Future Front-end platforms
For the Control System
Background - Control System Tiers

Front-end computer

Fieldbus (WorldFIP, Profinet, etc.)

- Digital I/O
- Sensor
- Valve
- Switch
- Power converter
- ADC
- DAC
- Function generator

Multiple platforms:
- PICMG 1.3
- VME/VME64x
- PXI/PXIe
- CompactPCI
- PLCs

Distributed I/O devices
Background – Current platforms

- VME/VME64x
- PICMG1.3 Industrial PCs
- CompactPCI
- PLCs
- PXI/PXIe
Purpose

- Deal with technical drawbacks of VME systems:
  - Low bandwidth.
  - Heavy power consumption.
  - EMI and noise issues.
  - Lack of standardized timing distribution and inter-card communication.
  - No standard way of crate management.

- Custom VME derivatives were developed in the past by projects requiring features unsupported by plain VME.
  - Encourage collaborative work
  - Avoid duplication of efforts

- Issues with PICMG 1.3:
  - Maintenance difficulties.
  - Cost vs lifetime.
  - Backplane standardization.
  - Convergence with high performance server platforms.
Non-technical reasons:

- VME slowly becoming a legacy standard.
- Core components (VME bridges, CPU modules) being discontinued.
- LHC Experiments and major labs (DESY, SLAC) already departed from VME → shrinking VME community.
- New platforms (MTCA.4, VPX, PXIe) gaining market.
- BE-CO mandate: anticipate user requirements and provide a centrally supported platform that meets them.
Scope of the project

- Determine the technical requirements for new HW projects in the Accelerator sector.
- Compile a list of available front-end technologies & define selection criteria.
- Evaluate the platforms and propose a recommendation.
- Define a set of standard COTS modules that will be centrally supported:
  - Designed at CERN and outside
- Incorporate the new platform in BE-CO IT infrastructure & support services.
MTCA.4: possible benefits

- Fits most of our performance needs.
- Standardized management & diagnostics.
- Growing adoption in physics/scientific community.
- Dedicated high-speed links.
- Timing & trigger distribution as part of the standard.
- Supports RTMs.
MTCA.4: Things to sort out

- Price.
- Inter-vendor compatibility.
- Design complexity of new cards (including MMC).
- Power distribution & dissipation.
- PCB real estate available for user design.
- Mechanical reliability (connectors).
Status & plans

- Established a working group & defined the selection criteria.
- Survey of available technologies in progress.
- Q2 2016: recommendation for the new platforms.
- Design and procurement of new hardware.
- Integration in CO infrastructure.
- Post-LS2: kit available for the users to build their applications.
Thank you!
Questions?