

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

Developing electronics boards through standardisation, specialised tools and collaboration

Andrea Boccardi SY-BI



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Accelerators and
Technology Sector

Outline

- SY-BI: who we are, what we do
- SW tools used for design
- CERN services and collaborations
- From specifications to deployment
- After the deployment: maintenance

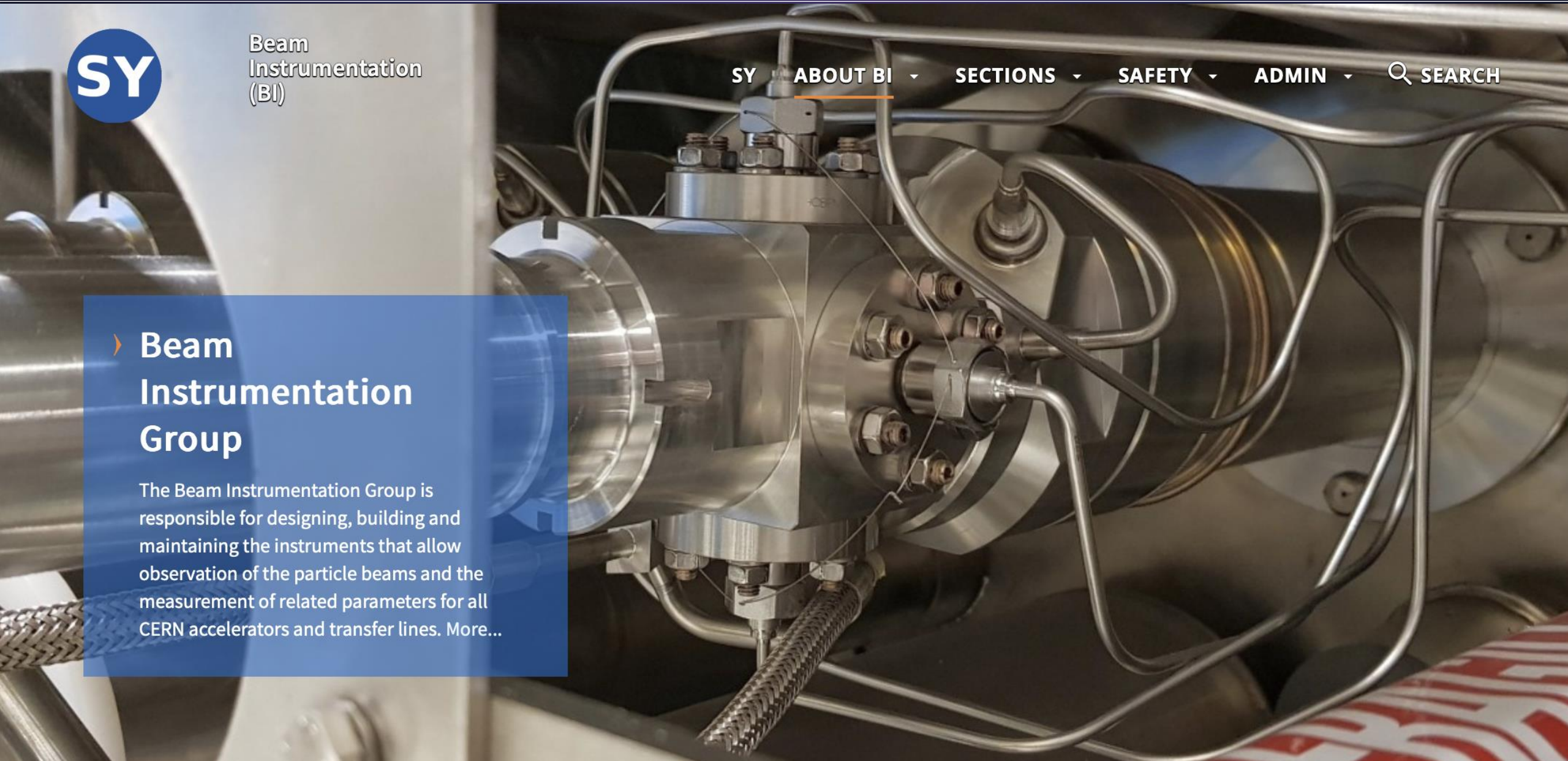


Beam
Instrumentation
(BI)

SY ABOUT BI ▾ SECTIONS ▾ SAFETY ▾ ADMIN ▾ 🔍 SEARCH

› Beam Instrumentation Group

The Beam Instrumentation Group is responsible for designing, building and maintaining the instruments that allow observation of the particle beams and the measurement of related parameters for all CERN accelerators and transfer lines. More...



