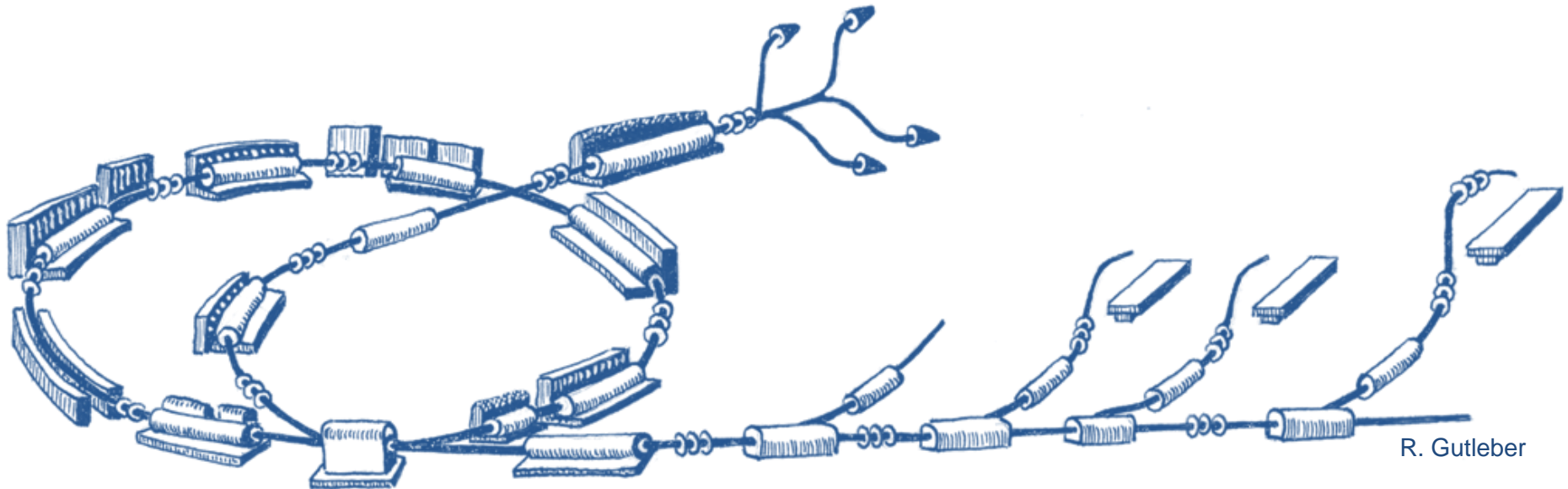


# Work Package Controls

MACS Week June 2010  
June 24th, 2010  
Johannes Gutleber



# STATUS REPORT



# Contents

- What has happened since Feb 5, 2010 (4 months)?
- Where do we stand with respect to the planning?
- What are our current activities?
- Where are we heading for the next 6 months (Dec. 2010)?

# Core Team Composition

- Johannes Gutleber – WP leader
- Roland Moser – Junior partner
- Markus Marchhart – Automation technology engineer
- Angela Brett – Software engineer
- Cesar Torcato de Matos – Embedded systems engineer
- Franz-Michael Coreth – IT coordinator (50%)
- Michael Thonke – System administrator (since June)
- Fabian Moser – doctoral student,  
20% beam verification analyst

# Procurement

- Framework Agreement with Cosylab
  - As of April 2010 team of up to 5 FTE for requirements, design, software and hardware developments
- CNAO Repository Management System (RMS)
  - As of June 18, source code, user documentation of software “AS IS”
  - Software not in use yet
- IBM Global Technology Services IT infrastructure architecture
  - As of June 11, common project until mid December to elaborate the requirements and the architecture of the overall IT infrastructure.
  - Output are “ready for tendering” documents
  - Includes processes, procedures, organization, hardware and software

# Framework Agreement

- EU tendering procedure completed
  - Framework Agreement with **Cosylab** in field of accelerator controls
- **Provision of** software and hardware **development services**
  - “Leasing” of skilled personnel that in close cooperation with WP controls core team creates the system
  - Includes requirements re-scoping and design
  - Work according to ISO 9001 QA process
- Call-off-contract/Contract Work Order principle
  - Payment of lump sum per CWO
  - Work items and deliverables for time frames of about 6 months

