# WEGA as a test-bed for the WENDELSTEIN 7-X control system

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W7Xcontrol

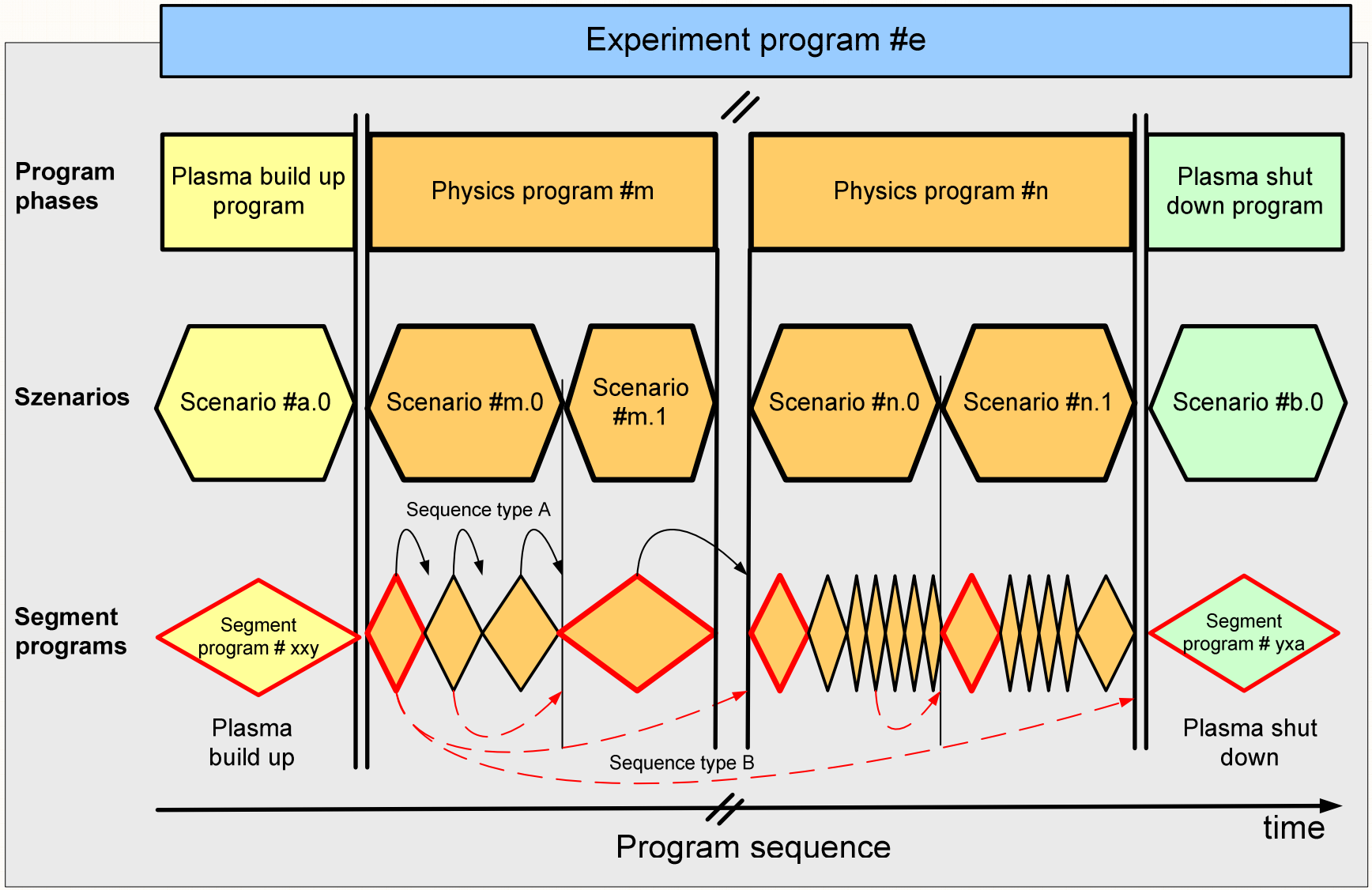
6th IAEA Technical Meeting for Fusion Research

