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BPM verification plan

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Outline

- Naming convention
- Data management system: Insight
- Acceptance tests workflow
- Installation
- After-installation tests

Naming convention

- Every Field Replaceable Unit (FRU) is named. A FRU can be a simple part or an assembly
  - Ex: FEB-050ROW:PBI-PPC-002 for a cabinet cable

- Naming convention:

Sec-Sub:**Dis-Dev-Idx**

Two major areas of FRU installation slots are identified:

- **tunnel**: including stub, tunnel wall and gallery wall,
- **support**: front end building (FEB), klystron gallery, gallery support area (GSA) in A2T

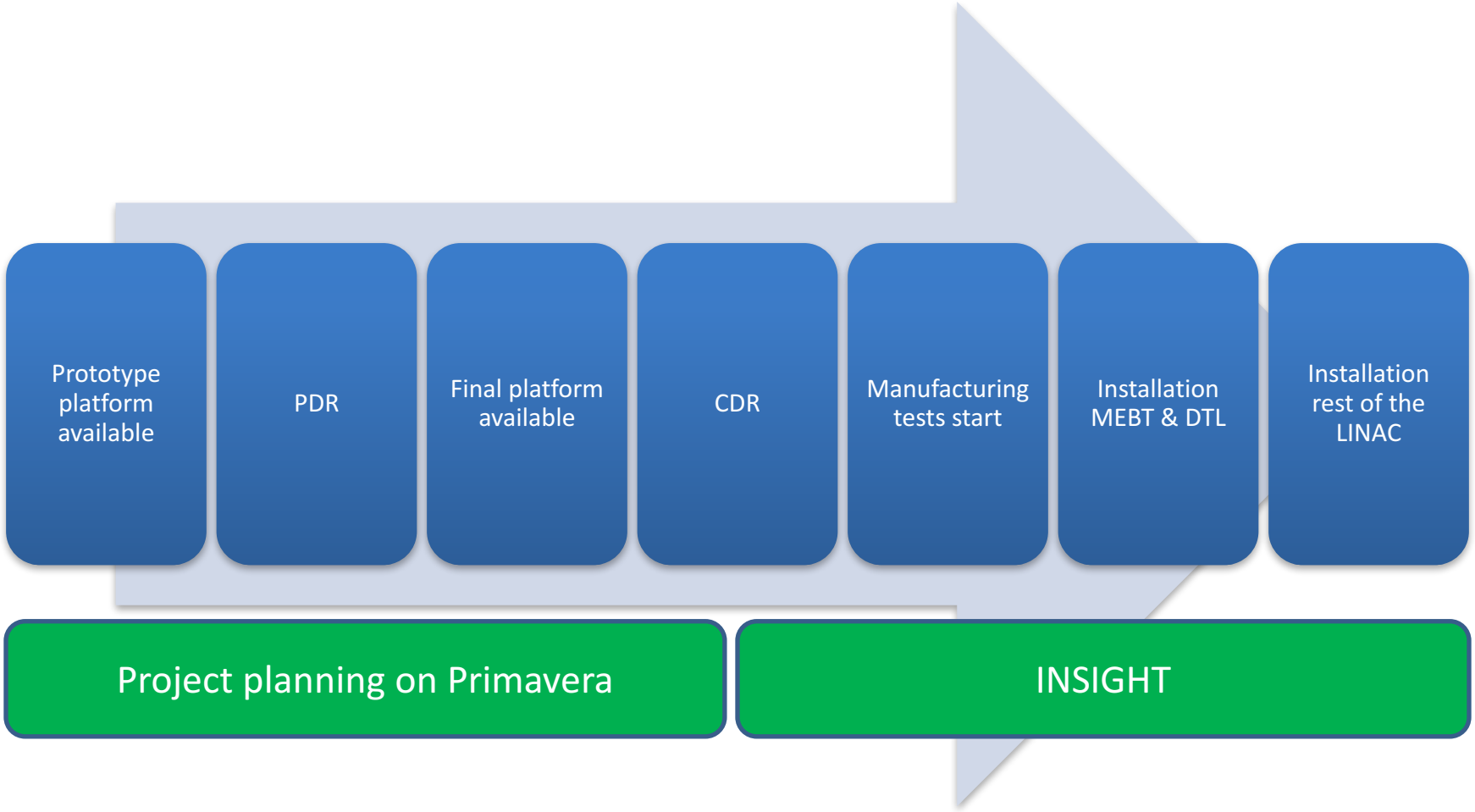
→ System name is not misused!

