

Applications

Operators Training

15.01.2019

Christian Hillbricht

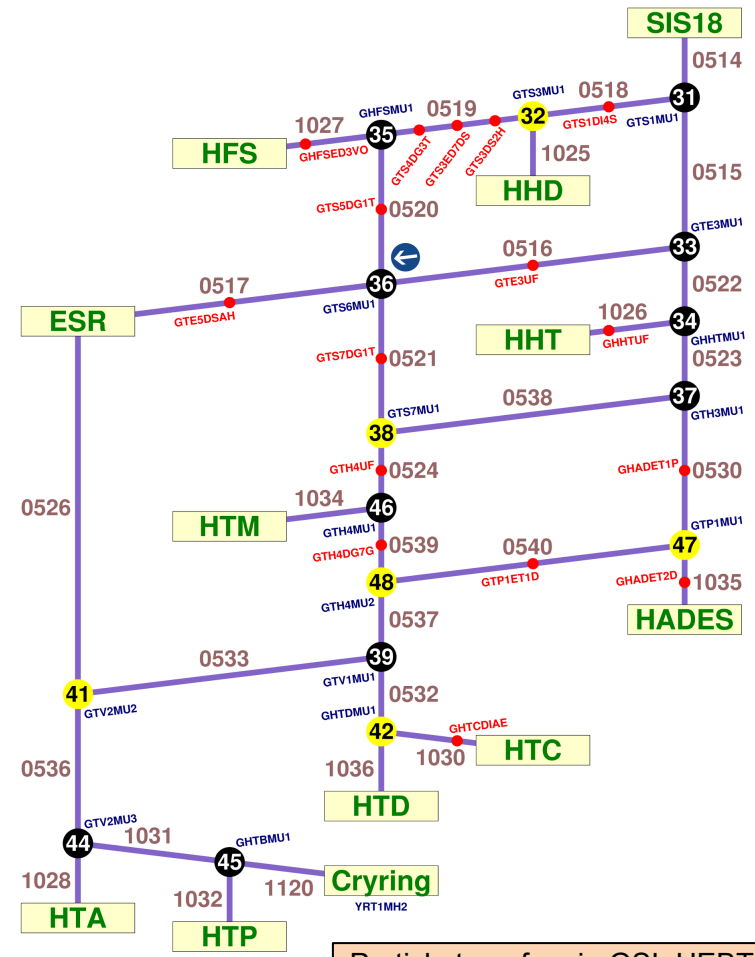
Terminology (I)

- Particle Transfer
 - Section of accelerator with identical timing

- Beam Process
 - Temporal section within a Particle Transfer with specific purpose (e.g. injection, ramp, extraction, transfer, ...)

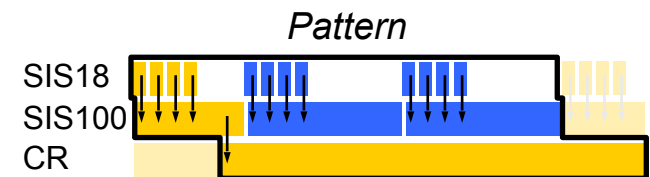
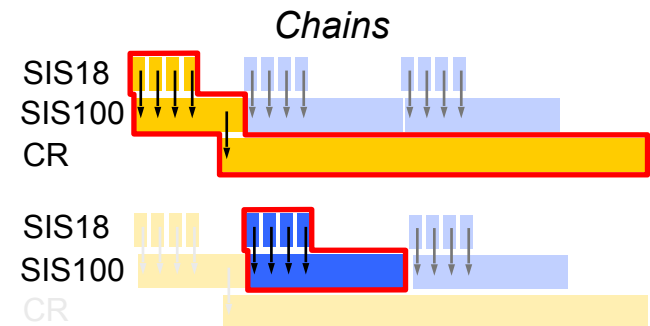
- Parameter
 - Physics or hardware quantity
 - Associated with a device

- Setting
 - Value of a parameter

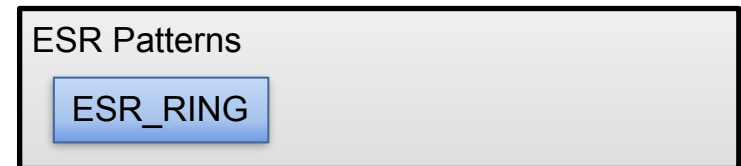
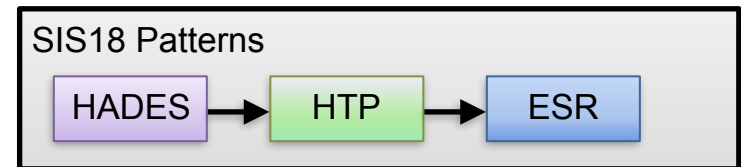


Particle transfers in GSI_HEBT: from forking point to forking point

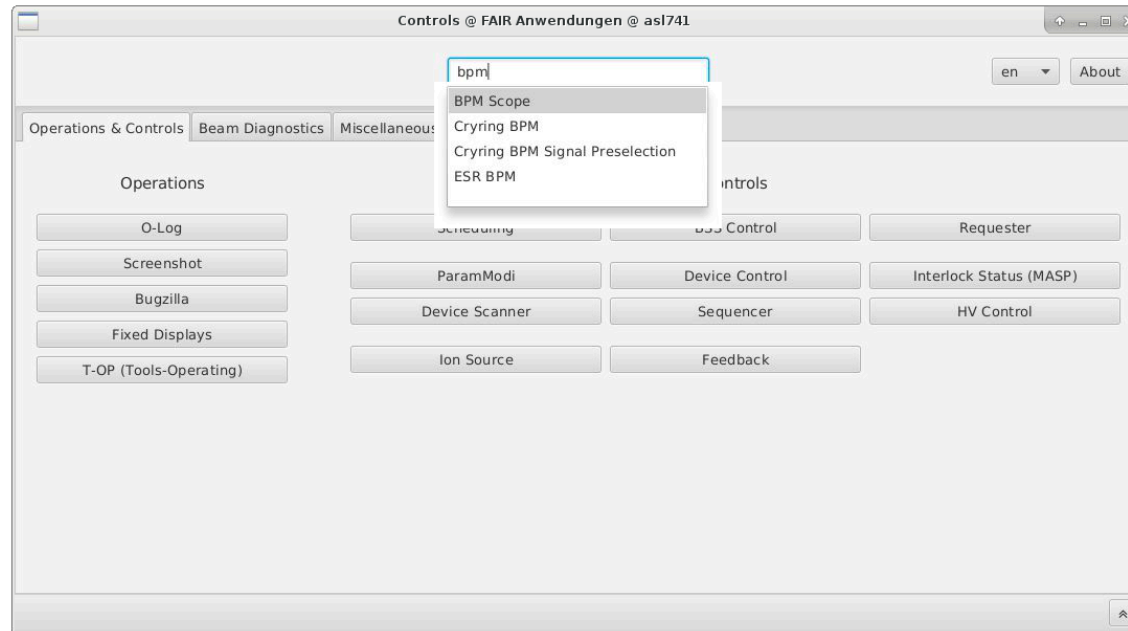
- Beam Production Chain (BPC)
 - Organizational structure to manage parallel operation and beam transfer through FAIR accelerator facility
 - Defines sequence and parameters of beam line from the ion-source up to an experiment
- Pattern
 - Grouping of Beam Production Chains that are executed periodically
- For 2018
 - One BPC per Pattern
 - Multiple Patterns in Round Robin
 - Similar to working with Virtual Accelerators



- Pattern Groups
 - Allow parallel pattern operation in disjunct parts of the facility.
 - Exist for scheduled patterns only.
 - For ESR operation patterns in SIS18 and ESR pattern group must be coupled.



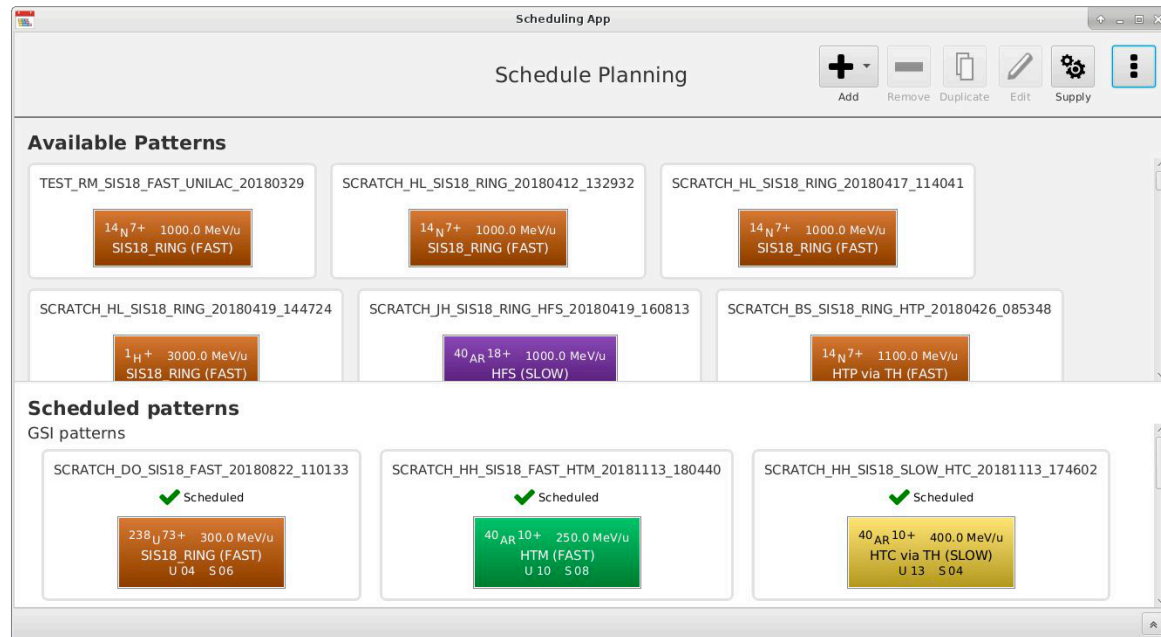
- Operations & Controls applications
- Beam diagnostics applications
- Misc. applications
- Fixed Display applications
- Beam-based feedback applications
- Storage Ring application
- FRS applications



- Launch apps available in the Main Control Room
- Launch apps using search or buttons
- Apps organized in tabs and groups

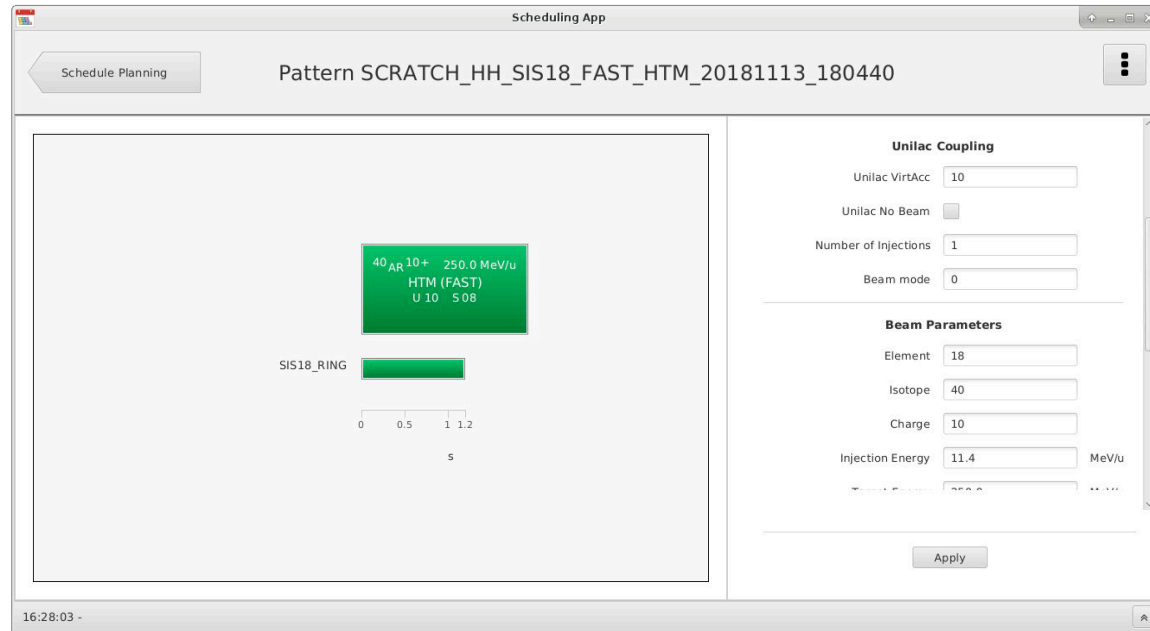
Developer: A. Schaller / C. Hillbricht

Scheduling application



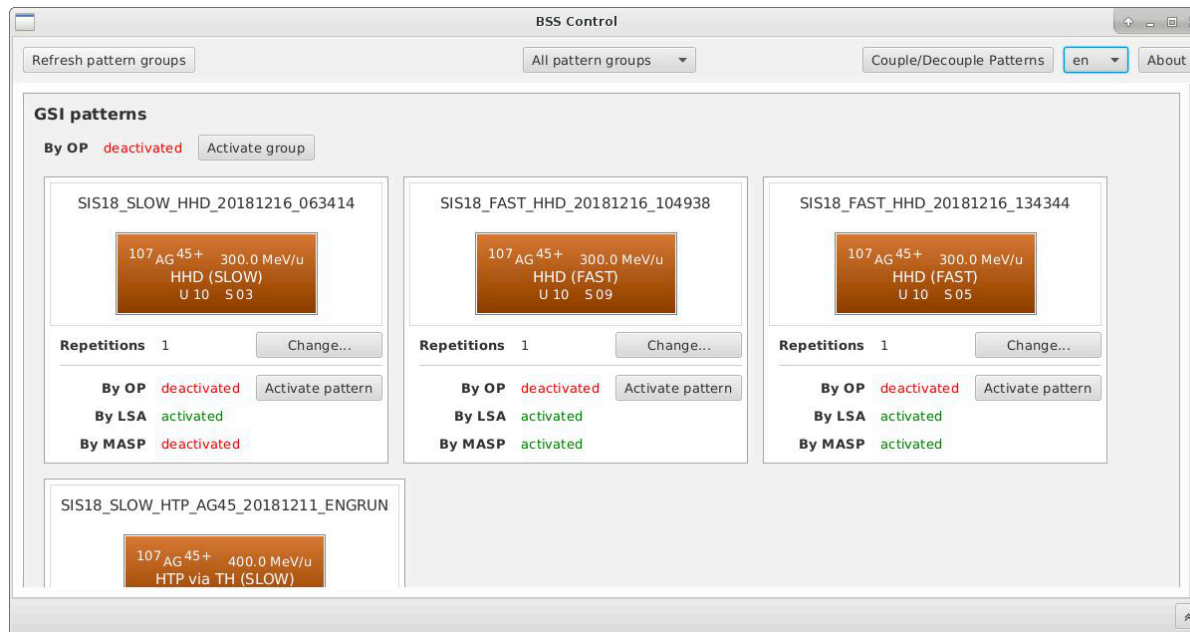
- Add patterns to schedule
- Remove patterns from schedule
- Change pattern order
- Supply facility

Product Owner: C. Wetzel
Developer: A. Walter



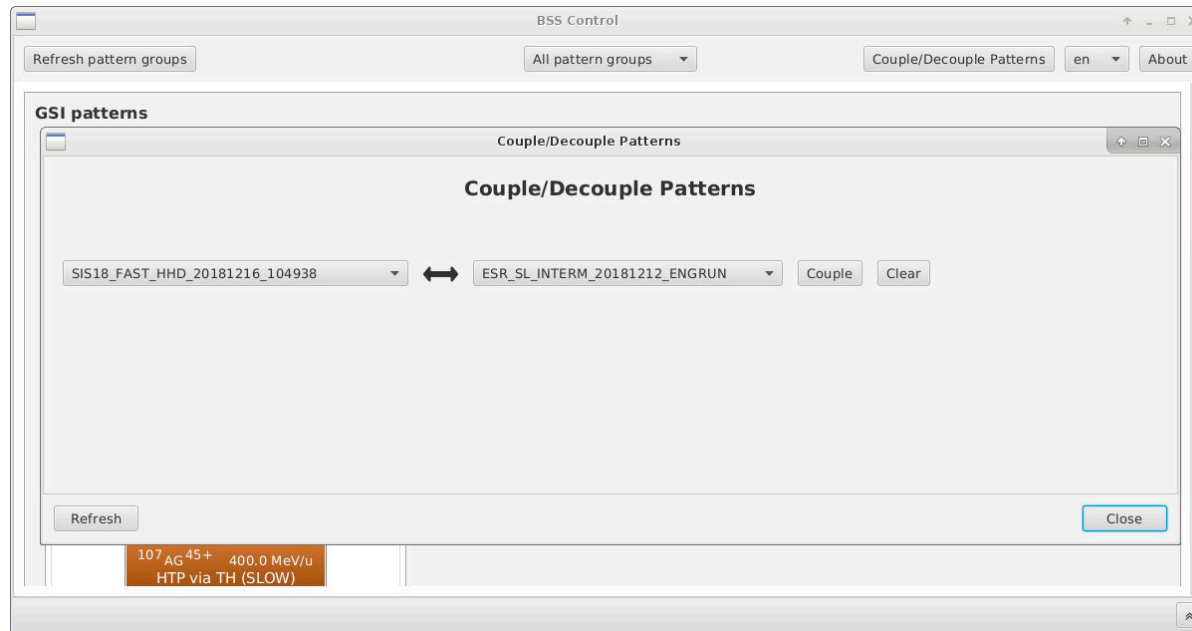
- Create chains and add them to selected pattern
 - Initialize chains by entering top level parameters