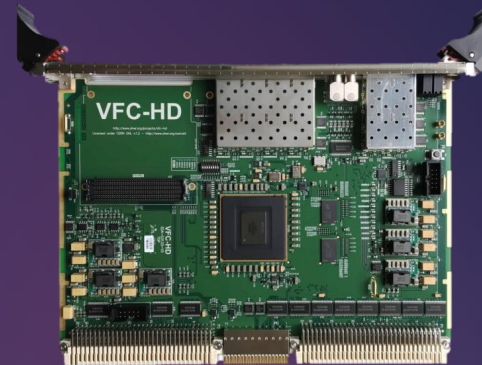
Electronics for instrumentation



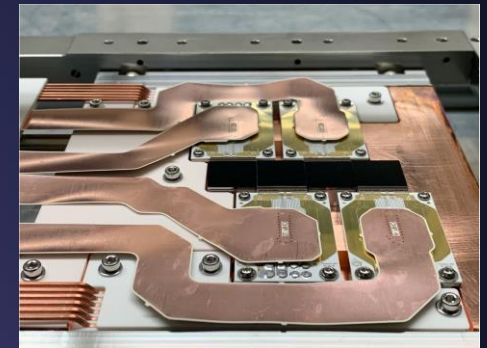
RF



Analogue



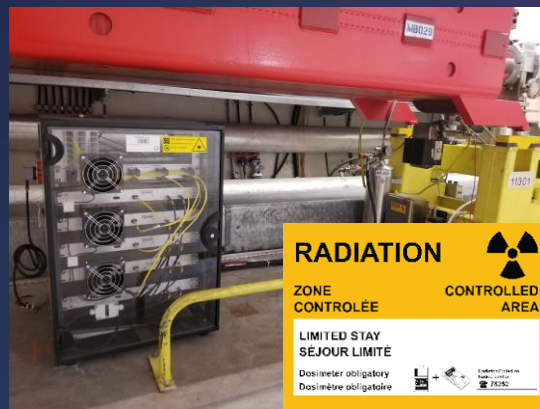
Digital



ASIC



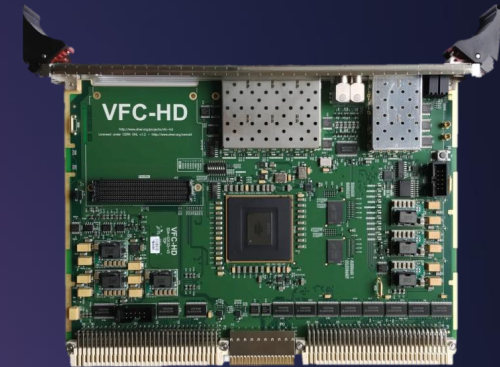
Surface



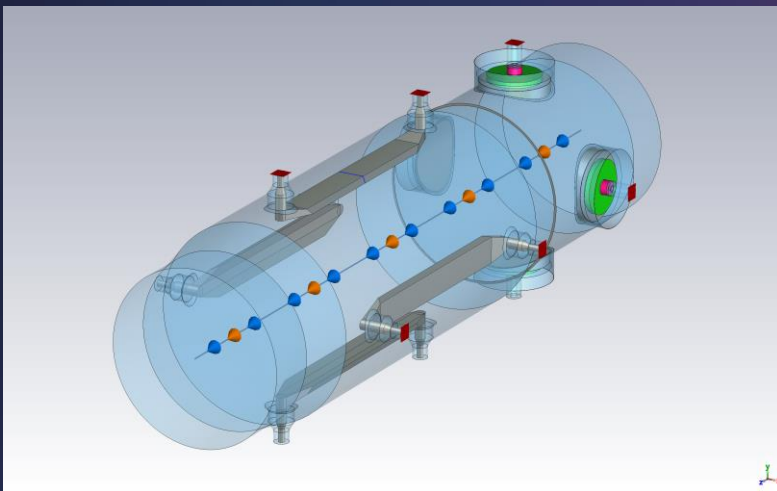
Tunnel /radiation-tolerant

Large systems: 1000s of BPMs and BLMs in the LHC
But also a lot of different types of instrument!
From ~DC to 10s of GHz
Safety systems: high reliability

SW tools used for the design

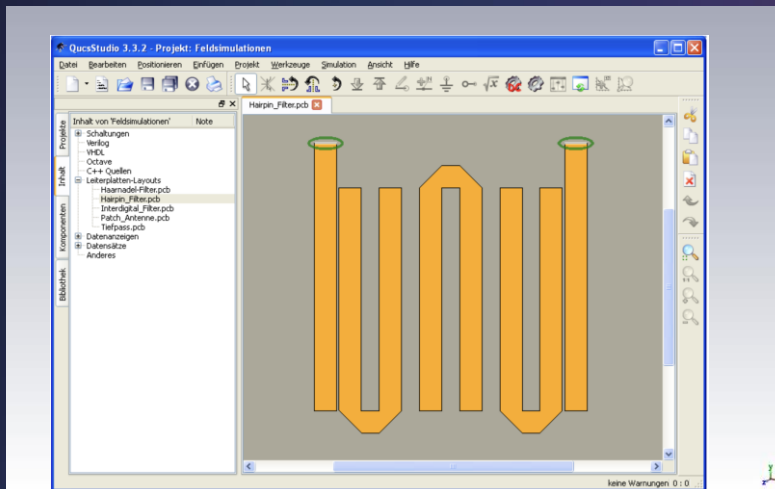
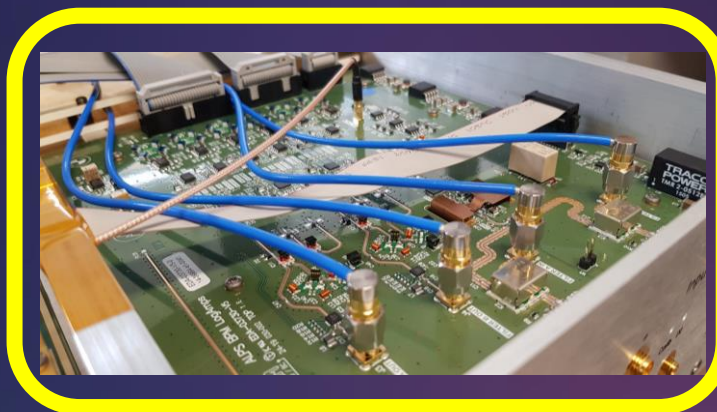


SW tools used for the design



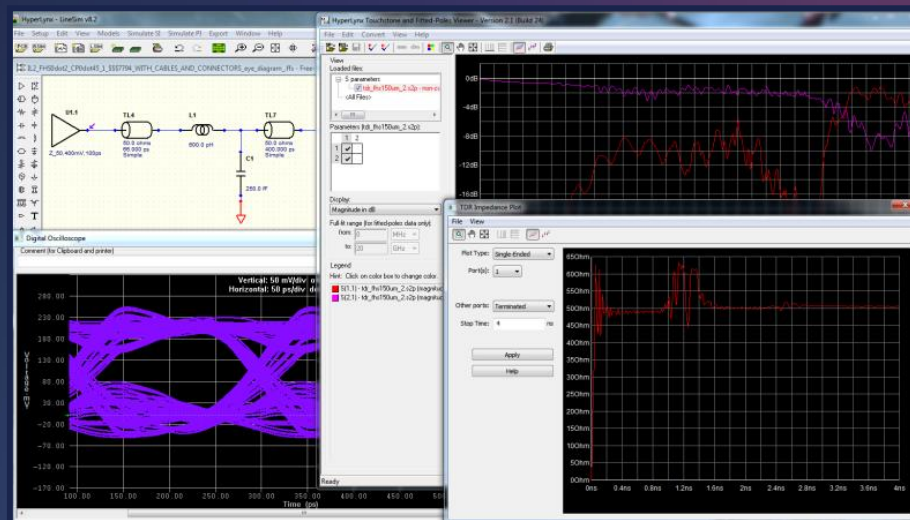
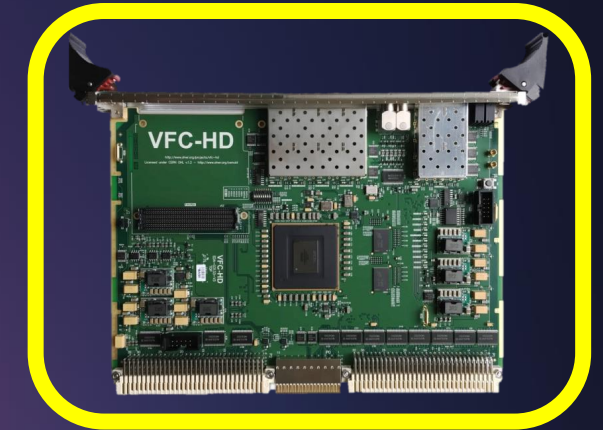
CST Studio Suite