IPP

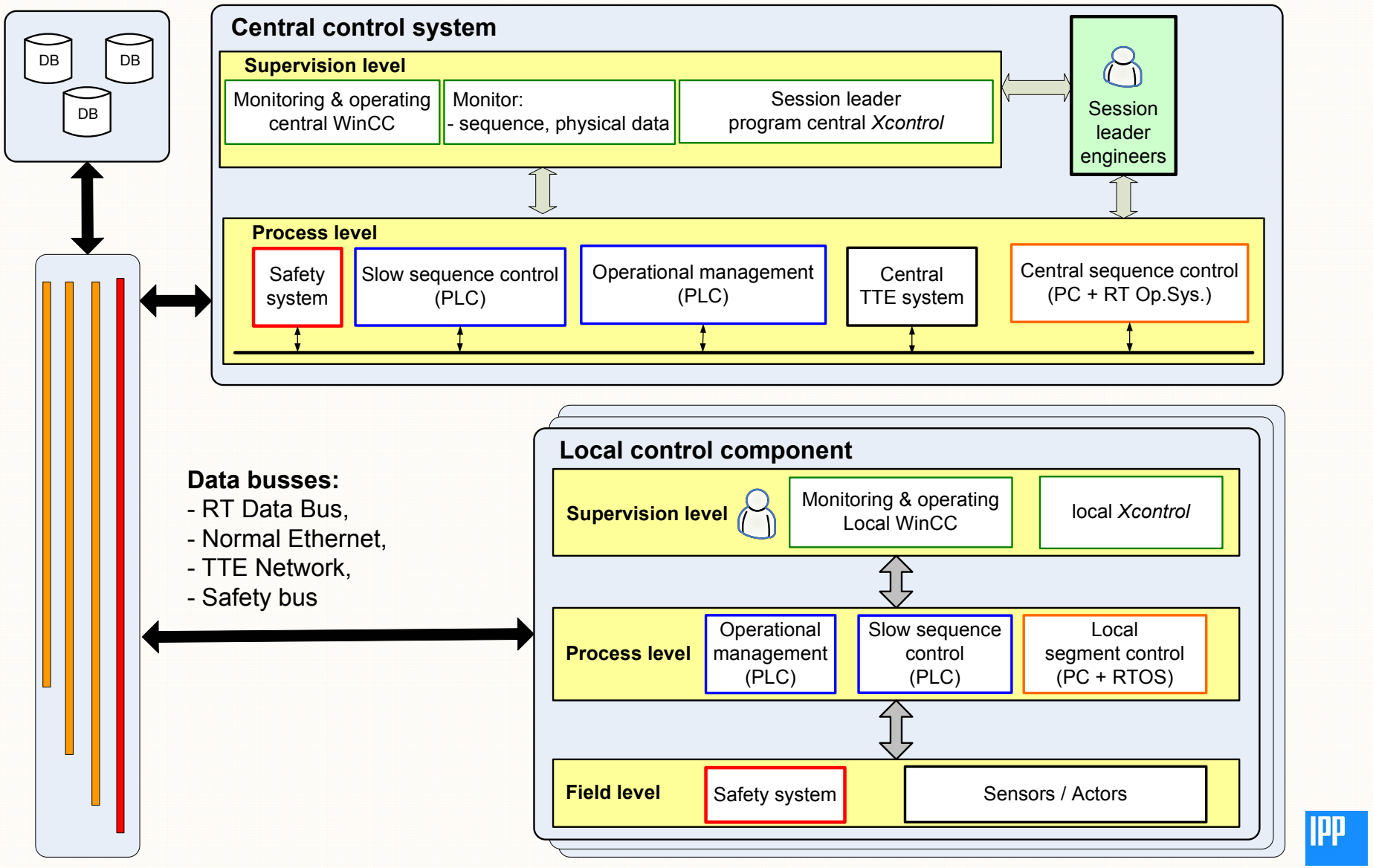
# Outline

- W7-X control system overview
- Motivation for a test project
- Project organization
- Project status
- Summary