Product Owner: C. Wetzel
Developer: A. Walter



- Monitor statuses of patterns and chains
- Set repetition count
- (De-)activate patterns and pattern groups

Product Owner: C. Wetzel
Developer: A. Walter

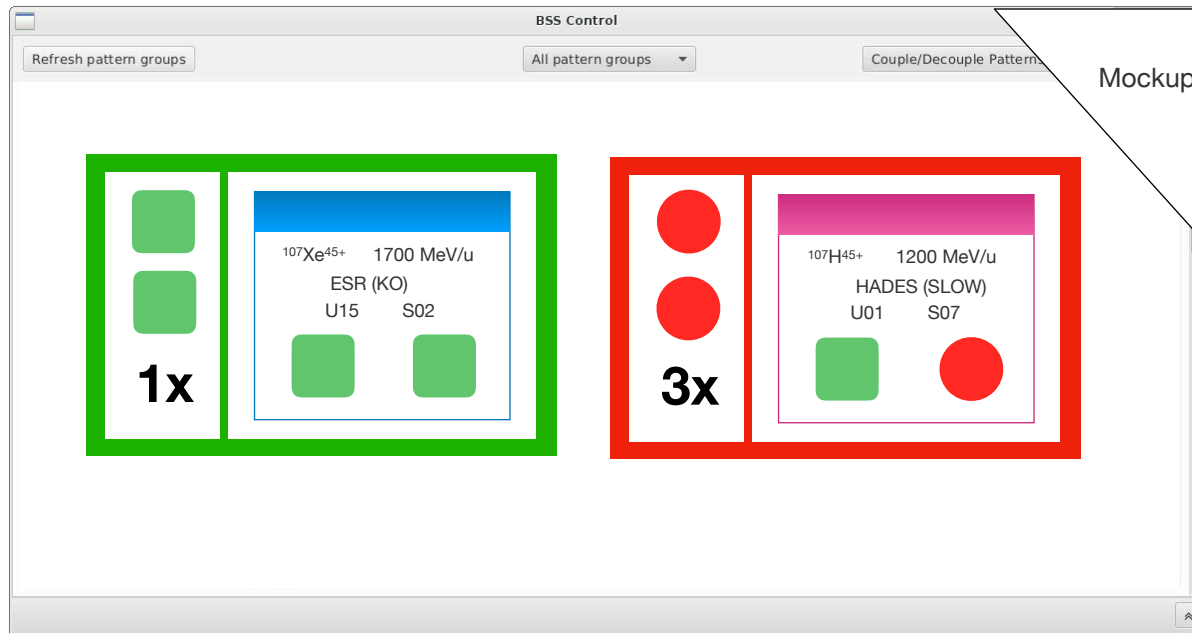


- SIS18 and ESR patterns must be coupled for proper operation
- Coupling works for resident patterns only.
 - Uncouple coupled pattern before removal.

Product Owner: C. Wetzel
Developer: A. Walter

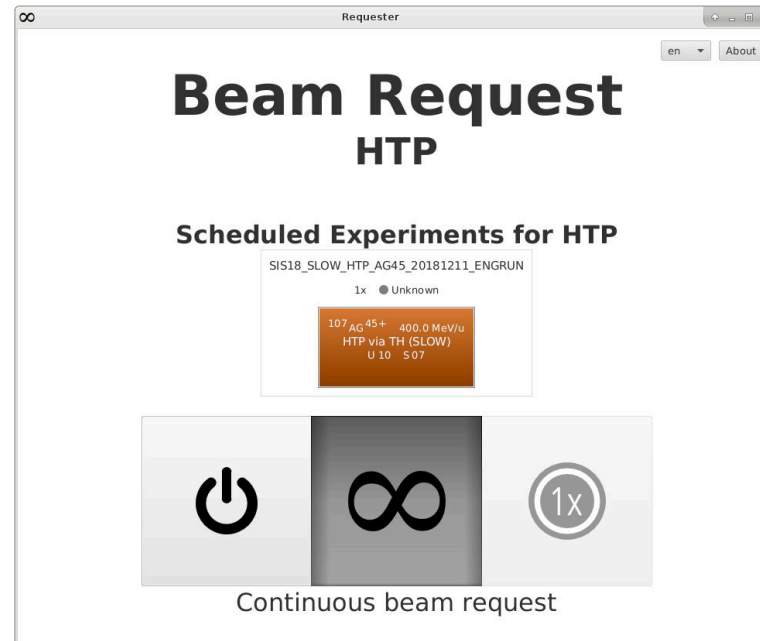


Planned



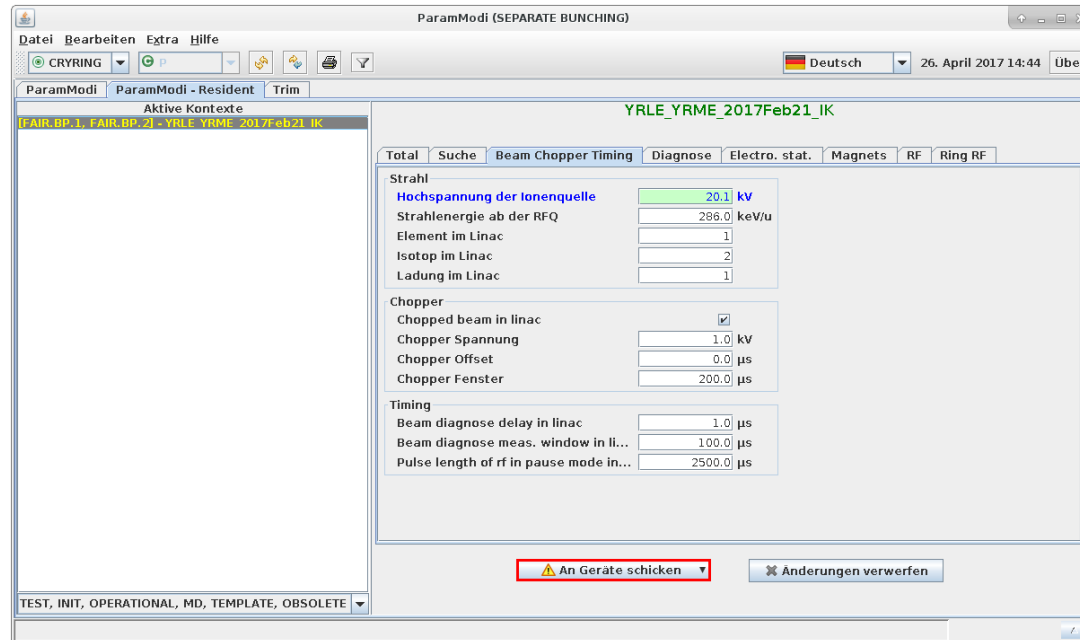
- Improved status
 - Display statuses visually
 - Display running status
 - Ready status (later)

Product Owner: C. Wetzel
Developer: A. Walter



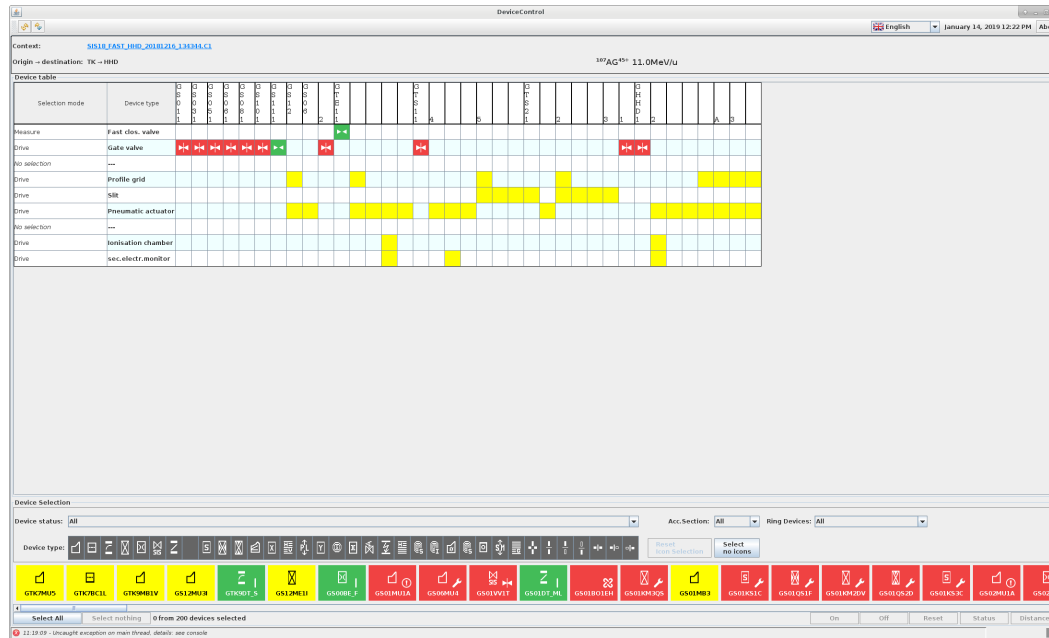
- Replacement of the old “Anforderungseinheit”
- Requests are now handled in Software by the Request Processor
- A REST interface is also available instead of the Application (e.g. CaveM)

Developer: A. Walter



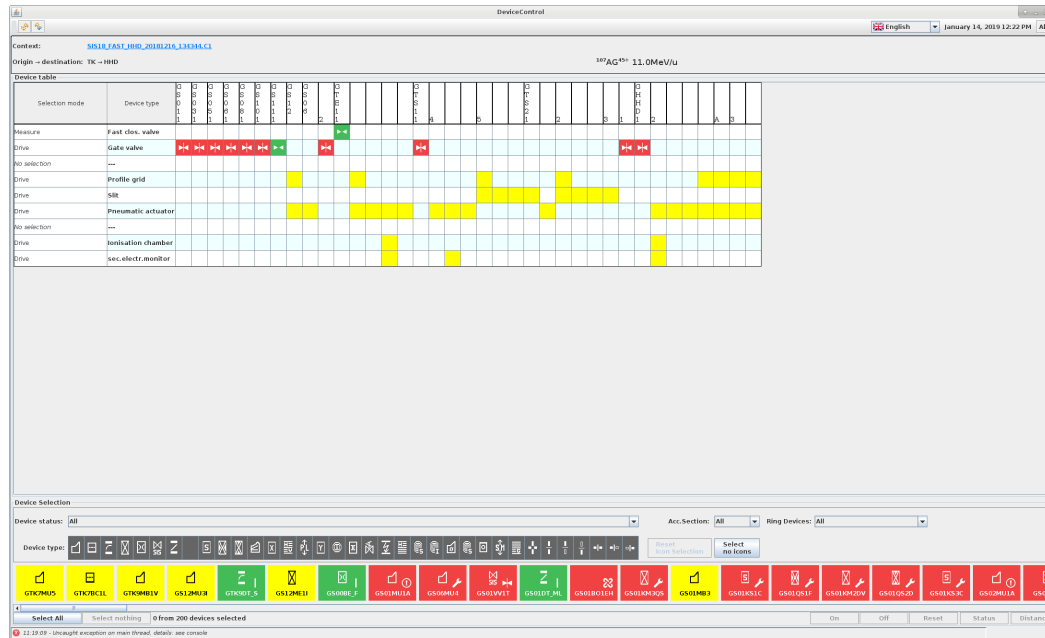
- Central Application for trimming set values
- View the settings on all levels of the hierarchy (plus expert trim)

Product Owner: C. Böhm
Developer: A. Walter



- Table of beam diagnosis devices
 - Position status
 - Functions for movable devices
- List of all devices with status and basic operations

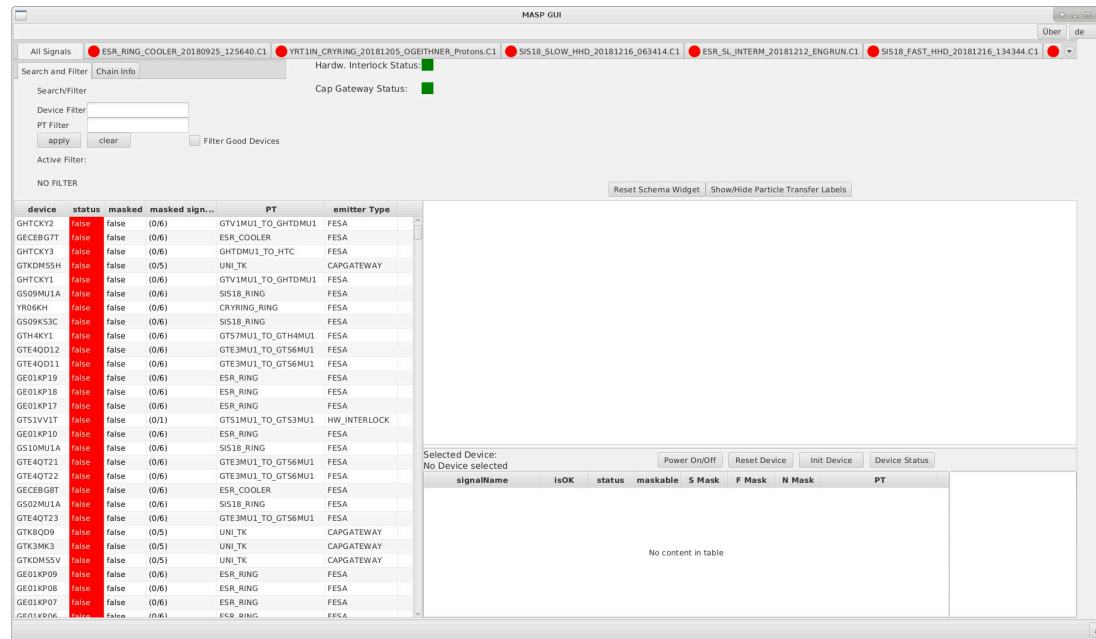
Product Owner: M. Stein
Developer: S. Heymell



- In the past
 - Based on beam process selection
 - Monitor values (set-actual-comparison and similar)
- Currently
 - Based on chain selection
 - No monitoring

Product Owner: M. Stein
Developer: S. Heymell

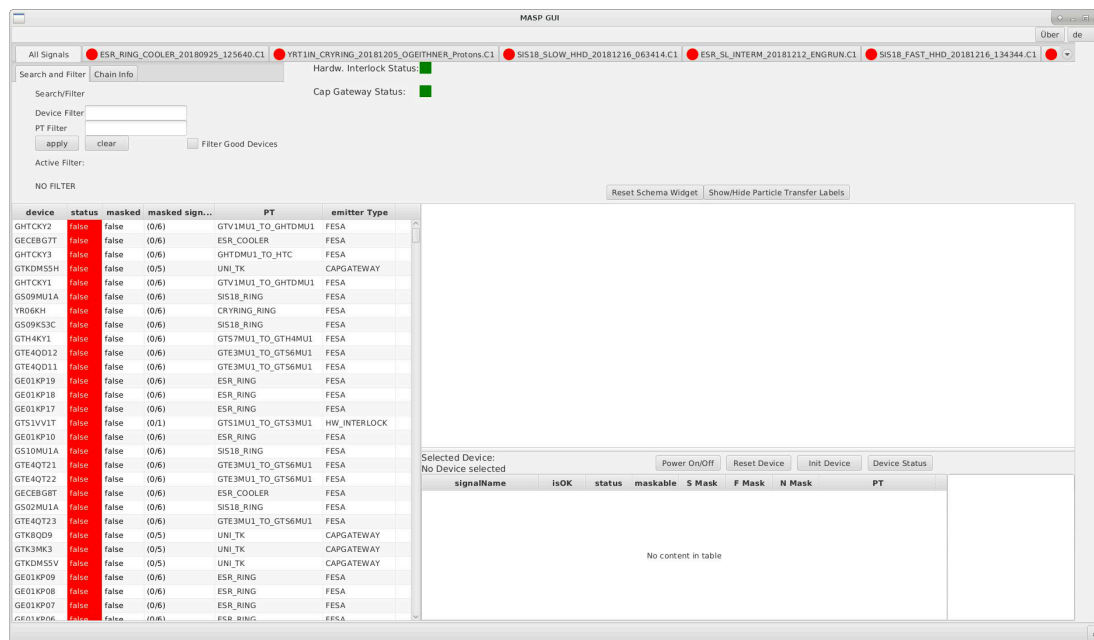
MASP UI (Working title)



