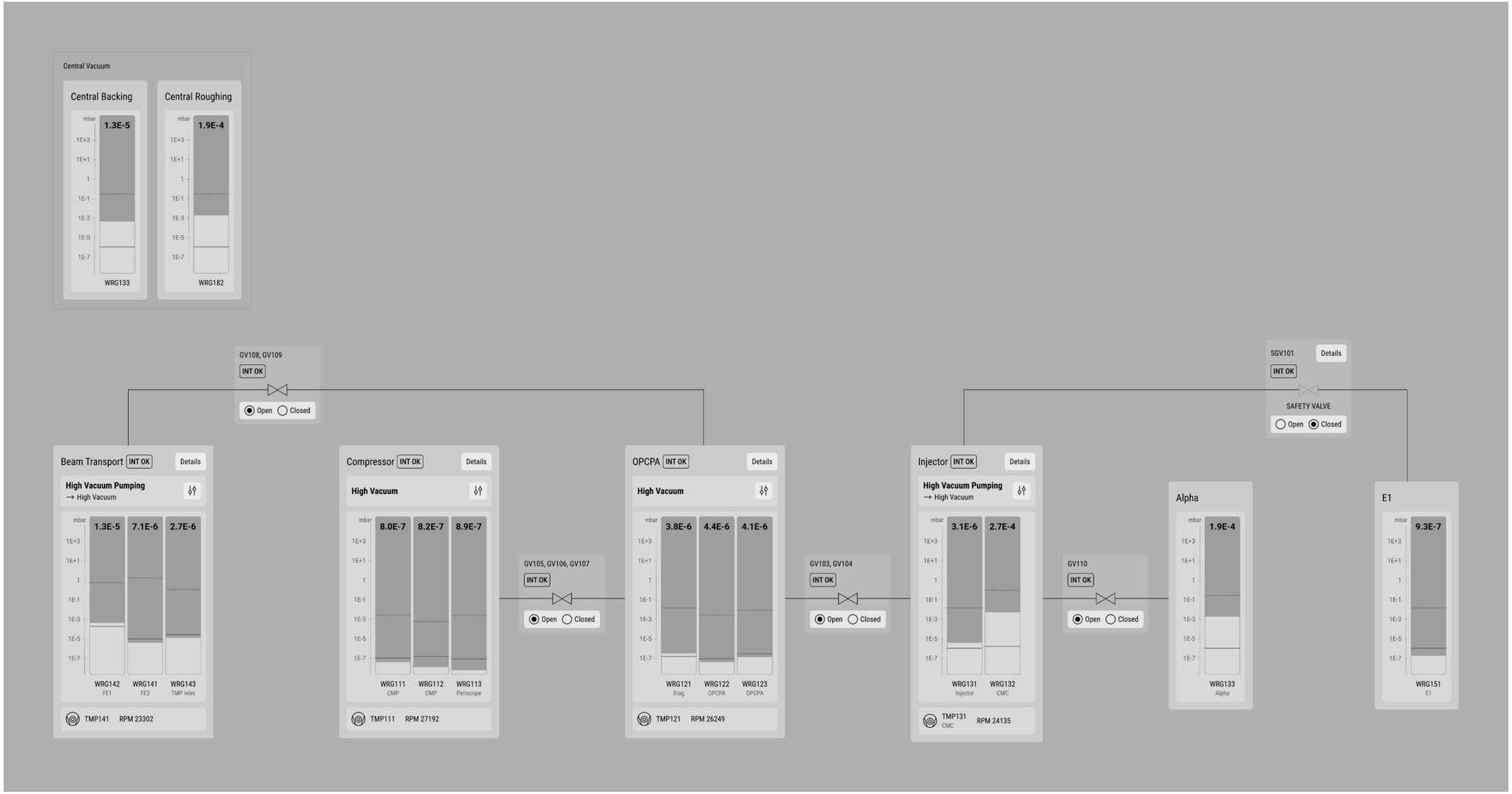
Tech-Stack

- Server side: Python, FastAPI, aioca
- Client side: Web Components, TypeScript

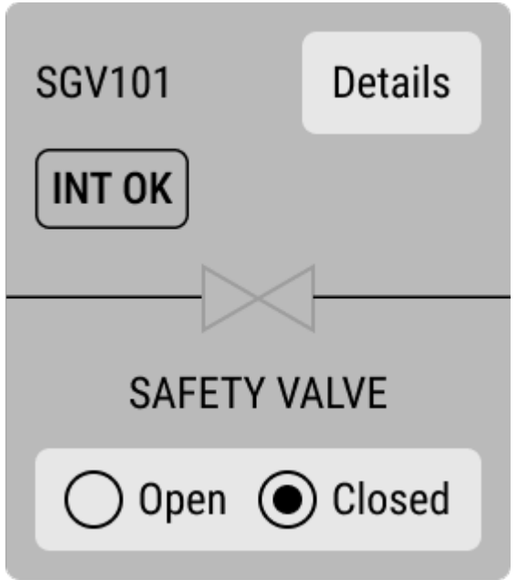
Examples

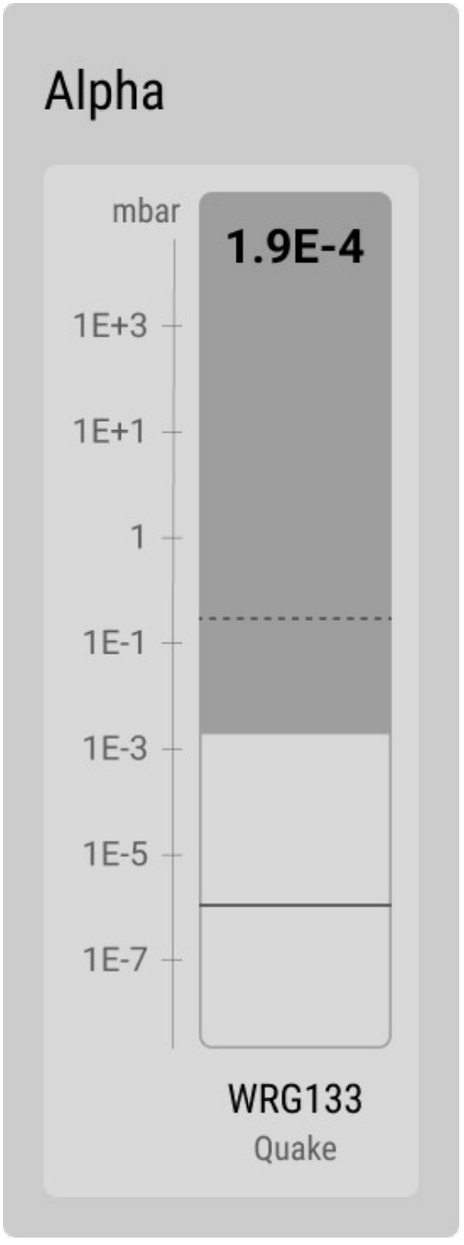

Frontend
INT OK
Details
High Vacuum Pumping
→ High Vacuum
mbar
1.3E-5
7.1E-6
2.7E-6
1E+3
1E+1
1
1E-1
1E-3
1E-5
1E-7
WRG142
FE1
WRG141
FE2
WRG113
PSY
TMP141
PSY
INT OK
RPM 1332
Alpha
mbar
1.9E-4
WRG133
Quake
mbar
1.9E-4
WRG133
Quake
bar
7.1
10
8
6
4
2
0
PG142
Quake
SGV101
Details
INT OK
SAFETY VALVE
Open
Closed
GV105, GV106, GV107
INT OK
Open
Closed
GV105, GV106, GV107
INT OK
Open
Closed
GV105, GV106, GV107
INT OK
Open
Closed
Opening...
TMP141
PSY
INT OK
RPM 1332
TMP141
PSY
INT OK
RPM 1332
SP141
INT OK
On
Off
SP141
INT OK
On
Off
CP141
TEMP -80 °C
CP141
TEMP -80 °C
DOOR34
PSY
Status: OPEN
DOOR34
PSY
Status: OPEN
DOOR34
PSY
Status: CLOSED