# Segmentation of an experiment



# Structure of W7-X (WEGA) control system



## Why WEGA as a test-bed?

- The principle of plasma operation at WEGA is very similar to the one at W7-X,
- All important types of technical and diagnostic components of W7-X do exist at WEGA, too.
- Prototypes of W7-X diagnostics can be installed at WEGA,

### The main project aims are the following:

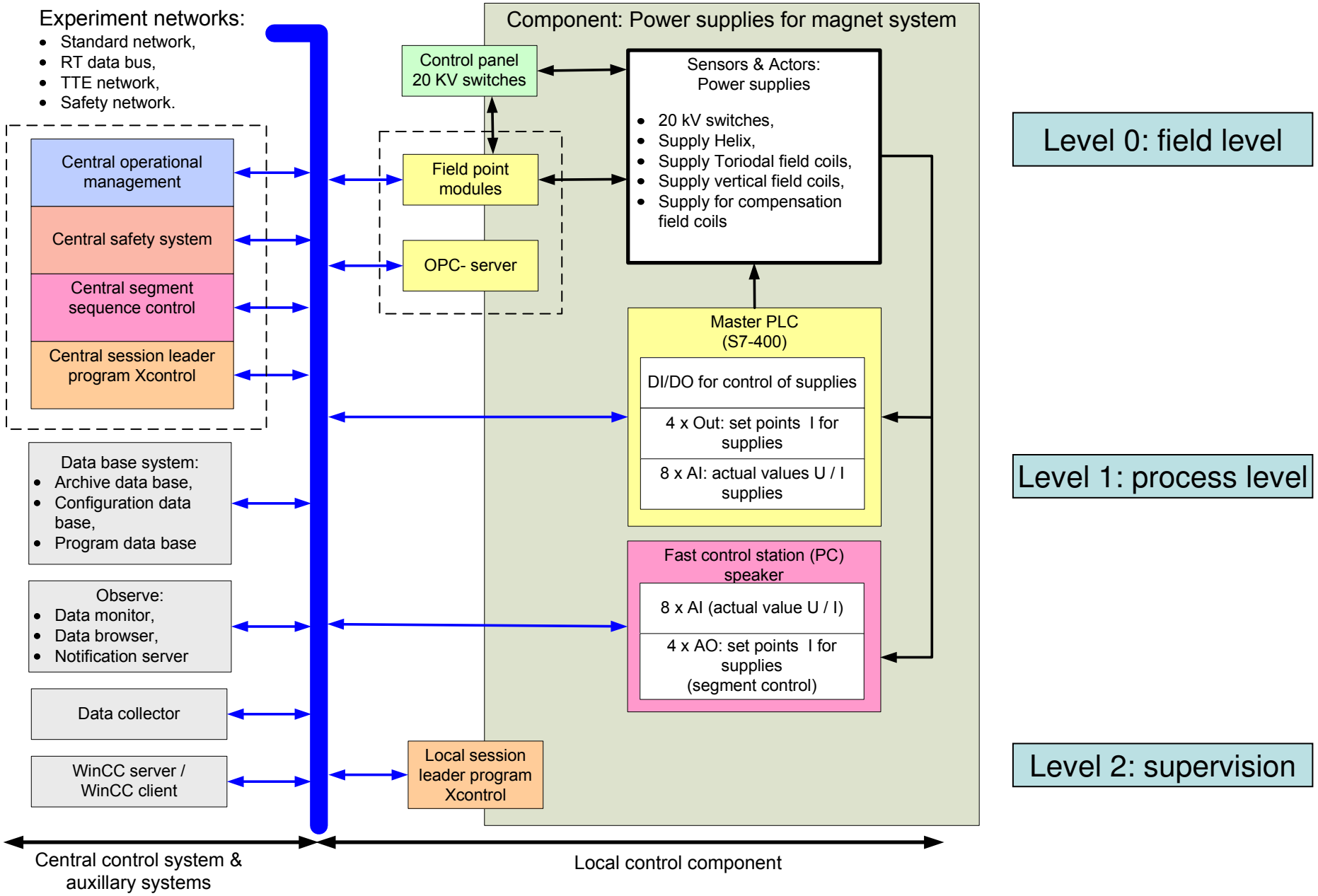
- Integrated test of the concepts for control, data acquisition and data processing in a W7-X like environment,
- Test of the concepts for the W7-X safety system as a part of the prototype,
- Education of personnel for design and installation of W7-X like control components and the operation of fusion experiments,
- Test and evaluation of user interfaces and tools for preparation and processing of experiment programs,
- Design, realization and test of diagnostic prototypes for the W7-X.