# First Experience

- Alignment of development processes completed
- Cosylab project team identified and assigned
- Current work items
  - Main Timing System (MTS)
  - Power Converter Controller (PCC)
  - Optical link from PCC to power converter
  - Labview real-time framework (FECOS)
- First CWO (4 months) completed
  - Company works according to well-defined QA process
  - Company helps in requirements finding (WHAT needs to be done)
  - Company showed flexibility in adapting schedule

# Status at Inception Phase Milestone

- ✔ Defined work package scope
- ✔ Agreement with other work packages on scope
- ✔ Cost and schedule estimated
- ✔ Project risk management process defined
- ✔ Major risks identified and acknowledged by top management
- ✔ Parameters from existing processes and designs identified
- ✔ Project environment defined
- ✔ Initial requirements defined
- ✔ Project plan defined
- ❓ Project plan aligned with top management
- ✔ Development process defined and accepted
- ✘ Medical device safety concept/scope completed



# Achievements since Feb 2010

- **Architecture** described (ES-100406-a-JGU)
- Main Timing System (**MTS**) **requirements** settled
- **MTS technology** chosen and design started
- Power Converter Controller (**PCC**) **requirements** settled
- **PCC technology** chosen and design started
- Optical link evaluation between PCC and PCO performed
- Labview-RT framework rapid **prototyping** started (**FECOS**)
- **Requirements collected** for source, conventional and special magnets slow controls
- Beam Interlock System requirements (initial)
- **IT infrastructure** requirements and architecture started

# Interfaces with Subsystems

- Identification of **controls contact** for each WP
  - **Contact persons should act autonomously in requirements definition and report/consult their WP holders in case of technical/organizational doubts**
  - Progress made, but not all contacts yet defined/available
- Requirements document with each work package
  - Capture **controls** requirements
  - Capture requirements on **interface** with SCS/ACS
  - Capture **safety** requirements

# Interfaces With Subsystems (1/3)

## **PCO** (ES-091111-a-JGU, ES-091203-a-JGU, ES-091216-a-JGU)

- Perform slow-control
- Provide set points and set-point sequences to power converters
- Provide triggers to power converters

## **Magnets** (ES-091021-a-MMA)

- Read out temperature and flow status
- Send control commands to magnet positioning system (septa)

## **Vacuum** (ES-090916-a-MMA)

- Interface to vacuum local control system (LCS)
- LCS designed and implemented according to controls guidelines

## **Beam Interception Devices** (action needed)

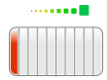
- Command devices
- Record device status

# Interfaces With Subsystems (2/3)



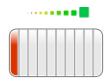
## **Ion Sources** (ES-091113-a-MMA in progress)

- Configure devices and command device parameters
- Change and record device status



## **RFQ, IH structure** and RFC (TBD next)

- Configure RFC local control system
- Change and record LCS states
- Provide main timing system events and triggers



## **Beam Diagnostics and Instrumentation** (TBD)

- Provide T4 programming framework and guidelines
- Configure T4 processing equipment
- Change and record T4 processing equipment states
- Provide main timing system events and triggers
- Provide Signal Acquisition and Distribution System (SADS)

# Interfaces With Beam Delivery (3/3)



## Beam positioning devices (WP BDS requires definition)

- Configure devices and record states
- Provide set points in real-time



## Beam verification monitors (WP BDS requires definition)

- Acquire digital signals and transmit to BDCS
- Record operational conditions



## Beam activation/de-activation devices (action needed)

- Configure devices and record states
- Provide triggers to activate/de-active beam

# Interfaces With External Systems

## **Med. Software Systems** (IS-090903-a-RTR, PM-090825-a-RTR)

- Interface to be elaborated in cooperation with MSS work package
- Mastership in clinical mode lies within PRVS
- PRVS controls patient positioning, gantry and MTE devices

## **Building Automation System** (TBD IT coordinator)

- Request uniform Authentication & Authorization solution
- Receive and report status

