

ATC/ABOC days 2008  
summary of 3<sup>rd</sup> session on controls issues

## ● Agenda:

1. The PS complex controls renovation project;  
scope and milestones **Simon Baird**
2. INCA:= Injector controls architecture;  
basic concept; milestones **Stephane Deghaye**
3. FEC renovation; guidelines; time scale  
**Claude-Henri Sicard**
4. Maintenance concept of existing injector controls until  
replacement **Eugenia Hatziangeli**
5. Responsibility limits AB-CO towards AB equipment groups as  
agreed in CO3 and ABMB **Andy Butterworth**
6. Responsibility limits AB-CO towards AT/TS equipment groups  
as agreed in AT-CO2 and GL meetings  
**Philippe Gayet**
7. Rapid Application Development Environment  
based on LabVIEW **Alessandro Raimondo**

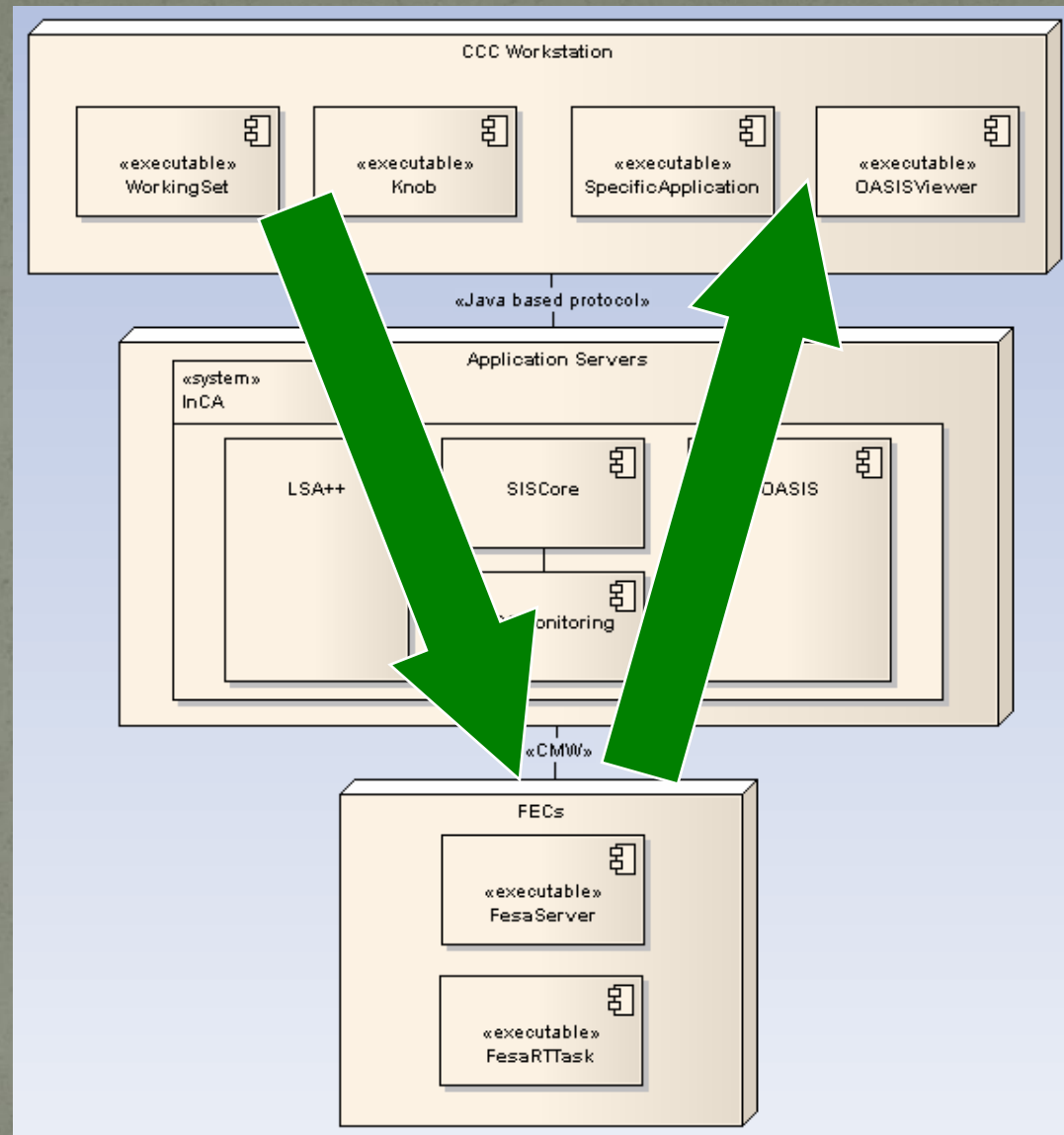
# Outline

- Renovation of CPS controls
- Responsibility share of AB-CO with other groups
- RADE
- Conclusions

# CPS controls renovation

- The aim is to have a unified control system for all CERN accelerators
- We talk about it for years
- Now the work is defined as departmental project and AB-CO invests an increasing effort into it.
- Optimistically by 2011 it will be done
- The project splits basically into 2 parts:
  - Injector Controls Architecture (InCA) S.Deghaye et al.
  - FEC renovation (C.H.Sicard et al.)

# Deployment View





# Present HW inventory

	Accel	FECs	Camac		1553		GPIB	Devices	Description
			loop	crates	loop	crates	crates		
	ADE	24	3	3	12	189	9	2067	Antiproton Decelerator
	CPS	63	5	8	29	393	4	4453	Cern Proton Synchrotron & beam xfer lines
	LEI	32	0	0	5	58		1157	LEIR Low Energy Ion Ring
	LN3	10	0	0	6	106	1	427	Lead Ion Linac
	ISO	6	0	0	2	3	4	650	ISOLDE facility
	LIN	10	2	4	9	156	1	956	Proton Linac
	PSB	56	6	9	12	231	8	3648	Proton Synchrotron Booster
	REX	4	0	0	0	0	0	122	REX facility
<b>Total PS</b>		205	16	24	75	1136	27	13580	



