

+ First aid for the ATLAS detector +

Detector Safety System event analysis

What is DSS?

- last line of detector protection
- actions keep ATLAS in safe state
- inputs → alarms → actions

DSS events [2018-2023]

- **event** = alarms given same "cause"
- event criticality = max. (alarm criticality)
- event types: error, intervention

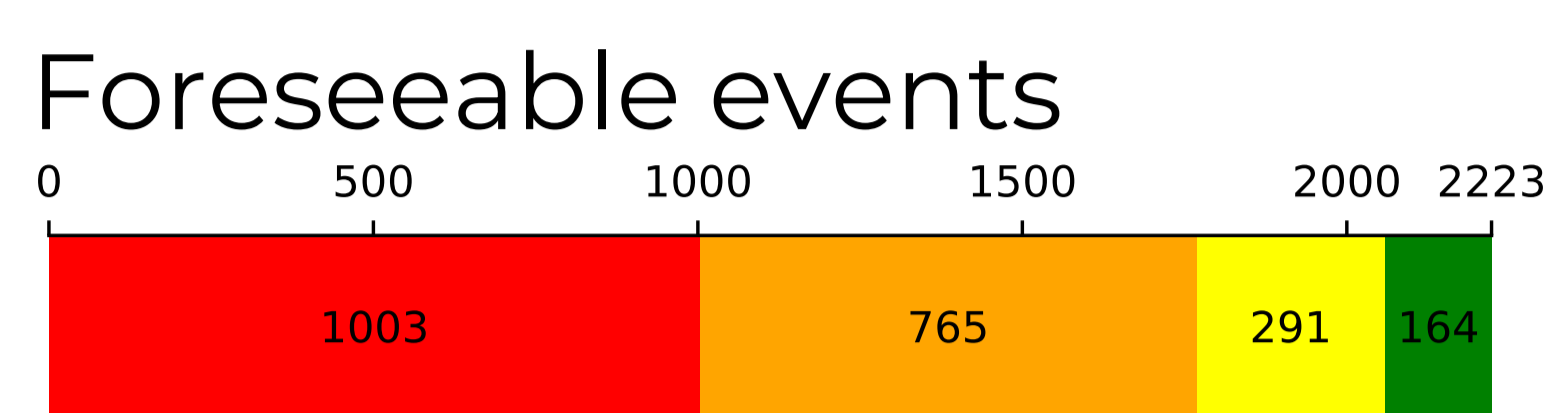
Alarm criticality

0	info	45	# alarm
1	no impact	65	
2	has actions	595	
3	high impact	145	e.g. fire
		850 DSS alarms	

WHY ► many false positives!