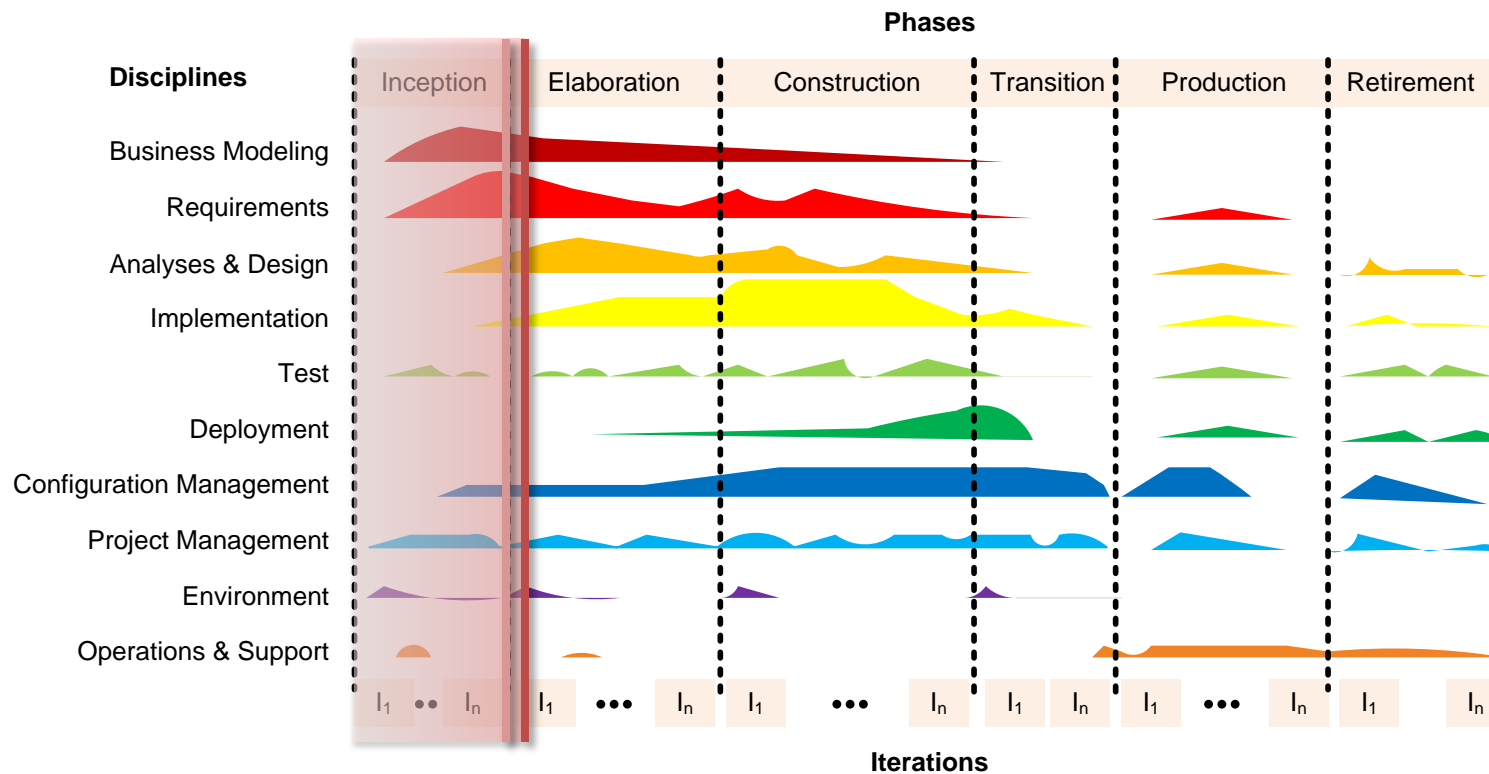
## **Access Control/Safety Management System** (TBD IT)

- Request uniform Authentication & Authorization solution
- Receive and report status

