

# The ACCOR Project

## Status Report and Outlook for 2010 and beyond

*M. Vanden Eynden on behalf of the ACCOR Project Team*

# Preamble

## What is this presentation about?

- Project snapshot
- 2009 : achievements and open Issues
- Context changes and impact
- Proposals for 2010

## What can Audience expect?

- A quick summary of the technical progress
- A list of strategic options to be discussed at both technical and managerial levels

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# Project Snapshot

## Scope

- Control system renovation of all machines, LHC excluded
- Budget :
  - 4.6 MCHF P+M (agreed mid-2009)
  - Period 2010-2012

## Motivations

- Hardware Obsolescence
- Need for Application software rationalization
- Need for having one (and only one) model of responsibilities for the development and operation of the control system of the entire Accelerator complex

# Project Snapshot

## An evolving Context

- High dependence on LHC Operational Schedule
- High dependence on the global Injectors consolidation project (S.Baird)
- High dependence on strategic choices such as SPL and PS2
- Complex planning involving several Equipment Groups from BE, EN, TE and GS departments
- But at the same time, we are hitting now the end-of-life of several components (more on this later)

**Management**

Project Leader , *M.Vanden Eynden (BE/CO)*

Budget

BE-CO Budget , *M.Draper (BE/CO)*

**Controls Core**

InCa Software , *S.Deghaye*

LSA, CBCM, ACQ Core, ...

Front-End Software , *A.Radeva*

Generic FESA Classes, FESA 3.0 Specs

Data Management , *R.Billen*

Controls Config DB, Layout DB, ...

Hardware Platforms & Layout , *N.de Metz-Noblat*

VME, PICMG1.3, cPCI, Linux,...

