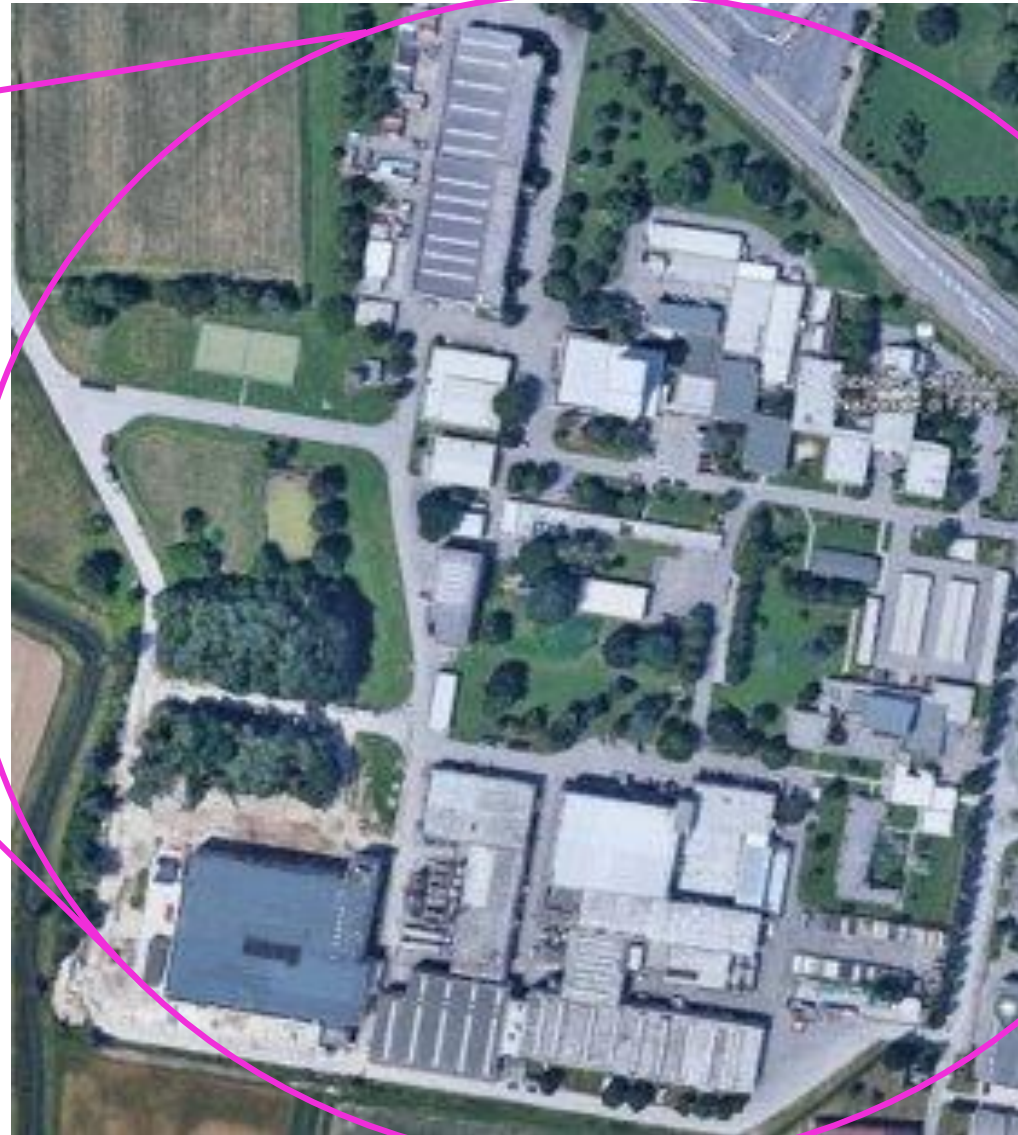
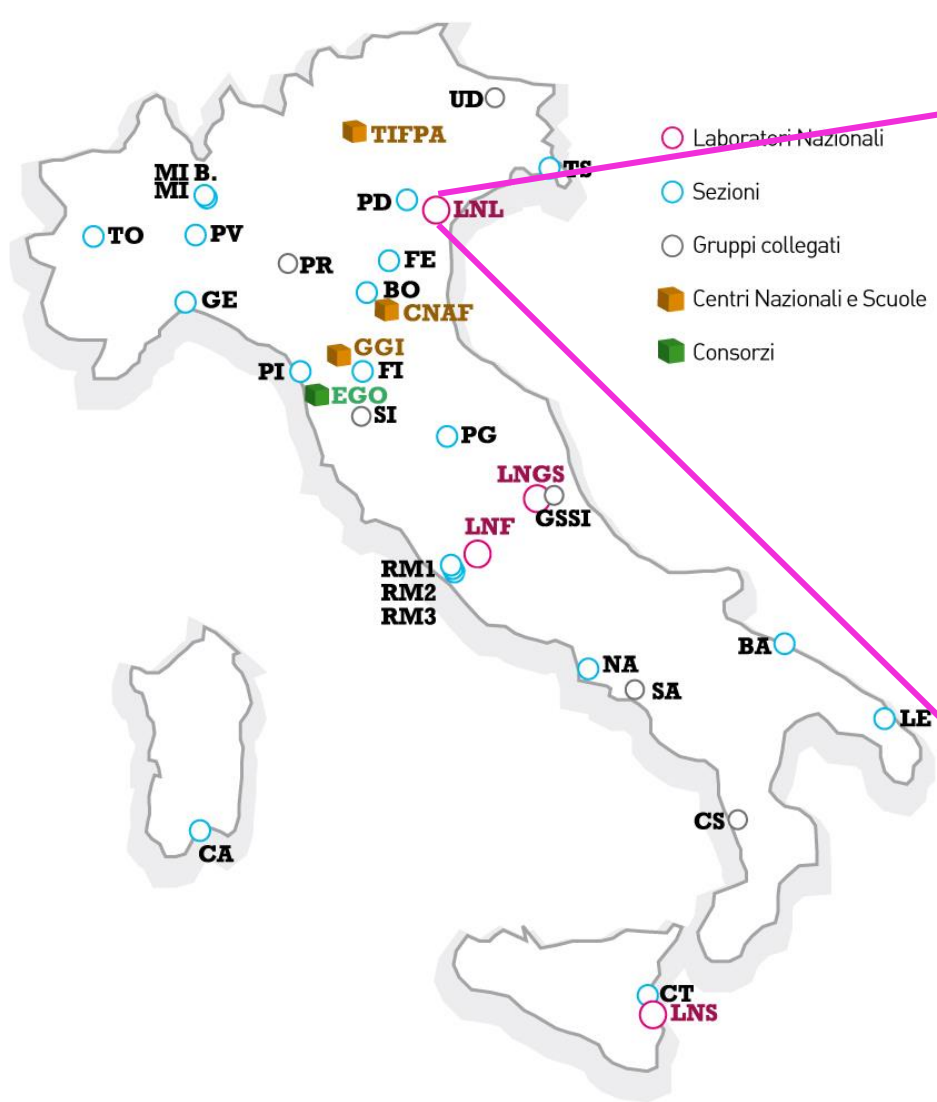