## **Beam Interlock System** (ES-100107-a-MMA, in progress)

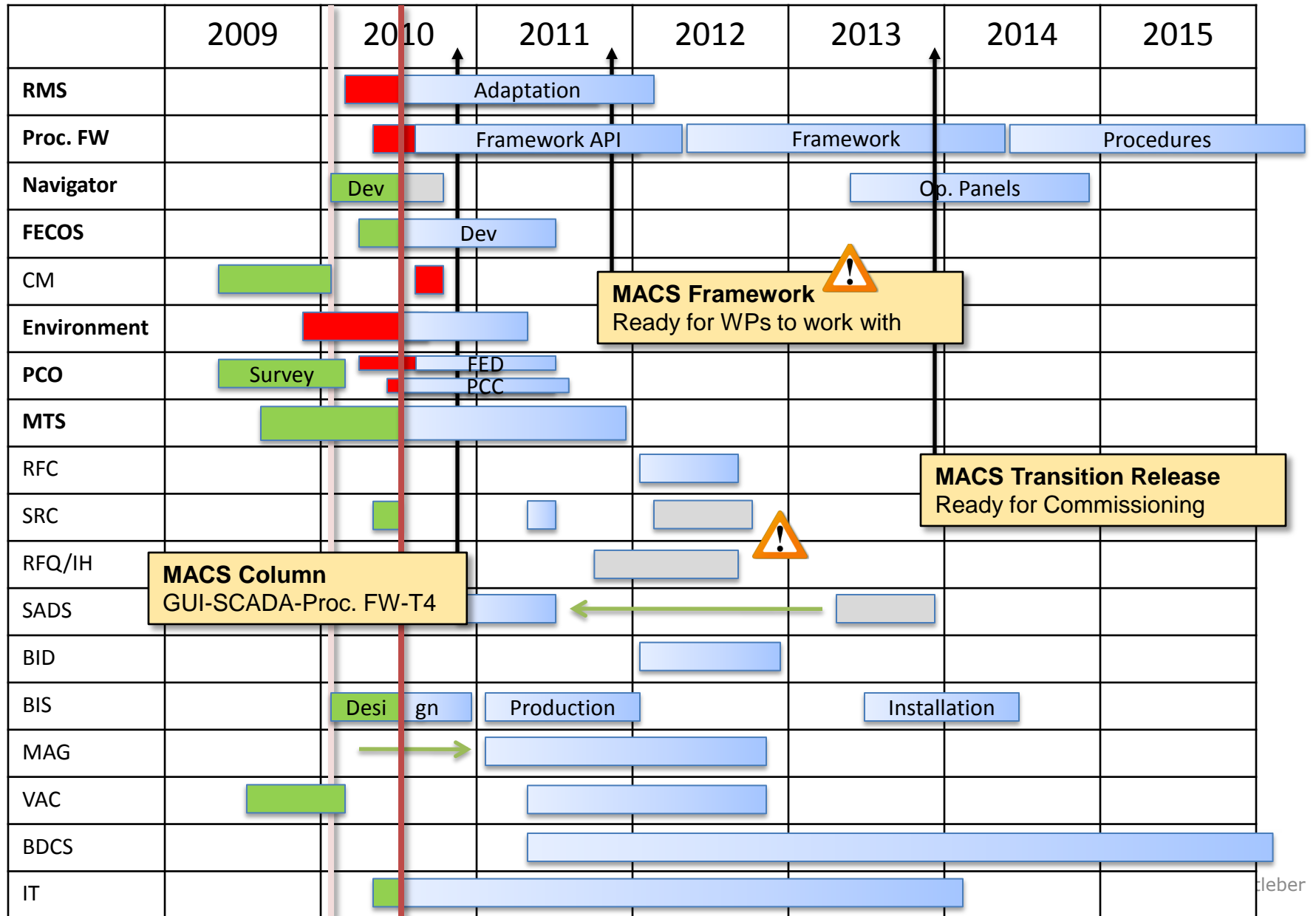
- Safety system that is orthogonal to operational functions
- Covered by work-package

# Entering Elaboration Phase



- Focus on **requirements, architecture, design**
- **Prototype** implementation and technology evaluation
- Prepare **development setup**

# Preliminary Schedule





# Current Activities

- Finalize Requirements (MTS, PCC, FED)
- Main Timing System (**MTS**) design
- Power Converter Controls (**PCC**) design
- Front End Control Operating System (**FECOS**) design
  - Framework for Labview real-time used for all developments
- Integration of FECOS with PVSS via OPC and DIM
- GUIs for FECOS and PCC
  - Integration of PVSS with NI Measurement Studio
  - Simulator components
- Procedure framework (**ProShell**) design started
  - Used to script control procedures for operation and machine development