DOOR34
PSY
Status: CLOSED

Examples

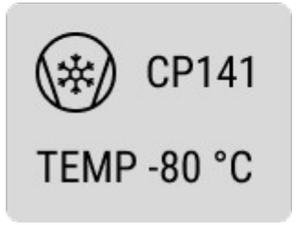

Central Vacuum
Central Backing
1.3E-5
WRG133
Central Roughing
1.9E-4
WRG182
GV108, GV109
INT OK
Open
Closed
SGV101
Details
INT OK
SAFETY VALVE
Open
Closed
Beam Transport
INT OK
Details
High Vacuum Pumping
→ High Vacuum
1.3E-5
7.1E-6
2.7E-6
WRG142
FE1
WRG141
FE2
WRG143
TMP Inlet
TMP141
RPM 23302
Compressor
INT OK
Details
High Vacuum
8.0E-7
8.2E-7
8.9E-7
WRG111
CMP
WRG112
CMP
WRG113
Periscope
TMP111
RPM 27192
GV105, GV106, GV107
INT OK
Open
Closed
OPCPA
INT OK
Details
High Vacuum
3.8E-6
4.4E-6
4.1E-6
WRG121
Diag
WRG122
OPCPA
WRG123
OPCPA
TMP121
RPM 26249
GV103, GV104
INT OK
Open
Closed
Injector
INT OK
Details
High Vacuum Pumping
→ High Vacuum
3.1E-6
2.7E-4
WRG131
Injector
WRG132
CMC
TMP131
CMC
RPM 24135
GV110
INT OK
Open
Closed
Alpha
1.9E-4
WRG133
Alpha
E1
9.3E-7
WRG151
E1