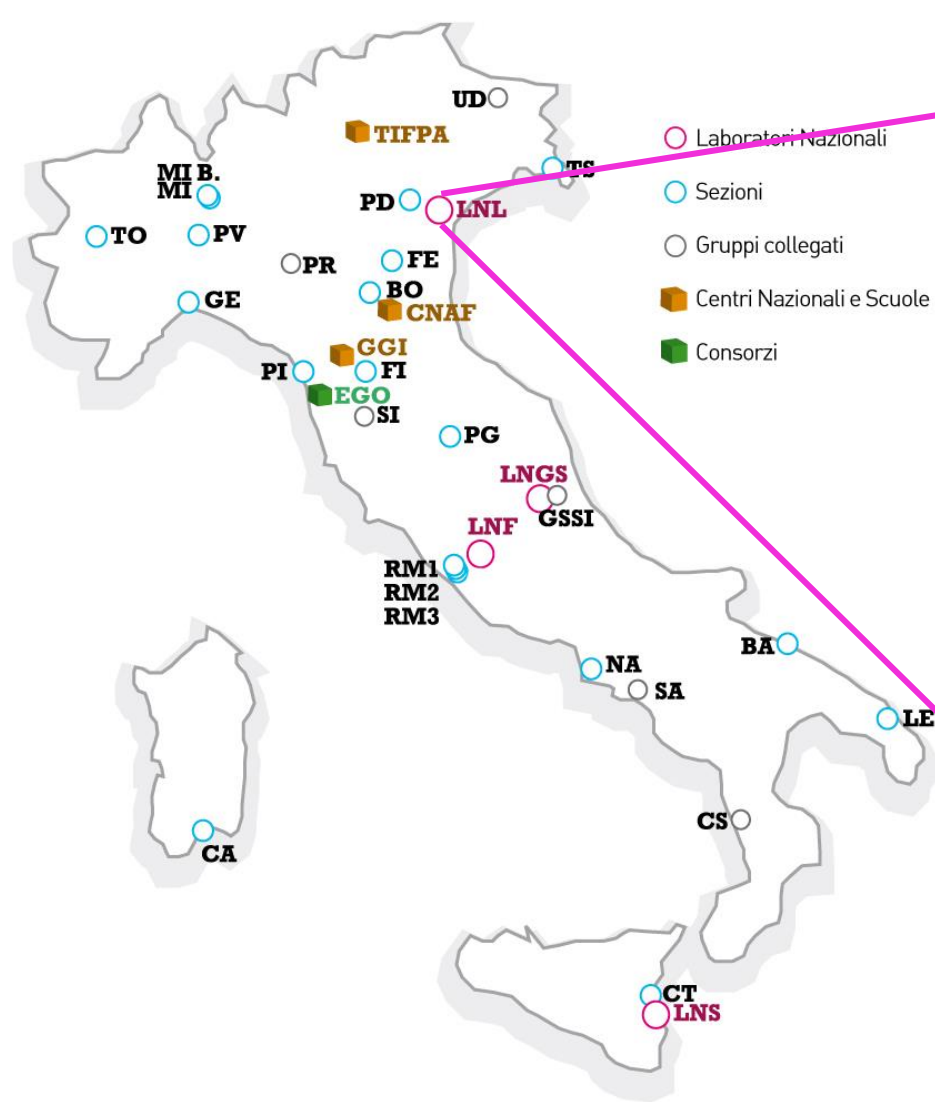
THE USAGE OF PLC AT INFN-LNL

Loris Antoniazzi

