

1st Accelerators Technology Sector Workshop

Engineering Design Tools and Processes
Project Management Methodologies and Tools

Chair: Mike Lamont

Interconnecting knowledge, experience, methods,
people & data to foster learning & collaboration



ATS
Accelerators and
Technology Sector

Creating high-quality, durable, efficient code: the software development workflow

Gabriele De Blasi



ATS
Accelerators and
Technology Sector

Mechatronics and Robotics

The collage features several key elements:

- Top Left:** A live video feed from 'Isomed Cameras v1.0.2-1-g9dab542' showing an orange robotic arm in a facility. Text overlays include 'shelves' and '10 fps'.
- Top Right:** A 3D CAD model of a yellow 'XZTable' with a stack of components. A control panel on the right lists degrading components:

Filter	State	Position
Degrader 40 mm	OUT	<input type="checkbox"/>
Degrader 20 mm	OUT	<input type="checkbox"/>
Degrader 10 mm	OUT	<input type="checkbox"/>
Degrader 8 mm	OUT	<input type="checkbox"/>
Degrader 4 mm	OUT	<input type="checkbox"/>
Degrader 2 mm	OUT	<input type="checkbox"/>
Degrader 1 mm	OUT	<input type="checkbox"/>

- Bottom Center:** A photograph of a workstation with various electronic components, including a control panel with 'X-Switches' and 'Z-Switches'.
- Bottom Left:** A 3D schematic of the LHC tunnel with various detector points labeled: Point 1, Point 2, Point 3, Point 4, Point 5, Point 6, Point 7, Point 8, Point 9, Point 10, Point 11, Point 12, Point 13, Point 14, Point 15, Point 16, Point 17, Point 18, Point 19, Point 20, Point 21, Point 22, Point 23, Point 24, Point 25, Point 26, Point 27, Point 28, Point 29, Point 30, Point 31, Point 32, Point 33, Point 34, Point 35, Point 36, Point 37, Point 38, Point 39, Point 40, Point 41, Point 42, Point 43, Point 44, Point 45, Point 46, Point 47, Point 48, Point 49, Point 50, Point 51, Point 52, Point 53, Point 54, Point 55, Point 56, Point 57, Point 58, Point 59, Point 60, Point 61, Point 62, Point 63, Point 64, Point 65, Point 66, Point 67, Point 68, Point 69, Point 70, Point 71, Point 72, Point 73, Point 74, Point 75, Point 76, Point 77, Point 78, Point 79, Point 80, Point 81, Point 82, Point 83, Point 84, Point 85, Point 86, Point 87, Point 88, Point 89, Point 90, Point 91, Point 92, Point 93, Point 94, Point 95, Point 96, Point 97, Point 98, Point 99, Point 100.
- Bottom Right:** A 3D schematic of a robotic arm with a control panel showing 'Status' (Actual X-Position: 200.000 mm, Actual Z-Position: 0.000 mm), 'Controls' (X-Position: 100.000 mm, Z-Position: 150.000 mm), and 'Predefined positions' (Name: pos2, X: 12.000, Z: 34.556).

SAMbuCa, CHARM Devices, ISOMED Cameras, TIM dashboard

Software development in ATS

BE

ABP CEM

CSS GM

ICS OP

EN

ACE

EL

IM

SY

ABT BI

EPC RF

TE

VSC

CRG

in short, almost all ATS!

Why do we need an (automated) Workflow?