# Goals for December 2010

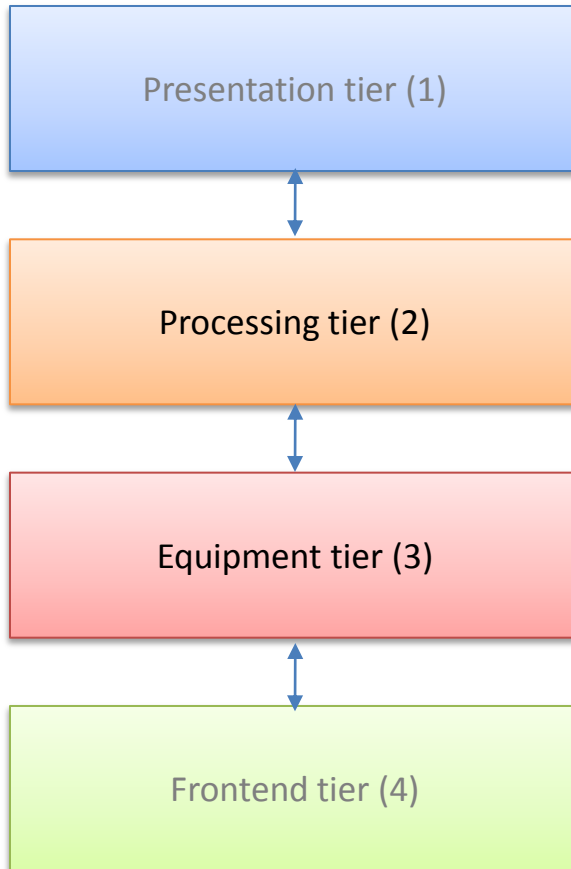
- Complete **architecture** and **implementing** first **components**
- Complete and **MTS** design and demo core functionality
- Complete **PCC** design and demo core functionality
- Make PCO **FED** ready for production
- Elaborate **ProShell** design and API skeleton
- Demonstrate **use of RMS**, database filler, PVSS filler
- Have development infrastructure (HW, SW) operational