Hardware Modules & Device Drivers

HW design & production  
*E.Van der Bij*

Device Drivers  
*D.Gonzalez Cobas*

**Systems**

Beam Instrumentation , *L.Jensen (BE/BI)*

Interlocks , *B.Puccio (TE/MPE)*

Beam Transfer , *E.Carlier (TE/ABT)*

Power Converters , *Q.King (TE/EPC)*

Controlled Access , *P.Ninin (GS/ASE)*

Radio Frequency , *A.Butterworth (BE/RF)*

Dumps and Targets , *A.Masi (EN/STI)*

Vacuum , *P.Gomez (TE/VSC)*

Magnets , *L.Walkiers (TE/MSC)*

**Procurement & Installation**

Field Installation & Coordination , *C.Dehavay (BE/CO)*

Hardware Purchase & Spares , *Ch.Gayraud (BE/CO)*

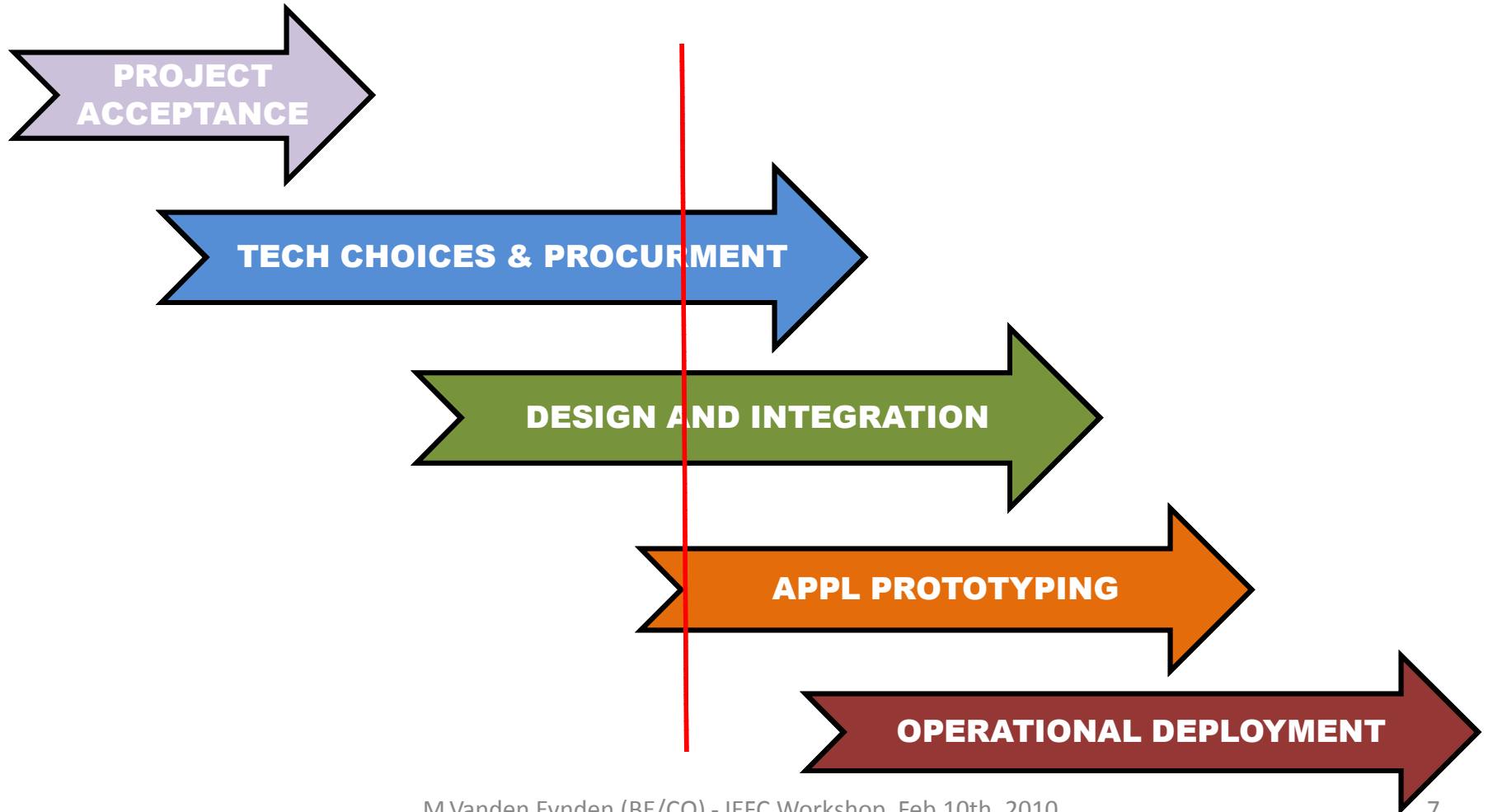
# Project Snapshot

## Roadmap

2009

2010

2011 ... 13



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# 2009 : Achievements and Open Issues

## Achievements - Strategy

- Organization and sharing of responsibilities agreed @ CO3
  - Based on the LHC approach (major culture change for the injectors complex)
- Solid Technical choices agreed @ CO3
  - New Hardware platforms (VMEbus, cPCI, PCI, PCIe)
    - Processors, Linux O/S, HW development strategy
  - FESA as embedded RT software framework
- Re-use of some LHC Q&A principles agreed @ CO3
  - Layout DB
  - Asset Management
  - Naming Convention

# 2009 : Achievements and Open Issues

## Achievements – Financial

- Global ACCOR Budget established and approved mid-2009
  - 4.6 MCHF covering
    - Front-End processors and crates
    - Hardware modules (design and mass production)
    - Human resources (PJAS, UPAS, etc)
- Large Tendering processes through CERN Finance Committee for:
  - VMEBus Processors (done)
  - PCI/PCIe PICMG1.3 Platform (done)
  - VMEBus crates (Starting Nov 2009 -> June 2010)