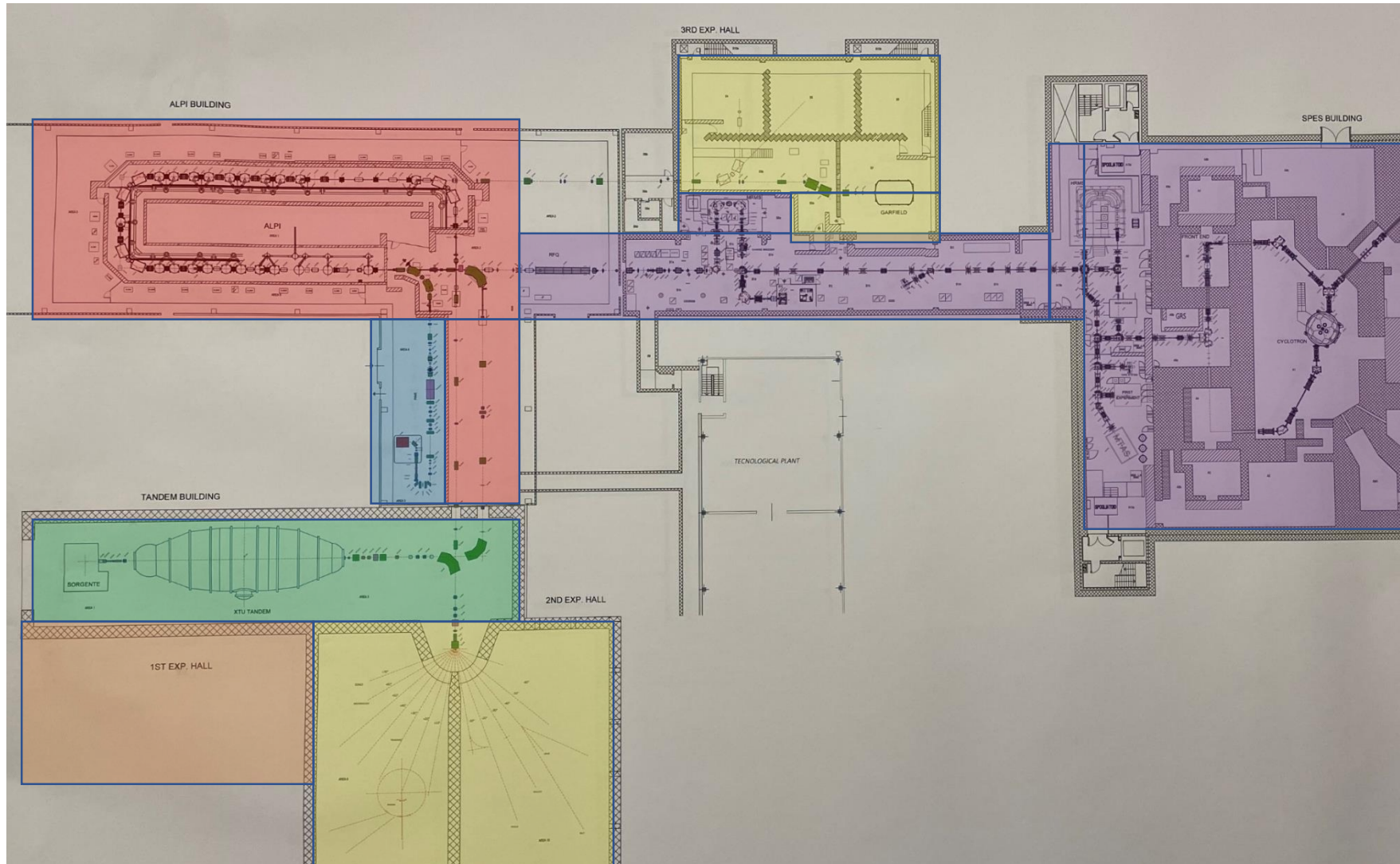
Responsible of the Service "Systems for the Accelerators"