SW tools used for the design



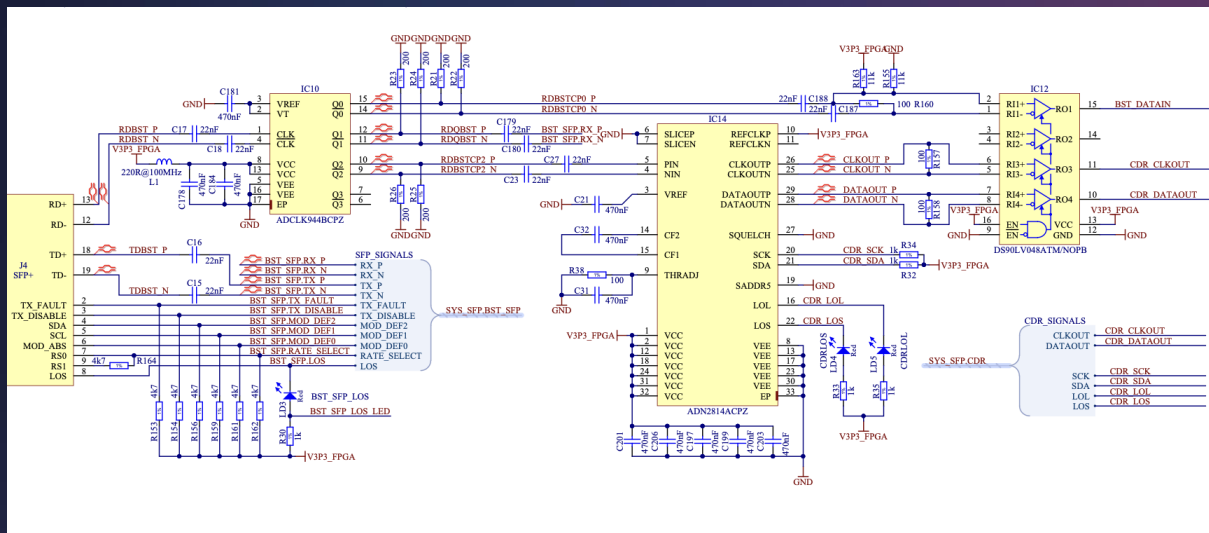
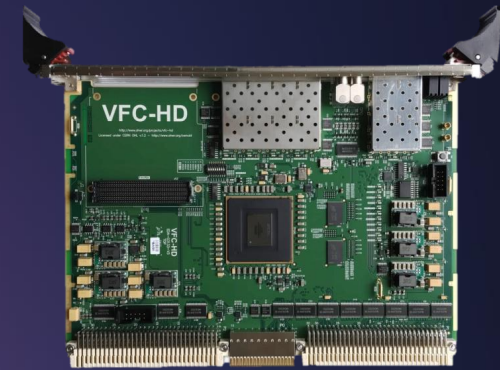
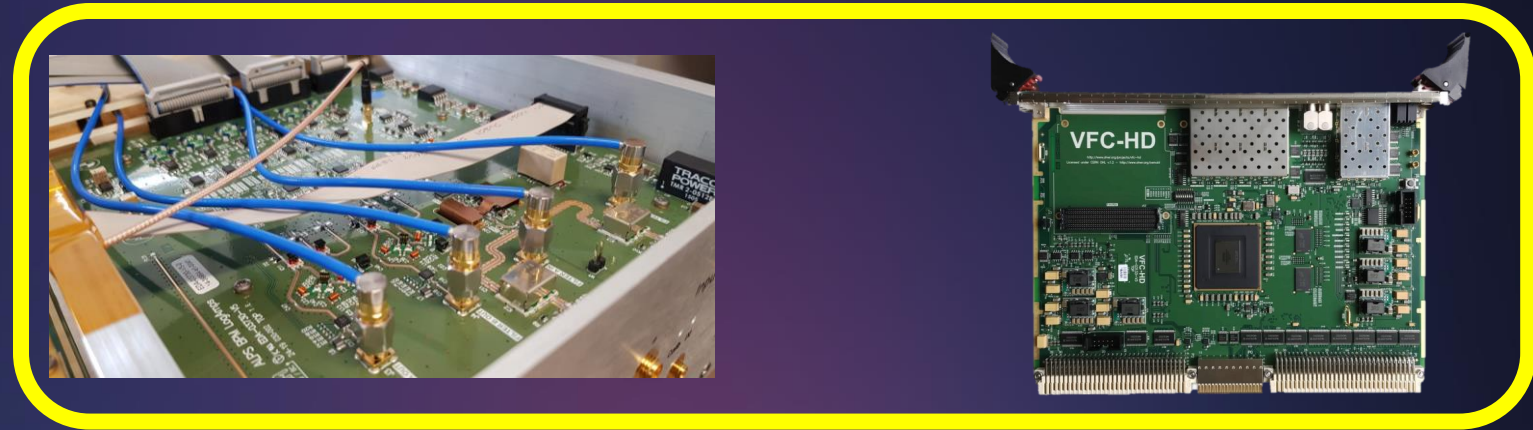
AWR Microwave Office | QucsStudio
Pspice | LTspice

SW tools used for the design



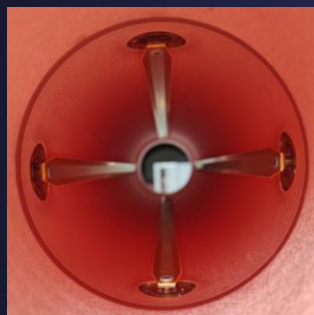
HyperLynx

SW tools used for the design



Altium

SW tools used for the design



CST Studio



Microwave Office & QucsStudio
Pspice & LTspice



HyperLynx

Altium

Many tools and some 'redundant',
but all industry standards



instrumentation (BI)