# 2009 : Achievements and Open Issues

## Achievements – Technical

- Hardware Platforms
  - Integration of new Intel Core2Duo VMEbus processors + Linux O/S quite well advanced.
  - Standardization of PICMG1.3 as the new cost-effective PCI/PCle solution with several candidate applications
  - Development systems and prototyping activities running in several Eq.Groups
- Integration Roadmap
  - Collection of “Standard” HW modules + Linux Device Drivers + FESA Classes has been proposed by BE-CO @ CO3 committee (priority list + timetable)
- Front-end Software
  - Sharing of the existing GM software classes (> 125) between all parties is agreed. Migration of “generic classes” remains under BE-CO responsibility and has started (in sync with the HW modules design)

# 2009 : Achievements and Open Issues

## Achievements – Technical

- InCA - Application & Business Software Layers
  - Objectives
    - Rationalise and homogenise the high-level controls
    - Use LHC components e.g. LSA for the settings management
      - Introduce extensions whenever required by the PS complex accelerators
    - Introduce an “acquisition service” to relieve the Front-end computers from high client load
    - Review and integrate central timing in the overall control system
      - Use BE/CO standard approach and components
    - Produce specifications for FESA 3.0 and specify an Application Programming Interface (API) to ensure smooth integration of new Front-end software developments
  - Validation through several iterations and MDs in 2009 (LEIR)

# 2009 : Achievements and Open Issues

## Achievements – Operations

- Dedicated P2P discussions with Equipment Groups
  - BE/BI, TE/ABT, BE/RF, TE/EPC, TE/MPE, TE/MSD
  - Several key technical options agreed
    - Use industrial PC platform for
      - Power Converters (MIL-1553 and serial)
      - Kicker systems (PS complex)
      - SPS RF system (MIL-1553)
  - First batch of operational objectives
    - Objective to renovate the SPS MUGEFs with the new VMEBus processors and Linux
    - Installation of 120 FGCs on Booster (shutdown 2010-11)
    - Installation of 350 FGCs on SPS North Area (shutdown 2011-12)
    - Objective to renovate all BI BTV front-ends on all machines (>27 systems) with the new VMEBus processors and Linux
    - Objective to renovate the BI SPS North Area installation with the new VMEBus processors and Linux
    - First deployment proposals for Beam Interlock Controllers (Booster in 2014)

# 2009 : Achievements and Open Issues

## Open Issues

- New sharing of responsibilities, mainly at the Front-end software level will require dedicated efforts in 2010
  - BE-CO can only ensure “corrective maintenance” of existing GM classes
  - Inventory of systems, understanding of software behaviors and interfaces are, in many cases not transferred yet to Eq.Groups
  - BE-CO will stimulate the process but **ownership transfer must be effective** if we want:
    - a more solid renovation plan coherent with the other activities of the Eq.Groups
    - More inputs for the “design an integration” work done by BE-CO
- Operational deployment objectives
  - We have some objectives but we lack a global vision compared to the complexity of the problem up-front
  - **Who owns the overall renovation planning for each Accelerator**, as controls is just one element of the problem?
- In some cases, Eq.Groups lack resources and competence @ the front-end software level
  - BE-CO is ready to accept this work, provided that these systems are clearly identified and that BE-CO received the ad-hoc resources for the development and maintenance effort
  - Typical examples : B-train systems, machine protection systems
  - **An exhaustive list of systems + resource estimates must be agreed in 2010**

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# Context Changes and Impact

## Long LHC Operational Run

News: 3 February 2010

Outcome from  
Chamonix: Better in  
the long run

*18-24 Months*

### Impact on Planning

Major hardware renovation campaigns on the LHC injectors will be postponed until end 2011-2012.

Example : Booster Power Converters Upgrade with LHC type FGC3 (x120)

Focus on AD, CTF, REX-ISOLDE

### Impact on Reliability

BE-CO not in a position anymore to guarantee support for obsolete hardware solutions supposed to be eradicated since 1993 ...

No test bed, almost no spares in unknown state, impossible to repair (> 30 years old)  
PO and CO have to work on this!