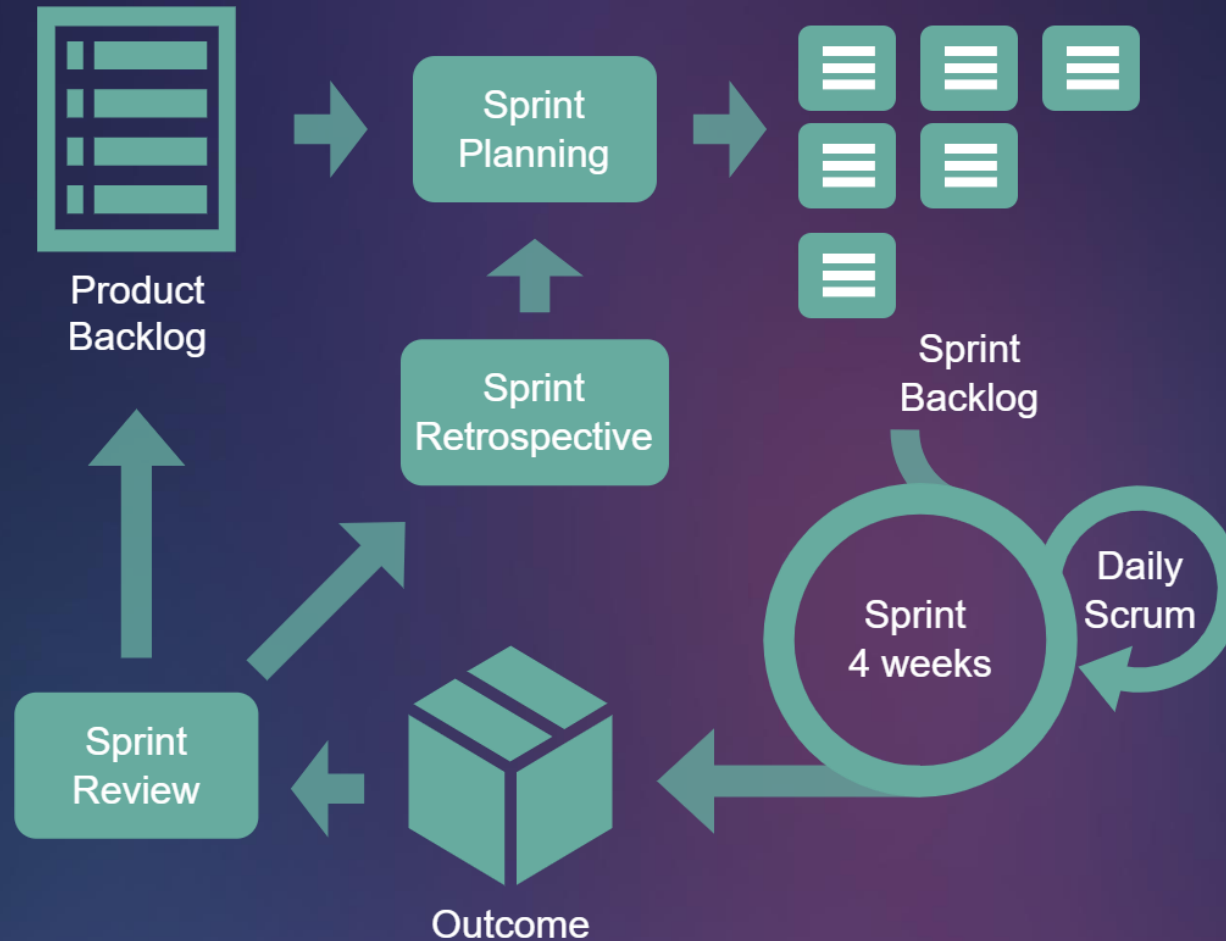
- **To guaranty higher quality and security:**
 - Standardized processes help maintain constant code quality.
 - Errors are caught early through systematic testing and reviews.
- **To enhance efficiency and productivity:**
 - Time wasted in repetitive tasks is significantly reduced.
 - **To support and improve business processes.**

```
Screenshot
  ✓ can retrieve a screenshot (68ms)

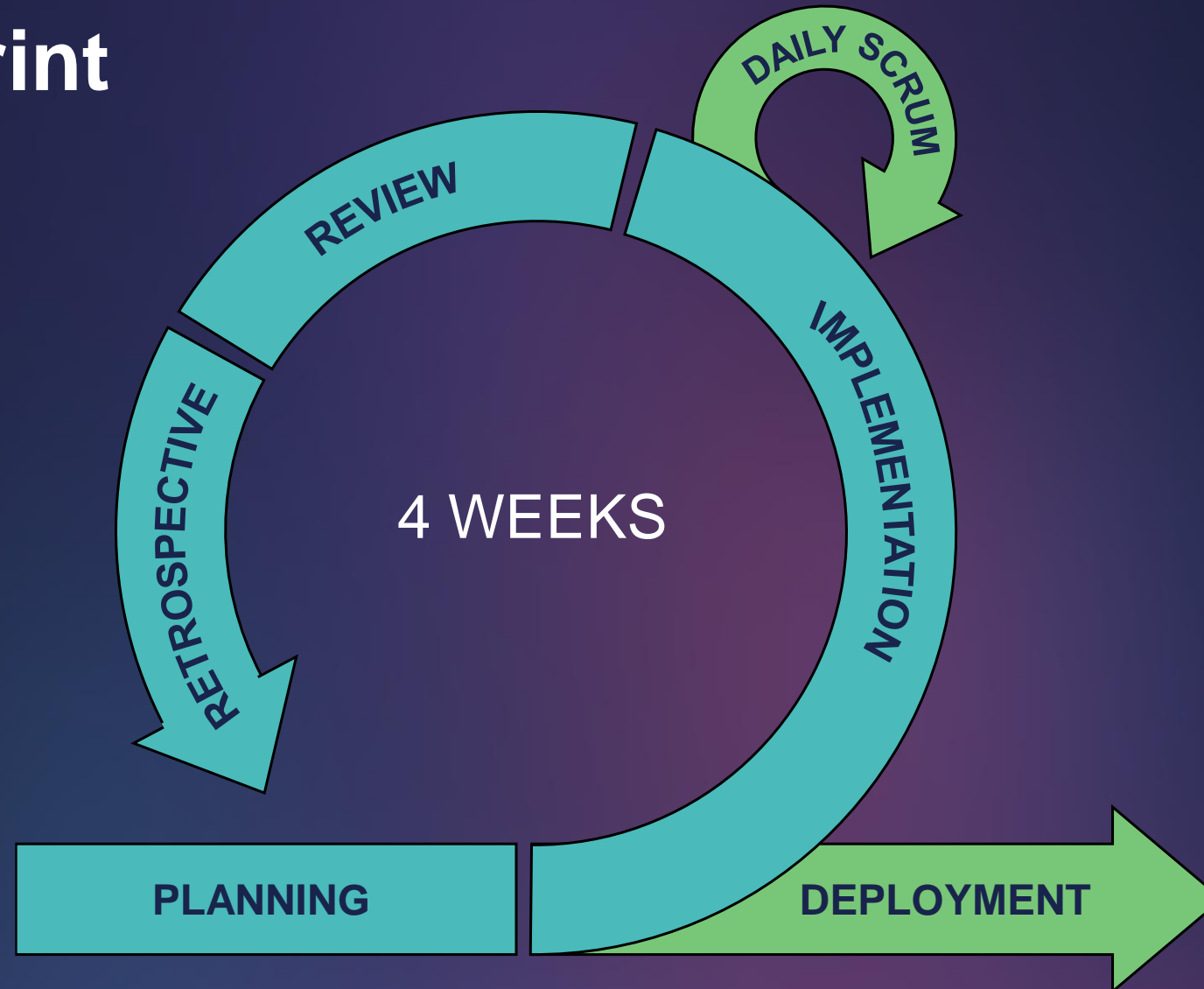
Swagger exposition
  ✓ provides json open-api doc
  ✓ provides swagger doc

VarBuffer
  ✓ can be enlarged on demand
  ✓ can be sliced like a Buffer
  ✓ can remove first n bytes
  ✓ can be partially copied at a specific offset
```

