



Upgrade of the old cryogenic ABB control systems using CERN-LHC-UNICOS framework



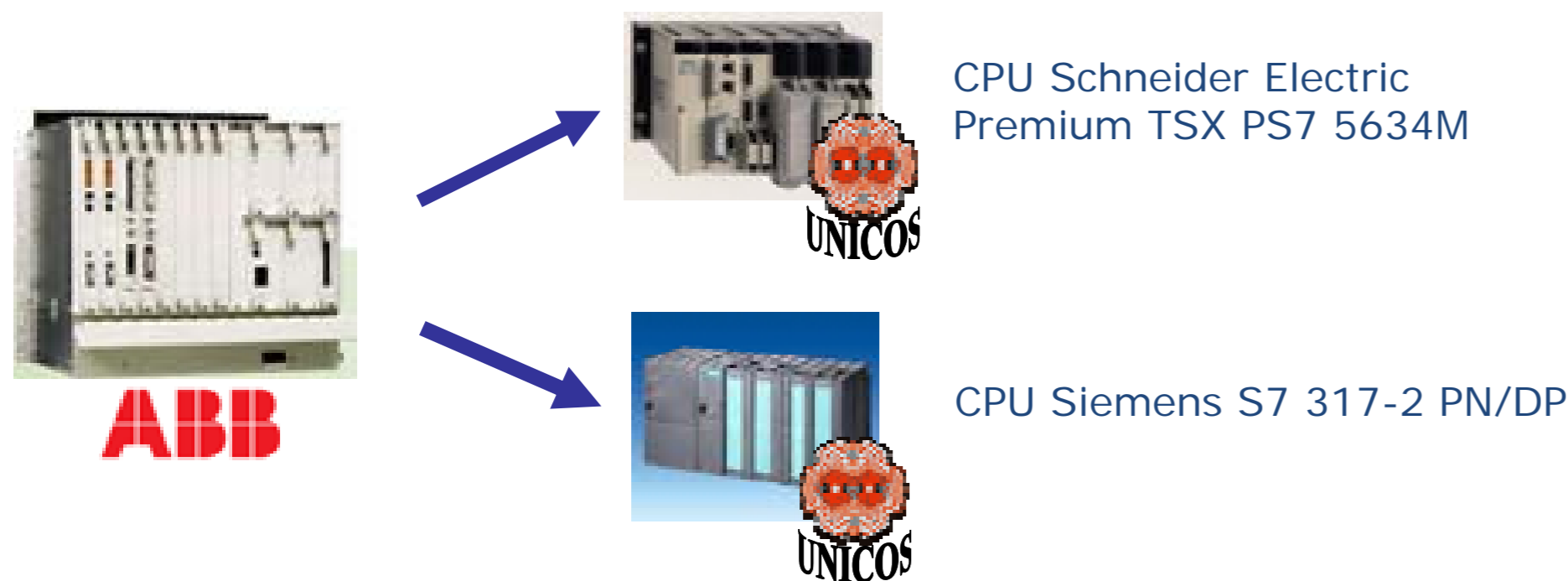
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Objectives

The CERN cryogenics experimental infrastructure include several cryogenic plants controlled by obsolete ABB-Master PLCs. These plants are spread throughs different experiential area around the CERN sites. All these ABB control systems cannot assure anymore the safety and reliability standard that CERN requires and we need therefore to make a major upgrade using the experience gained during the construction of the LHC cryogenic UNICOS control system.