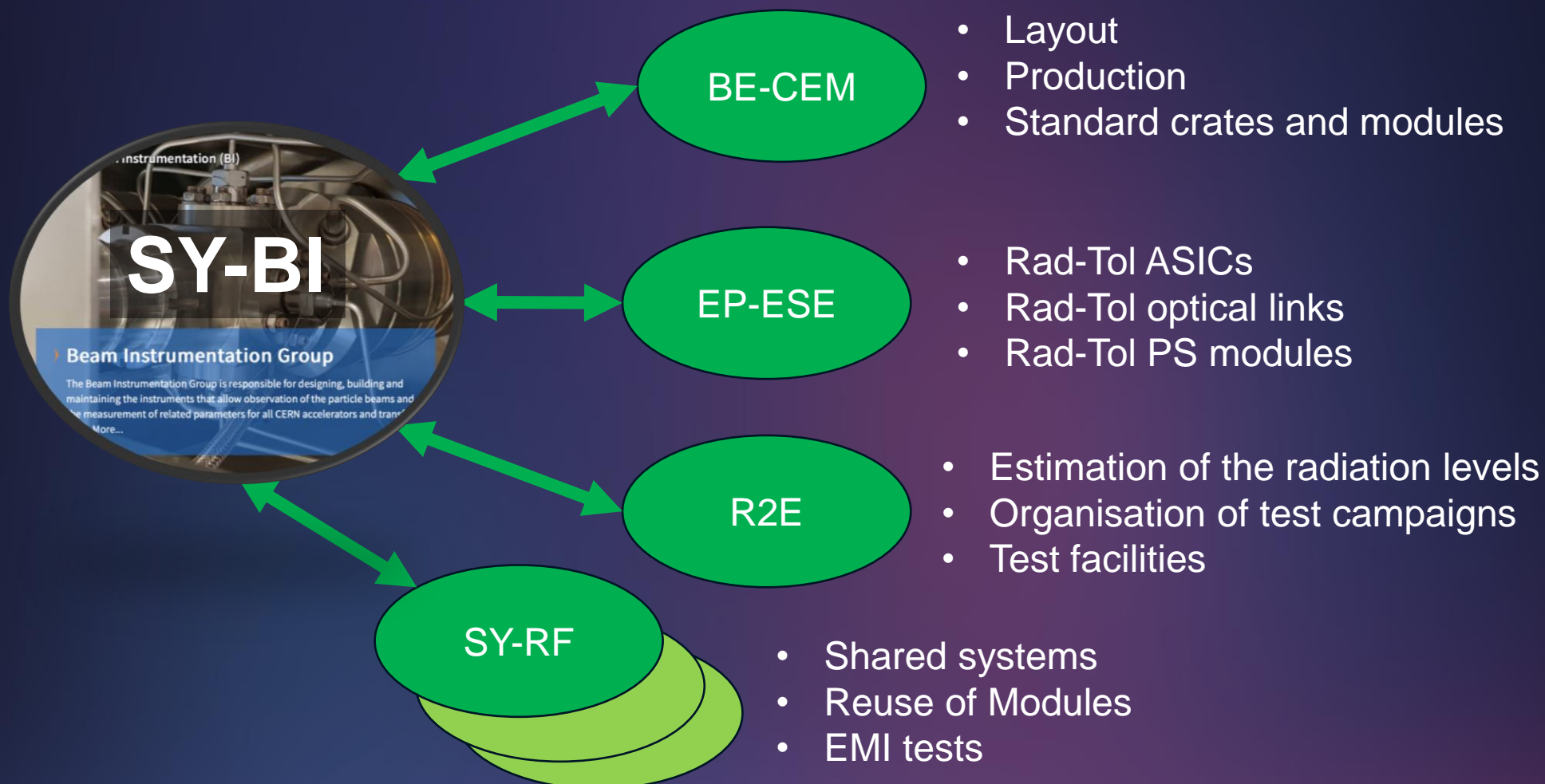
SY-BI

▶ Beam Instrumentation Group

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CERN services and collaborations



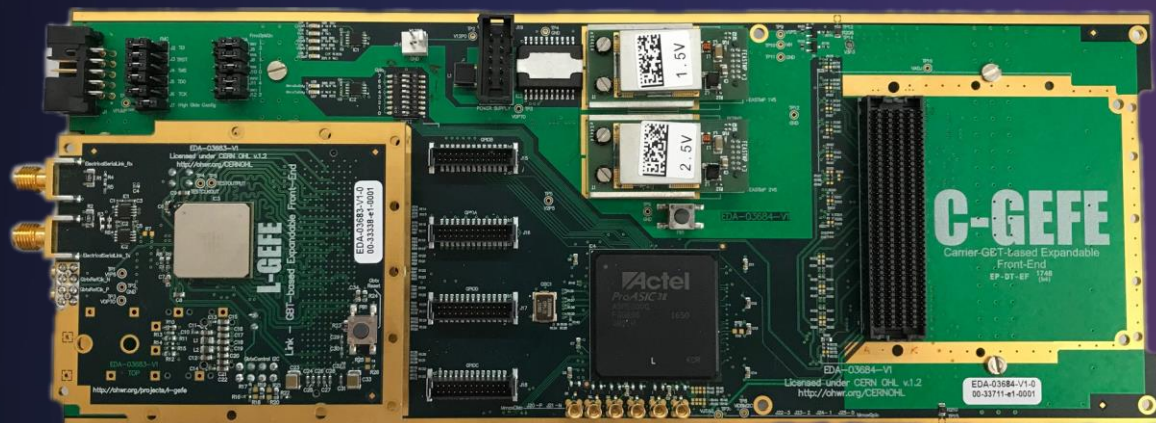
Collaboration examples: BE-CEM and R2E



GEFE: a radiation-tolerant digital front-end

- Layout with the design office of BE-CEM
- Produced using the BE-CEM services
- Qualified for radiation-tolerance with R2E
- Use of several EP-ESE radiation-tolerant ASICs

Collaboration examples: BE-CEM and R2E



DI/OT Rad-Tol system board

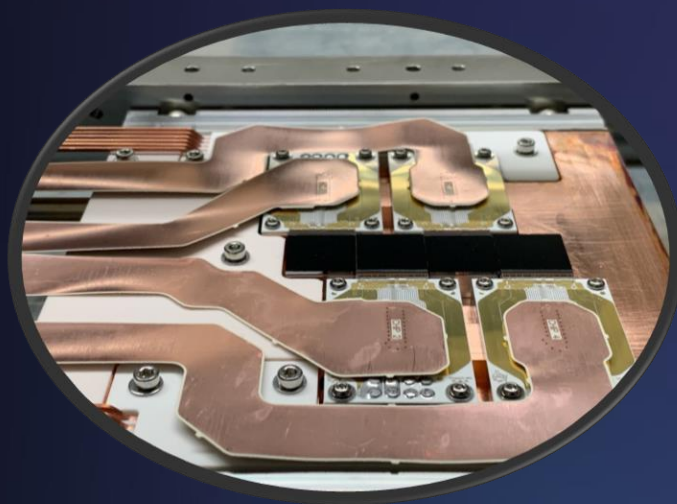
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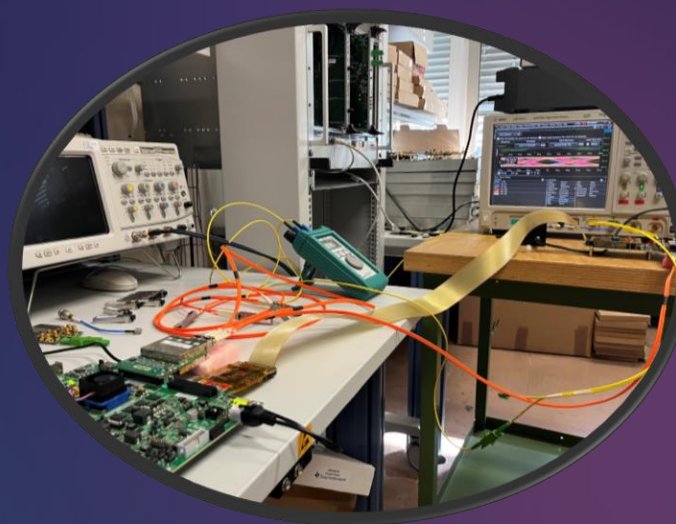