# Present HW Inventory: cables & repeaters

Repeaters

16RI	8RI	8RI inTTL	16RI Fast	total installed channels
11	267	11	1	2416

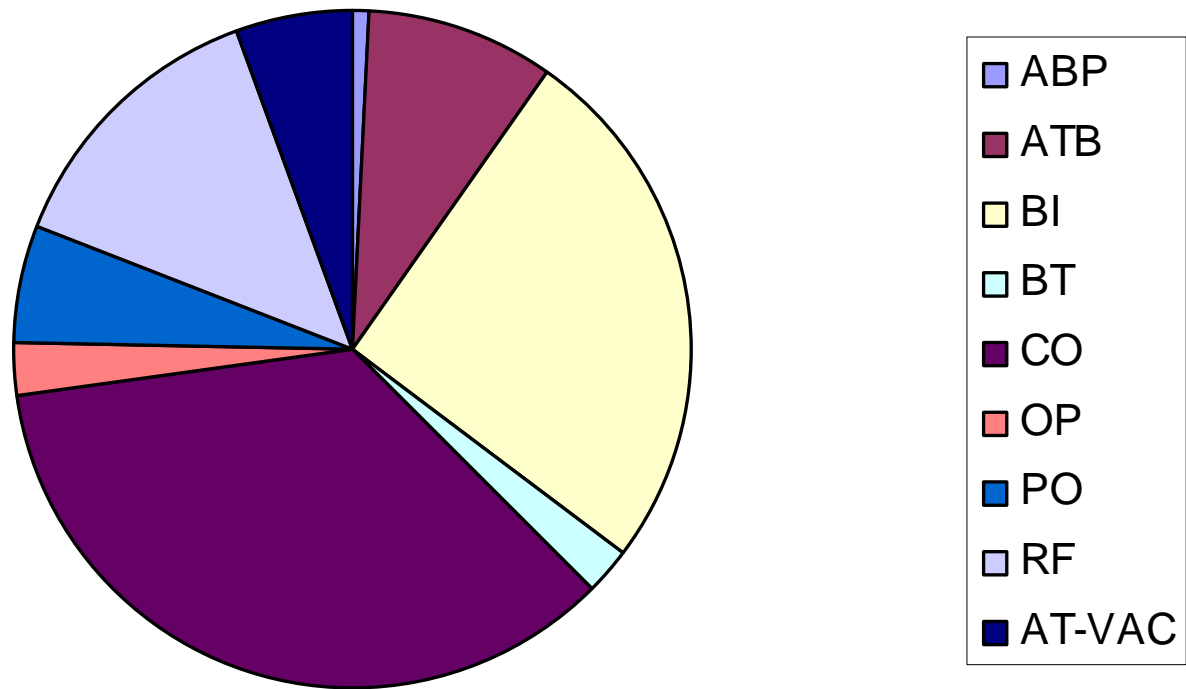
level adapters

LA Blo-ttl	LA ttl-blo	la-filter	lasb	lapf	ptg	10MHz	clk-fanout
125	23	8	22	11	15	27	14