Data management system

- Data export / import with other software tools
- Systems and subsystems tests results coming from different locations (ESS, IK Partner, Industry partners…)
- We must be able to trace back acceptance tests results to laboratory measuring devices
- We need to be able to prepare an installation batch when an installation slot is ready: need for a dynamic tool

→ Having a reliable Data management system is critical!

Data management system

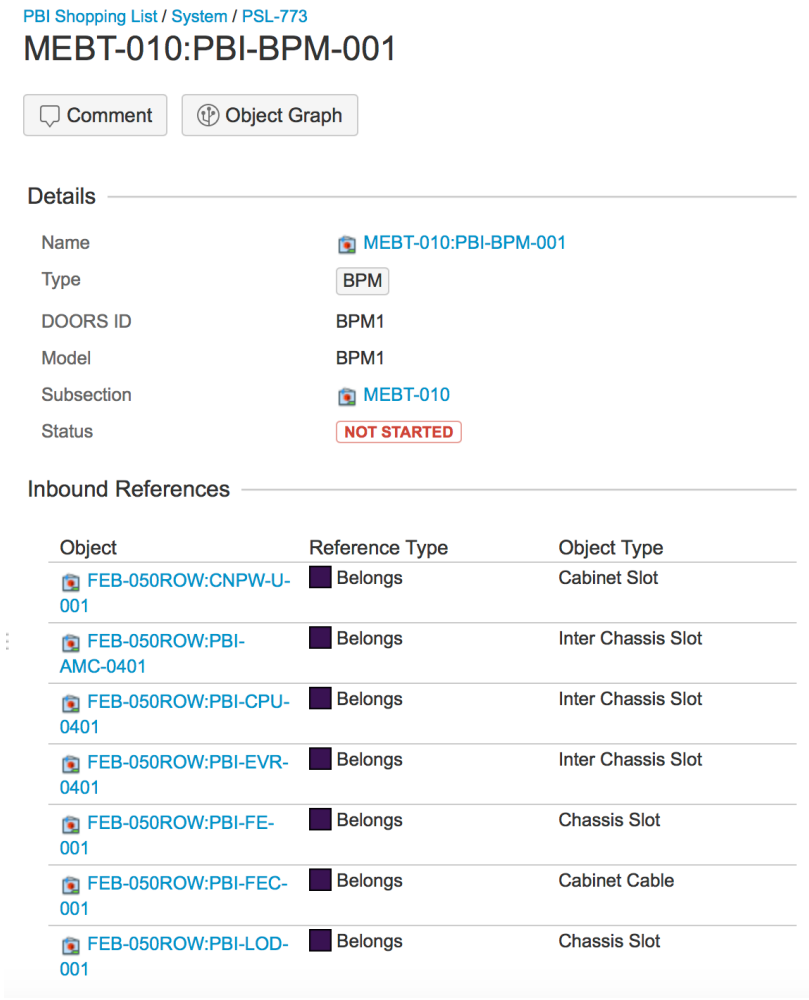


Data management system: Insight

- Ensures traceability between tests and production data, system components and laboratory devices.
- Objects' attributes store all FRU info: responsible, current status (procured, received, RFI…) etc.
- Added value, current installation or production progress… can be automatically extracted for each system or FRU
- Timeline is managed in Jira, tasks are linked to Insight.

Data management system: Insight

- Change of status are triggered when all required documents and conditions are met.
- ICS database requirements are being defined. It will be automatically populated from Insight when available.