# Context Changes and Impact

## Upgrade of Accelerator Complex

**Conclusions I**

The session looked at the possible upgrade of the complex with LP-SPL/PS2 and the present limitations and upgrade possibilities for the existing complex.

The outcome here must be put into the context of what the LHC actually wants  
(sessions 8 and 9)

Some things are already very clear:

- The present injector complex must run with high performance and high reliability for 15-25 years more.  
**Consolidation Plan/Risk Analysis to be done**
- The present bottleneck in the complex is the SPS and this would remain even with SPL/PS2  
**Urgently Launch a Task Force to complete studies and propose upgrade projects.**
- A possible upgrade path in the existing complex by increasing the energy of the PS Booster to 2GeV has been identified  
**Launch a Study/Project to Upgrade the PSB Energy to 2 GeV**

Chamonix Summary, 5th Feb 2010 19

### Chamonix 2010

Summary of Session 7:  
*Future Upgrade Scenarios for the Injector Complex*

P. Collier /BE  
(V. Mertens /TE)

This should provide  
A high-level upgrade plan,  
along with priorities for  
controls

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# Proposals for 2010

## Technical perspective

- BE-CO
  - continue the design, integration and production of core control system components (HW and SW) – **roadmap exists**
    - HW modules, FESA 3.0 framework and generic FESA classes
  - Run tendering process for electronics subracks
    - VMEBus, cPCI, general purpose crates
  - Continue the Inca development, validation and deployment – **solid plan exists**
- EQ-Groups
  - Validate BE-CO deliverables – **important technology shift**
  - Identify performance problems and fix them with the support of BE-CO
  - Develop and validate prototype applications

# Proposals for 2010

## Operational objectives

- For each Accelerator
  - Review current controls situation
  - Identify areas requiring most urgent controls renovation (obsolescence, performance problems)
  - Develop action plan between CO, OP and Eq.Groups
  - Link this to the general renovation planning (see later)
- To achieve this:
  - **Machine Controls Coordinators (MCC)** are mandated in BE-CO in order to propose concrete action plans for each Accelerator

ACCELERATOR	BE-CO MCC
LHC	E.Hatziangeli
LINAC2, 3, PSB, LEIR, CPS	M.Gourber-Pace
LINAC4	I.Kozsar
SPS	M.Arruat
AD	M.Cattin
CTF	M.Draper
ISOLDE	F.Locci
REX	F.Locci

# Proposals for 2010

## Overall Renovation Plan

- ACCOR will provide (through the MCC) a prioritized list of controls renovation actions (scope, resources, time estimates)
- These proposals need to be combined with:
  - Other urgent consolidation initiatives
  - Modifications and or extensions required in the context of the forthcoming Booster and SPS upgrade studies (cf. Chamonix workshop session 7 summary)
- A high-level planning effort seems now mandatory as it is agreed that the current complex must run with high performance and high reliability until 2025

# Conclusions

## What is OK

- The ACCOR project has solid asset in terms of budget, technical strategies and sharing of responsibilities between all parties
- Many resources in BE-CO are actively working on this project
- A first roadmap exists for the procurement of core controls components
- Eq.Groups are actively validating the new technological choices
- The need to run the existing complex until 2025 is clear to everybody

# Conclusions

## What has to be improved in 2010

- We lack operational objectives -> **Machine controls coordinators** will enter in action in 2010
- **We are hitting the LIMITS in terms of hardware obsolescence** and the long LHC run requires immediate decisions in some areas (PO, CO)
- **Ownership of front-end software** must become a reality in 2010. BE-CO has the know-how and is ready to help Eq.Groups
- Some Eq.Groups lack competences and resources at the front-end software level. **BE-CO can only take this responsibility if an exhaustive list of such systems exists, along with resource estimates and provision**
- Important decisions are being taken after the Chamonix WS, we need now a **high-level upgrade plan** to which, of course, ACCOR will provide inputs.