# SW Inventory (1/2)

GM classes distribution / group



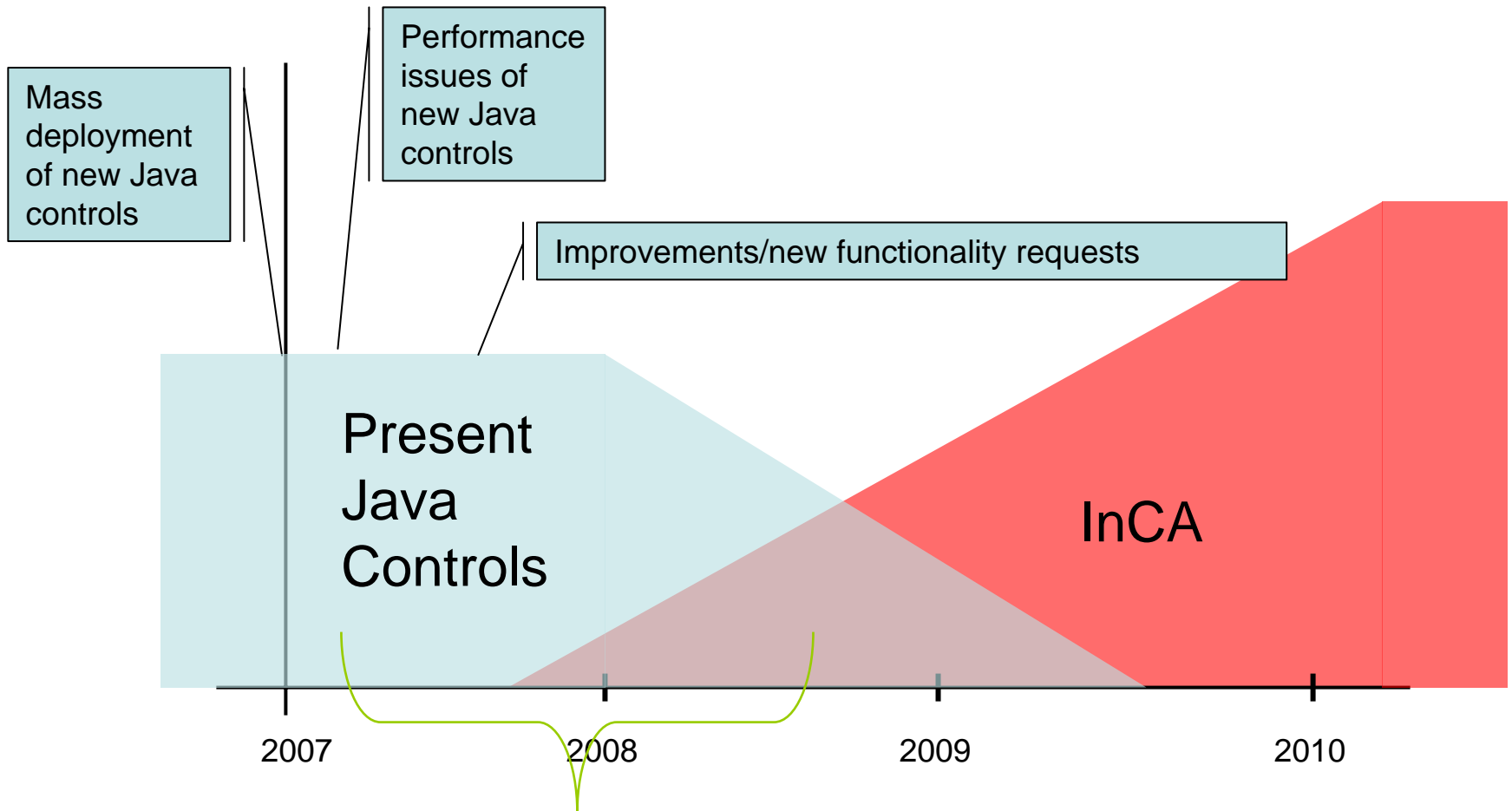




## **SW Inventory (2/2)**

- ◆ **Present state: mix of GM and FESA classes**
- ◆ **Eq groups agreed (CO3) taking charge of migrating the GM classes under their responsibility, work already started**
- ◆ **CO will migrate GM classes under its responsibility (45) + others from groups lacking resources (list TBD)**

# Gentle take-over

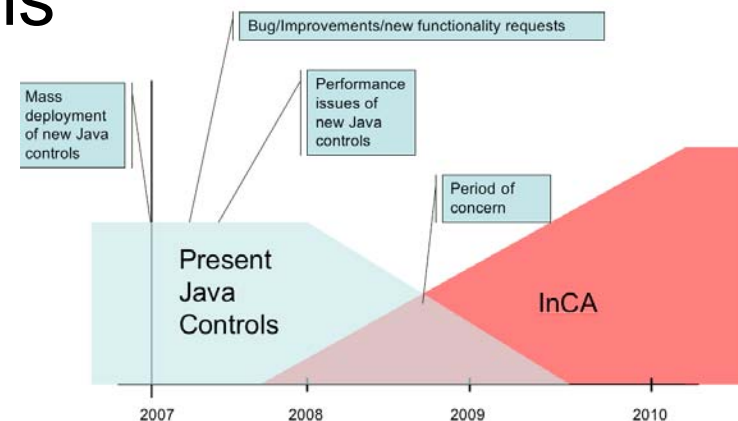


New projects (i.e. MTE) during 2007-2009 will be implemented using existing technology (like additional power supplies) or new technology for previously non existing equipment.

# Scope

- Evolution of Java Controls for the next 3 years keeping InCA in mind
  - Generic Java software (Working Sets, Knobs, ...)
    - Software Improvements
    - Diagnostic Tools
    - Performance Issues
  - General services (LASER, OASIS, Passerelle,...)
  - Equipment specific applications

- Maintenance scheme



# Example of Improvements

The screenshot shows the ArchiveUI application window with several callouts pointing to specific features:

- Support for AD**: Points to the 'Protected' and 'Update PLS' options in the 'OpConfigs' section.
- Archive filtering according to PLS + wildcard support**: Points to the 'Pls filter' dropdown menu.
- Sort archive by date (creation, modification, PLS,...) (not XMotif)**: Points to the 'Archive sorting select' dialog box.
- Action log to keep a track of what, where and who (not XMotif)**: Points to the 'Show log' button in the top right.
- Latest modifications reloaded from ORACLE**: Points to the 'Reload archive list from Oracle' button.
- Able to create archives from GUI (not XMotif)**: Points to the 'Create archive' button.
- Show SRC/DEST archive contents in browser (not XMotif)**: Points to the 'Show archive contents' button.

The main window displays a table of archives with columns for ID, Creation Date, Modification Date, PLS User, and Archive name. A context menu is open over the table, showing options like 'Archive ID', 'Creation Date', 'Modification Date', 'PLS', and 'Comments'. The status bar at the bottom indicates '15:58:04 - Found 12 archive(s) / 12 total.'