ACCELERATORS at INFN – LNL

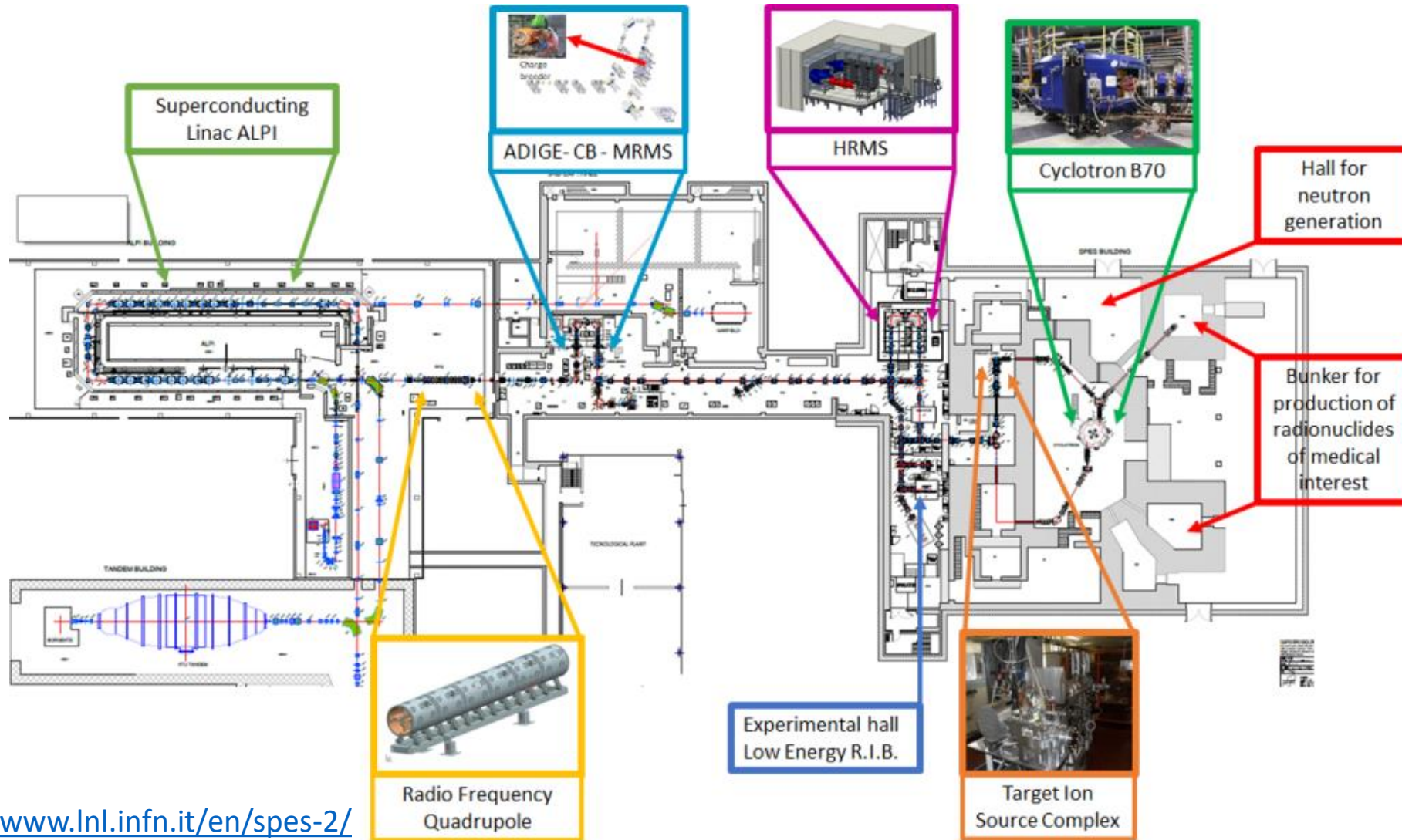


ACCELERATORS at INFN – LNL



- Experimental Halls
- ALPI
- TANDEM
- Control Room
- SPES
- PIAVE

ACCELERATORS at INFN – LNL



<https://www.lnl.infn.it/en/spes-2/>

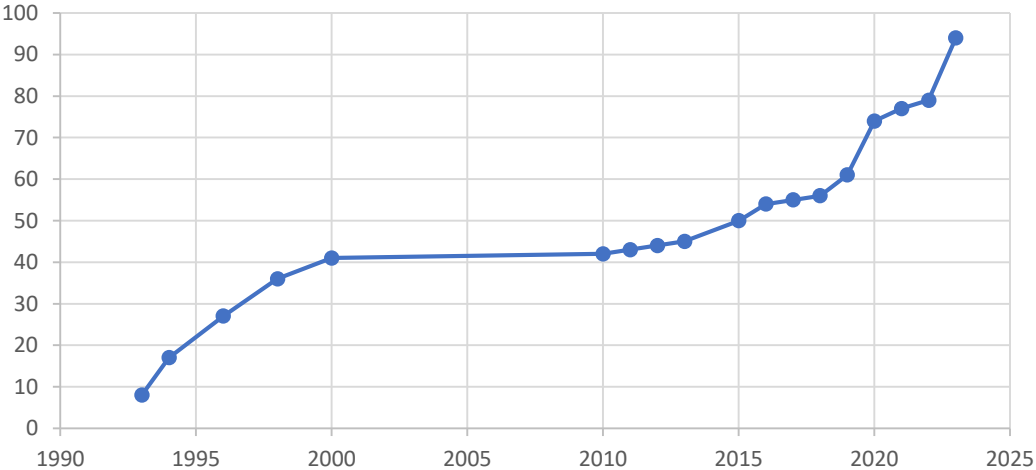
In the next slides are shown the results of a small survey about PLC installations at LNL