CHARM Radiation Tolerant FPGA Tester Board
(CRATEBO)

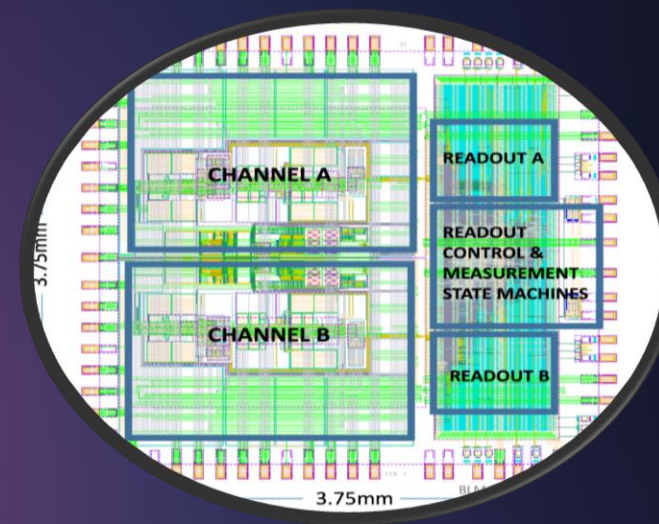
Collaboration examples: EP-ESE



TimePix for BGI

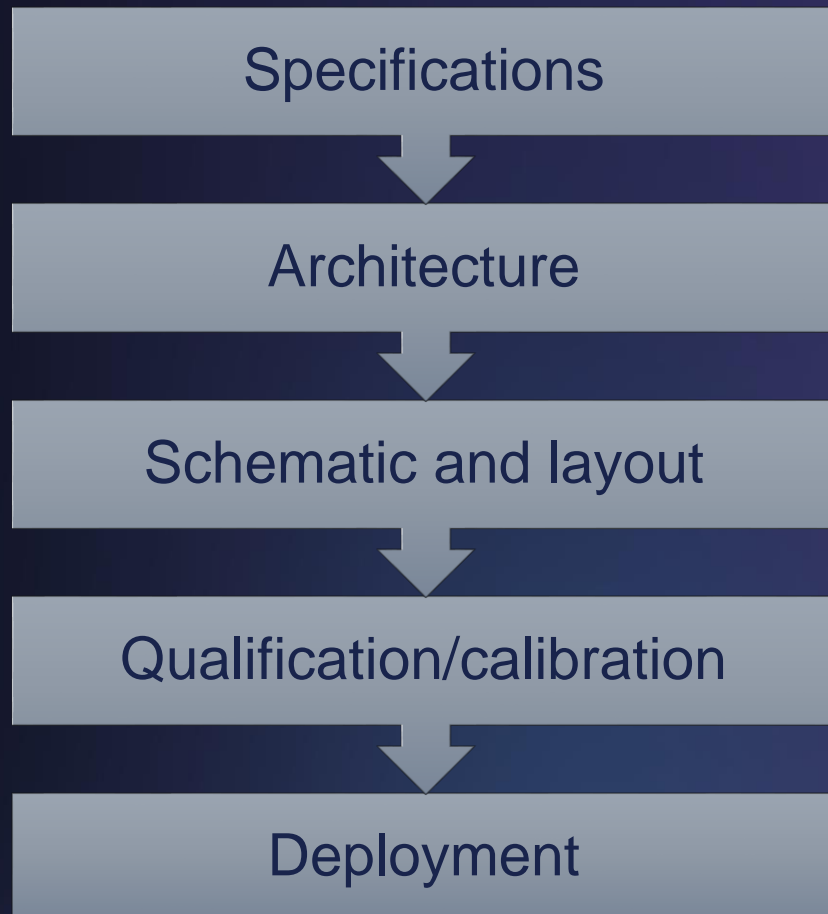


BRATOL
BI Rad-Tol Optical Links

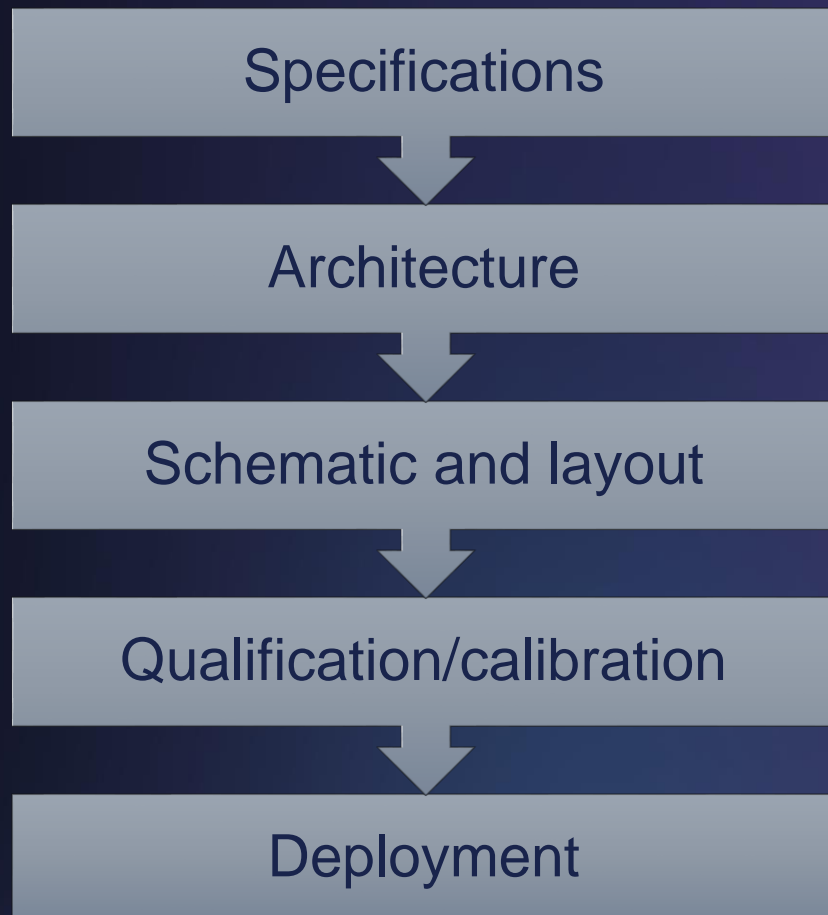