# Summary for application domain

- The current controls system will continue to be maintained and provide for the most essential requirements of the Operations
  - C/Motif Generic software will remain frozen
  - The Java Generic software is becoming fully operational
  - A set of improvements will be implemented to overcome the serious performance limitations of 2007
- New CO services are now providing functionality for the PS Complex
  - Logging covers the most essential data ⇒ goal: statistics during 2008 run
  - Fixed Displays software system has replaced all the legacy Vistars
  - LASER alarm system is moving towards covering the functionality of Alarm tree
  - Passerelle is resurrected from the dead and it is fully functional
- Renovation of the remaining legacy equipment specific software will be done at the most appropriate time to avoid any duplication of effort with InCA
  - A process of controlling the status of these applications and the evolution of the requirements is put in place by a team of OP and CO with ties to InCA and CO3

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## ATB

Areas, Targets and Beams

## BI

Beam Instrumentation

## BT

Beam Transfer

## PO

Power Converters

## RF

Radio Frequency

### ATB - Areas, Targets & Beams

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### BI - Beam Instrumentation

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<b>BI-ML</b>	Mechanics and Logistics	G. Tranquille	70243
<b>BI-PI</b>	Position and Intensity	U. Raich	72632
<b>BI-PM</b>	Profile Measurements	E. Bravin	71895
<b>BI-SW</b>	Software Support	J. J. Gras	79577

### BT - Beam Transfer

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<b>BT-KSL</b>	Fast Pulsed Magnets, SPS and LHC	L. Ducimetière	74638
<b>BT-SE</b>	Septa	J. Borburgh	72596
<b>BT-TL</b>	Transfer Lines, Injection & Extraction Systems	B. Goddard	75484

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<b>PO-IEE</b>	Integration, Exploitation & Electronics Production	H. Thiesen	75784
<b>PO-MPC</b>	Main Power Converters	J.P. Burnet	75342
<b>PO-PH</b>	Pulsed and High-voltage Converter	C. De Almeida	74135
<b>PO-SC</b>	Switch Mode Converters	V. Montabonnet	75351
<b>PO-TC</b>	Thyristor Converter	G. Le Godec	74577

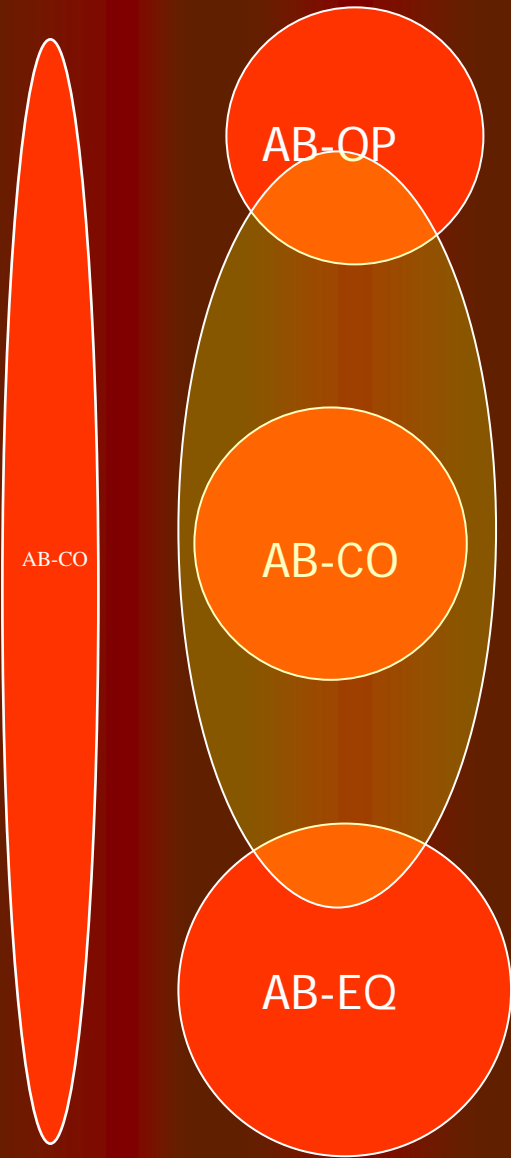
### RF - Radio Frequency

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<b>RF-FB</b>	RF Feedbacks and Beam Control	W. Hoffe	75175
<b>RF-LR</b>	Linacs RF	G. Geschonke	73894
<b>RF-MK</b>	Modulators & Klystrons	O. Brunner	76251
<b>RF-BR</b>	Beams and RF	E. Chapochnikova	76778
<b>RF-SR</b>	Synchrotrons RF	E. Jensen	74298