PBI Shopping List / System / PSL-773

MEBT-010:PBI-BPM-001

Comment | Object Graph

Details

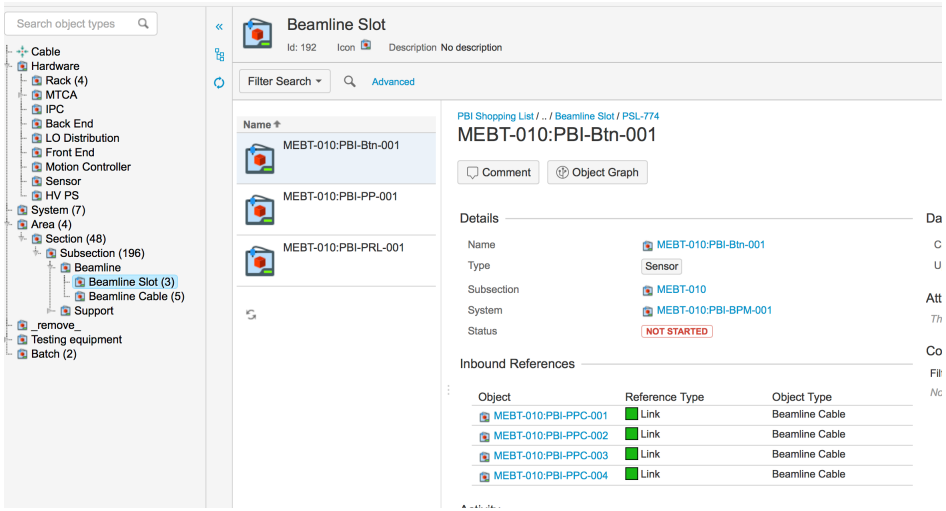
Name	MEBT-010:PBI-BPM-001
Type	BPM
DOORS ID	BPM1
Model	BPM1
Subsection	MEBT-010
Status	NOT STARTED

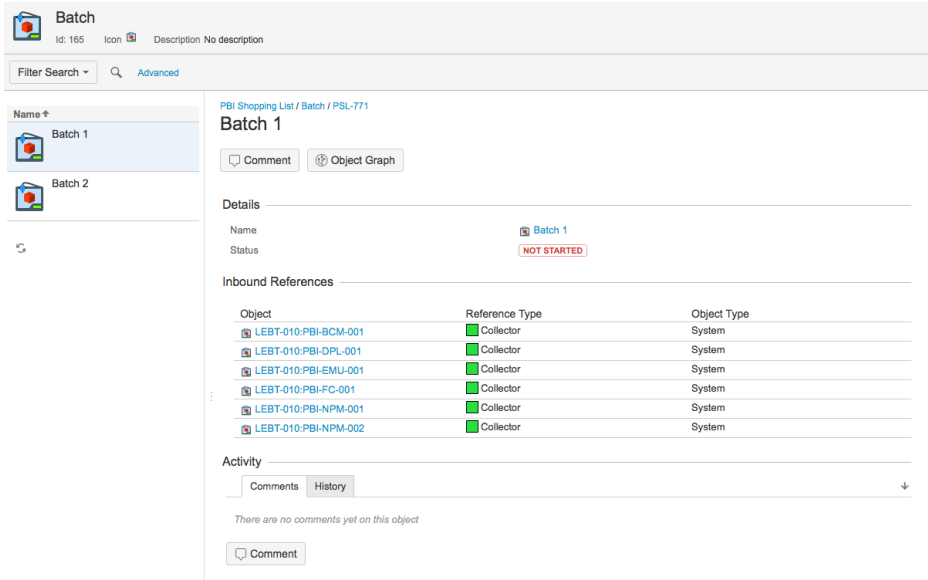
Inbound References

Object	Reference Type	Object Type
FEB-050ROW:CNPW-U-001	Belongs	Cabinet Slot
FEB-050ROW:PBI-AMC-0401	Belongs	Inter Chassis Slot
FEB-050ROW:PBI-CPU-0401	Belongs	Inter Chassis Slot
FEB-050ROW:PBI-EVR-0401	Belongs	Inter Chassis Slot
FEB-050ROW:PBI-FE-001	Belongs	Chassis Slot
FEB-050ROW:PBI-FEC-001	Belongs	Cabinet Cable
FEB-050ROW:PBI-LOD-001	Belongs	Chassis Slot

Data management system: Insight

- No lost effort, as everything can be scripted to populate external tools and extract any needed information!
- Installation batch: installation status easily verified and prepared
- Data is uploaded by BD team. Training IK and industrial partners on that is possible.