- Model,
- Brand,
- System,
- Application Type,
- Installation Date,
- Supervisor,
- SW Develop Manager,
- System User/Operator,
- SW Versioning,
- SW Develop Method,
- SW Code Test,
- System Test,
- Specifications
- SW Versioning

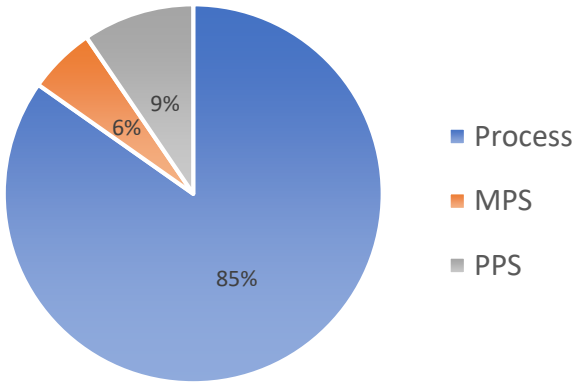
Note: Partial data related only to Accelerator Division and part of Technical Division

PLC installations

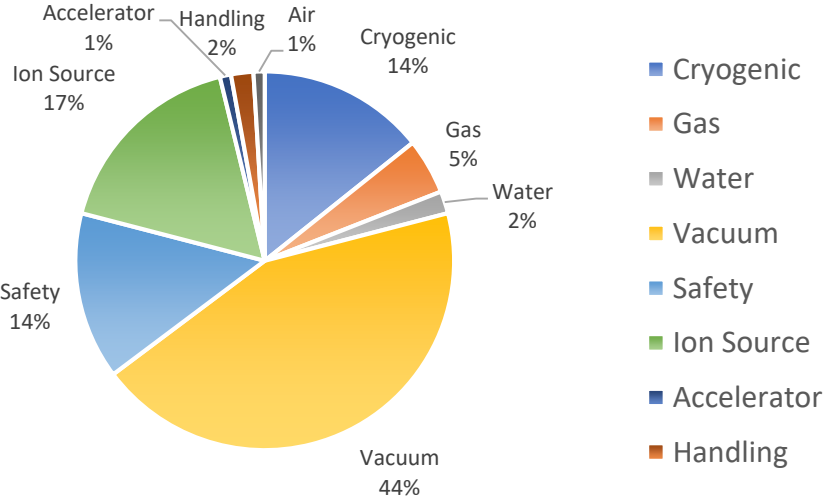
Installed PLCs