**All goals are part of the MACS Column**



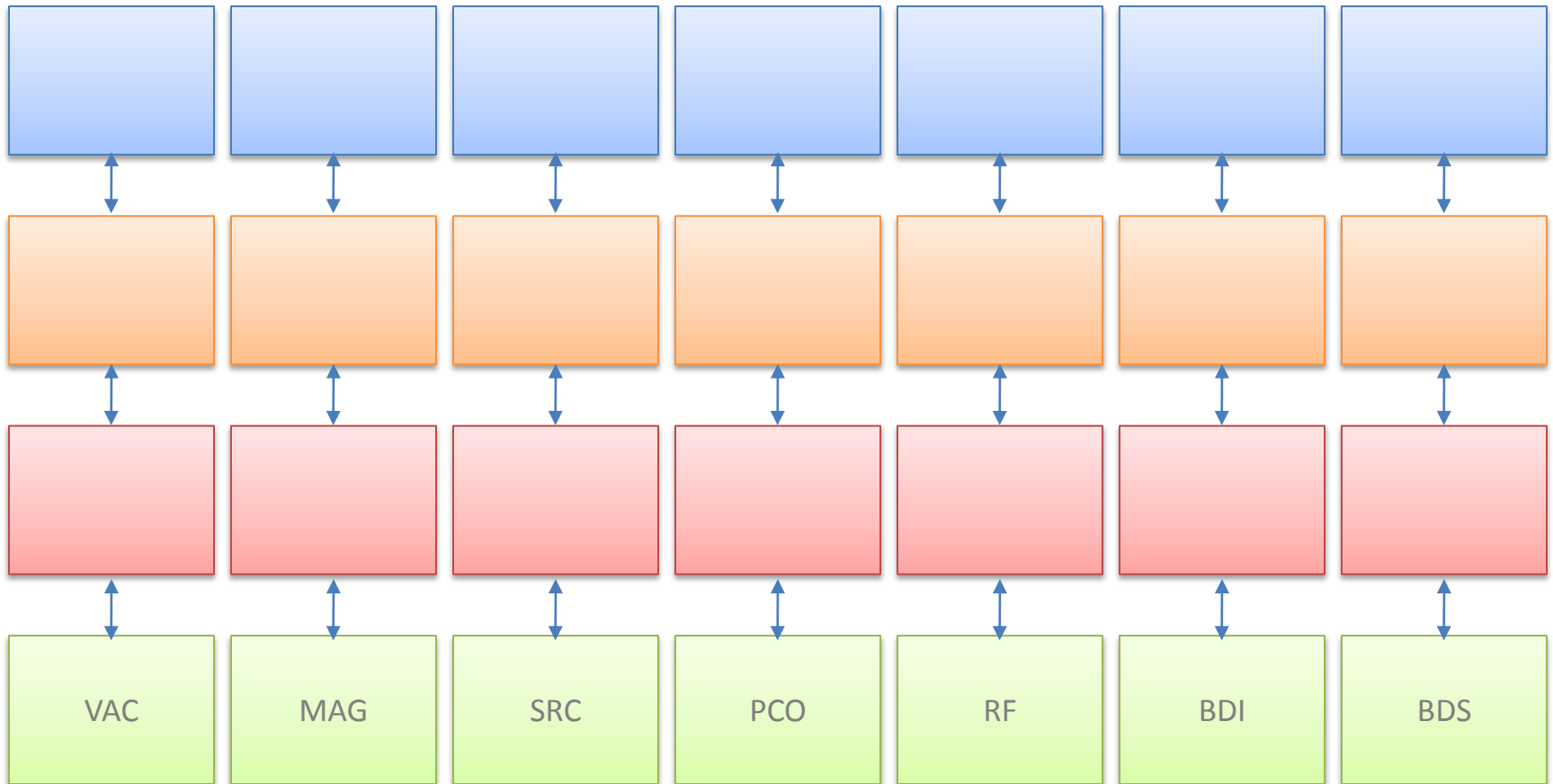
# MACS COLUMN 2010

# MACS Column

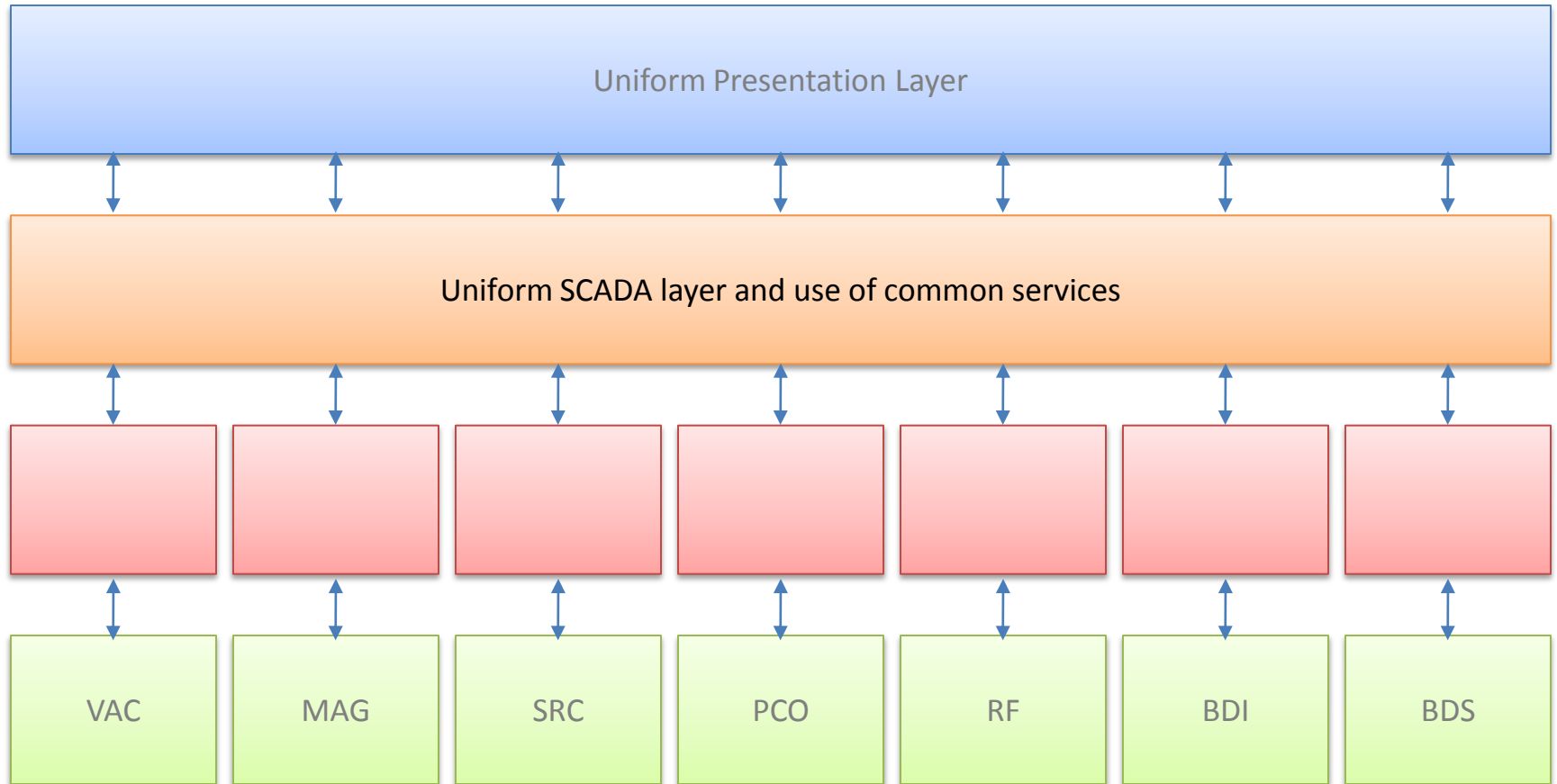


- Functional **vertical cut** through the control system architecture for
  - confirming technology choices
  - Refining the design
  - Improving project cost/time estimate
  - Providing users with a working infrastructure skeleton
- To be **replicated** for each subsystem
- Leads to a **scalable** system