BLM ASIC

From specifications to deployment

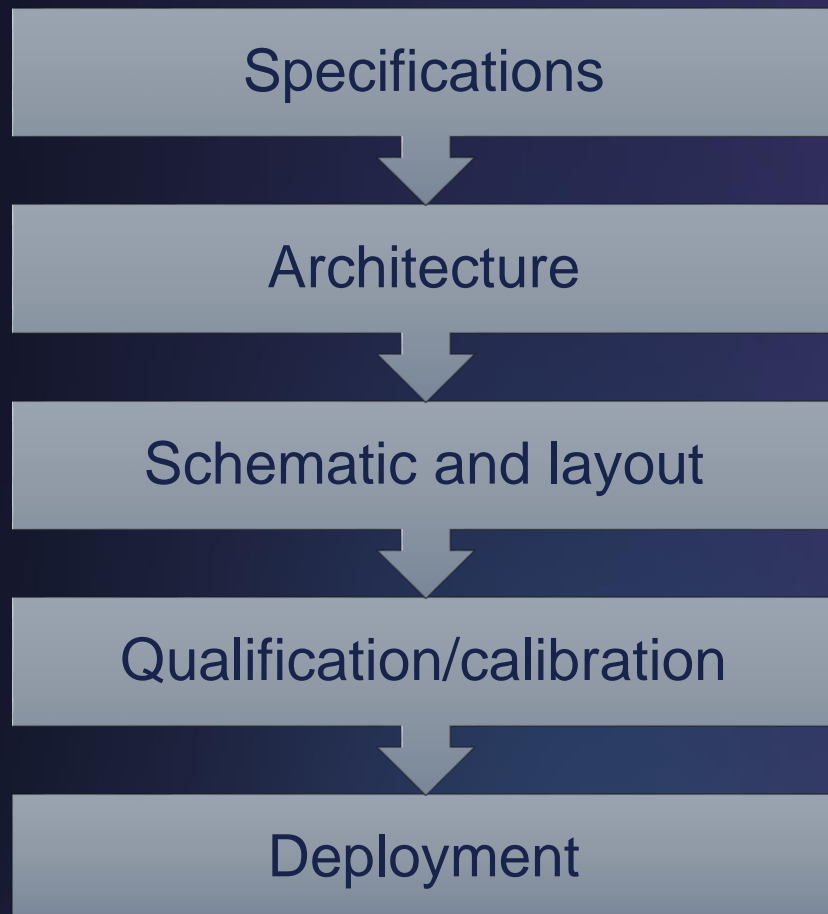


From specifications to deployment



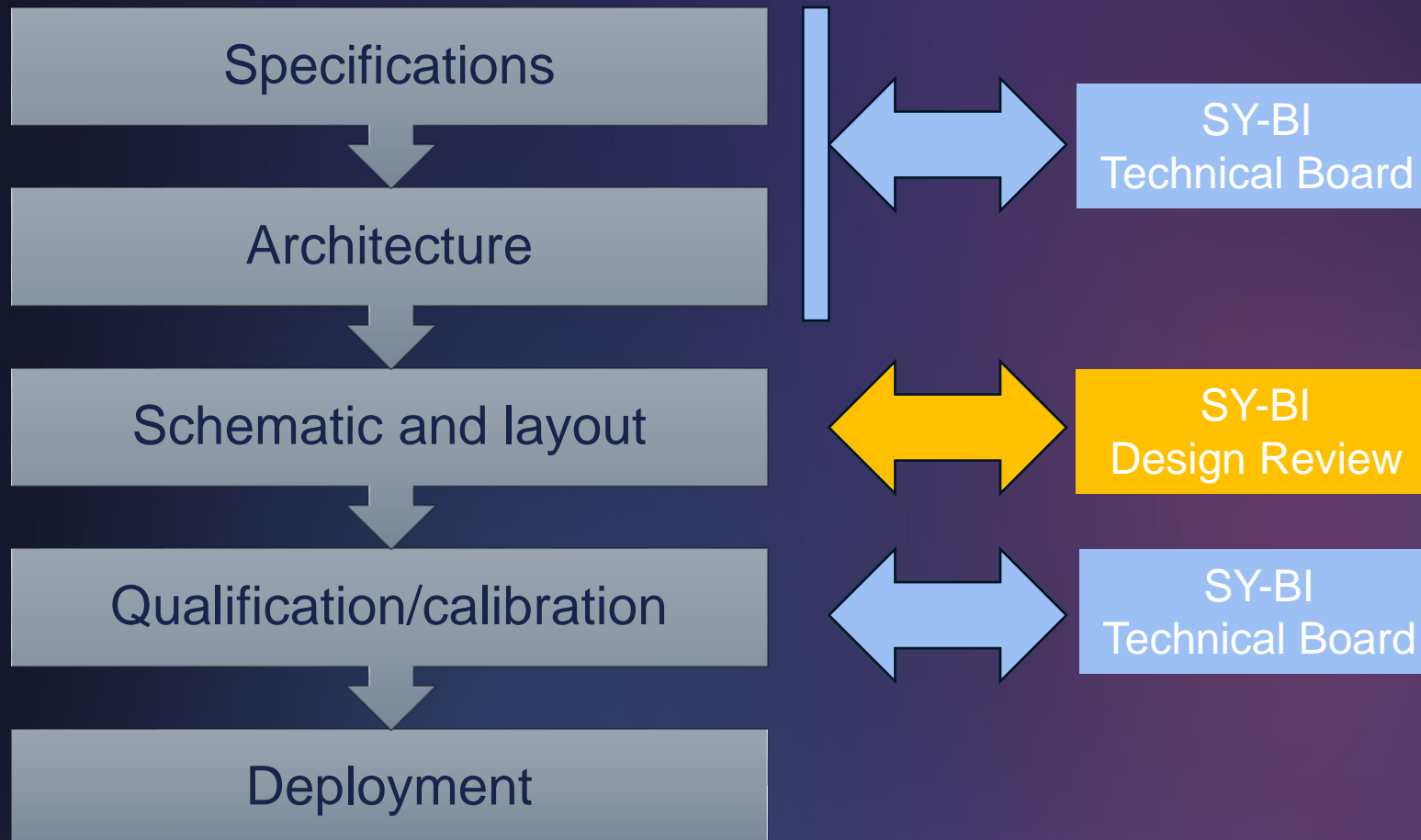
Burn-in / Run-in tests

From specifications to deployment