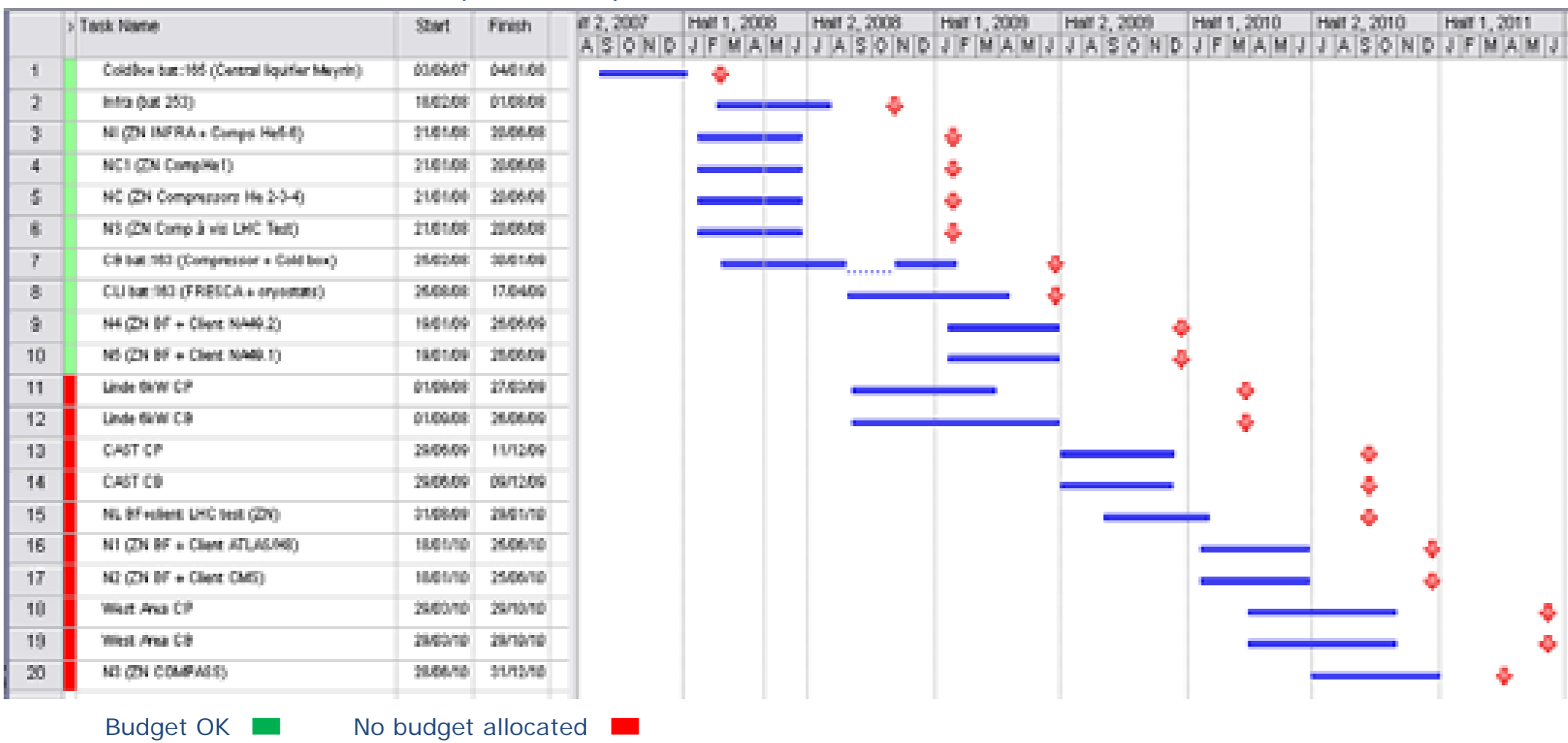
Major project steps :

- ✓To physically replace the old ABB PLC hardware with Schneider Electric and/or Siemens PLCs.
- ✓To translate the ABB programming into the CERN standard UNICOS architecture.
- ✓To standardise the various Cold Box control logics.