  - In terms of performance
  - In terms of management

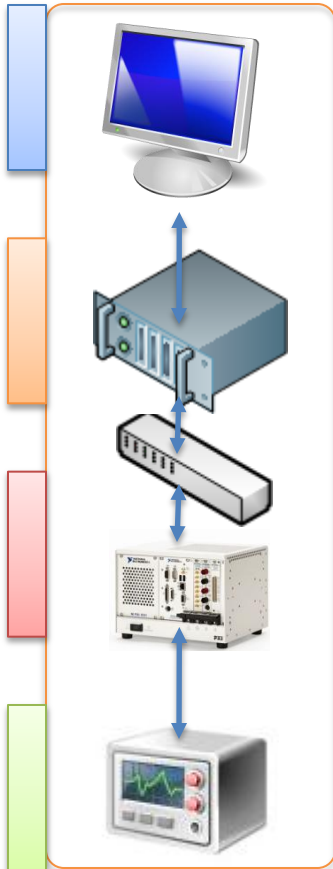
# Individual Columns



# Unified at Later Stage



# MACS Column Technologies



Windows 7, NI Measurement Studio, GUIs and PVSS Panel Navigator  
 SCADA and ProShell skeleton, Main Timing System demo  
 Control and Data Exchange  
 FECOS, Power Converter Controller  
 Optical link to transmit setpoint sequences and acquire measurements from power converter FED