A Scrum-based workflow



Scrum Sprint

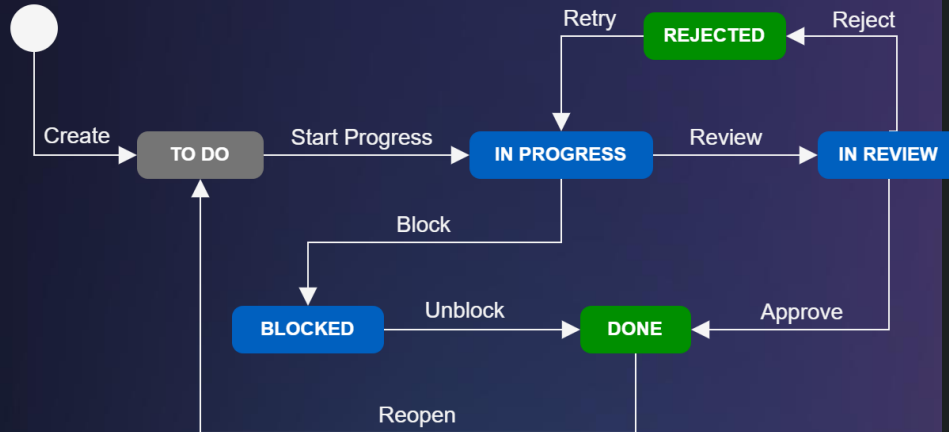


Planning



Project management

- Facilitated thanks to Jira



sambuca-mfe LVDT tuning	UNRELEASED	<div style="width: 75%;"><div style="width: 75%;"></div></div>	Characterization and tuning for LVDTs
sambuca-mfe resolvers tuning	UNRELEASED	<div style="width: 60%;"><div style="width: 60%;"></div></div>	Characterization and tuning for resolvers
kinova-protocol	RELEASED	<div style="width: 100%;"><div style="width: 100%;"></div></div>	Kinova arm protocol inspection
base-vue-3	UNRELEASED	<div style="width: 40%;"><div style="width: 40%;"></div></div>	base-vue library renewal
sambuca-functional-tests	UNRELEASED	<div style="width: 80%;"><div style="width: 80%;"></div></div>	SamBuCa functional tests
motion-lib-1.4.1 (homing)	UNRELEASED	<div style="width: 95%;"><div style="width: 95%;"></div></div>	Homing sequence handling in SamBuCa
motionlib-1.0 (FRAS / FSI)	UNRELEASED	<div style="width: 90%;"><div style="width: 90%;"></div></div>	MotionLib release suitable for FRAS/FSI project