- MASP = Master Accelerator Status Processor
- Displays devices which prevent chain execution
- Operations like Reset or Init for solving a status problem
- MASP is now armed

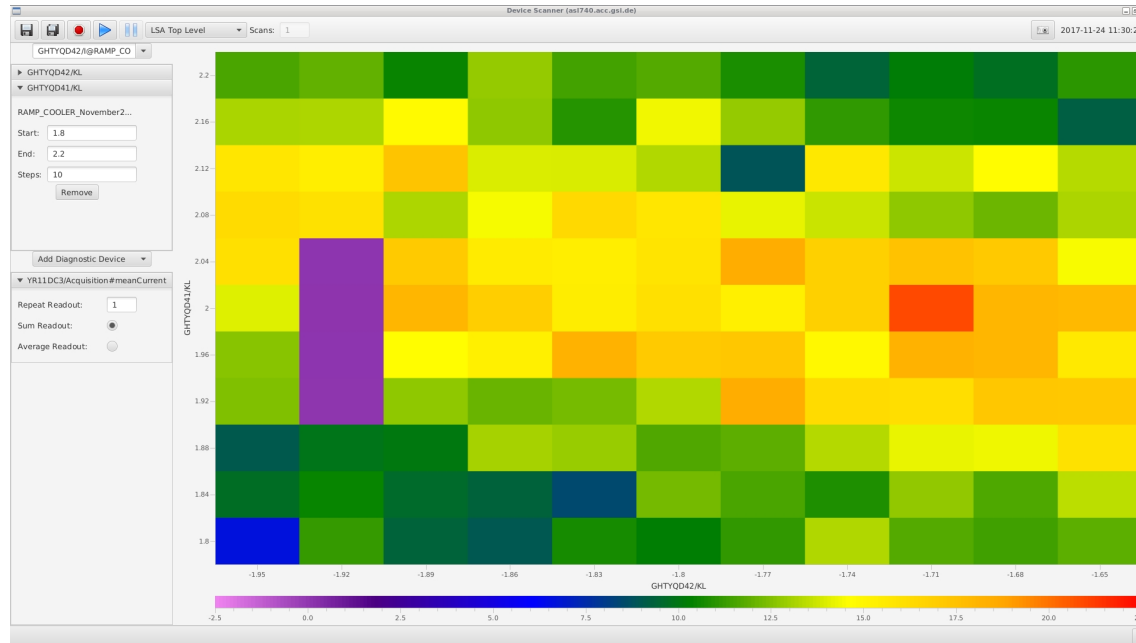
Product Owner: Dr. P. Schütt
Developer: M. Müller

MASP UI (Working title)



- Planned:
 - Masking devices
 - Set beam mode

Product Owner: Dr. P. Schütt
Developer: M. Müller

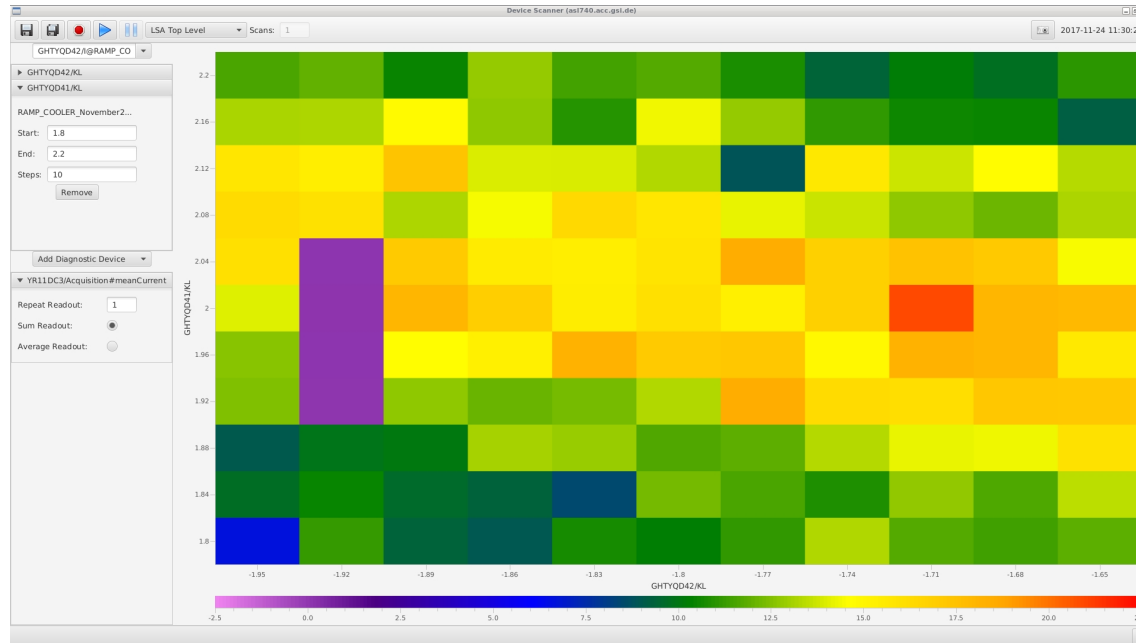


- Passing-through of parameters
- Selectable diagnose device
- Different scan algorithms: Brute-force or Genetical

Developer: W. Geithner

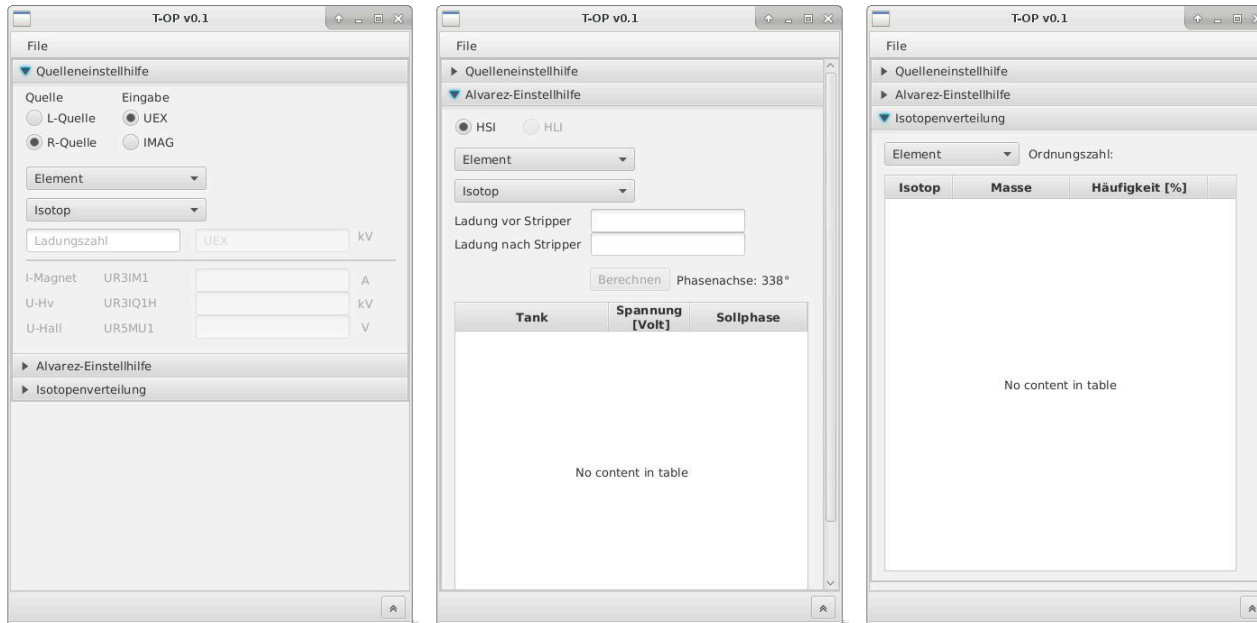


Planned



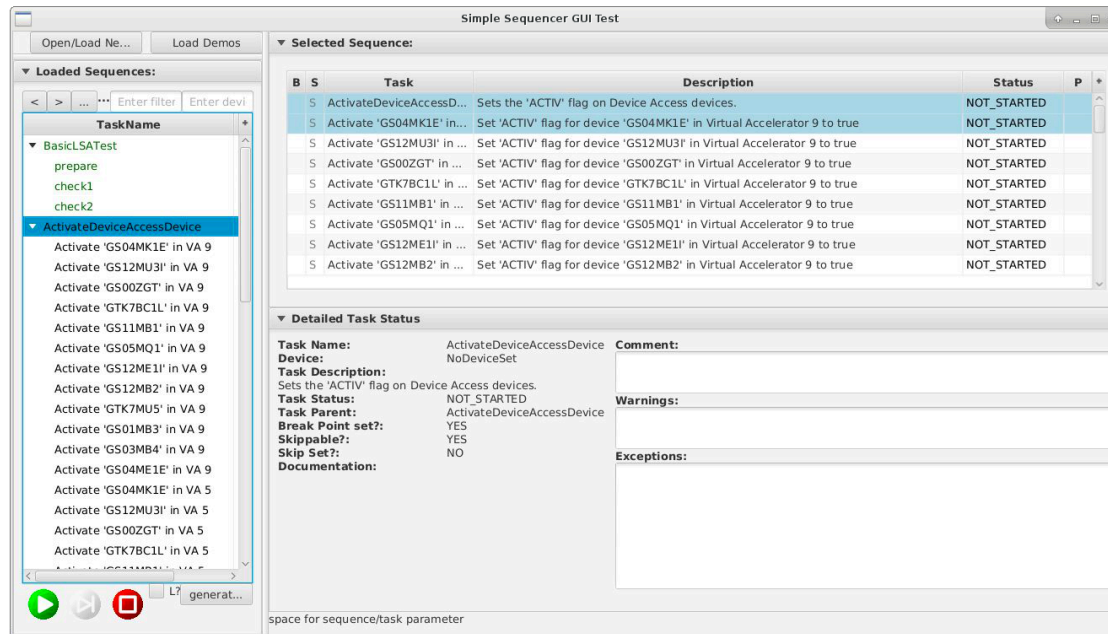
- Read stored sessions
- Support for device access devices
- More algorithms
- Manual scan

Developer: W. Geithner



- Successor of UNIABC
- Small helpers for setting up ion sources and Alvarez
- Isotope distribution of elements

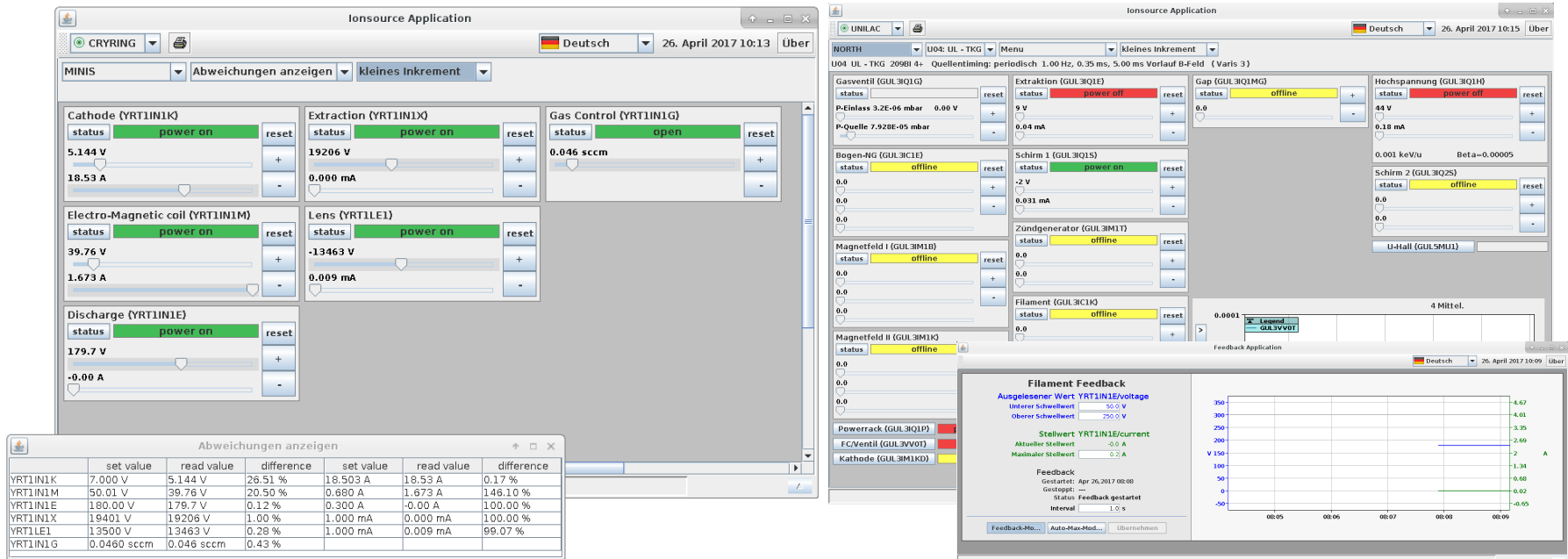
Product Owner: H. Rödl
Developer: M. Ohlig



- Execute a bunch of tasks, can be combined to larger sub-sequences
- Saves a lot of manual work
- Helps with diagnosis and to clearly identify problems

Developer: R. Steinhagen

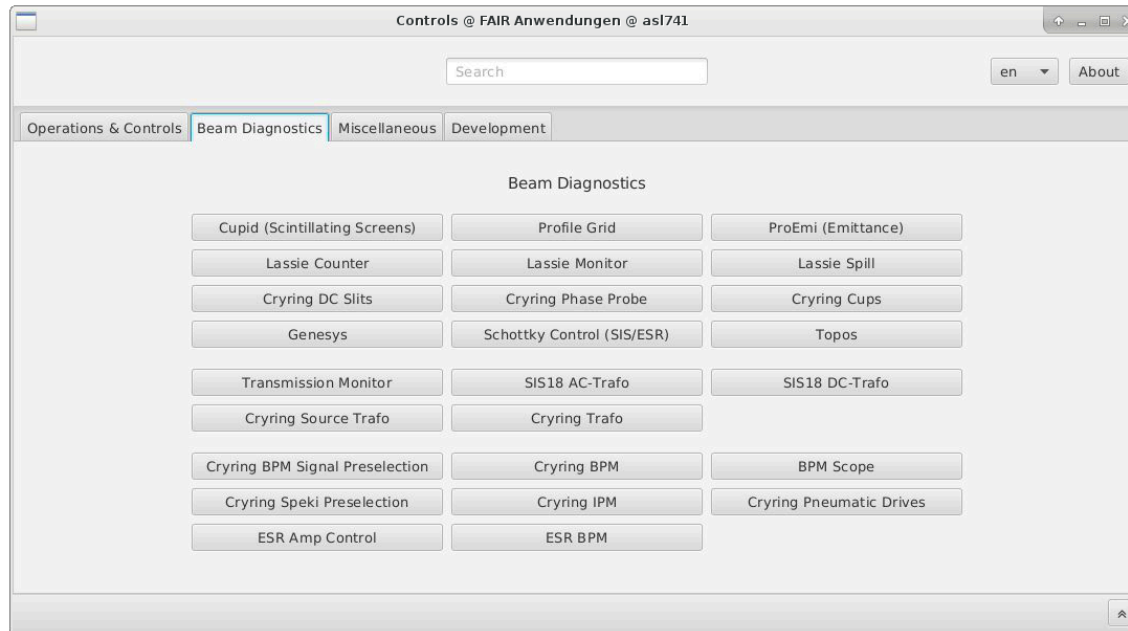
Ion Source application



Abweichungen anzeigen						
	set value	read value	difference	set value	read value	difference
YRT1IN1K	7.000 V	5.144 V	26.51 %	18.503 A	18.53 A	0.17 %
YRT1IN1M	50.01 V	39.76 V	20.50 %	0.680 A	1.673 A	146.10 %
YRT1IN1E	180.00 V	179.7 V	0.12 %	0.300 A	-0.00 A	100.00 %
YRT1IN1X	19401 V	19206 V	1.00 %	1.000 mA	0.000 mA	100.00 %
YRT1LE1	13500 V	13463 V	0.28 %	1.000 mA	0.009 mA	99.07 %
YRT1IN1G	0.0460 sccm	0.046 sccm	0.43 %			