Windows, NI Measurement Studio  
GUIs and PVSS Panel Navigator

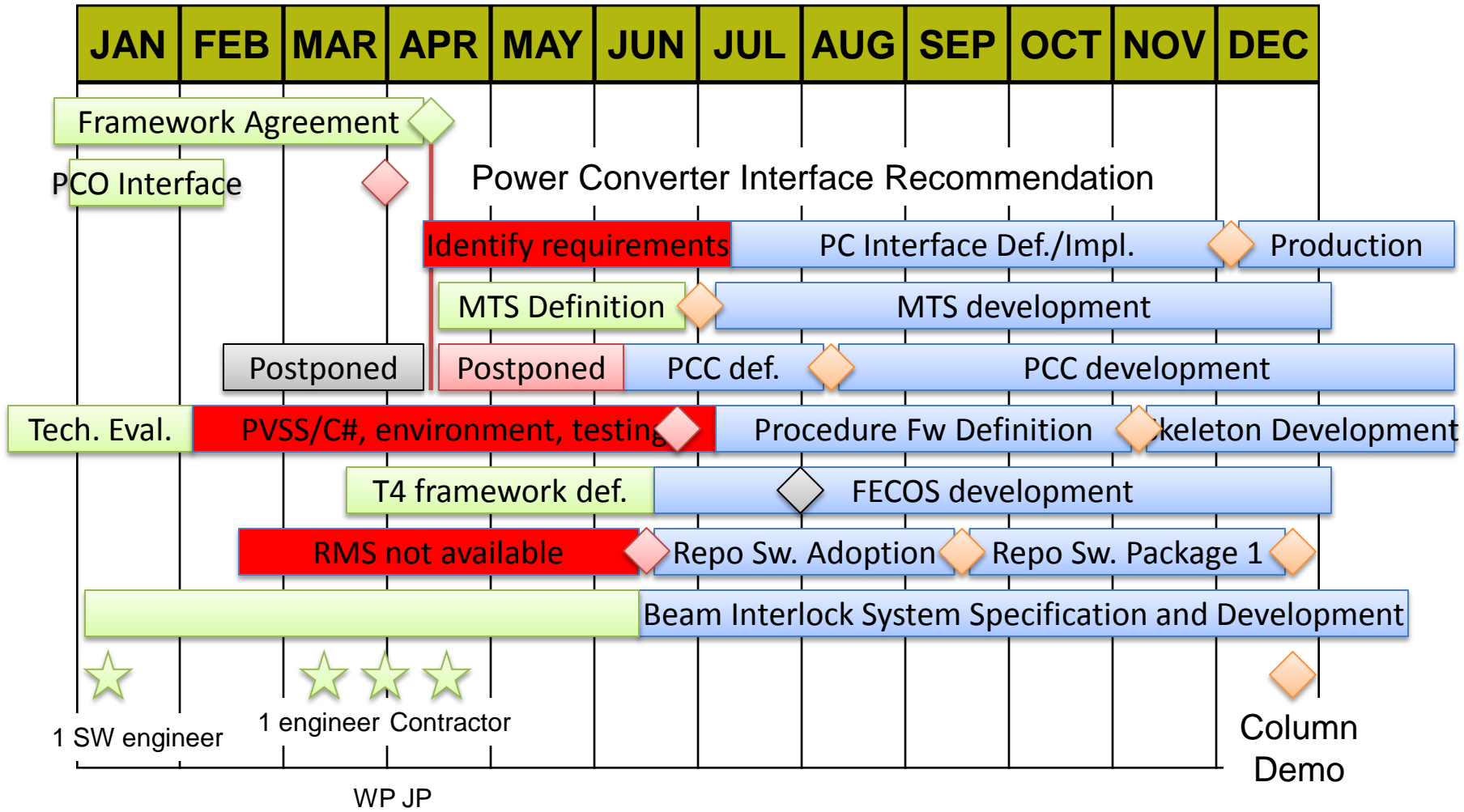
SCADA and ProShell skeleton  
Main Timing System demo

Control and Data Exchange

FECOS  
Power Converter Controller

Optical link to transmit  
setpoint sequences and acquire  
measurements from power  
converter FED

# Column Time Frame 2010







# SUMMARY AND OUTLOOK

# Summary

- Requirements and design work has well progressed
- Planning requires adaptation
  - **Work with contractor**
    - Requirements needed to be reduced and clarified (**re-scoping**)
    - Followup of deliverables (**geographical separation**)
  - **Change in power converter control strategy**
    - Elaboration of multiple options and support in decision making process
  - **Inhouse software development**
    - New team members need time to adapt to project goals
    - Taking responsibilities and autonomous work needs to be fostered

# Outlook

- **MACS column remains on track (scope and deadline)**
- Delivery of production grade software in time of originally planned WP CO schedule
- Team members should act more independent from now on
  - Ensure that goals beyond 2010 are clear to everyone