JIRA Dashboards ▾ Projects ▾ Issues ▾ Boards ▾ Plans ▾ More ▾ Create ?

BE-CEM-MRO (TeamA) Links Hierarchy ▾ Board ▾

Backlog QUICK FILTERS: SAMBuCa SSVG TIM CRF Vistar RadMon kinova Recently Updated ... Show more

Backlog 143 issues Create sprint ⋮

- MROSUPPORT-1642 {SAMBuCa}{TESTS} Test motion range sambuca-functional-... 2
- MROSUPPORT-1723 {FESA}{MLStepperAxis} disable motion range feature 2.5
- MROSUPPORT-1623 {SAMBuCa}{TESTS} Test Step-lost detection sambuca-functional-... 2.5
- MROSUPPORT-1766 {SAMBuCa} Additional Requirement Report Axis State
- MROSUPPORT-1081 {CRF}{WEB} server-side device introspection sequence L
- MROSUPPORT-1113 {SAMBuCa}{LIB} add memory object SAMBuCa 3
- SSVG-9 {SSVG} {EDITOR} when keyboard-hints are displayed buttons has to be clicked twice 2.5
- MROSUPPORT-915 {CRF} implement CRF remote proxy service 2 Versions
- MROSUPPORT-766 {MREST}{WEB} Backport express middleware to change timestamp format session 2
- MROSUPPORT-601 {DashBoard}{PSID} migrate to WRAP 4
- SSVG-13 {SSVG} {EDITOR} open help documentation in another tab 1
- MROSUPPORT-1049 {RadMon}{WEB} better locations support 4
- MROSUPPORT-1088 {FixedDisplay}{spike} Black screen on the ground floor monitor in 937/R-201 2
- MROSUPPORT-867 {WEB}{MREST} Add config option to limit api 3.5

Implementation



Implementation 1/2

- Automated testing and quality control
- KanBan board
- Documentation

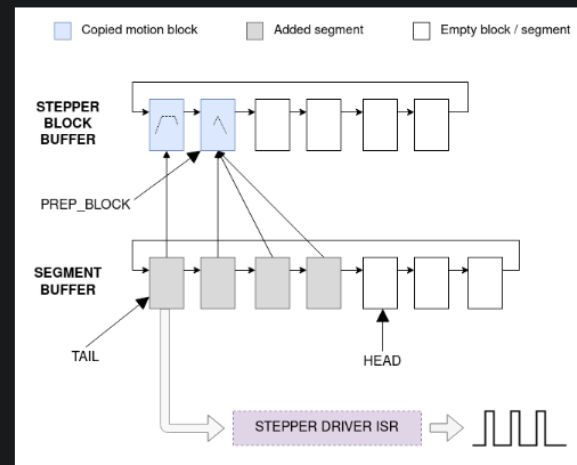
BE-CEM-MRO sprint 52 11 days remaining Complete sprint Links Hierarchy Board

QUICK FILTERS: [Only My Issues](#) [Recently Updated](#)

TO DO	IN PROGRESS	DONE
<p>MROSUPPORT-2219 {FIXED-DISPLAY} Use a BeagleBoard for displaying MRO monitoring dashboards</p> <p>✓ 🔔</p>	<p>MROSUPPORT-2206 {SamBuCa}{LIB}{spike} refactor units code</p> <p>✓ = 3</p>	<p>MROSUPPORT-2218 {FIXED-DISPLAY}{WRAP} Graphs are not displayed in Tizen Browser</p> <p>🔔</p>
<p>MROSUPPORT-2038 {WEB} base-vue3 migrate inputs</p> <p>✓ 🔔 3</p>	<p>MROSUPPORT-1971 {SamBuCa}{LIB}{APU} implement driver-disable and driver-ready</p> <p>✓ = 4</p>	<p>MROSUPPORT-2203 {RadMon} db hot-fix: revert radmon updates in db</p> <p>✓ 🔔 4</p>
<p>MROSUPPORT-1618 {SAMBuCa}{TESTS} Test automatic homing</p> <p>✓ 🔔 3</p>	<p>MROSUPPORT-2114 {SamBuCa}{PL} configure input debounce</p> <p>✓ = 5</p>	<p>MROSUPPORT-2009 {ISOLDE}{MEDICIS}{CAM} Enable camera controls in Isomed WebApp</p> <p>📈 🔔 3</p>