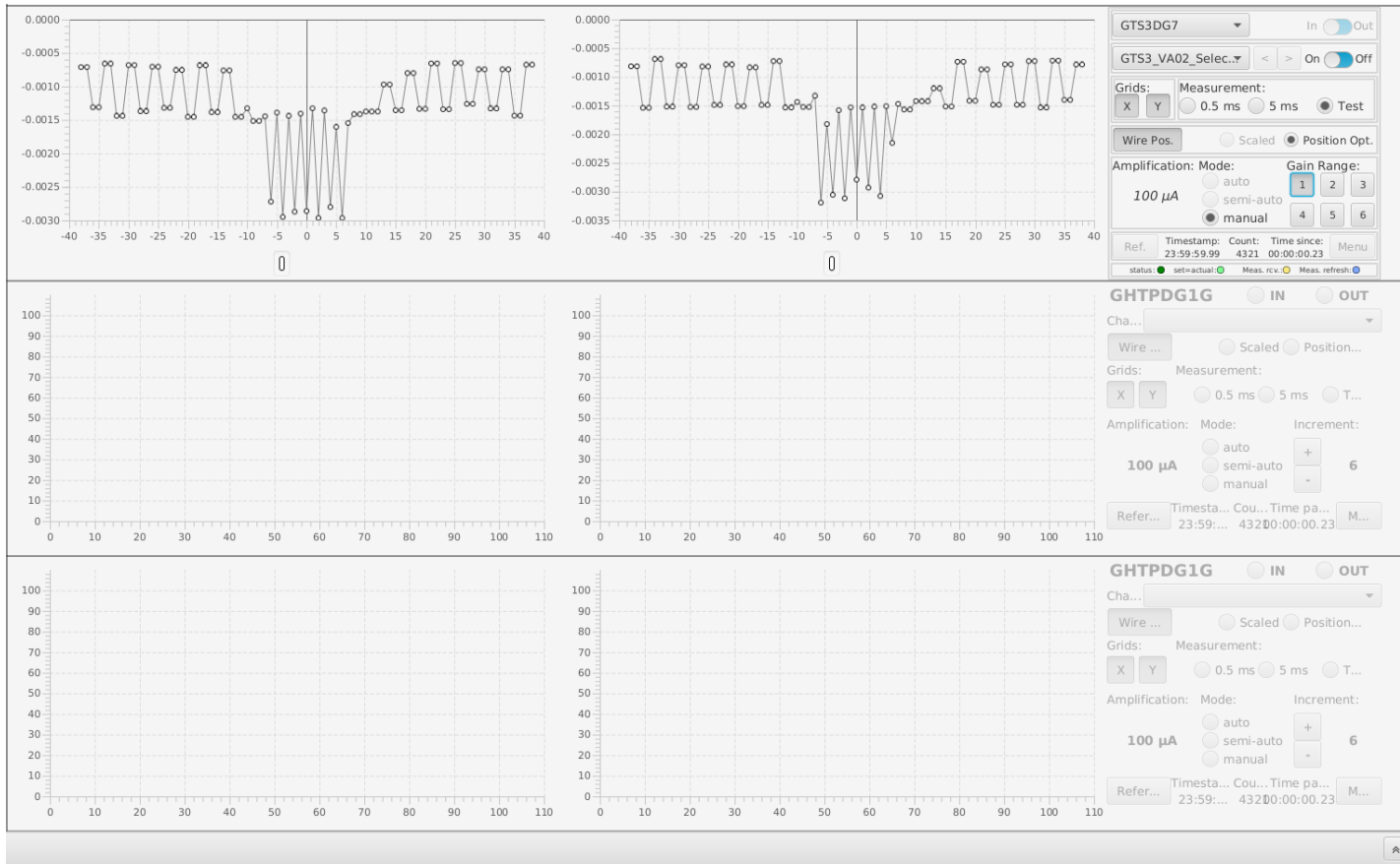
- Generic Ion Source Program for FAIR
 - At Crying (operational)
 - At Unilac North/South (first prototype)
- Feedback Application for Crying Ion Source

Product Owner: Dr. A. Adonin
Developer: B. Grasmück



- Mainly provided by beam diagnostics Dept.
- Not covered in this presentation

Profile Grid Application



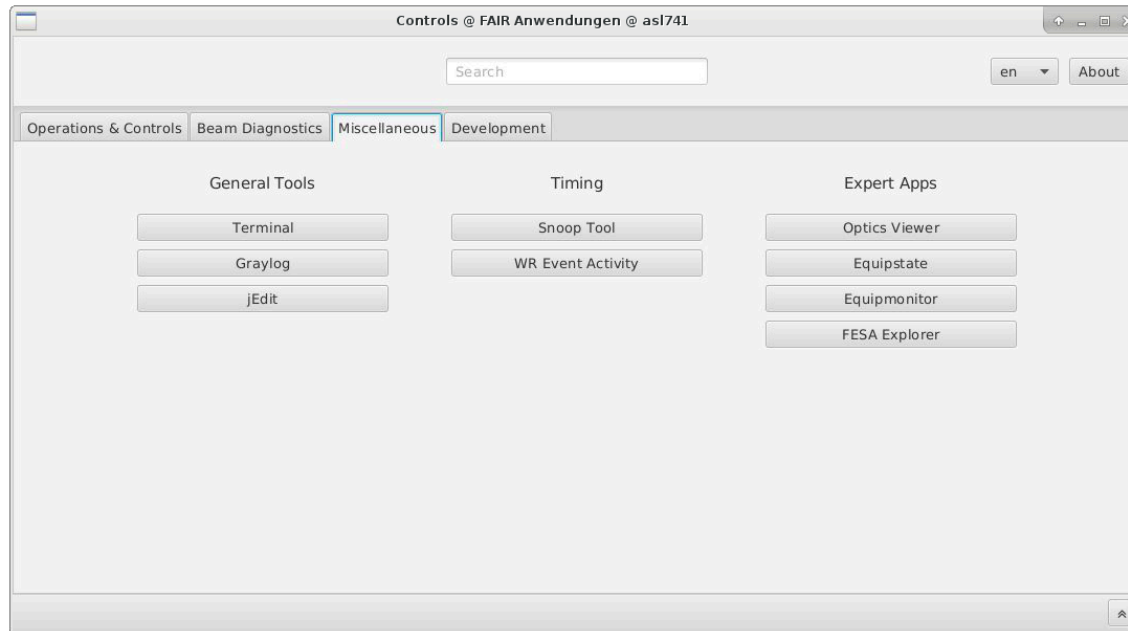
- Remake of the existing Profile Grid Application

Product Owner: M. Ohlig
Developer: M. Stein

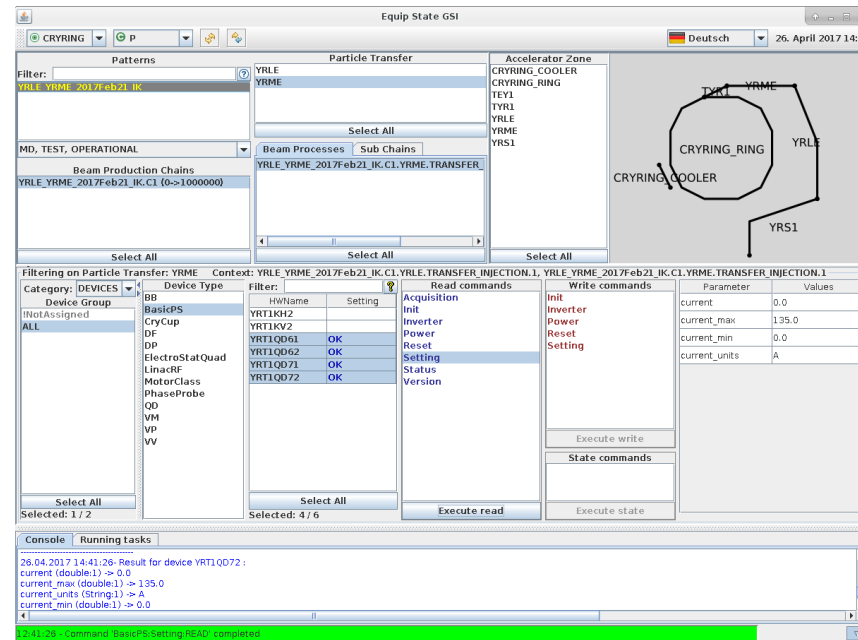


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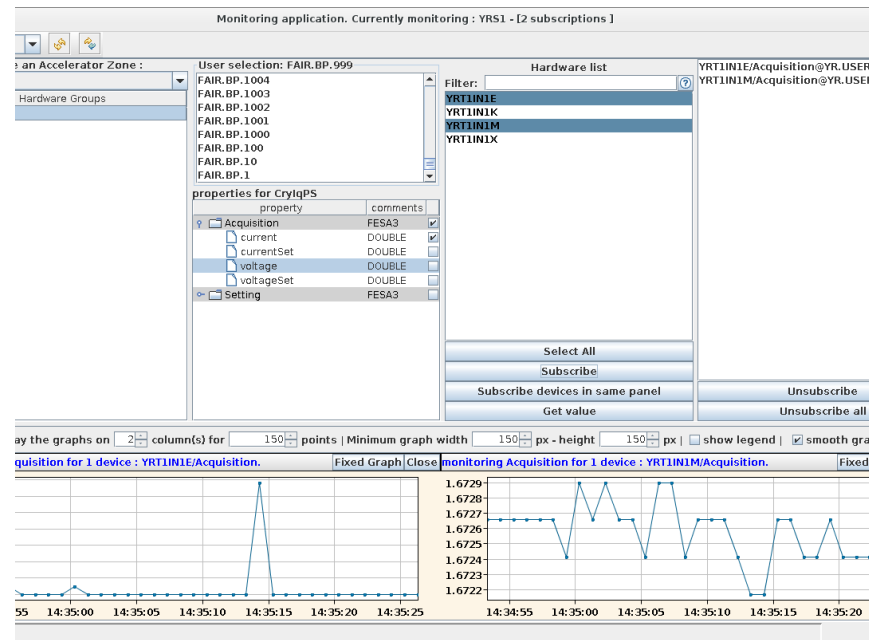
- Beam Transmission Monitor application
 - Implementation start delayed
 - Technical base not ready
- Digitizer App
 - Displays digitized analog signals



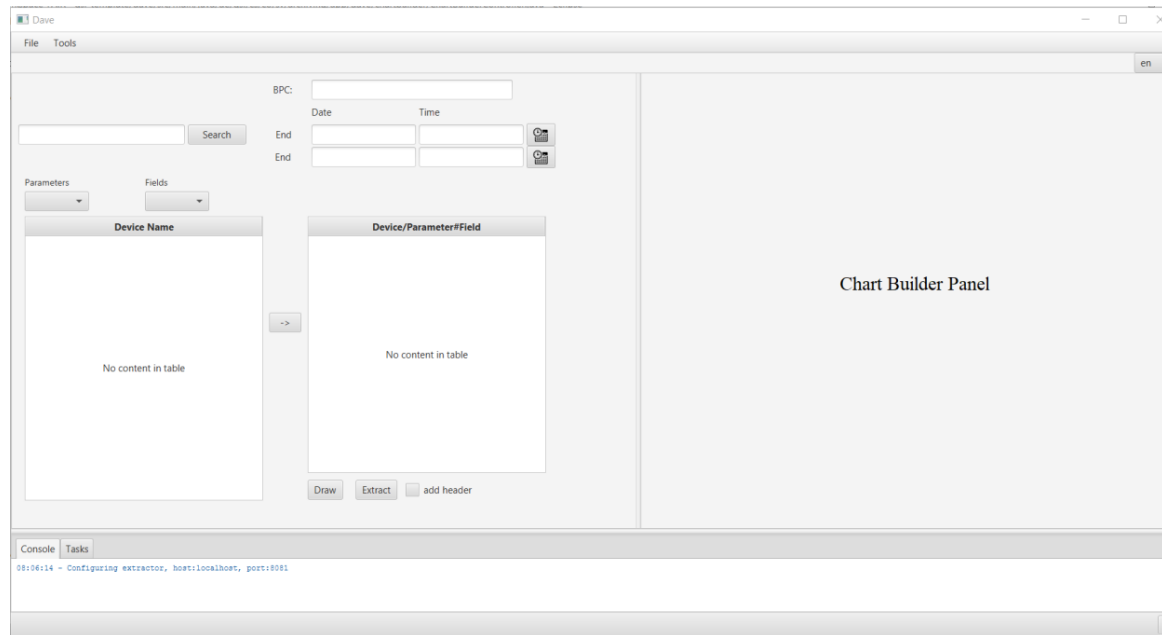
- General tools
- Timing - is timing running and if so, where?
- Expert applications



- EquipState: Set/Read all properties of the devices (comparable to FESA Explorer, bit less „low-level“)
- Used for Dry Runs, Commissioning, Error diagnosis



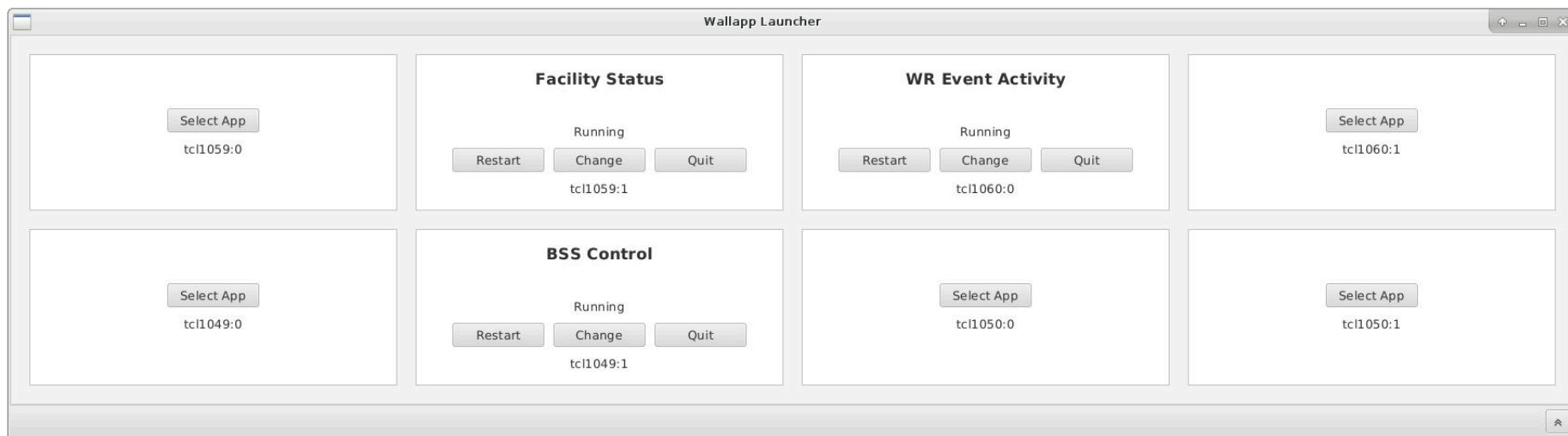
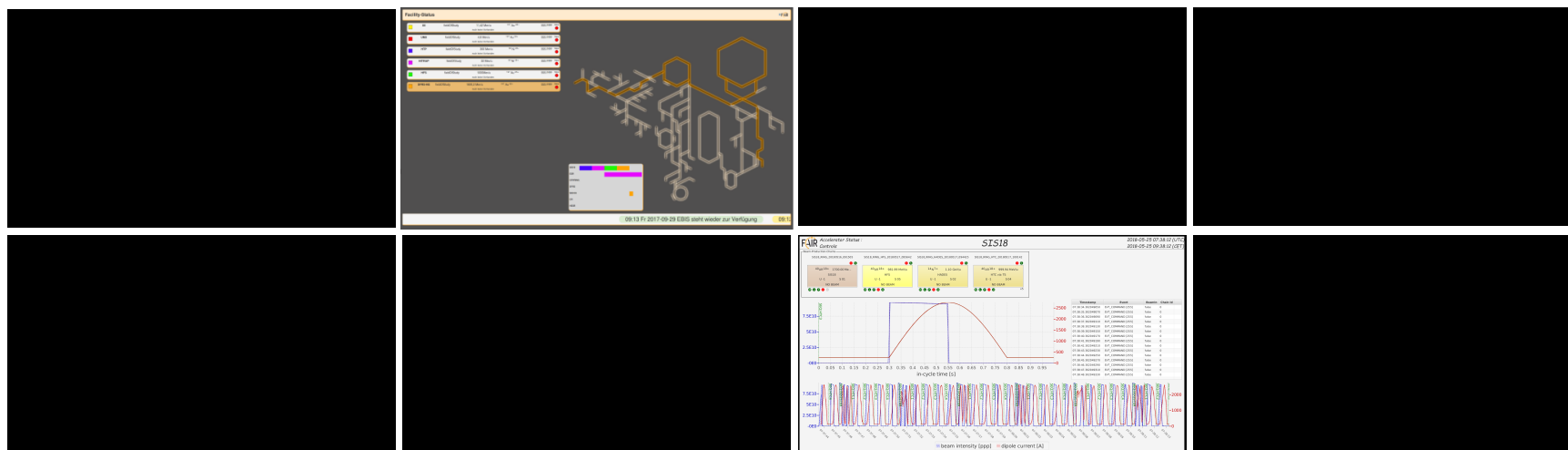
- Subscribe to all properties of the devices
- Will be replaced in the future by the Archiving System GUI (DAVE)