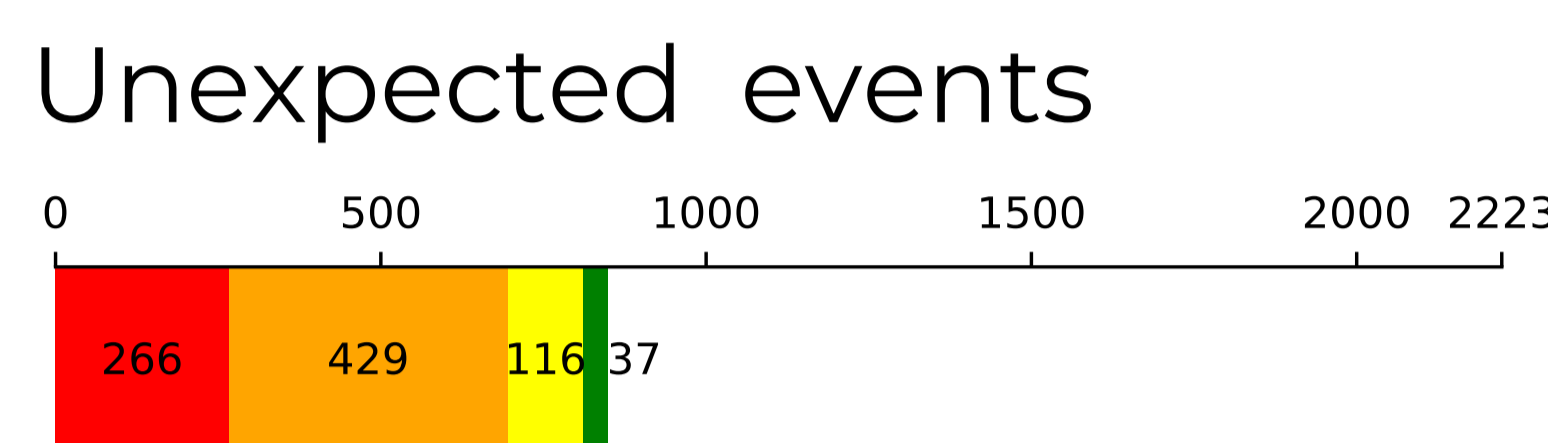
Interventions

repairs & maintenance



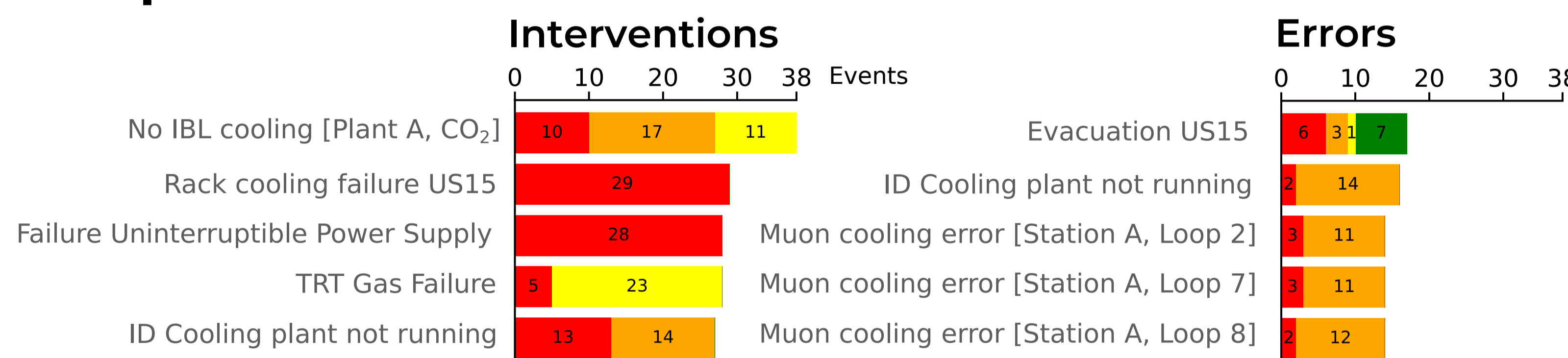
Errors

can also be triggered by interventions
vital to identify!