Control Function

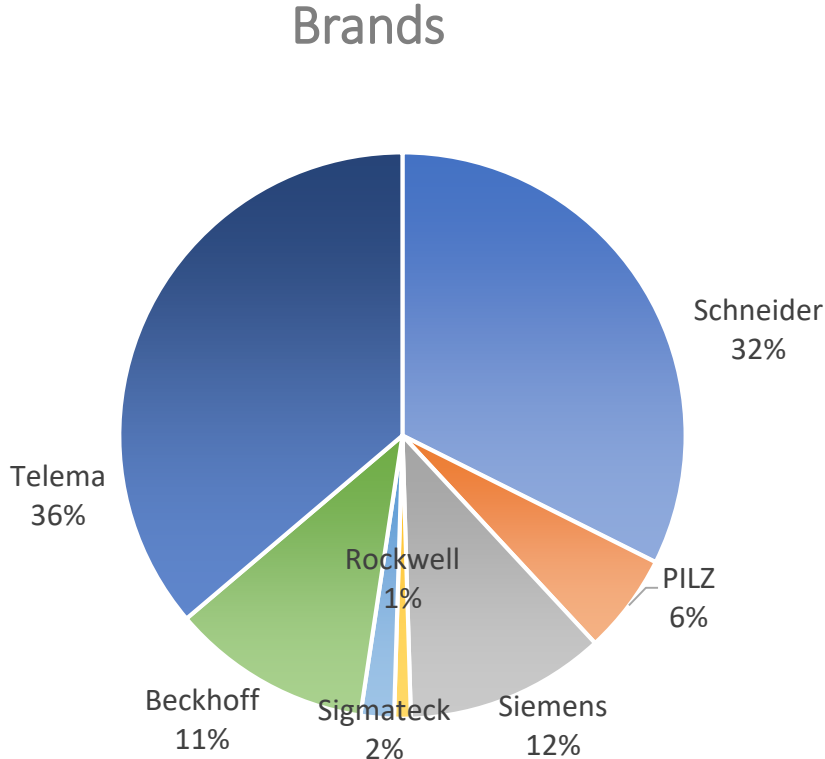
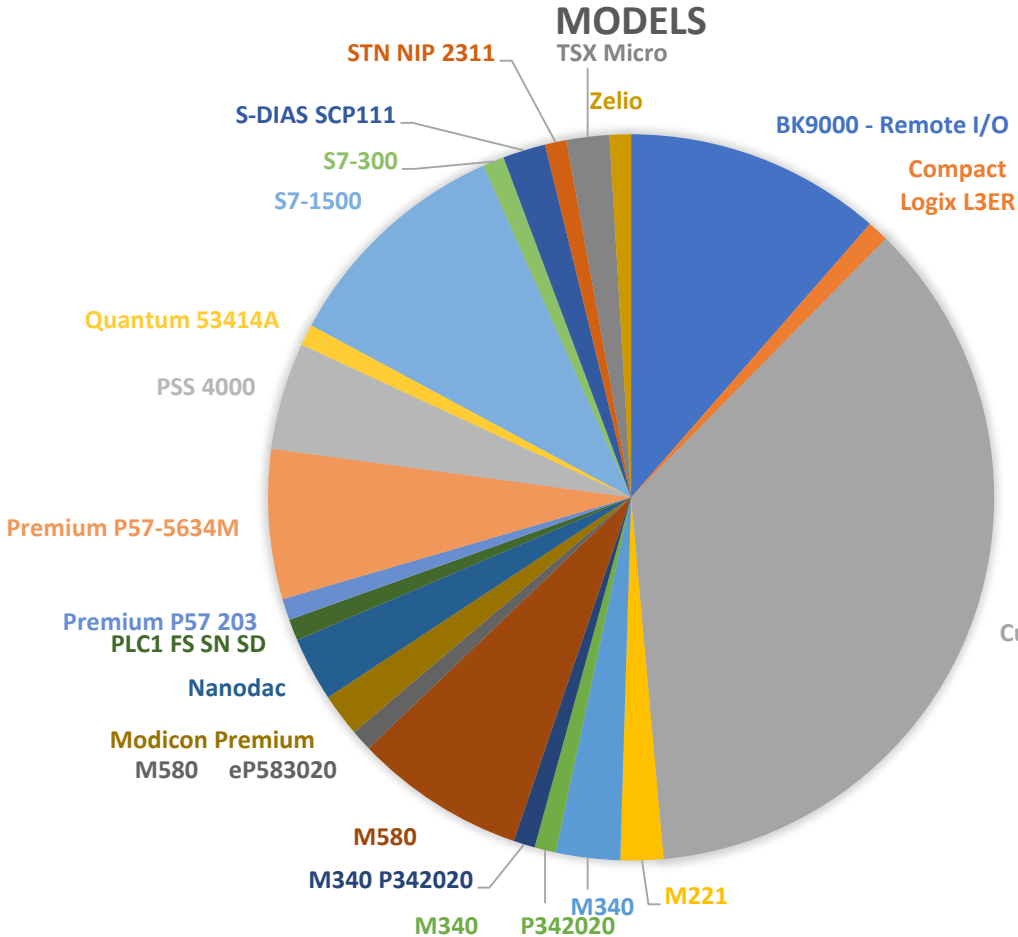


Application



Note: Partial data related only to Accelerator Division and part of Technical Division

PLC installations

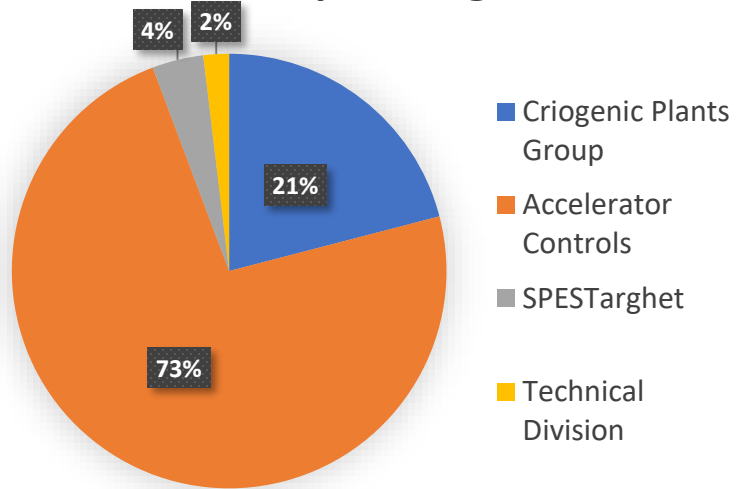


TELEMA Vacuum Control System Racks

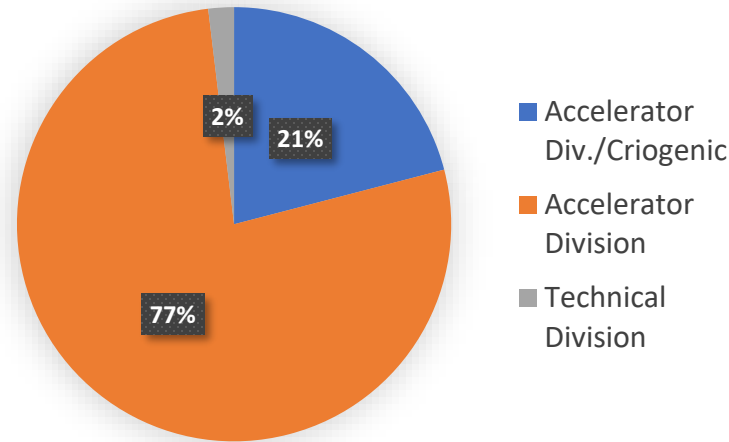
Note: Partial data related only to Accelerator Division and part of Technical Division