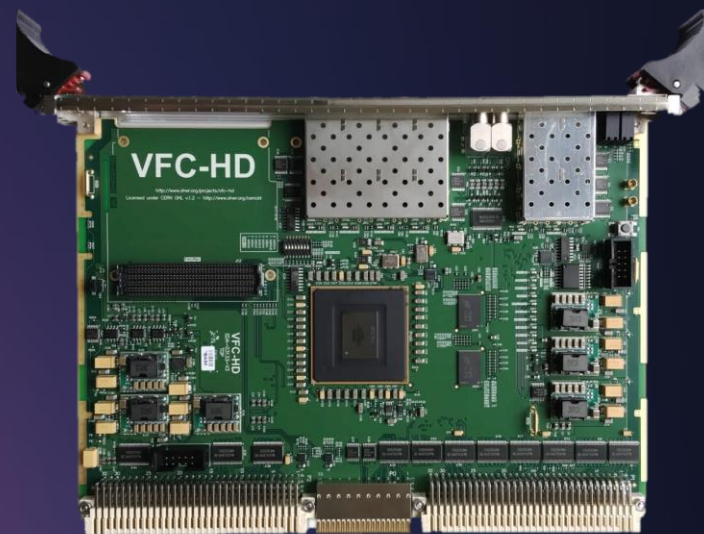
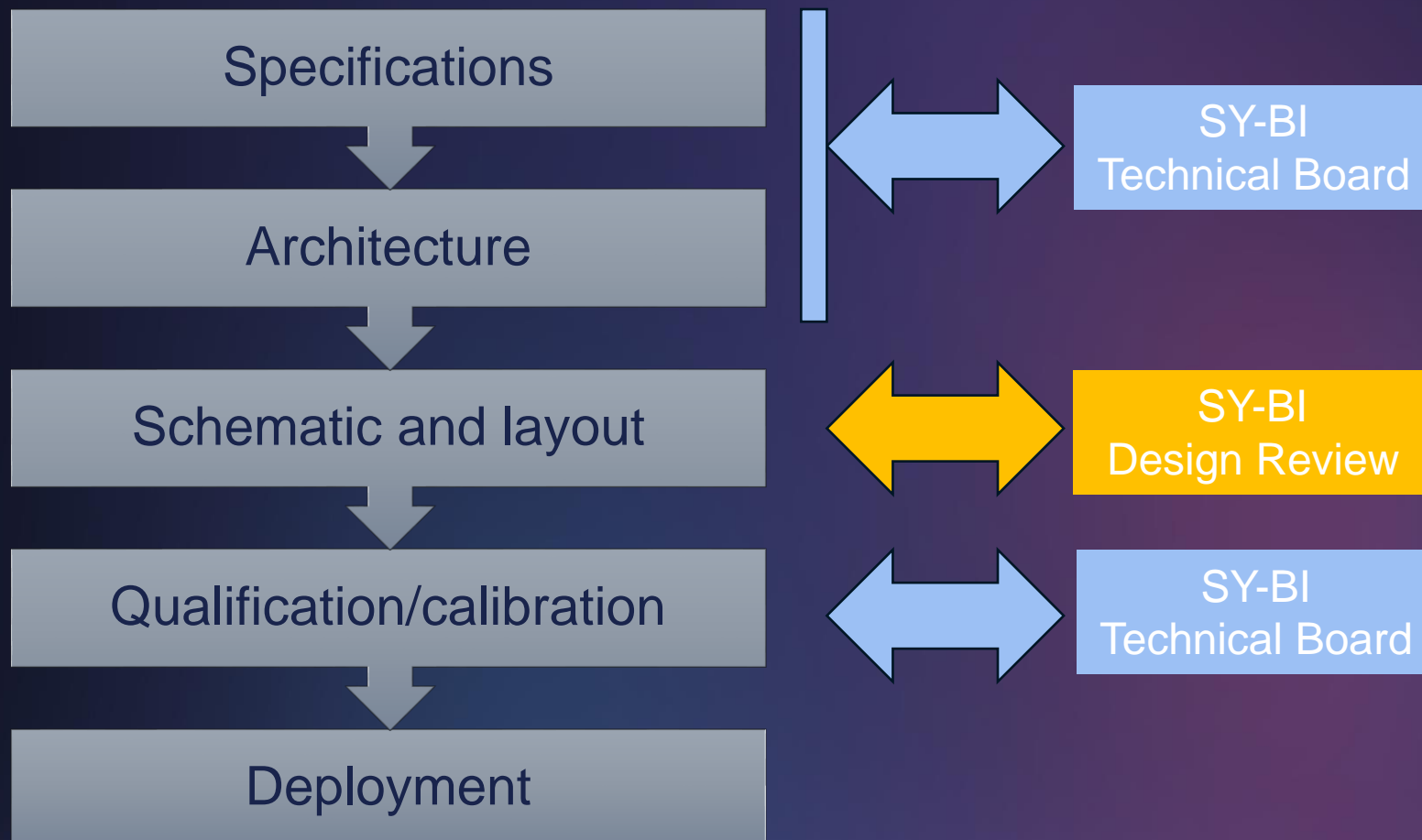


- EDMS
 - Specifications
 - Design files
 - Calibration results
 - ECR
- JIRA
 - Process tracking
 - Task assignment
 - Development sprints
- EAM
 - Asset management