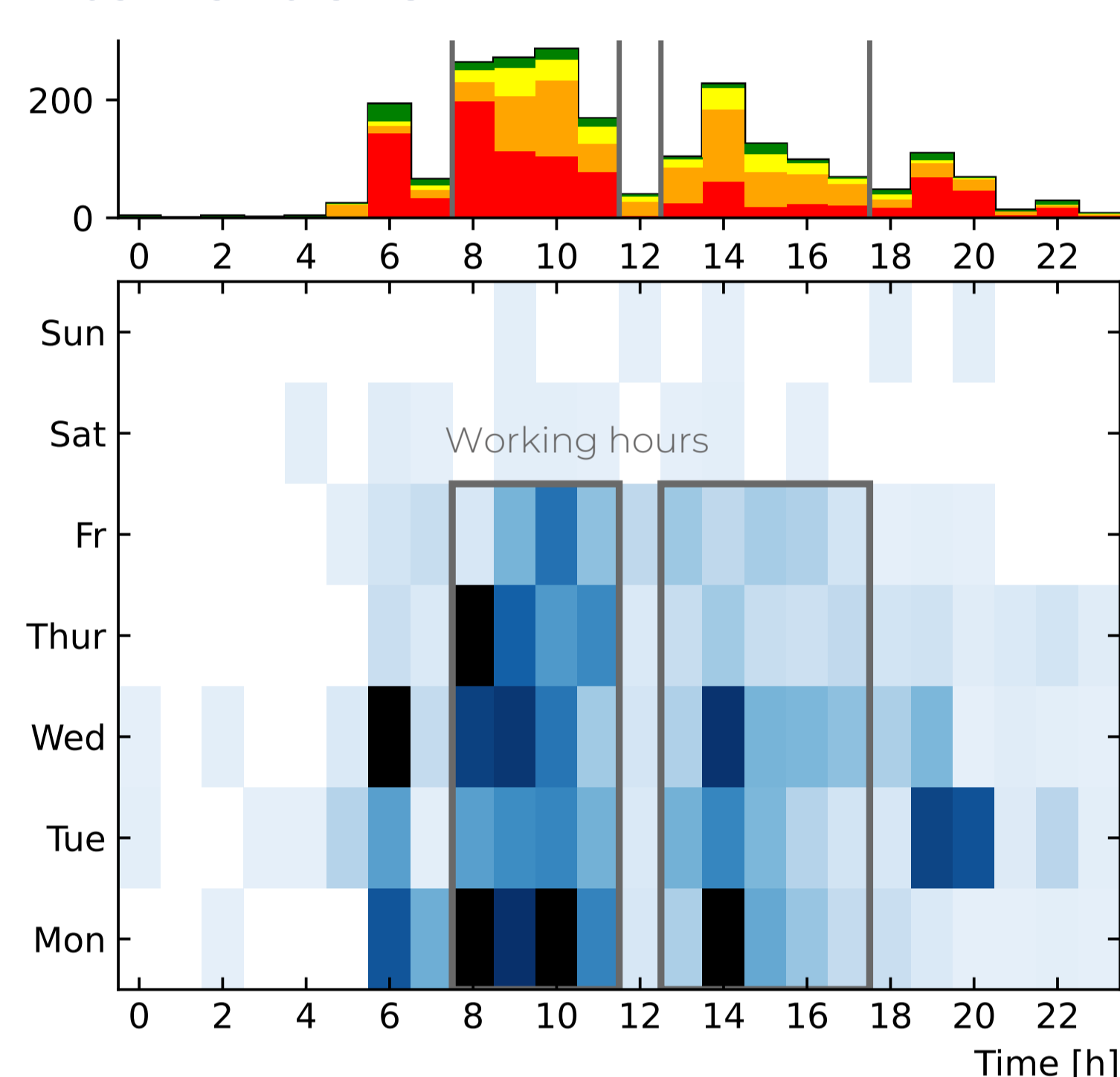
WHAT ► often critical systems!