PLC and HMI SW

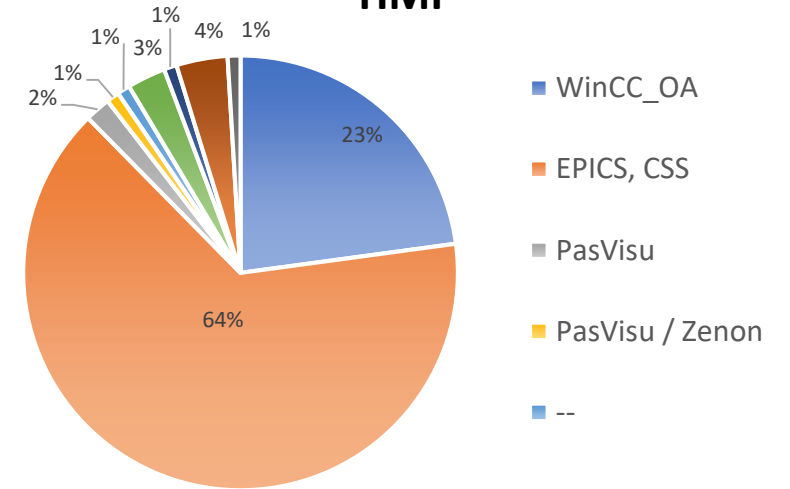
SW Develop Manager



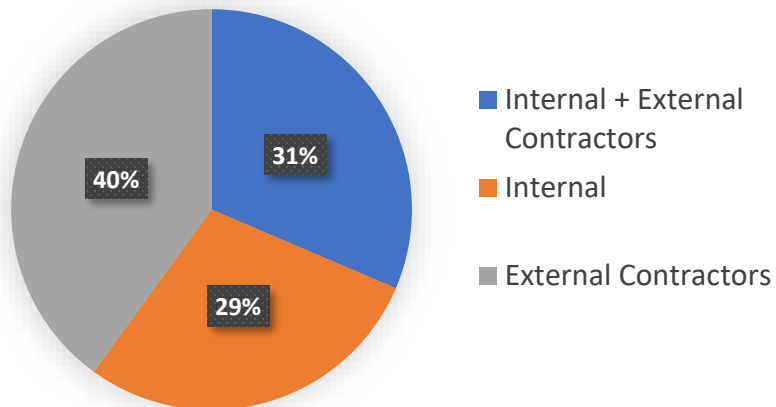
System User



HMI



Developer

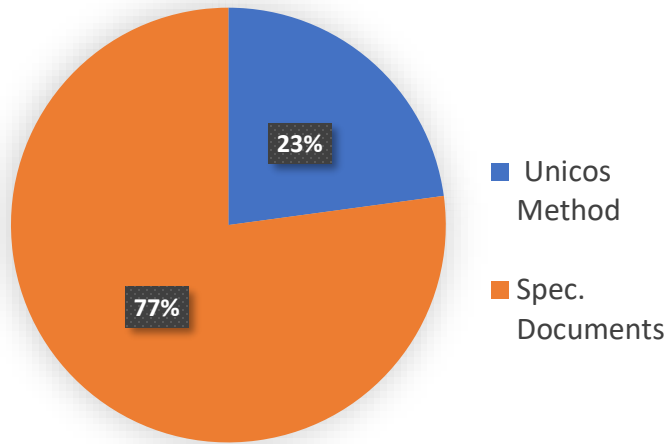


Most of the user are responsible about the SW Development

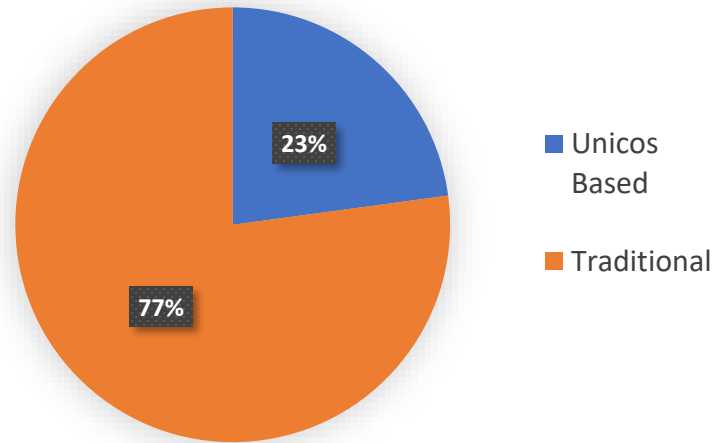
Note: Partial data related only to Accelerator Division and part of Technical Division

SW LIFECYCLE

Specifications



Development



In most of cases specification documents regards only system description and process functionality and not code organization and rules.