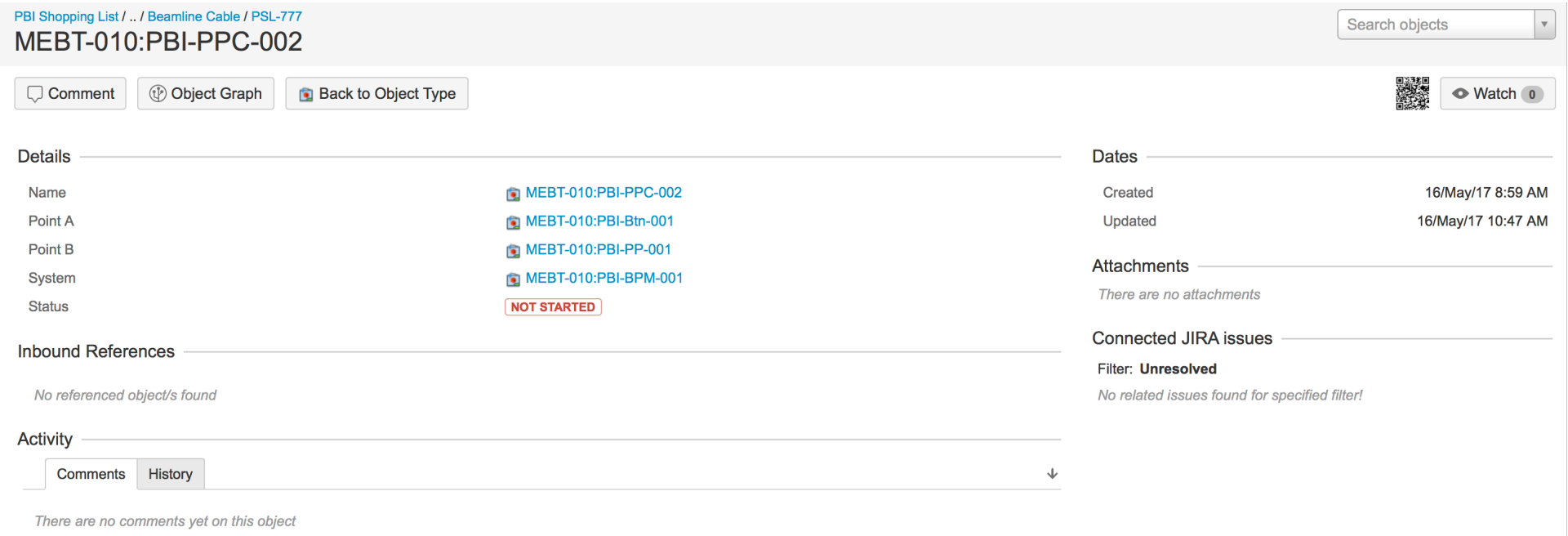




Data management system: Insight

- Hierarchy goes down to systems cables and their status and properties

- Example of a Beam line cable connecting a BPM button to a Patch Panel:



Measurements files format

- Large amount of measurements parameters: Data logged in HDF5 and uploaded to Insight.

- Data files produced at ESS follow a fixed configuration: Files, groups and datasets mandatory attributes are defined.

- Existing data received from IK and industry partners is stored as is for now, adding the needed metadata. Re-formatting to HDF5 is planned for each test results.

Acceptance tests workflow

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System tests requirements

- Tests requirements are defined for each subsystem

Test plan

- Describes subsystems' test setup and characterization procedures
- When not COTS: test plan is prepared/discussed and agreed with IK partner

Test Design Document

- Design document is validated by system lead: we make sure test requirements are correctly translated
- Test coverage is reviewed. Possible risk assessment if we do not reach 100% coverage
- Tests IDs defined for each measurements

testbench implementation

- Test system implemented in python.