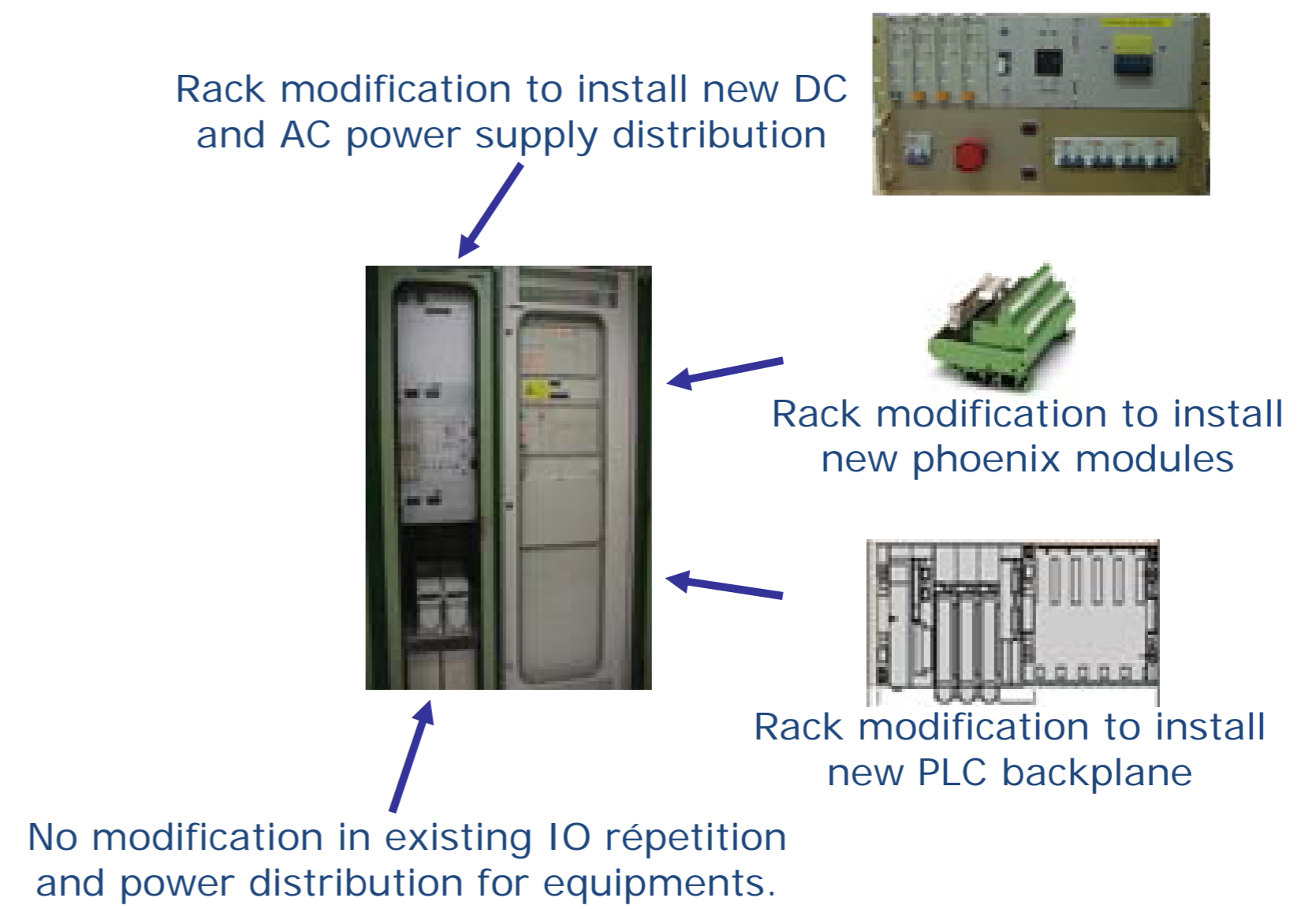
Installations to be upgrade :

- ✓Cryolab (5 PLCs)
- ✓SM18 helium storage (2 PLCs)
- ✓CAST CB+CP (2 PLCs)
- ✓North Area Infra+CP+Customer (10 PLCs)
- ✓West Area CB+CP (2 PLCs)