Code development is done according to the Standards/Best practice of each group.

Note: Partial data related only to Accelerator Division and part of Technical Division

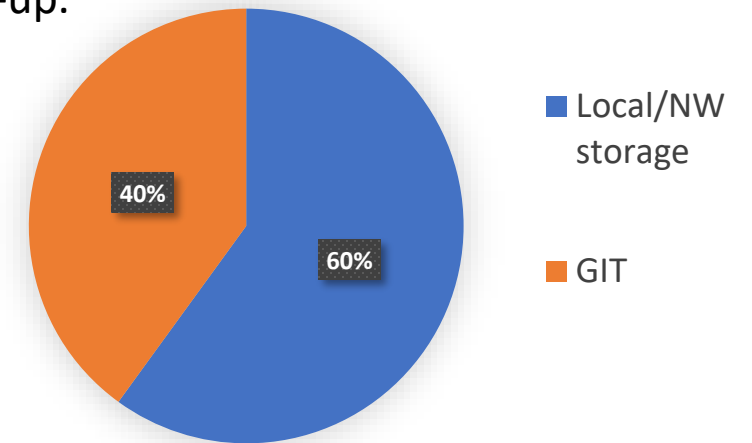
Verification

Different receipts which mainly includes

- Code verification in most of case is done executing functional test of single functionalities and within simulation SW or HW test set-up.
- The entire application is functional tested within simulation SW or HW test set-up.
- System test includes:
 - point to point checks
 - communication checks
 - Dry Run check of
 - Safety functions
 - Single functionalities
 - Procedures
 - Functional Tests

Test reports are not always detailed.

Versioning



Local or Net Work Storage typically includes a Changes Log

Note: Partial data related only to Accelerator Division and part of Technical Division

THE VACUUM SYSTEM CASE

- Substitution of vacuum control system racks from Telema to Siemens S7-1500
- Installation of new beam lines for the SPES Project



New Vacuum Control System Racks

About 50 racks, 4 Main Configurations (up to 21 cases), multitude of Hw combinations (position, connections, models..)

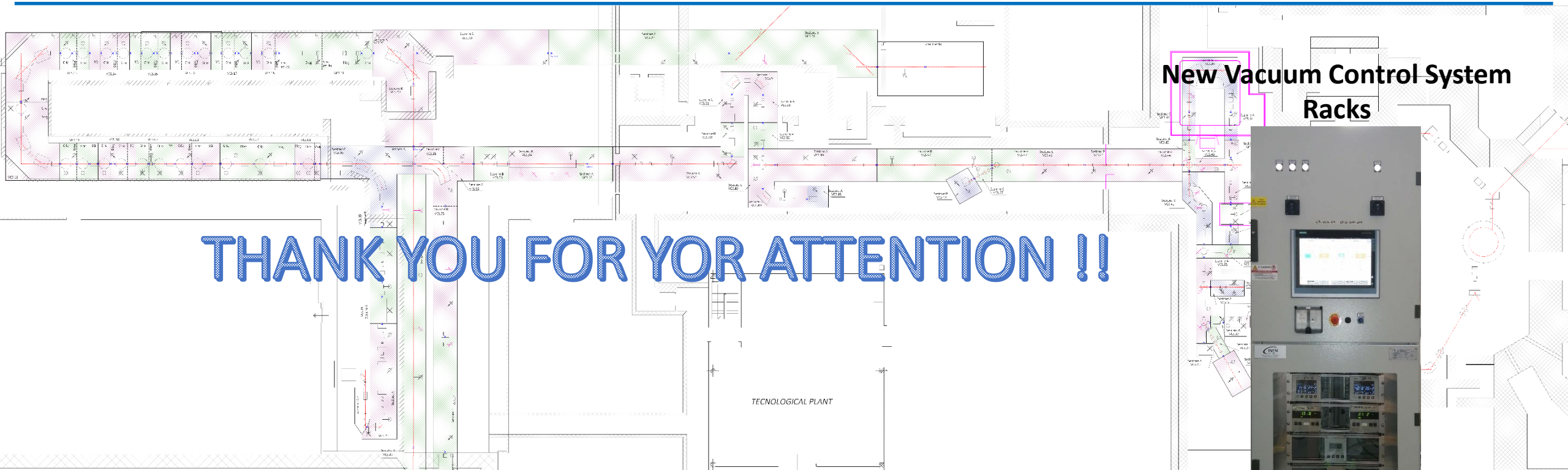
- **Same HW to standardize the platform**
- **One configurable SW to keep change easier to track**
- **SCL Language, Modular SW and large use of UDTs, templates etc..**

Open point:

- Keep track of the deployed version in any rack → up to now deployment are manually log
- Manage the continue SW upgrade for a large number of devices
- Upload, Download and Versioning of the online configurations set to easy restore the system even after a massive update



POSTER TUPDP038



THANK YOU FOR YOUR ATTENTION !!

New Vacuum Control System Racks



POSTER TUPDP038