**→early tests, full integration, and education of personnel save time & money**
**→WEGA is a bunch of test-beds!**

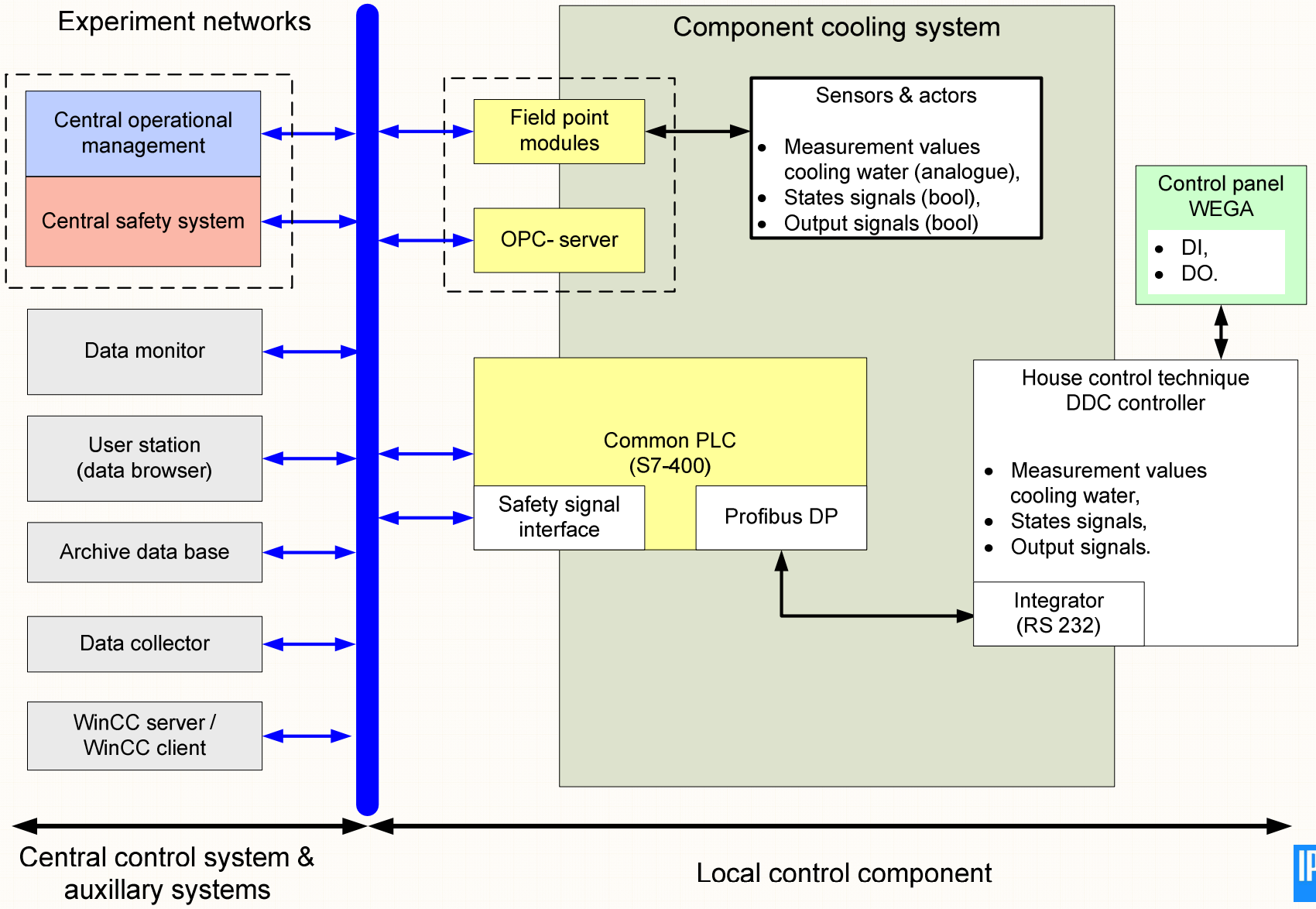
- Project phase 1: Implementation of W7-X control concepts
  - Modification of WEGA control system
    - Signal switch unit (old control system ↔ new control system),
    - Planning, design and realization of new control components (WBS):
      - Central WEGA control system,
      - Safety system,
      - Technical components: Magnet supplies, cooling system, Micro waves heating system, vacuum system, gas inlet system,
      - Diagnostic components: Machine instrumentation, Density control, Spectrometry, Video diagnostics,
  - Time schedule: Sept. 06 → Dez. 07
- Project phase 2: Operation, tests and physics operation
  - Test and routine operation with new control system
  - Development and test of W7-X diagnostic prototypes
  - Time schedule: Jan.08 → start operation W7-X – 2 years