Top 5 alarms

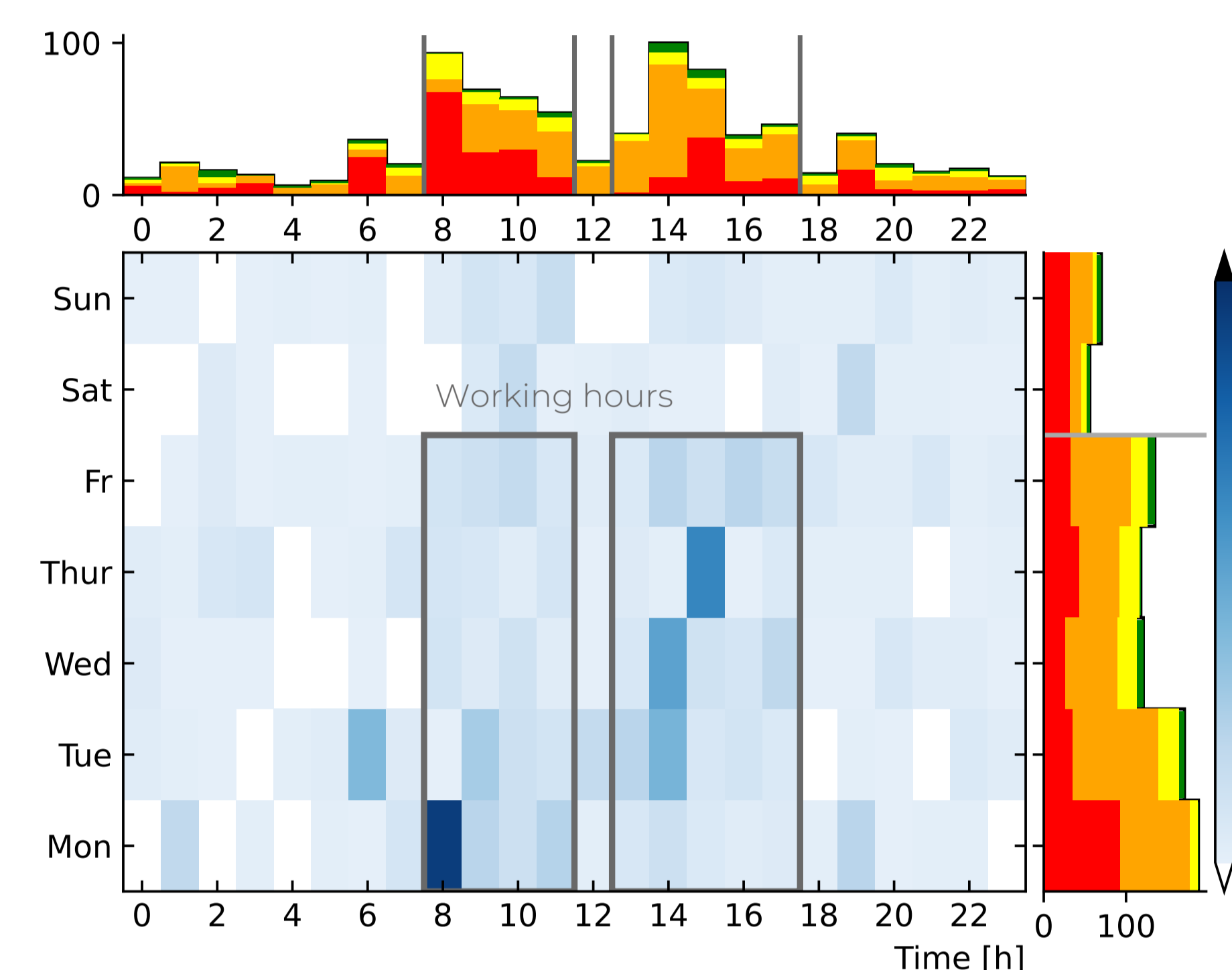


WHEN ► difference interventions vs errors

Interventions



Errors



WHO ► many stakeholders!

Interventions:

- Piquet teams
- Subsystem experts
- External contractors
- Servicing groups, ...

DSS alarms follow up:

- Shift leader
- Operational Manager
- DSS

limited by availability of information!

Alarm helper: transparent expert knowledge

For any triggered DSS alarm, make expert knowledge available to all stakeholders in a webpage.

WHAT

Expert System

Estimated criticality

- 1 AL_COL_MUN_StationA_Loop3_Stopped 10:04 Station A Loop 3 off.
- 2 AL_COL_MUN_CoolingFailure_SideA 10:03 No muon cooling (Side A).

Possible point of failure [Simulation]