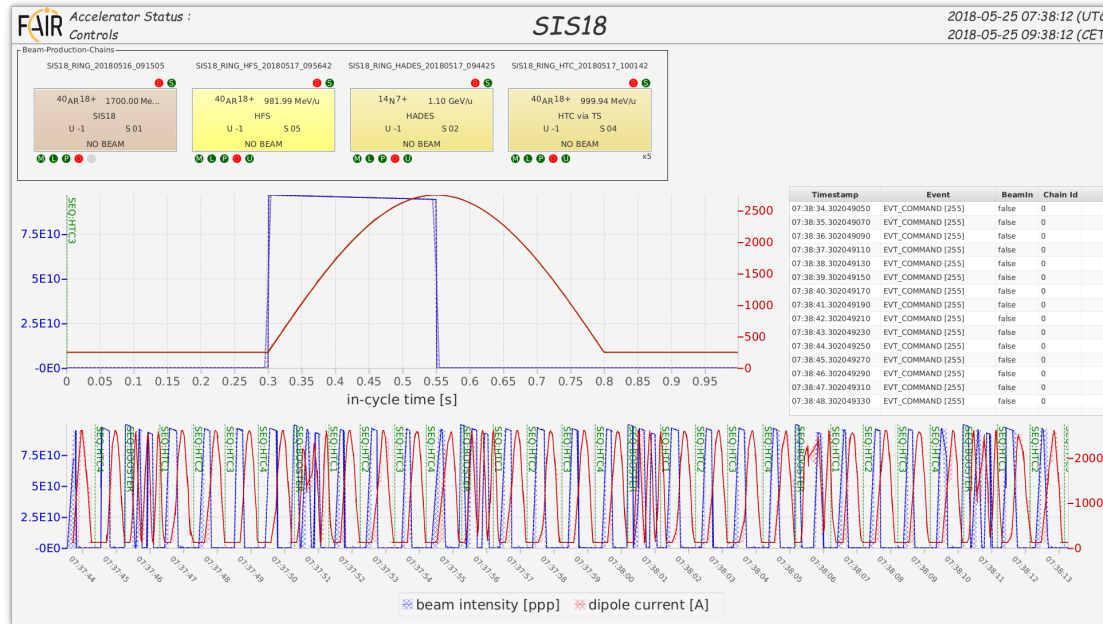
- Select device, parameter and field
- Filter by chain or timespan
- Display as chart or export to file

Product Owner: Peter Owner
Developer: Dave Developer

Fixed Display Applications



Accelerator status overview

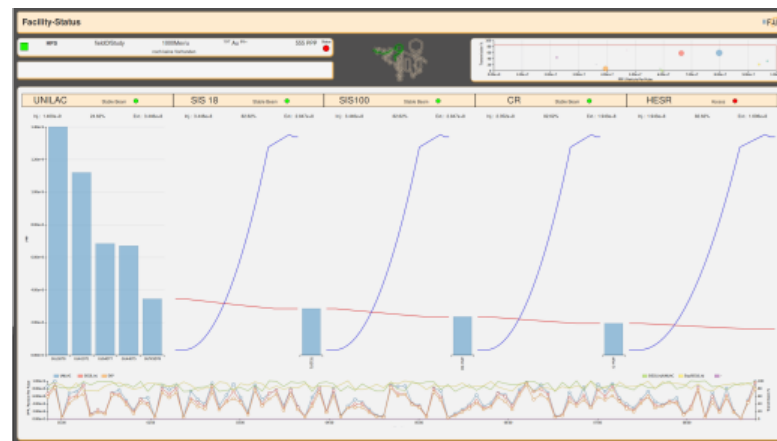
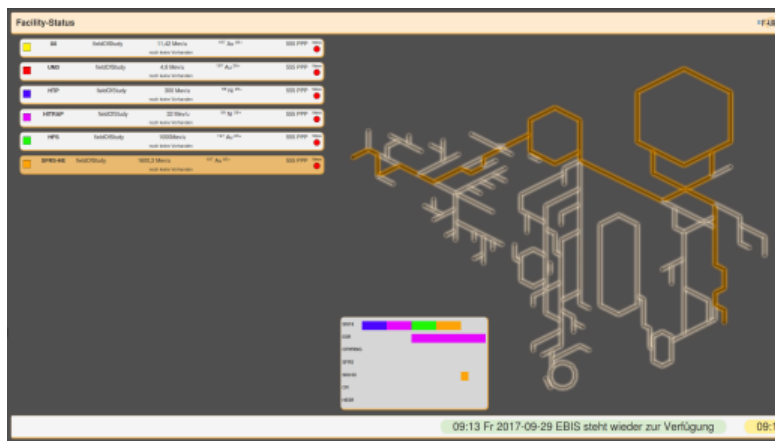


- Accelerator-focused status overview
- Pattern statuses of displayed accelerator
- Beam intensity and dipole current
- Last cycle and history

Developer: R. Steinhagen



Planned



- Which beams are running?
- What is their status?
- Transmission, history
- => fixed / detailed version for the control room, short (possibly rotating) version for the canteen

Product Owner: S. Reimann
Developer: A. Bloch-Späß

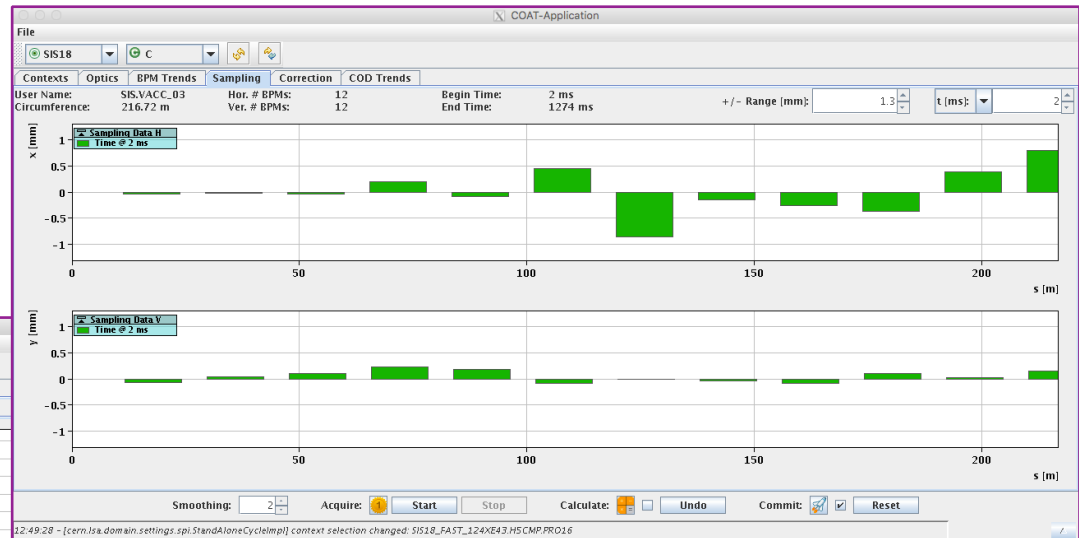
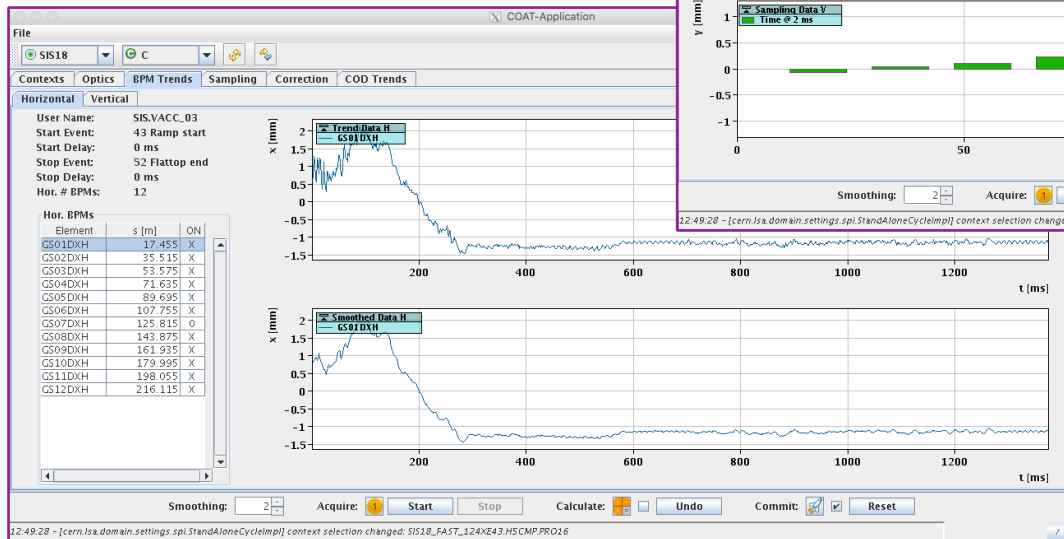


Planned

- Display pattern statuses
- Display bad status visually

- COAT: LSA-based Orbit Feedback (proof-of-concept during beamtime 2016)
- LSA-based Macro-Spill & Harmonics Control (proof-of-concept 2016)

COAT - Controlling Orbits and Trajectory



Developer: B. Schley



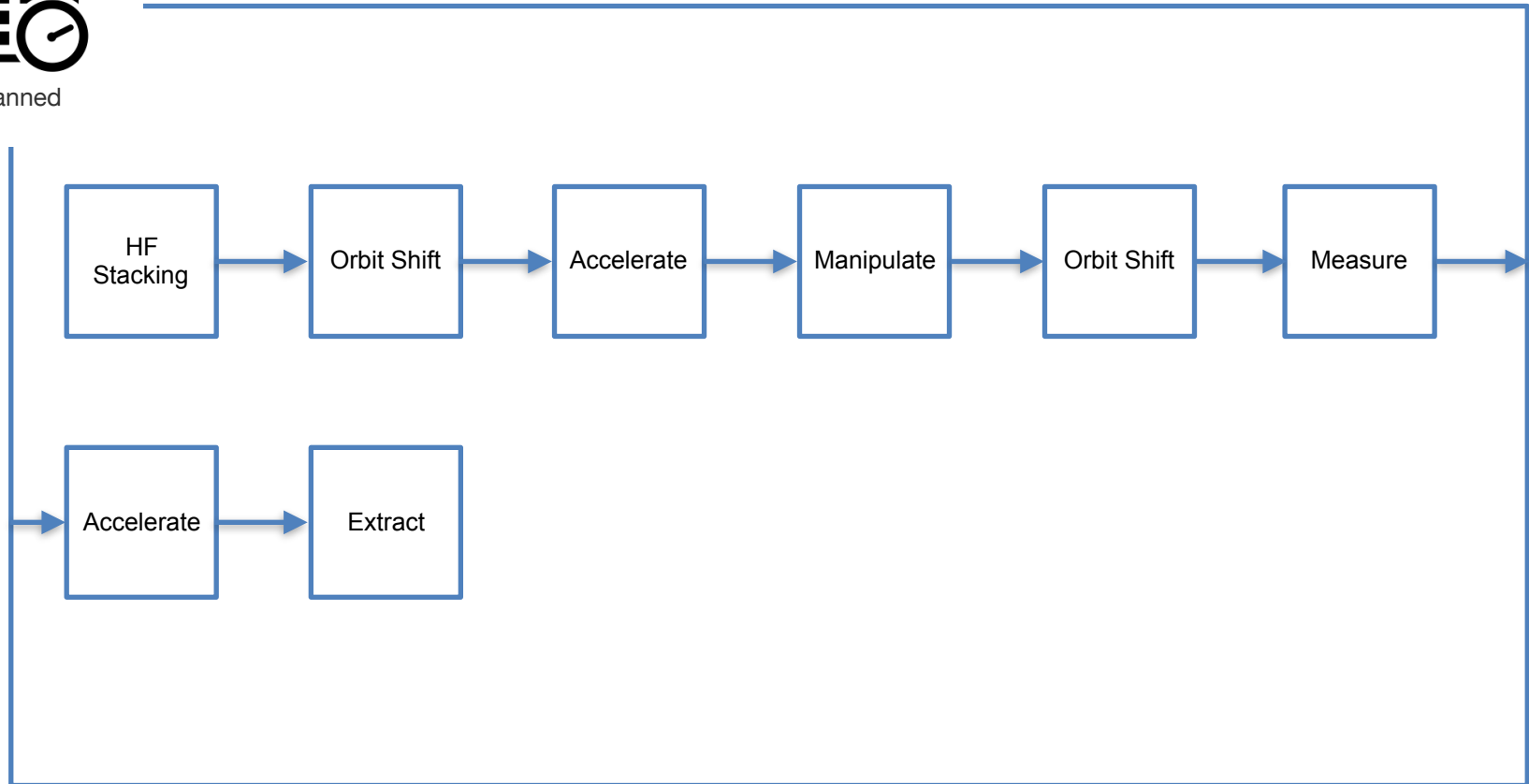
Planned

- Schedule storage ring operation
 - Add sequence of storage ring operations -> Storage ring pattern
- Available Operations
 - HF Stacking
 - Orbit shift
 - Accelerate
 - Manipulate during cycle
 - Extract
 - Measure