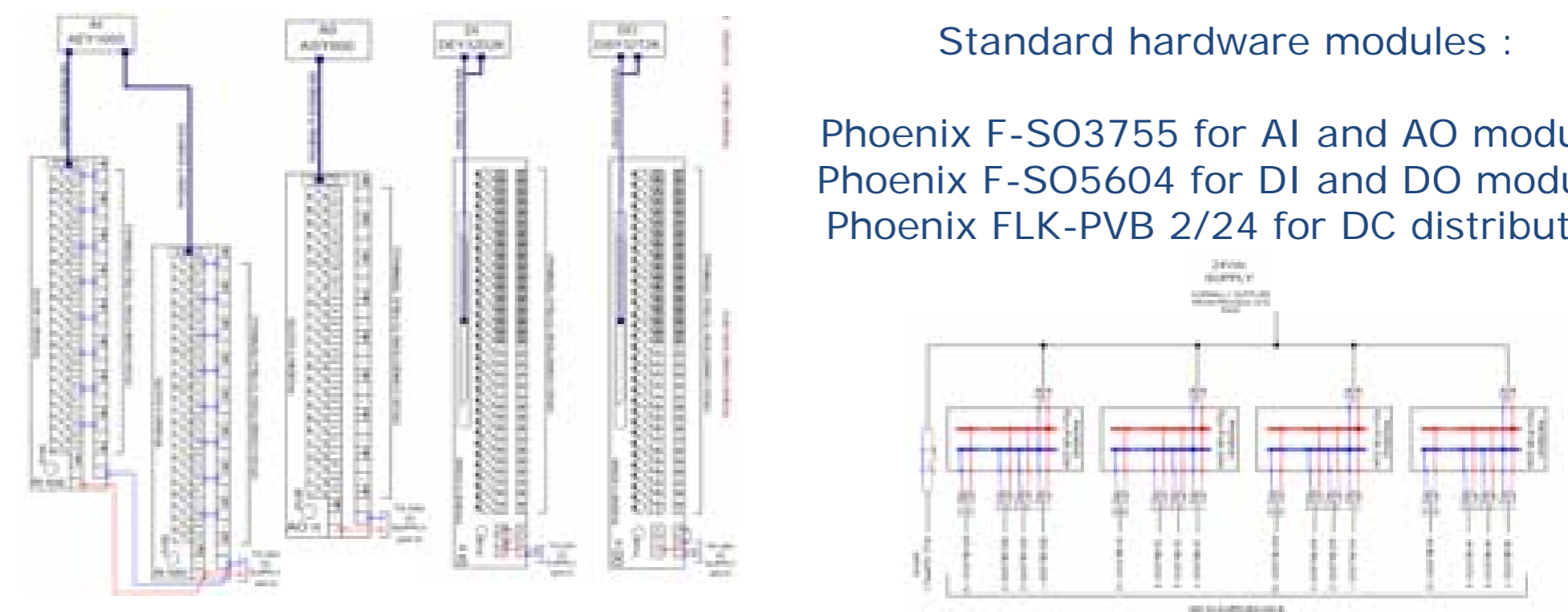
PLC hardware migration

The hardware upgrade must be done in a way to minimise any effects on the plant operation and in the shortest possible plant shutdown. To achive these aims the new UNICOS control system will be pre-constructed and tested in the workshop, with the same field cabling connectors as the existing ABB system. This will allow a direct rack for rack replacement during a limited plant shutdown. At the same time an upgrade of the 24Vdc supply system will also be done, again using pre-constructed and pre-tested modules that will be directly swappable with the existing components.



Key points :

- ✓Definition and design of standardised chassis and racks
- ✓Use of standard, off the shelf components as much as possible.
- ✓Backwards connections compatibility to existing field cabling.
- ✓Limited shutdown requirement.



UNICOS control system integration

With the installation of new PLC, we will extract the ABB programs and translate them into the UNICOS standard program architecture.

This task need :

- ✓To write the new UNICOS DataBases for each installations.
- ✓To write the new UNICOS specifications for each installations.