MUN_StationA_Loop3 – Manual turn off

Similar interventions

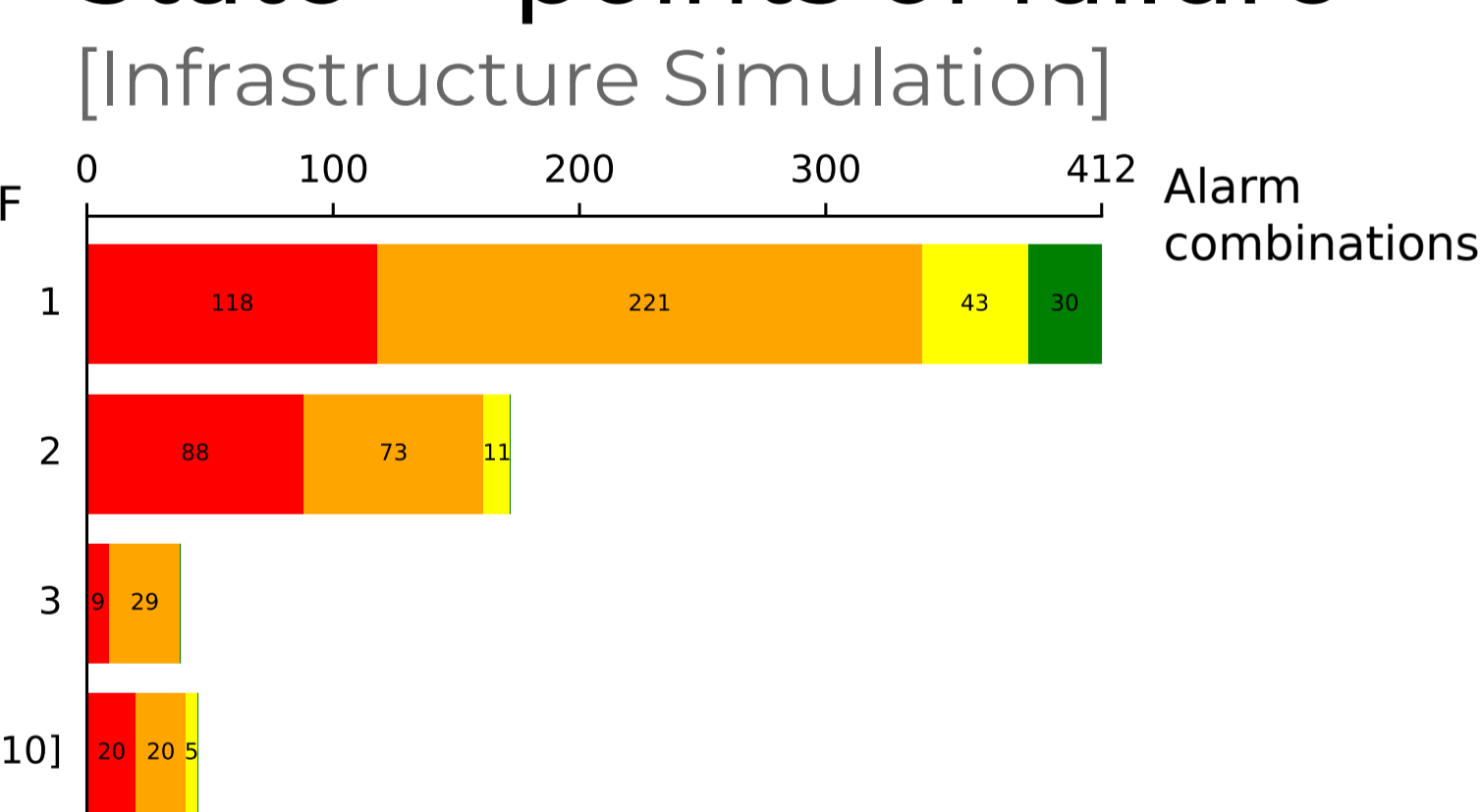
Muon plant intervention	09:37	06/03/19	Piquet	Documentation
New breaker installation	09:48	06/03/20	Cooling	Documentation
Heat exchanger replacement	14:09	05/12/21	NSW	Documentation

WHY

WHO

Expert System

State → points of failure



DSS history

ranked by similarity

alarm overlap, time, detector status, ...

What's next?

- use planned interventions to forecast alarms
- increase transparency to the experiment
- minimize impact on operations
- self-updating expert knowledge
- simplify documentation of interventions and follow-up

Planning

- Interventions
- DSS history
- Expert System
- Documentation

Execution

Weekly Forecast

Review + Update

Weekly Review

Be aware of which alarms are expected due to interventions!

KEEP CALM AND USE THE ATLAS ALARM HELPER