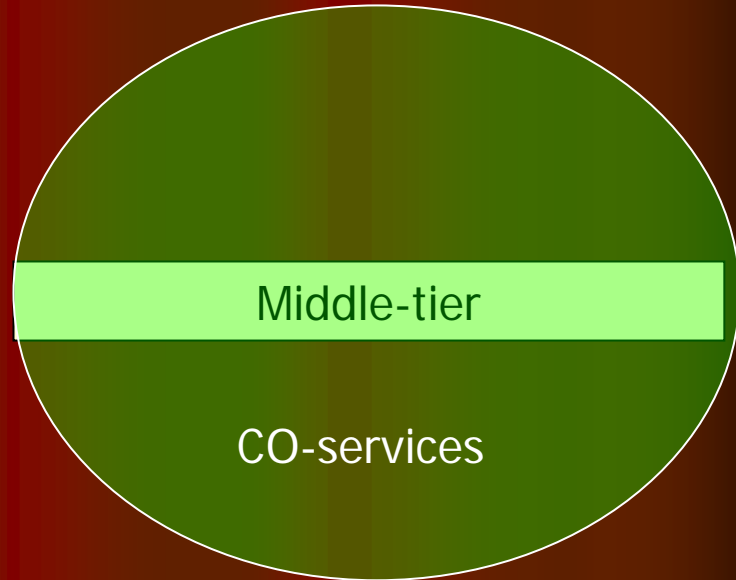
# AB/AT controls activities

- Summary in AB:
  - about 50 FTE in equipment groups on controls activities
  - AB-CO is about 80 staff plus presently 60 collaborators under various contract conditions
  - AB-OP has probably another 25 FTE for work on applications
  - AT department has much fewer people working on controls, but in total more than 10
- This makes a total of 225 FTE!
  - The old (and well functioning) model of PS-CO is not applicable to AB and AT
  - a clear separation of responsibility has been worked out and agreed by all partners
- final endorsement of this agreement for AB in ABMB of the 4<sup>th</sup> of February (thanks to long negotiations in the CO3)
- The same work needs to be done for AT within 2008





Application-tier



Frontend-tier



# Summary for LHC App

taken from ATC/ABOC days presentation of P.Gayet

	QPS	ACC Cryo process	SECT cryo process	CIET	EXP cryo process	VAC
Specification	Red	Red	Red	Red	Red	Red
FIP AGENTS / Instrumentation/ Profibus agent	Red	Red	Red	Red	Red	Red
FEC/PLC hardware	Yellow	Yellow	Yellow	Yellow	Yellow	Red
FIP NETWORK / PROFIBUS network	Yellow	Orange	Yellow	Yellow	Yellow	Red
FEC/PLC framework & tools	Yellow	Yellow	Yellow	Yellow	Yellow	Red
FEC PLC application	Yellow	Yellow	Red	Yellow	Red	Red
BE hardware	Yellow	Yellow	Yellow	Yellow	Yellow	Orange
PVSS framework	Yellow	Yellow	Yellow	Yellow	Yellow	Orange
PVSS applications	Yellow	Yellow	Orange	Yellow	Orange	Red



# Conclusions (as presented)

- ◆ Responsibility sharing between AB-CO and AT are inhomogeneous and depend of projects history.
  - ◆ Coordination has been done at the project level.
  - ◆ A coordination body on the model of CO3 is not useful.
- ◆ Nevertheless CO must have the knowledge of all ongoing and future projects to avoid technical and HR decisions that can affect the present and the future AT projects.
  - ◆ A CO representative from the IS or MA section ( the most involved in AT activities) or the GL in MARIC could be a strategy.
- ◆ The projects related to LHC (QPS, CRYO, VAC) are in good shape, but due to Permanent or Temporary staff departure and the possible control restructuring we will have to reassess the responsibility sharing mid 2008.
- ◆ VAC has to be associated to CO3 for the PS renovation matters.
- ◆ The Future control & Acquisition system project for SM18 need to be defined by a joint working groups Involving CO, CGR, MEI.