The following image briefly illustrates how the last two buffers are handled during segmentation and the relationships between them, more specifically:

- `st_prep_block` (stepper preparation block) points to the latest planner block copied during the generation of segments
- `segment_buffer_tail` points to the first segment ready to be consumed by the stepper driver ISR
- `segment_buffer_head` points to the first segment empty segment able to store new data
- segment's `exec_block` points to the motion plan from which the same segment is derived



test	package
✓ ci-git-submodules	✓ doc
✓ ci-git-update-submodules	✓ package
✓ lint	✓ tn-package
✓ style	
✓ test	

2

Implementation 2/2

- **Peer Reviews**

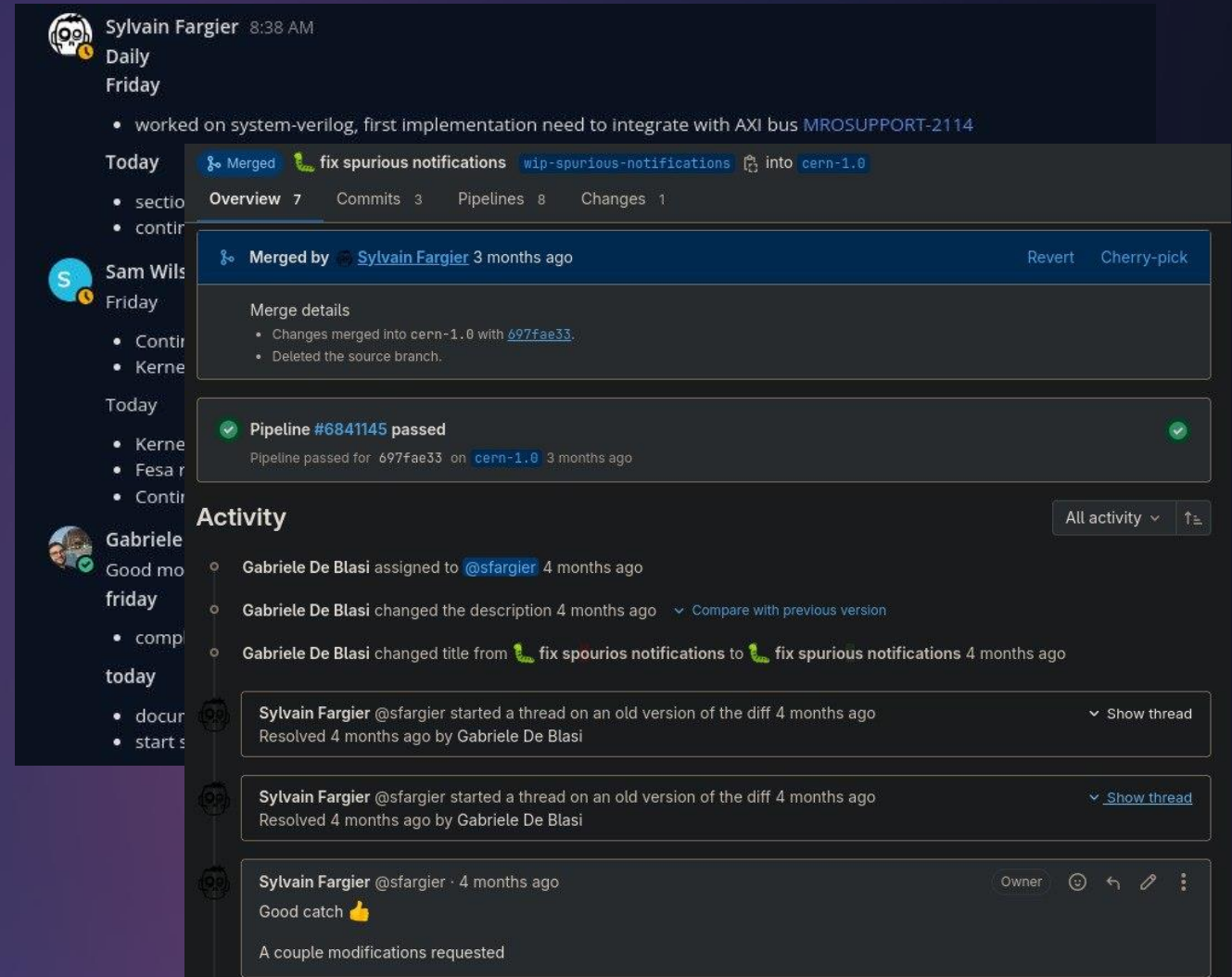
- All work must be reviewed before being merged