From specifications to deployment

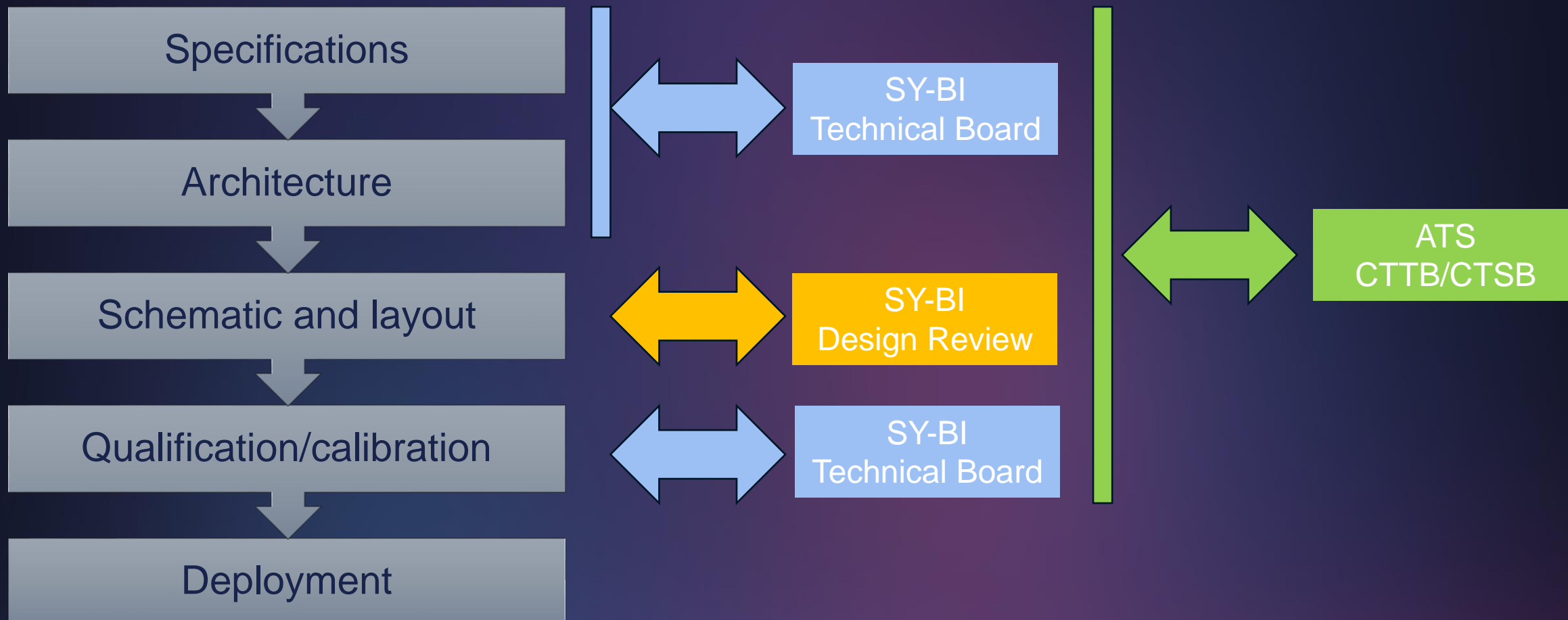


From specifications to deployment

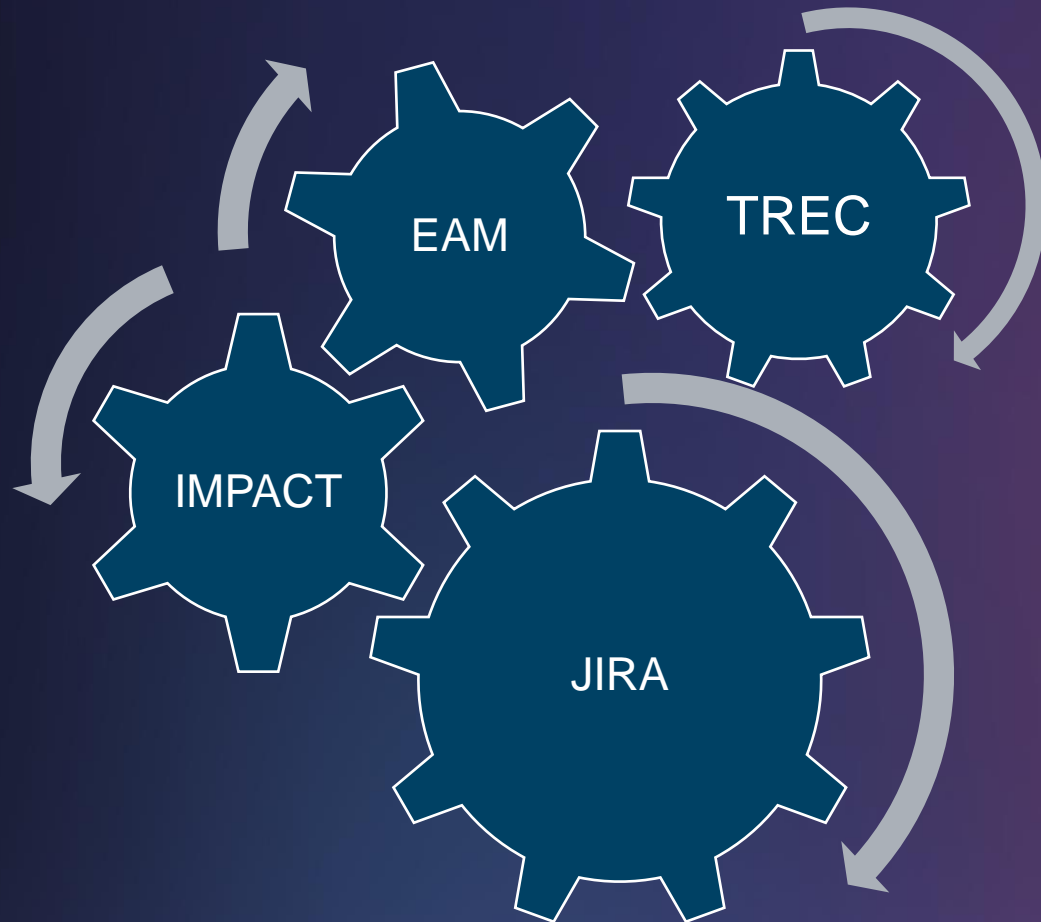


- Specified in the TB
- Started as a collaboration with CEM
- Layout in CEM and reviews in BI
- More than 1000 produced
- Quality assurance with Burn-in/Run-in tests
- Creation of the BI Digital Designer Forum

From specifications to deployment



After the deployment: maintenance



Could this be more fluid?

Could these tools be
more linked/integrated?

Closing considerations

ST@#D@RD!\$@T!O#



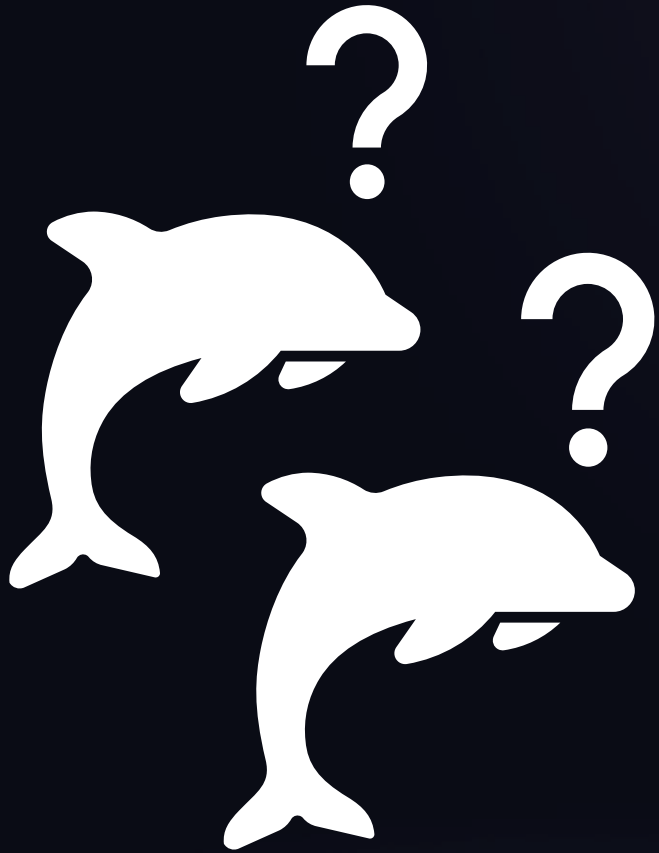
Closing considerations

Standardisation is a **need** with many different and sometimes very large systems,
but is also an **opportunity**

Many tools for the design, but also for tracking => could some be better integrated?

Last slide: what did we talk about?

- What does SY-BI do
- Which type of electronics it deals with and designs
- The tools used and the collaborations in place
- The process we follow from specification to deployment
- The maintenance
- Why standardisation is important for SY-BI



So long

and thanks for all the fish



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