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# CO users applications domains

- Beam Control  
JAVA

- SCADA  
PVSS

- Test & Development

**Rapid Application Development Environment  
(RADE)**  
LabVIEW, Matlab, Scripts, etc.

# Test & Development applications characteristics

- Short lifetime applications (i.e. specific analysis)
- Punctually used applications (i.e. expert diagnostics)
- Rapidly evolving applications (i.e. machine development)
- Stand-alone systems (i.e. test facilities)

# Requirements

- Fast programming
- Rapid learning curve
- Drag and drop GUI development
- Wide range of analysis libraries
- Light/independent environment

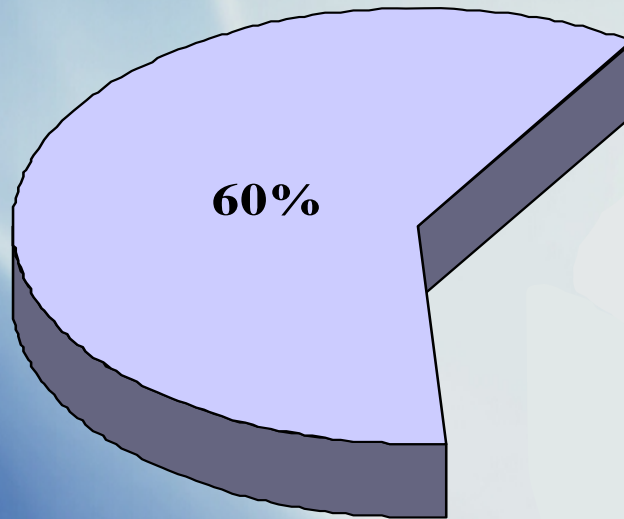
**LabVIEW  
programming  
language**

- Integration with the control infrastructure

**← AB-CO-MA  
contribution**

# Covered domains

Test facilities



Expert tools

Machine development



# Building blocks

## 1. Installation

- Clear LabVIEW version policy
- NFS installation for Linux
- Windows TS installation

## 2. Control Integration

- Maintained interface libraries
  - CMW
  - RBAC
  - SDDS
  - DB
  - JAPC

## 3. Support

- Information Webpage
- Mailing list
- JIRA for issue tracking
- User support

## 4. Development help

- Defined GUI
- Application templates
- Configuration files
- Training
- Documentation

# Next events

- 14-Feb-2008:  
Public information and discussion meeting  
organized by A.Raimondo
- To be scheduled:  
Presentation in ATC and decision

# Conclusions: Controls Renovation

- CO has launched a comprehensive renovation program of the injector chain control system.
  - Budget is covered by the CO exploitation budget (3Msfr over 4 years)
  - detailed timescale will be negotiated with the equipment groups until summer 2008 and documented in APT. Negotiations will be done through CO3.
- **Follow up by ATC very welcome.**
  - scope is all CERN accelerators (not CTF3) with priority to the LHC injector chain
  - depending on resources and LHC commissioning the project will end by 2011
- During the renovation the existing controls are kept in shape, the underlying technology is changed for the applications and performance issues are addressed.

# Conclusions: Responsibility share

- The size of the controls activity in AB demands a split between AB-OP, AB-CO and the equipment groups.
- A satisfactory and detailed definition of responsibilities has been agreed thanks through the work in CO3.  
Exceptions demonstrate the rules...
- A similar approach for the controls relations AB-CO <->AT department has not shown the same result. The controls activities in AT are of very different nature, the remaining resources in AT are very low and compared to AB the volume of work is much lower.  
→ in the frame of the mandated working group for CERN wide controls activities a proposal will be elaborated.  
Follow up in ABMB and AT-GLM

# Conclusions: RADE

- Big step done in defining a LABVIEW development environment for a **very specific range of applications**.
- This effort responds to a clearly expressed need in AB and AT.
- Open issues (additional MATLAB integration, interfaces to existing control system etc) will be addressed this month.
- **Follow up in ATC suggested.**