- **Weekly Code Reviews**

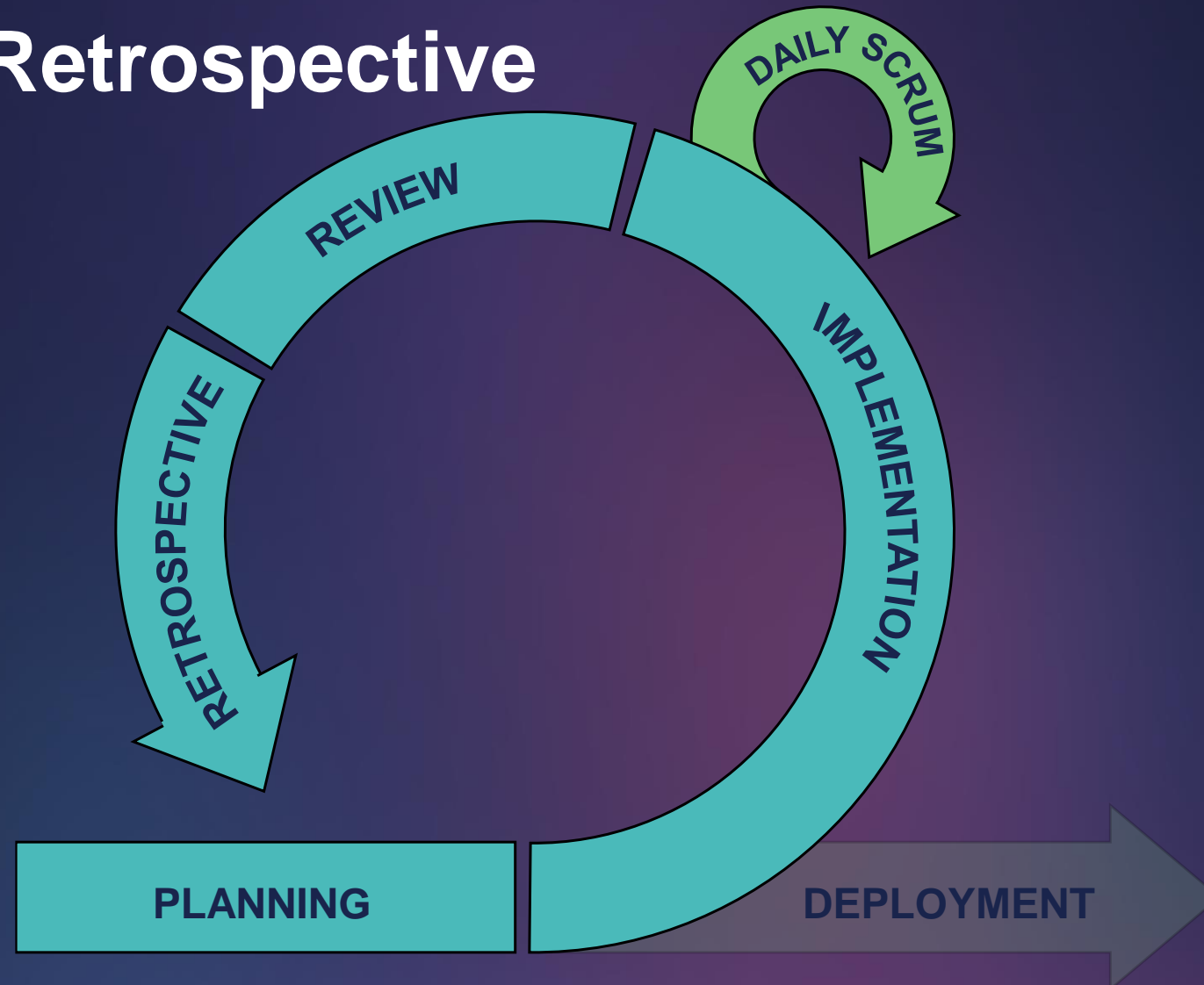
- To show your work or a topic will contribute to the team's growth