Product Owner: Dr. S. Litvinov
Developer: A. Walter



Planned





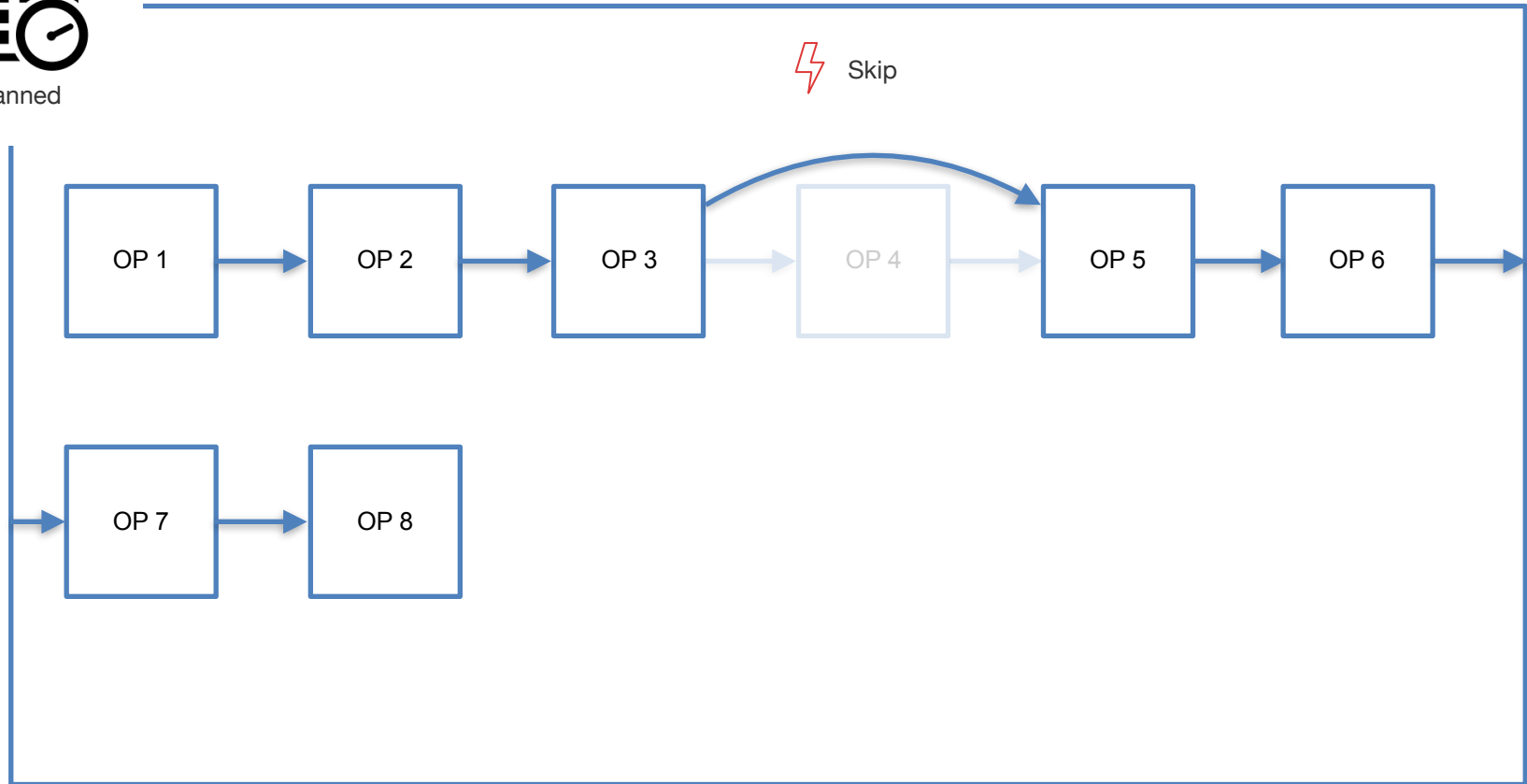
Planned

- Control storage ring operation
 - **Skip** operation (available for certain operations)
 - **Repeat** operation (available for certain operations)
 - **Cancel** cycle (skip remaining if possible)
 - **Stop** when cycle has finished
 - **Pause/Continue** after current operation
 - Possible after each operation
 - Can be used for measuring purposes