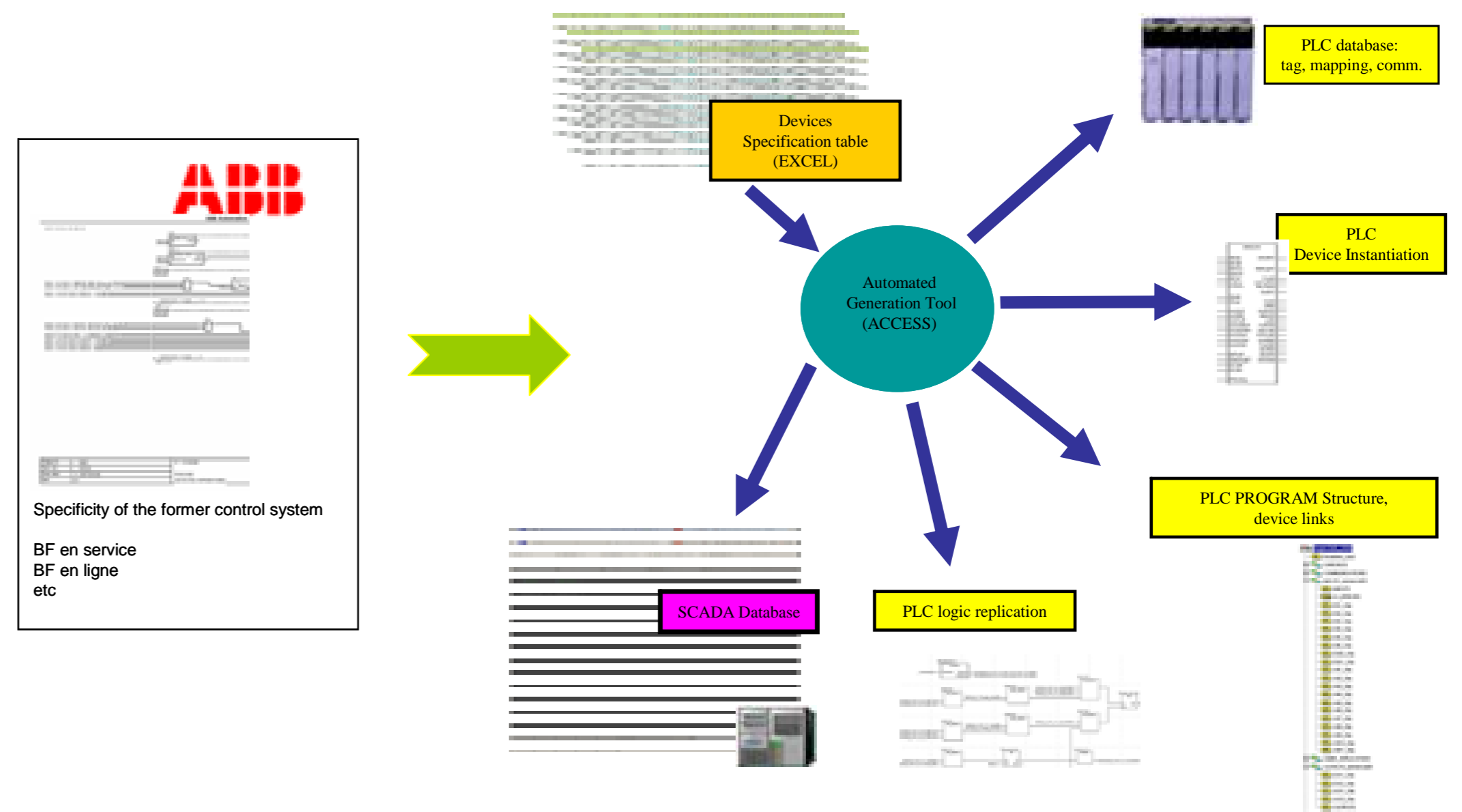
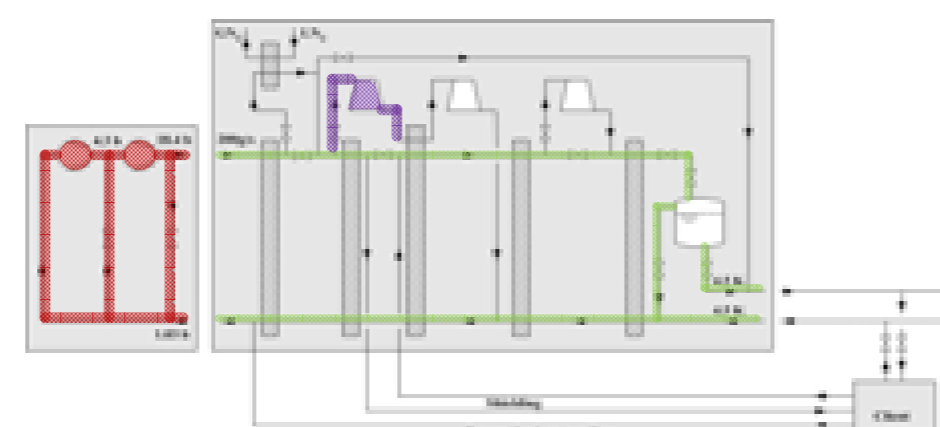
Key point :

- ✓Logic replication from ABB programm
- ✓Modular programm.
- ✓Using of logic generator.
- ✓No modifications in working system for the operators.

To increase the speed of programming of similar cryogenic installations, the programs will be divided in modular PCO.

Exemple :

- 1 PCO for turbines.
- 1 PCO for compressor.
- 1 PCO for the main transfer line.



The ABB supervision interface will be replaced by the CERN standard PVSS SCADA. This is necessary for the global supervision of all cryogenic plants at CERN.

The upgrade of the supervision system will be transparent to the end users and plant operators as it will use the same standardised process signoptic screens in it's HMI.