- **Daily-Scrums**

- On Mattermost in addition to on-site stand-up dailies

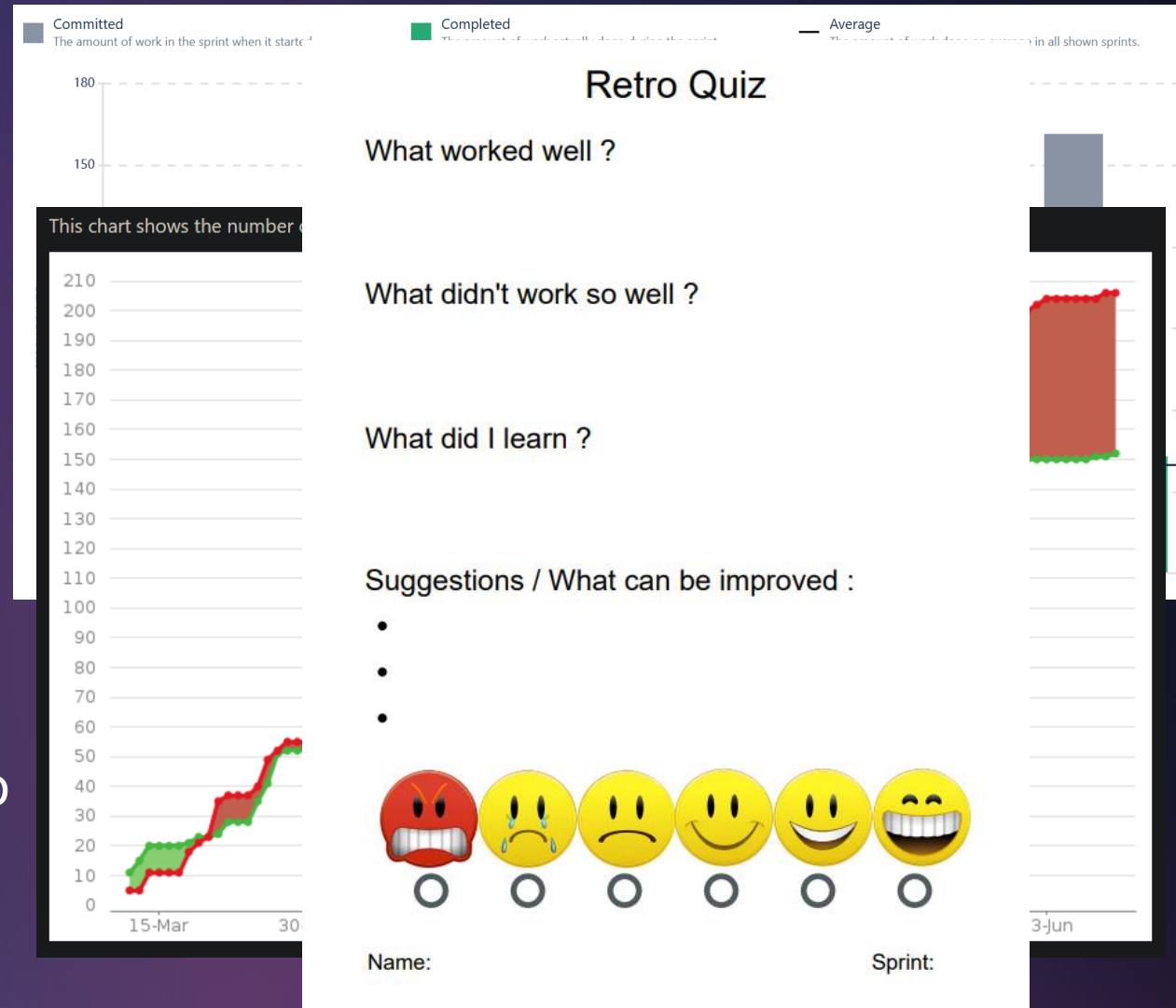


Review & Retrospective



Review & Retrospective

- **Work review**
 - Updating the product backlog
- **Workflow analysis**
 - Using Jira reports
- **Continuous Improvement**
 - Identifying what can be enhanced and planning improvement actions to be implemented in the next sprint.



Committed
The amount of work in the sprint when it starts

Completed
The amount of work that has been completed

Average
The average amount of work completed in all shown sprints.

Retro Quiz

What worked well ?

What didn't work so well ?

What did I learn ?