Skip operation



Planned

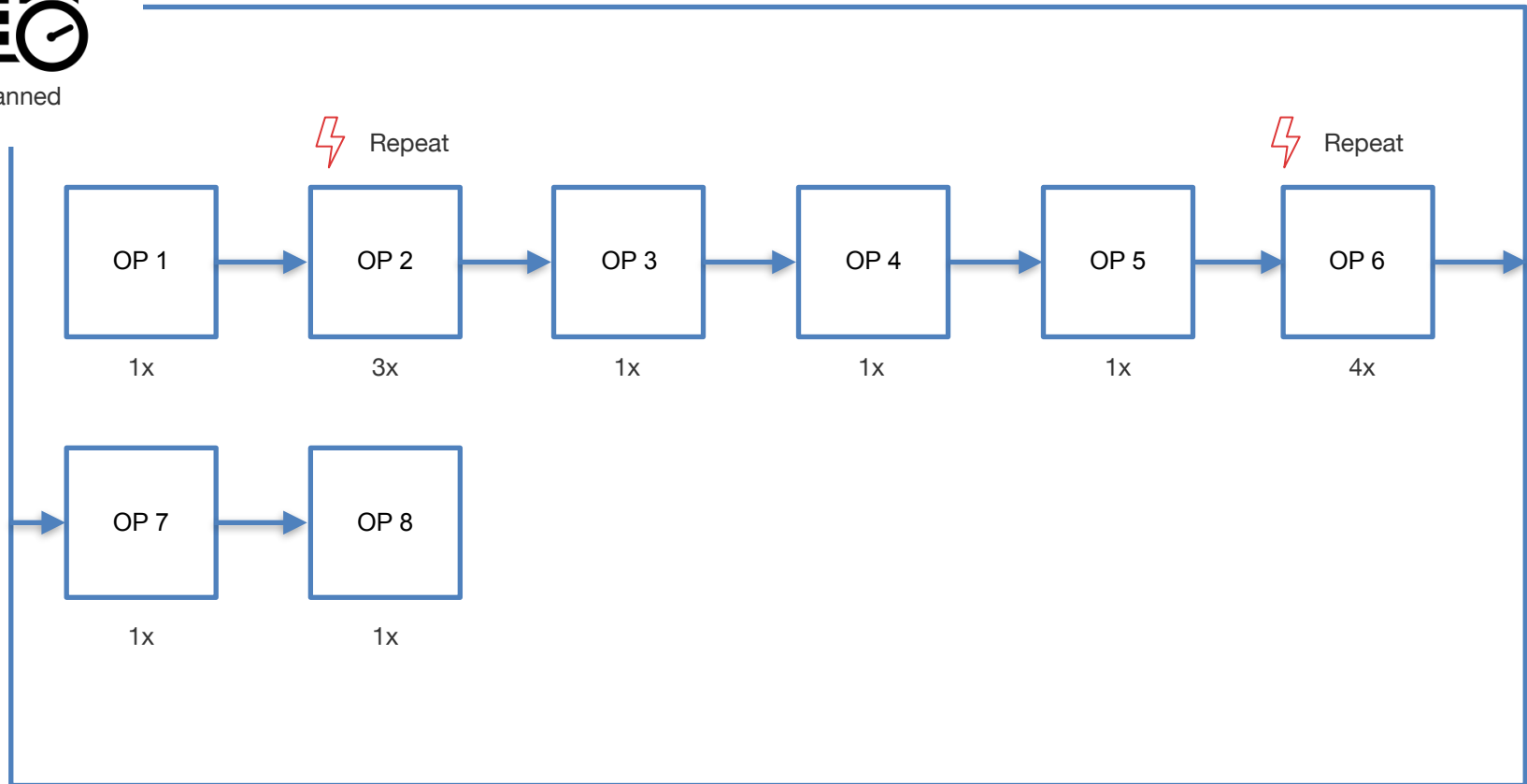


Storage Ring Application



Planned

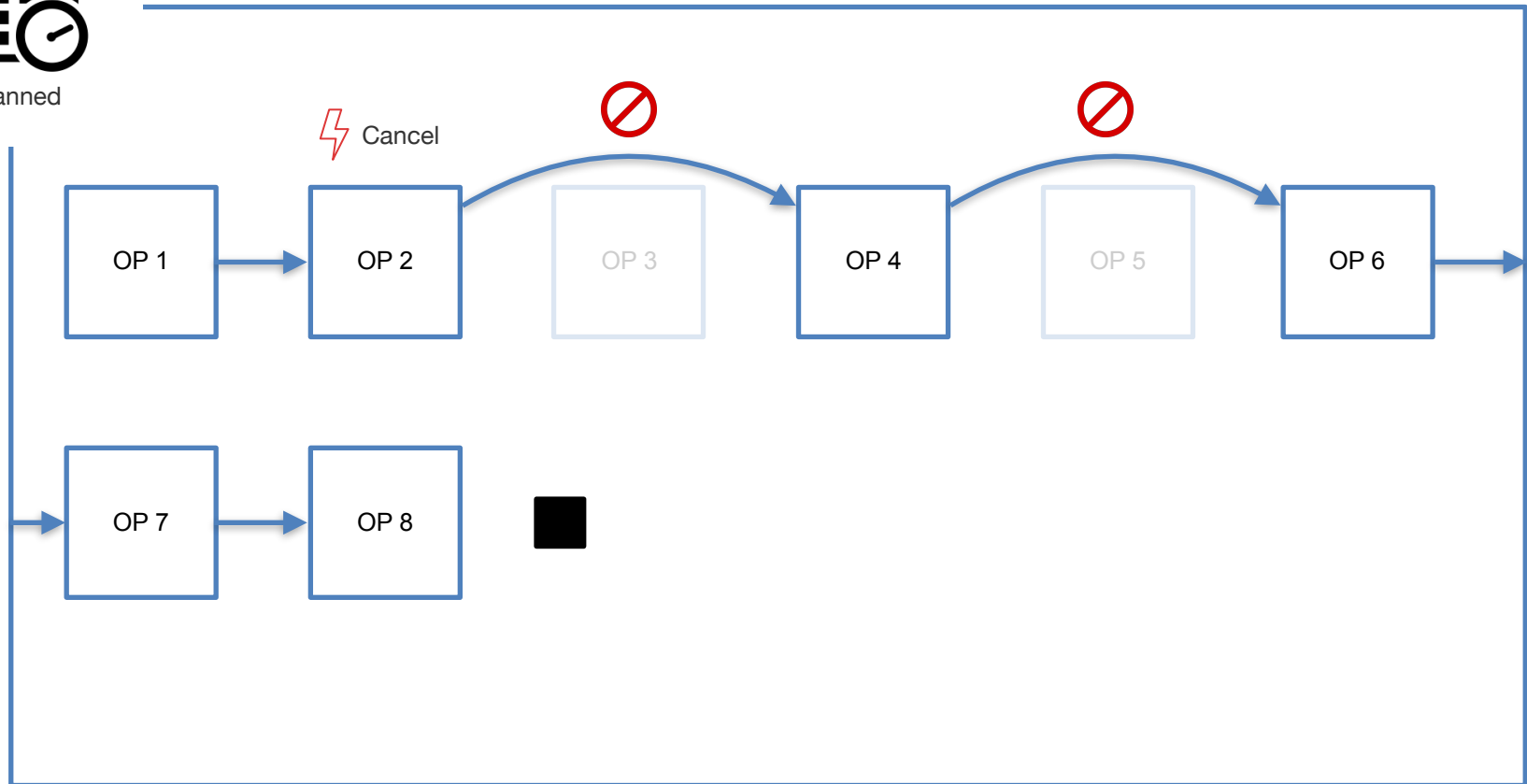
Repeat operation





Planned

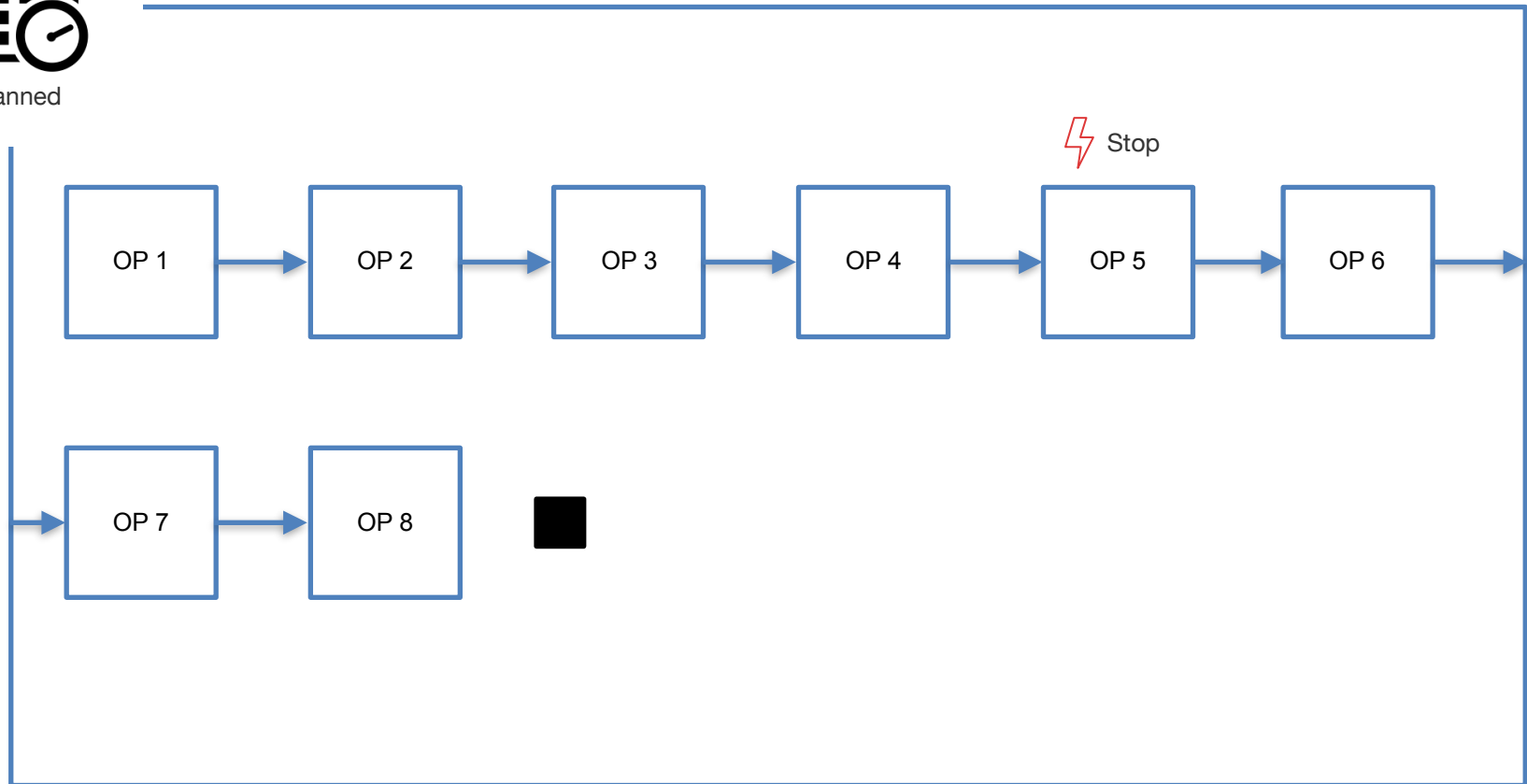
Cancel cycle





Planned

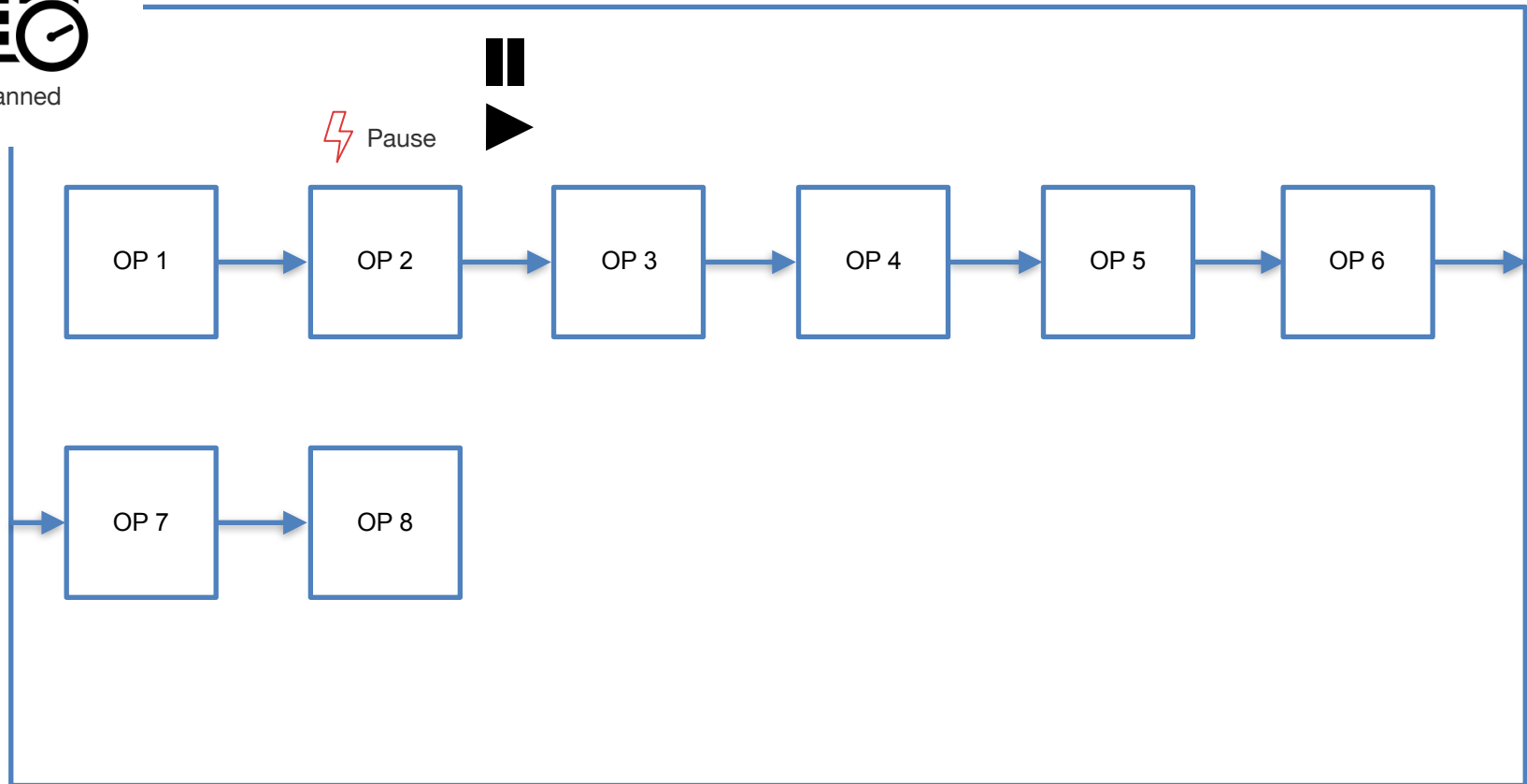
Stop cycle





Planned

Pause / Continue cycle



MagStat

Pattern: SIS18_FAST_HHD_COOLER_20180821 Chain: SIS18_FAST_HHD_COOLER_20180821.C1

Device ID	Status	DC_Mode	I_ist [DC] (A)	I_ist (A)	I_soll (A)	ΔI (A)	BL_ist (T)	BL_soll (T)	KL_soll (T)	Hall Probe (V)
GTE1KY1	1	false	-0.0	-0.0	-0.030945	0.030945	0.000014	0.0	0.0	0.0
GTE1QD11	3	false	-0.0	90.295877	21.152342	69.143535	2.188741	0.515600	0.106997	0.0
GTE1QD12	3	false	-0.0	72.839290	0.000000	72.839289	1.766483	-0.005700	-0.001186	0.0
GTS1MU1	3	false	-0.0	0.210578	287.548339	-287.337761	0.000462	0.630700	0.130900	0.0
GTS1KY1	1	false	-0.0	-0.0	-0.030945	0.030945	0.000014	0.0	0.0	0.0
GTS1QD11	3	false	-0.0	-0.0	67.120306	-67.120306	-0.500000	-2.594000	-0.538341	0.0
GTS1QD12	3	false	-0.0	-0.0	80.835563	-80.835563	-0.500000	3.122100	0.647950	0.0
GTS1MU2	3	false	-0.0	-0.0	131.407930	-131.407930	-0.0	0.630700	0.130900	0.0
GTS2QT11	1	false	-0.0	-0.0	189.167230	-189.167230	-0.0	3.679500	0.764977	0.0
GTS2KY1	1	false	-0.0	-0.0	-0.030945	0.030945	0.000014	0.0	0.0	0.0
GTS2QT12	1	false	-0.0	-0.0	125.396418	-125.396418	-0.0	-2.908600	-0.604706	0.0
GTS2QT13	1	false	-0.0	-0.0	27.213264	-27.213264	-0.0	0.529100	0.110000	0.0
GTS2KS1	1	false	-0.0	-0.0	0.0	-0.0	-0.0	0.0	0.0	0.0
GTS3MU1	1	false	-0.0	-0.0	0.0	-0.0	-0.0	0.0	0.0	0.0

Buttons: Save [Manual], Save [Auto], Print, Graph, About, Exit

Data successfully loaded. Elements [14]

FMGSKAL

Magnet Group Selection

TA -> S1 HP Cal

S1 -> S2 Precycling

S2 -> S3 About

S3 -> S4 Exit

S3 -> S5

S5 -> S6

S5 -> S7

S7 -> S8

S6 -> ESR

Only Dipoles

Beamline Destination: HFS, HTC, ESR

Switch

- MagStat: it shows the status of the magnets belonging to a selected pattern/chain (preliminary tests successfully performed).
- DriveStat: it shows the status of the drives belonging to a selected pattern/chain (preliminary tests successfully performed).
- FMGSKal: it performs the calibration and precycling of magnets belonging to a certain beam line (to be tested)

Developer: Dr. F. Schirru

Questions?

A large, detailed wireframe model of a particle accelerator is the central focus of the slide. It features a long, curved main ring and several smaller, more complex sections at the top. The model is rendered in a light gray wireframe style, showing the intricate structure of the accelerator's components.

Control System Architecture

15.01.2019

Slides by Hanno Hüther

Presented by Christian Hillbricht

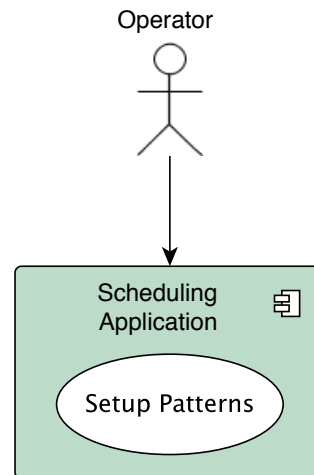
- Question
 - What happens between the application and the hardware?

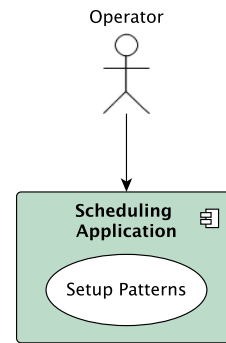
- Implication
 - It would be helpful for Operators to know what's going on behind the scenes

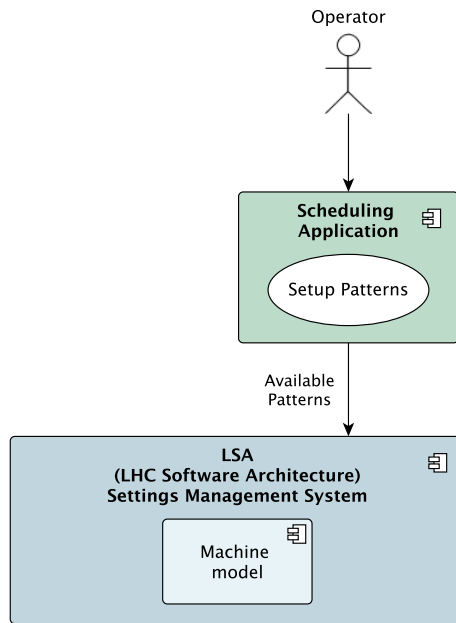
- Challenge
 - Explain system architecture of (a part) of the control system in a way that the information provided is useful for commissioning and operating

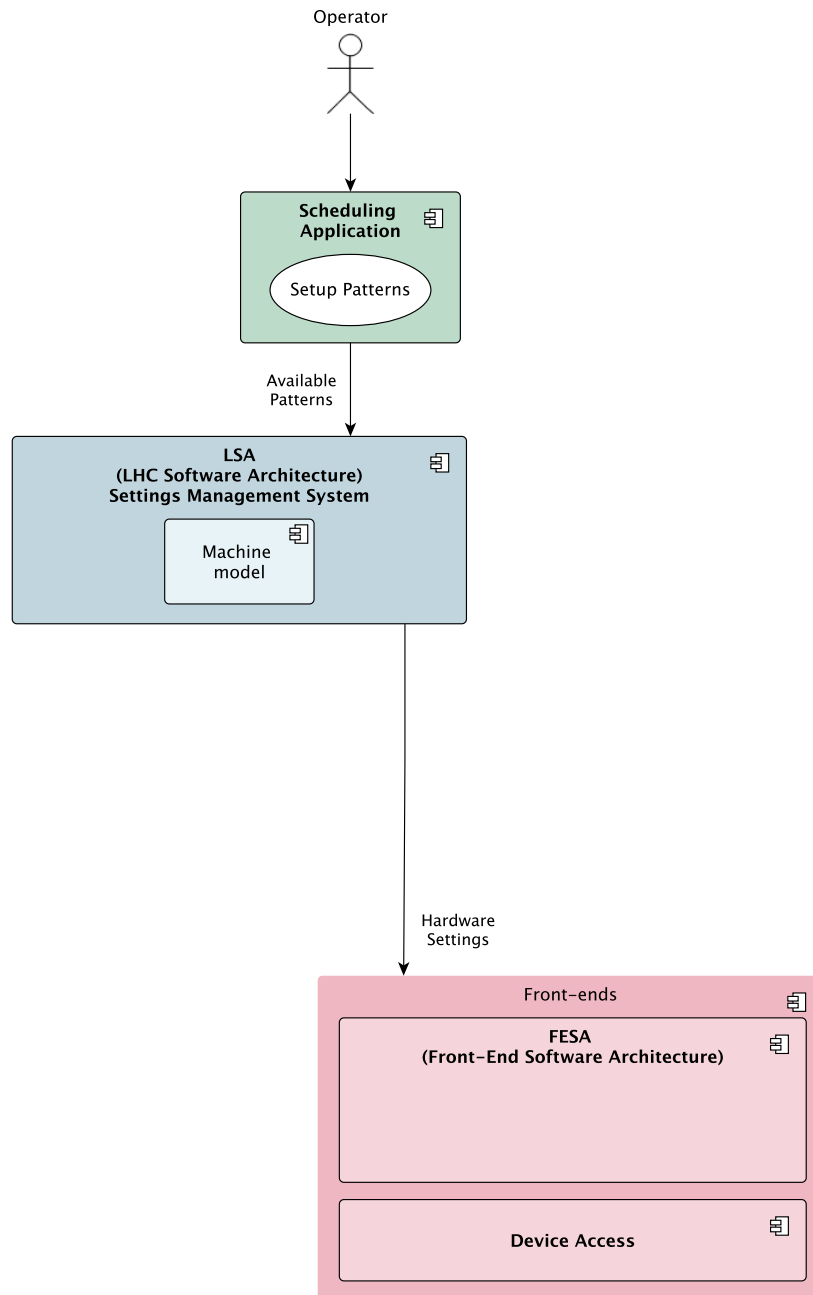
- Idea
 - Explain some of the most common use cases by the systems involved and the data flows between them