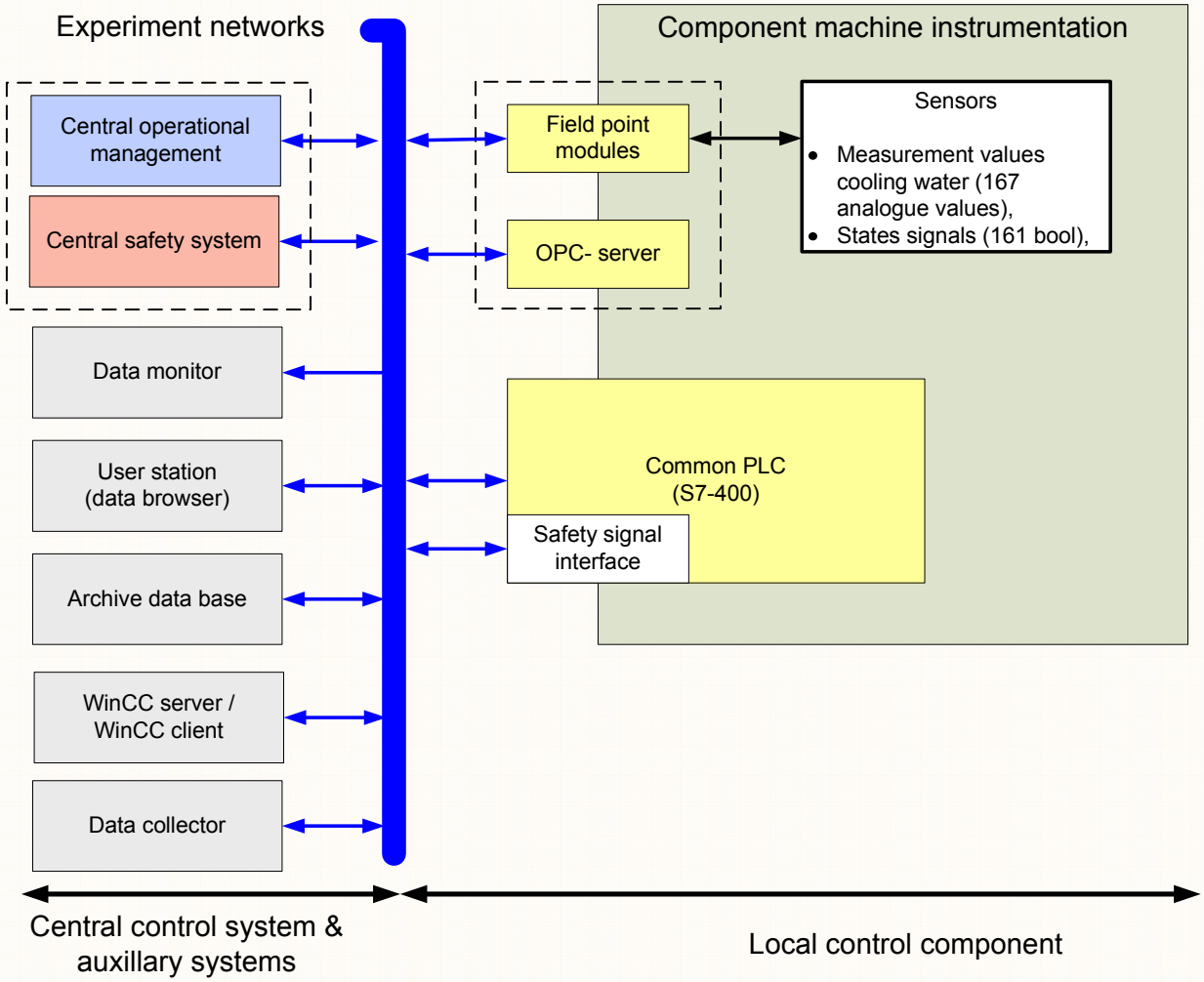
# Project status

# Power supplies for magnet system

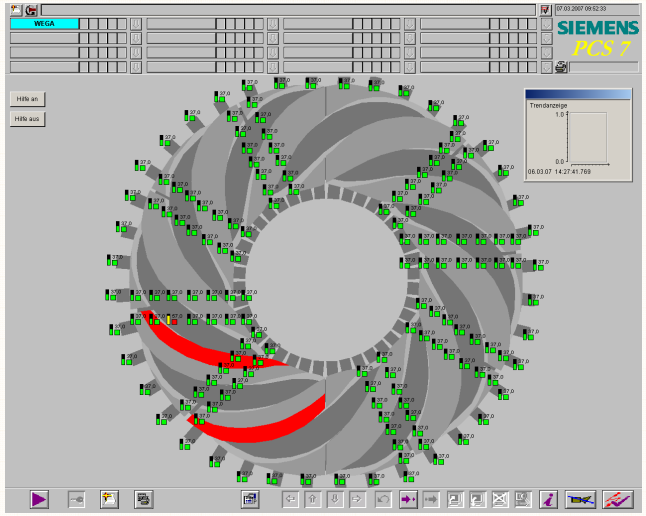


# Cooling system






**Structure of MI control system**




**Visualization of temperature and mass flow sensors:**

•some regions of cooling systems (Helix) are heated up

# Summary

- The W7-X physics department has decided to use WEGA as a test-bed for the W7-X control concepts,
- The project team started the work in October 2006.
- The first phase is used for installation of a W7-X like control system.
- The second phase is intended for:
  - routine every-day-operation of physics experiment,
  - including of W7-X diagnostic prototypes,
  - test of advanced control scenarios, …
- First control system components are under realization,
- Next steps:
  - Commissioning of all technical and operational diagnostic components,
  - stand alone tests of the components,
  - subordinated operation of components are possibly at the end of 2007

# Pictures of new control system parts

central control room

electrical cabinets

part of the signal switch module


console for switch operational states