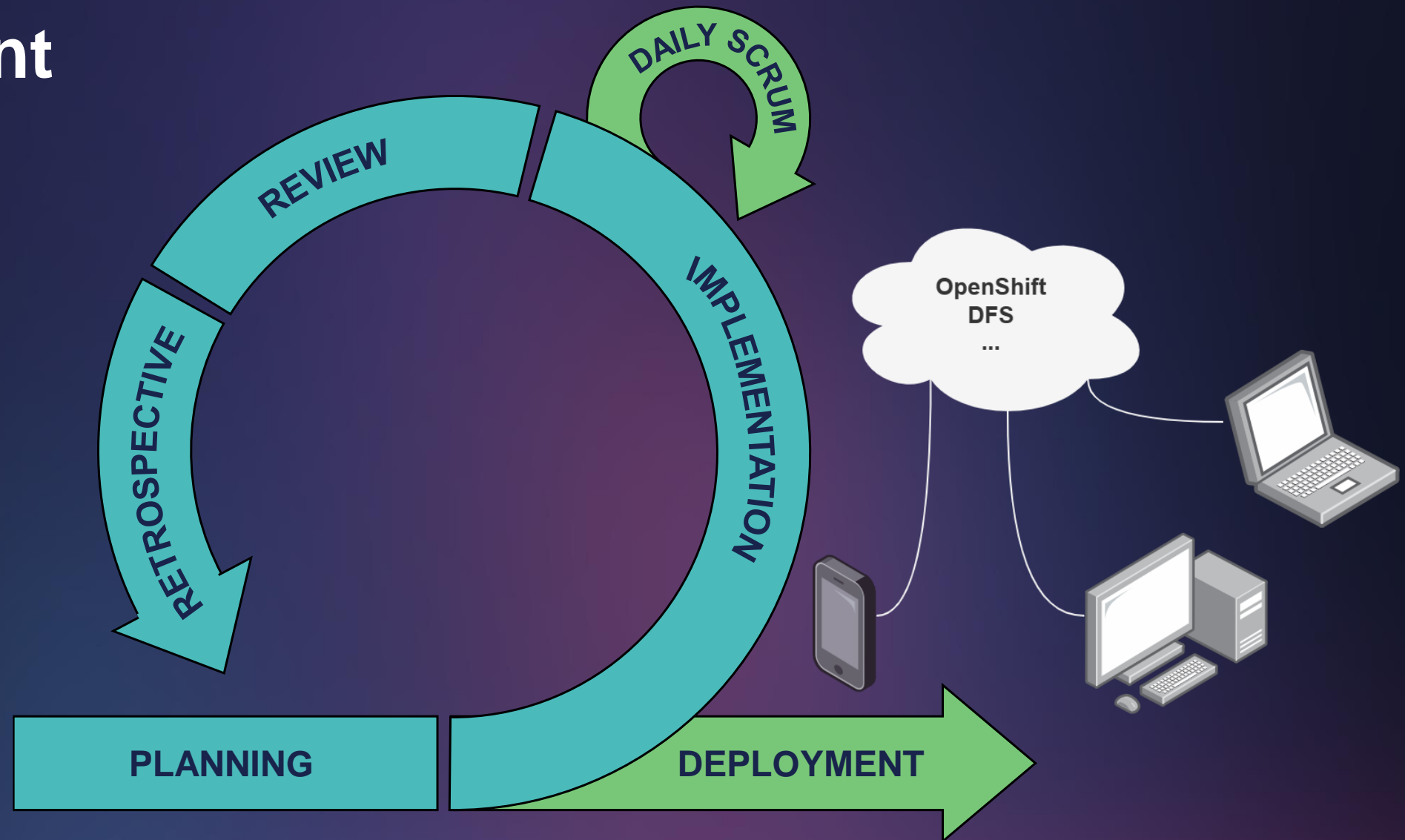
Suggestions / What can be improved :

-
-
-

Angry, Sad, Neutral, Happy, Very Happy, Laughing

Name: _____ Sprint: _____

Deployment



Conclusion 1/2

- **No one-size-fits-all workflow, each team implements its custom solution but faces the same challenges.**
- **Rely on proven methodologies (Scrum, XP, etc.), learn and benefit from the industry standard.**
- **Keep It Simple Stupid (KISS), so that everyone can understand and be part of it.**



Conclusion 2/2

- **A clear and well-defined workflow is crucial for the success of any project and thus of business processes.**
- **By integrating testing, quality control and automation into a workflow, software reliability and maintainability increase significantly, along with productivity.**
- **Continuously improve your workflow by exploiting (properly) available tools such as Jira.**
- **The quality of decisions depends on the quality of data – adequate planning, reporting, estimating is essential.**



Acknowledgment

Many thanks to **Sylvain Fargier!**



Thank you

Questions?