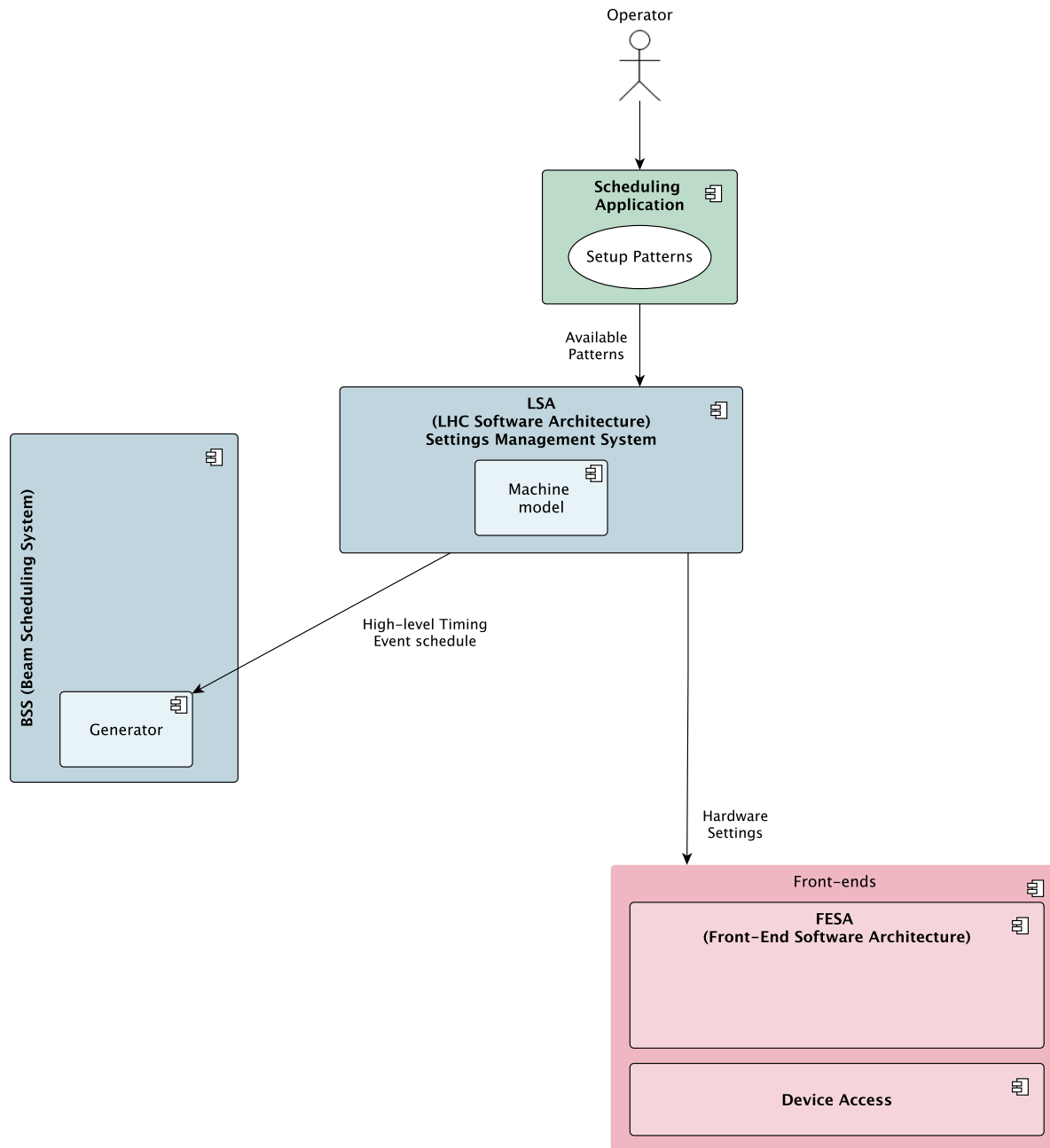
Use Case 1: Setting up Patterns

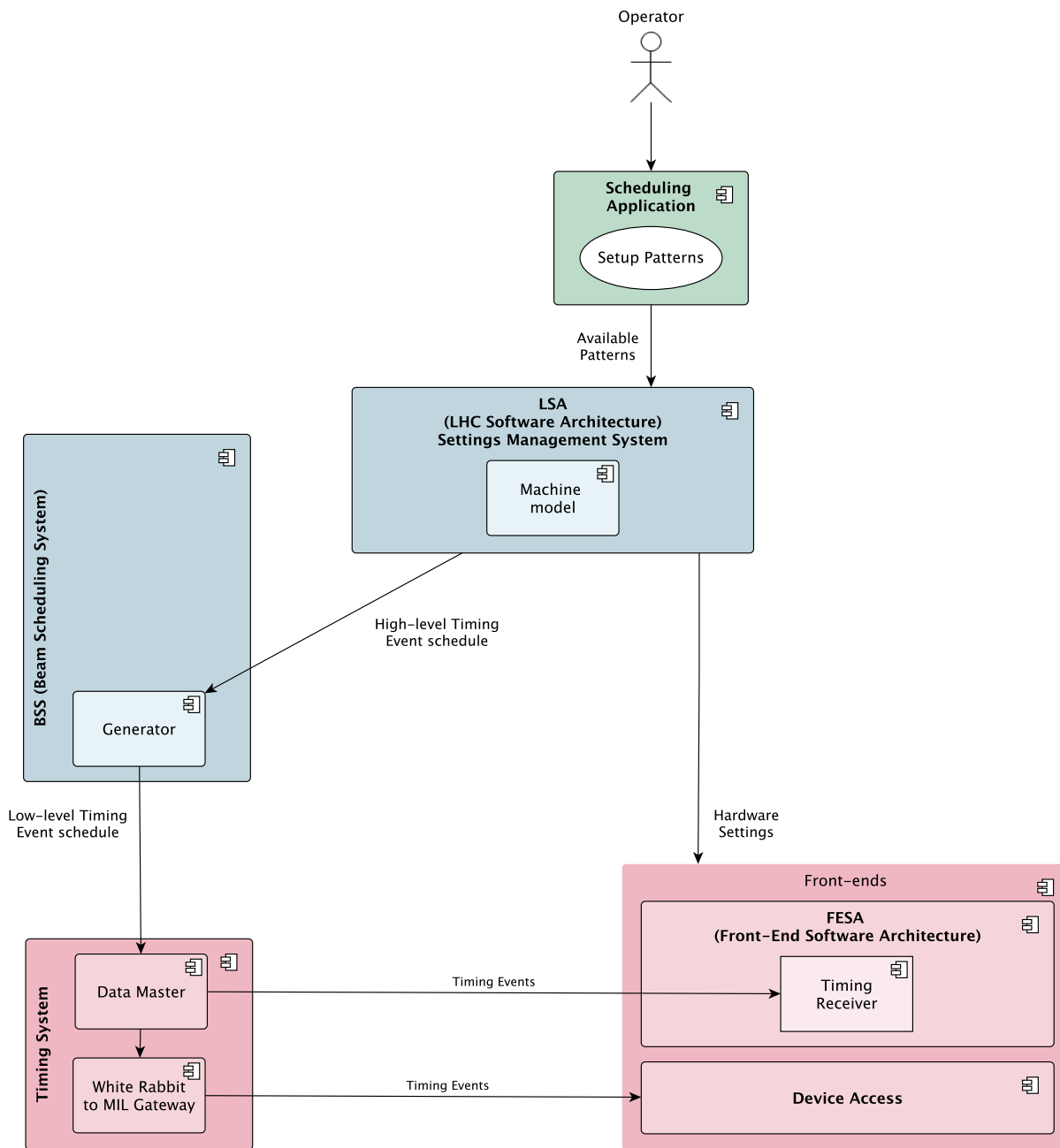


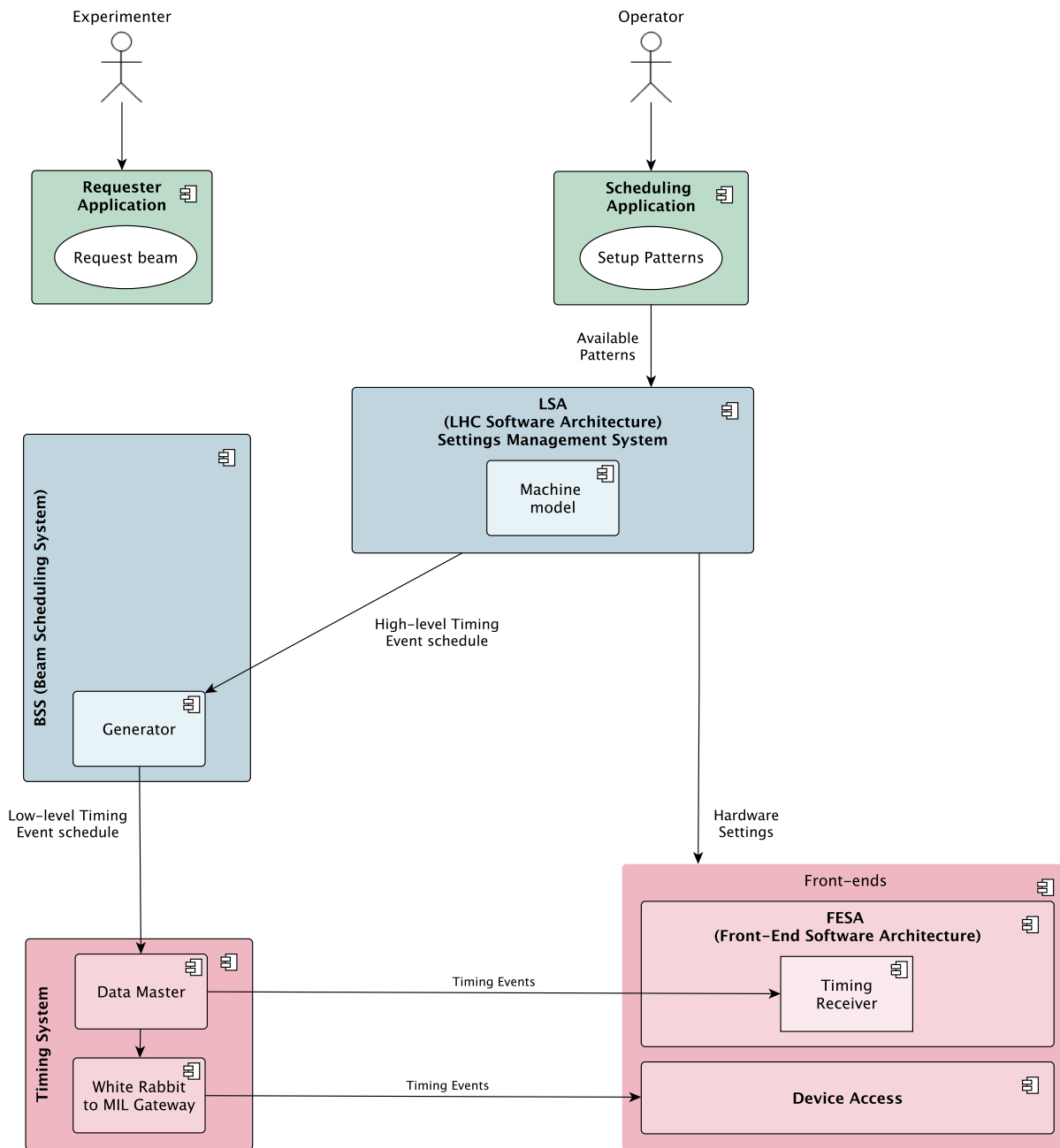


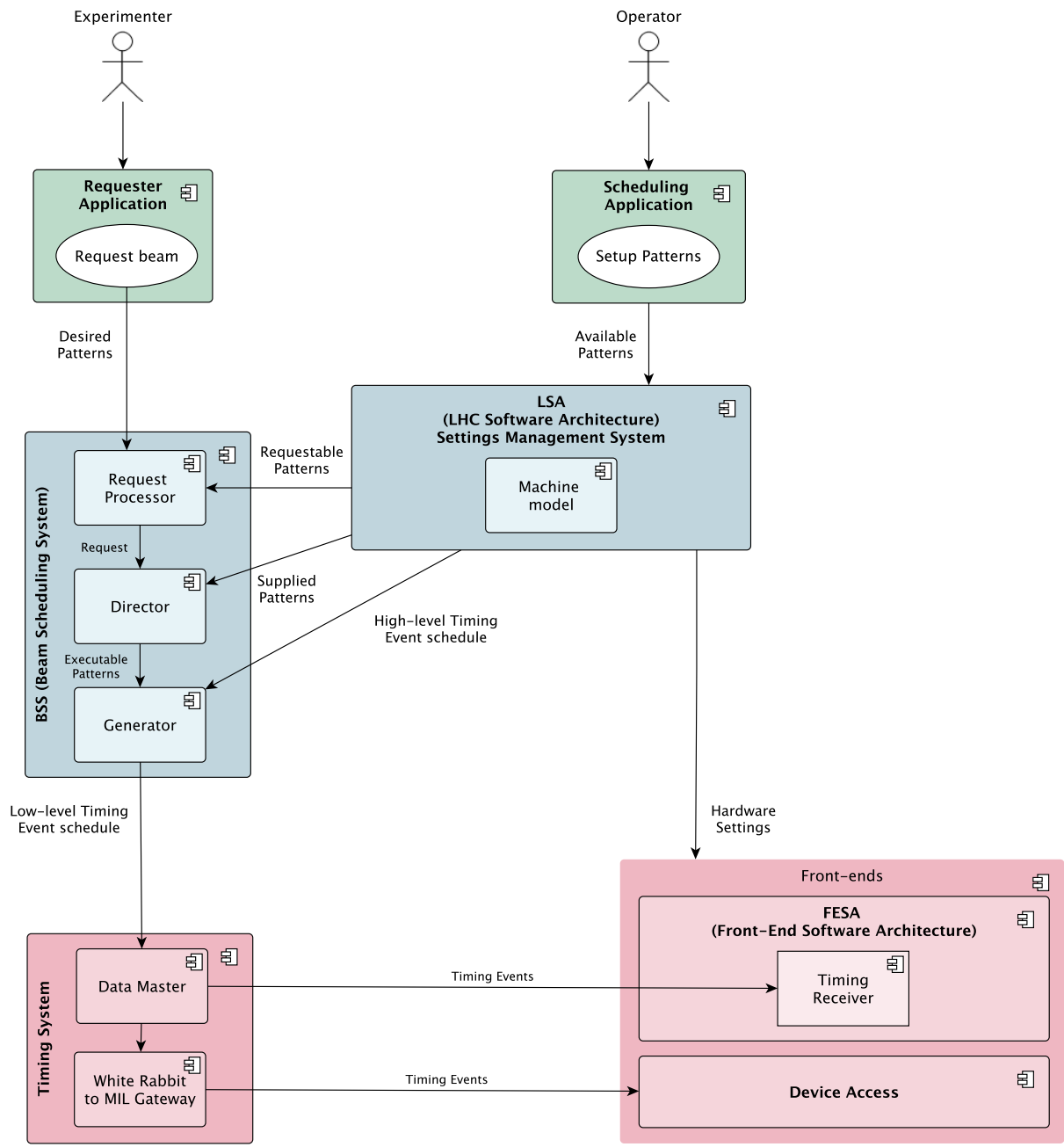


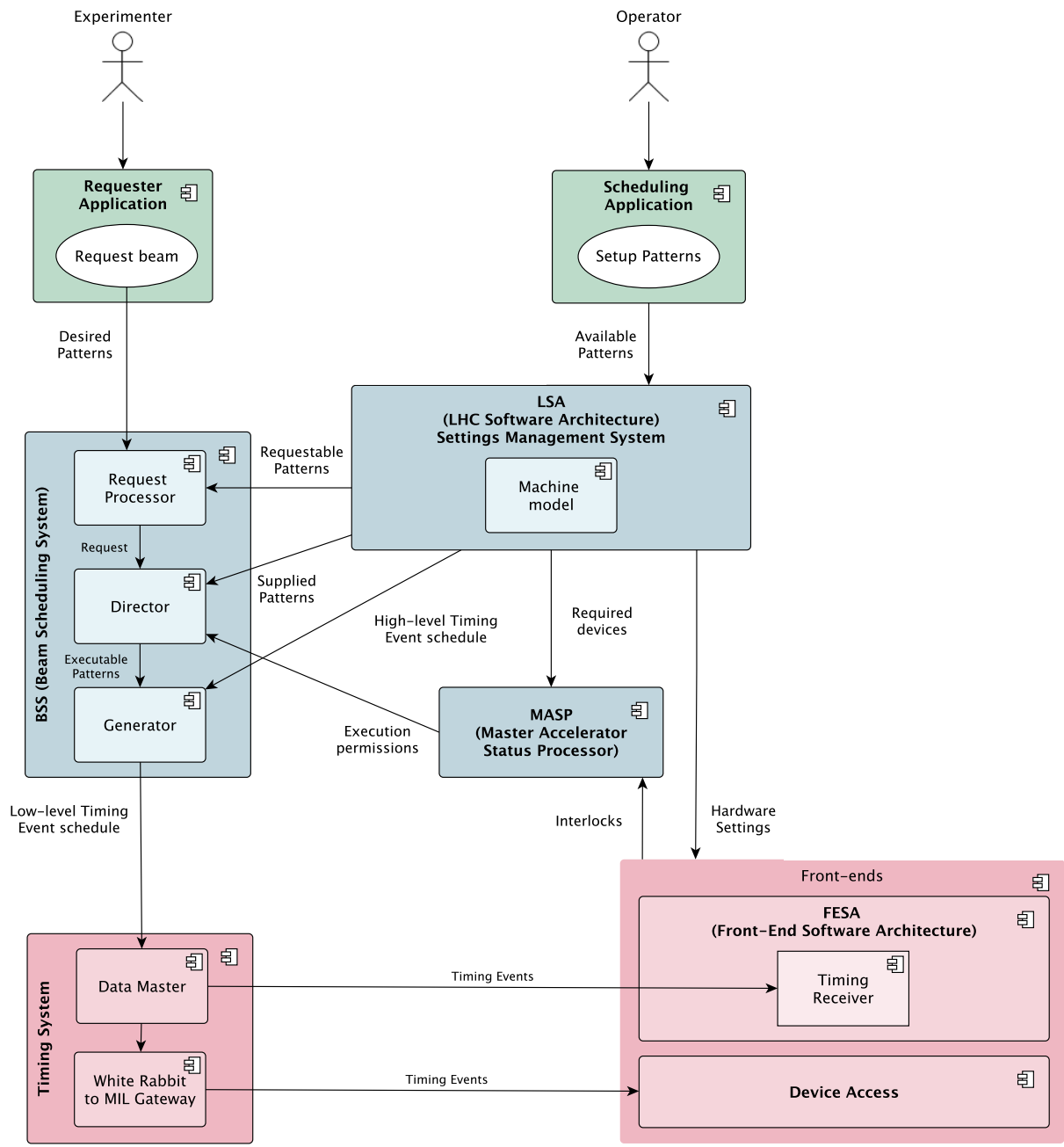


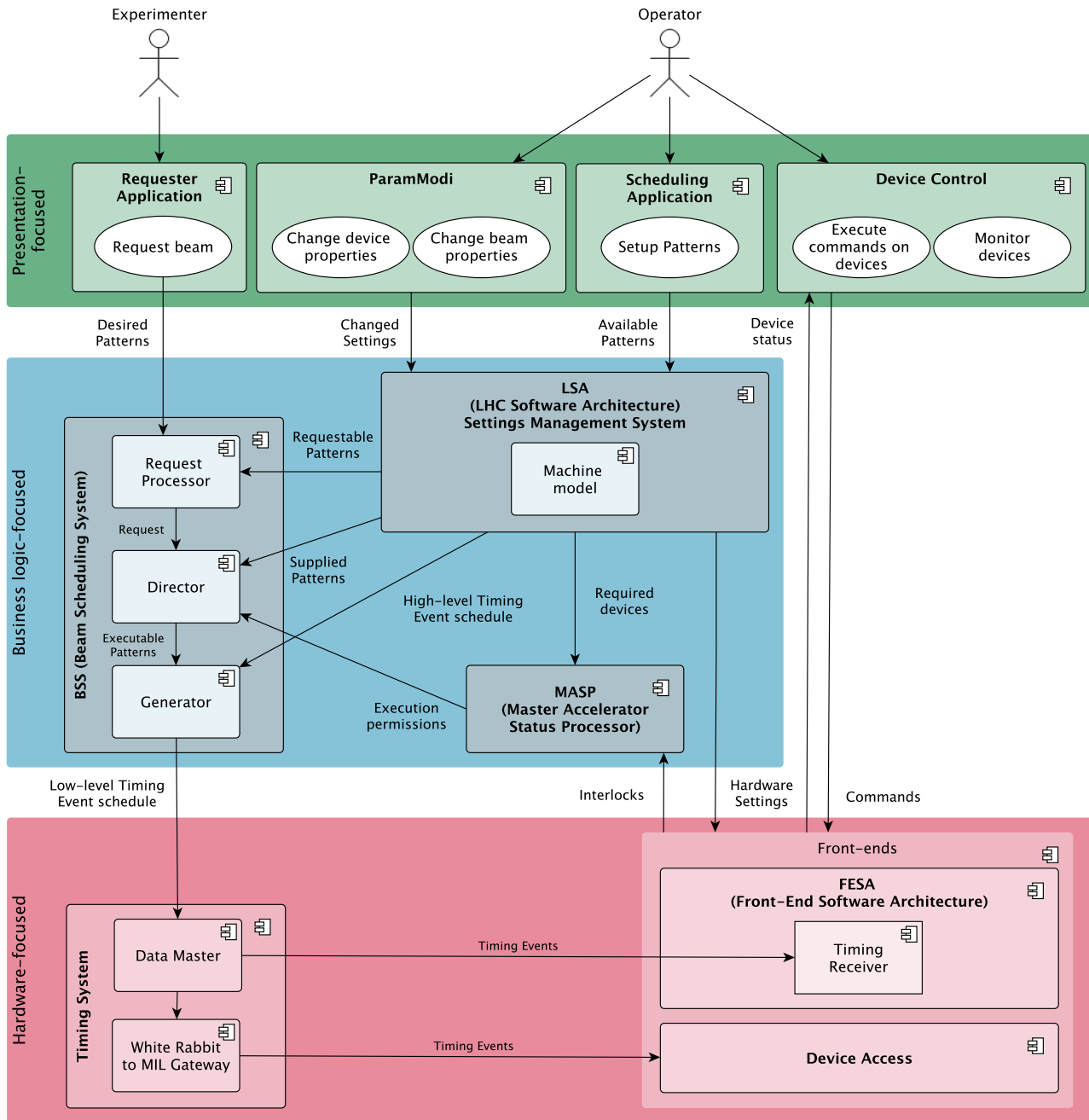












Questions?