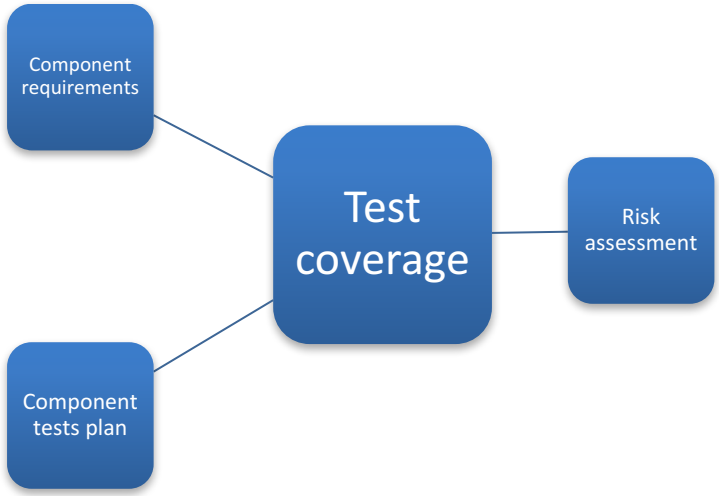
Run tests

- Acceptance tests performed in RATS
- Data logging in Insight

Acceptance tests workflow

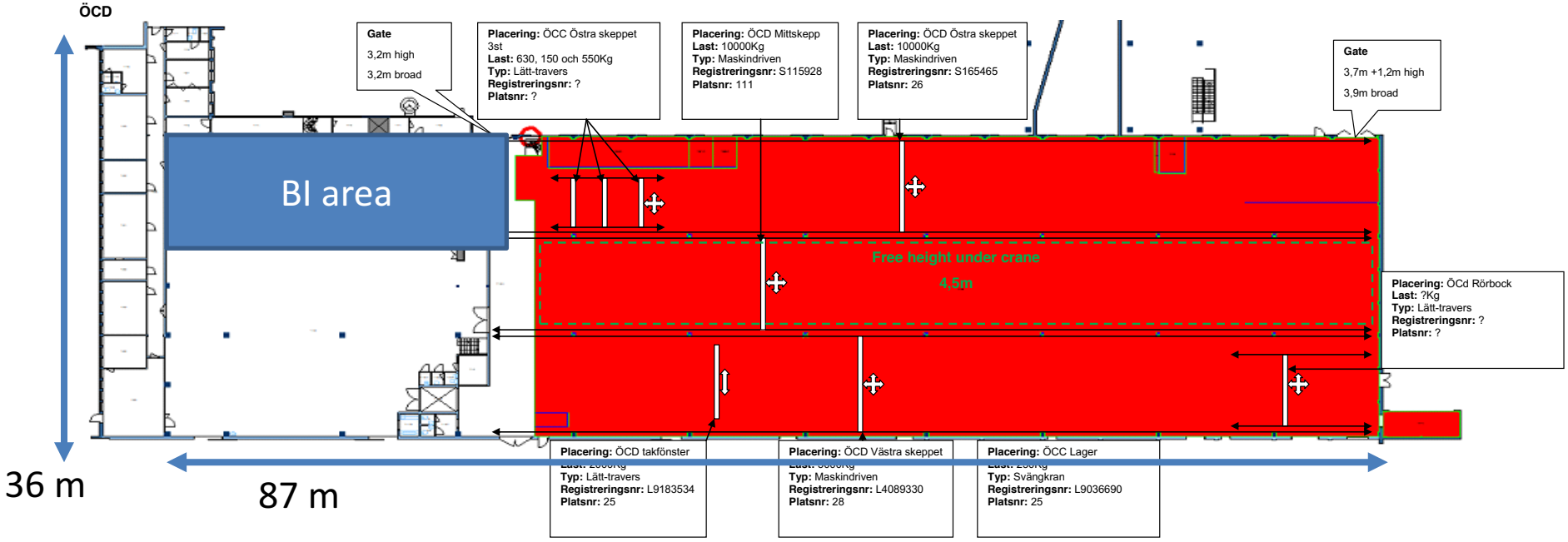
→ Global output is a system level test coverage.

Risk assessment is performed if we do not reach 100% coverage.



Where do we test our systems?