Examples

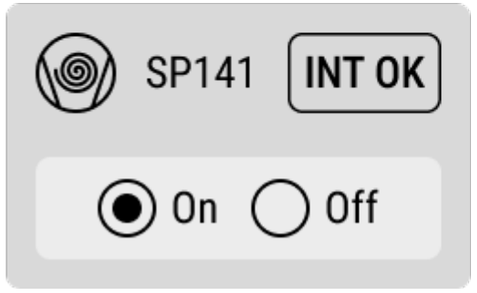

SGV101
Details
INT OK
SAFETY VALVE
Open
Closed


Alpha
mbar
1.9E-4
1E+3
1E+1
1
1E-1
1E-3
1E-5
1E-7
WRG133
Quake


CP141 TEMP -80 °C

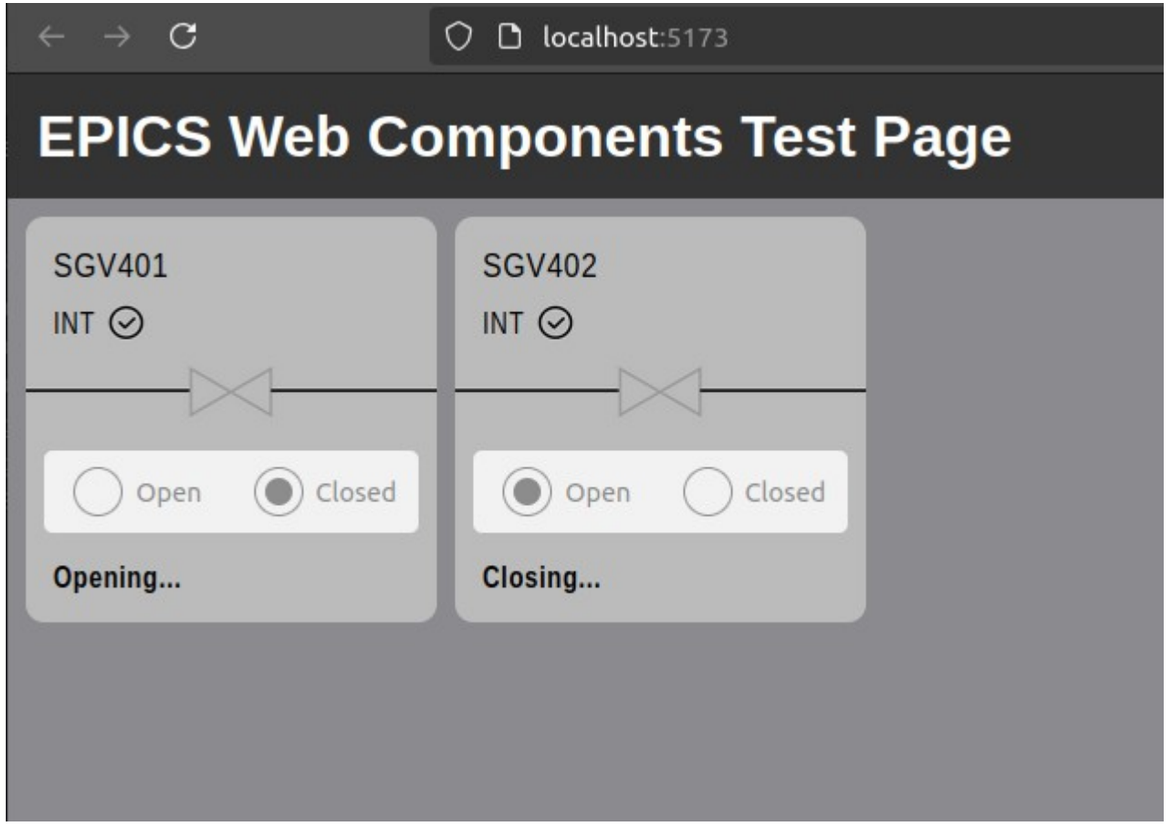

CP141
TEMP -80 °C


SP141
INT OK
On
Off


SP141
INT OK
On
Off

Examples

```
<body>
  <h1>EPICS Web Components Test Page</h1>
  <ewc-web-socket-provider url="ws://localhost:8000/ws/pvs">
    <ewc-valve pv-prefix="L4-CIS-SGV401" header="SGV401"></ewc-valve>
    <ewc-valve pv-prefix="L4-CIS-SGV402" header="SGV402"></ewc-valve>
  </ewc-web-socket-provider>
  <script type="module" src="./main.ts"></script>
</body>
```



Future

- Demo project
- Server side services implementations
- Web Components library
- Complex client application

Conclusion

- We still need to perform more load/stress tests
- Hiring of the UX designer was a great choice – unified UI design
- The design of new GUIs should always go through the UX designer
- Implementation and deployment should then be very fast
- Satisfied operators and less workload for technical support

Thank you for your attention!

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