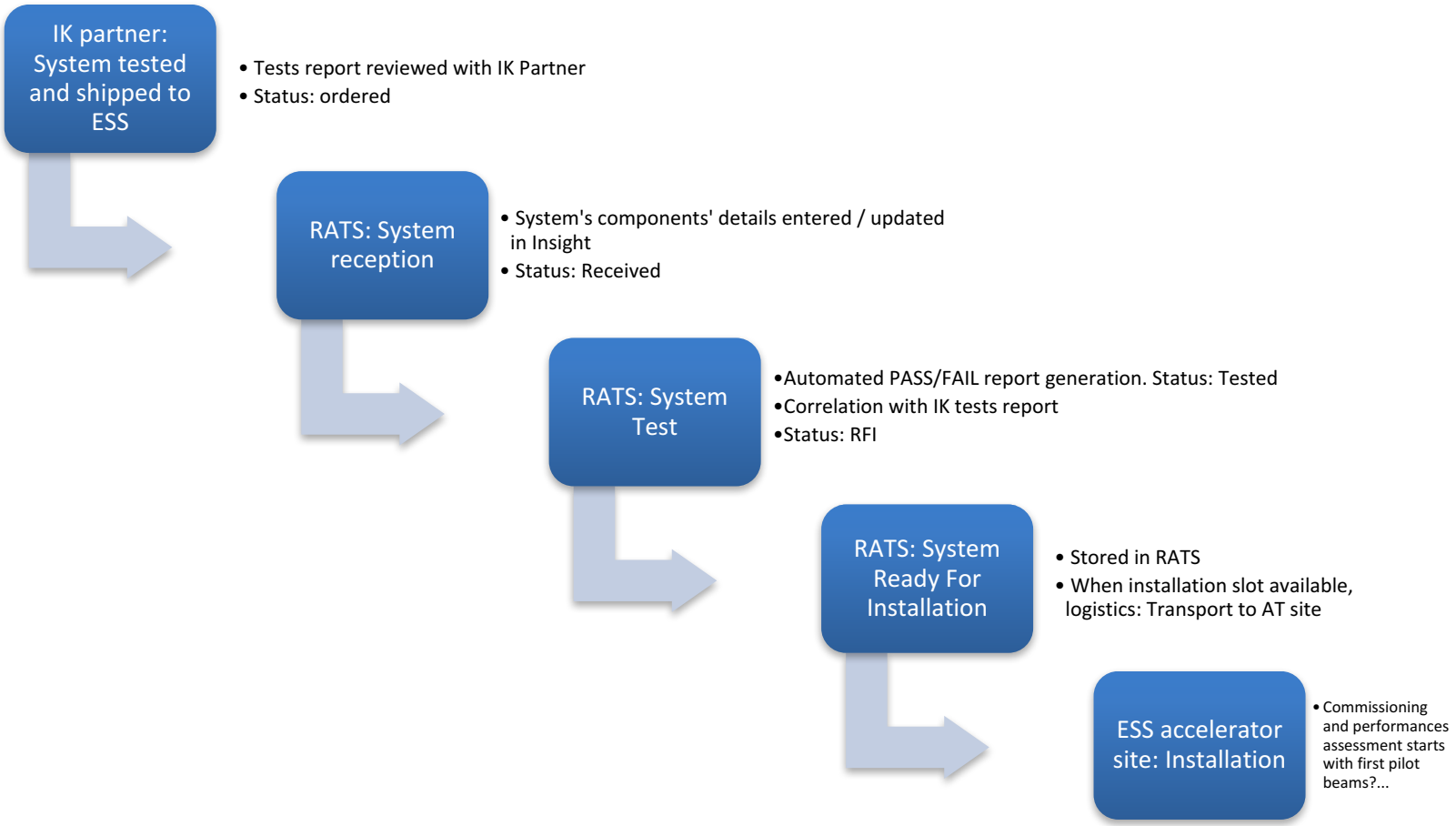
- RATS preliminary layout



Acceptance tests workflow

- RATS: Component received.
- RATS: Component tested.
- RATS: Component stored.
- RATS: System assembly and test → RFI
- RATS: System stored
- Installation slot: System goes to ESS AT site.
  - **Guideline: Install and test as much as possible, as early as possible**
  - **Learning curve will help us moving faster with installation work after the first systems are processed**
- Last step: commissioning

Acceptance tests workflow: System received from IK partner



Installation

- Logistics discussion with Slava
- System (BPM) goes to AT site as soon as we have an installation slot.
  - That is when we use our installation batches in Insight!

After-installation tests sequence

- After-installation tests sequence:
  - **initial first-time commissioning: test_ID**
  - **cold check-out: test_ID**
  - **commissioning with beam: test_ID**
  - **quick self-check: test_ID**

- Sequential testing is important (tests timestamps are checked automatically). Otherwise the statement: "**the instrument is installed and working properly**" has less confidence.

- During debugging:
  - Relevant tests in each architectural layer are repeated until satisfactory results are obtained.
  - If the problem is identified and can be isolated within its layer, there is normally no need to repeat all of the tests which are sequentially following. Depending on the situation, some test might become mandatory nevertheless (for instance a software recompilation might entail a standard interface check, and a repaired connector might entail a signal transmission check).

After-installation tests sequence

- Cold check out: Testing of the whole instrument on all architectural layers:
  - monitor, front-end electronics, cables, mTCA-electronics, timing, data treatment, publishing, network transmission and machine protection interface.

- Commissioning with beam: Aims at verifying the correctness of the integration for machine operations.
  - Includes initial comparisons and cross-calibrations in order to gain confidence in the instrument. Performance limiting factors are identified.

- Quick self test: The self-test procedure includes testing of calibration, machine protection and data transmission.

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Thank you!

Questions ?