
IST 37652 Hard Real-time CORBA

# HRTC Overview

Ricardo Sanz

The IST HRTC Consortium

# Contents

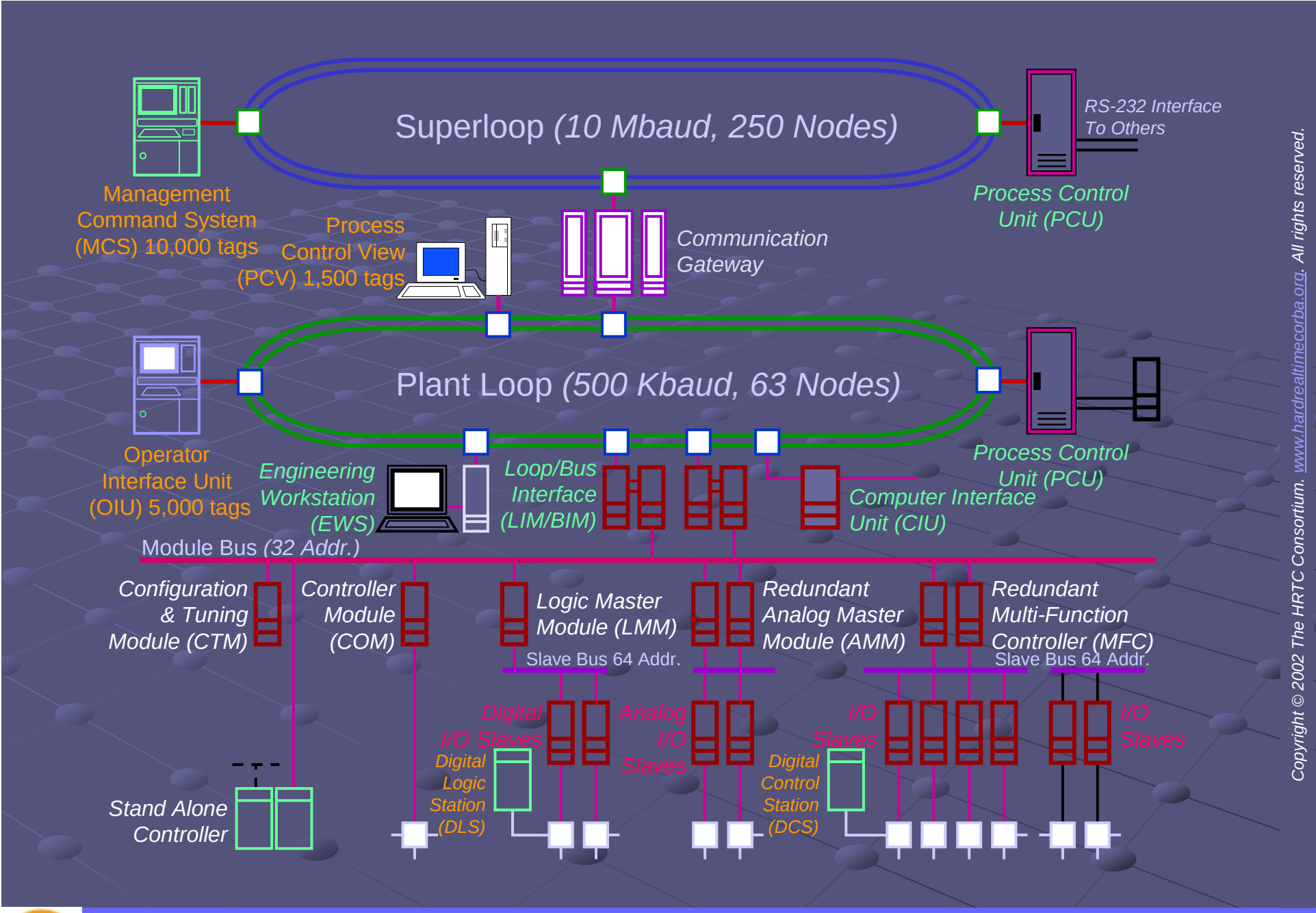
- CORBA-Based Control Systems
- The HRTC Project
- Future Work


IST 37652 Hard Real-time CORBA

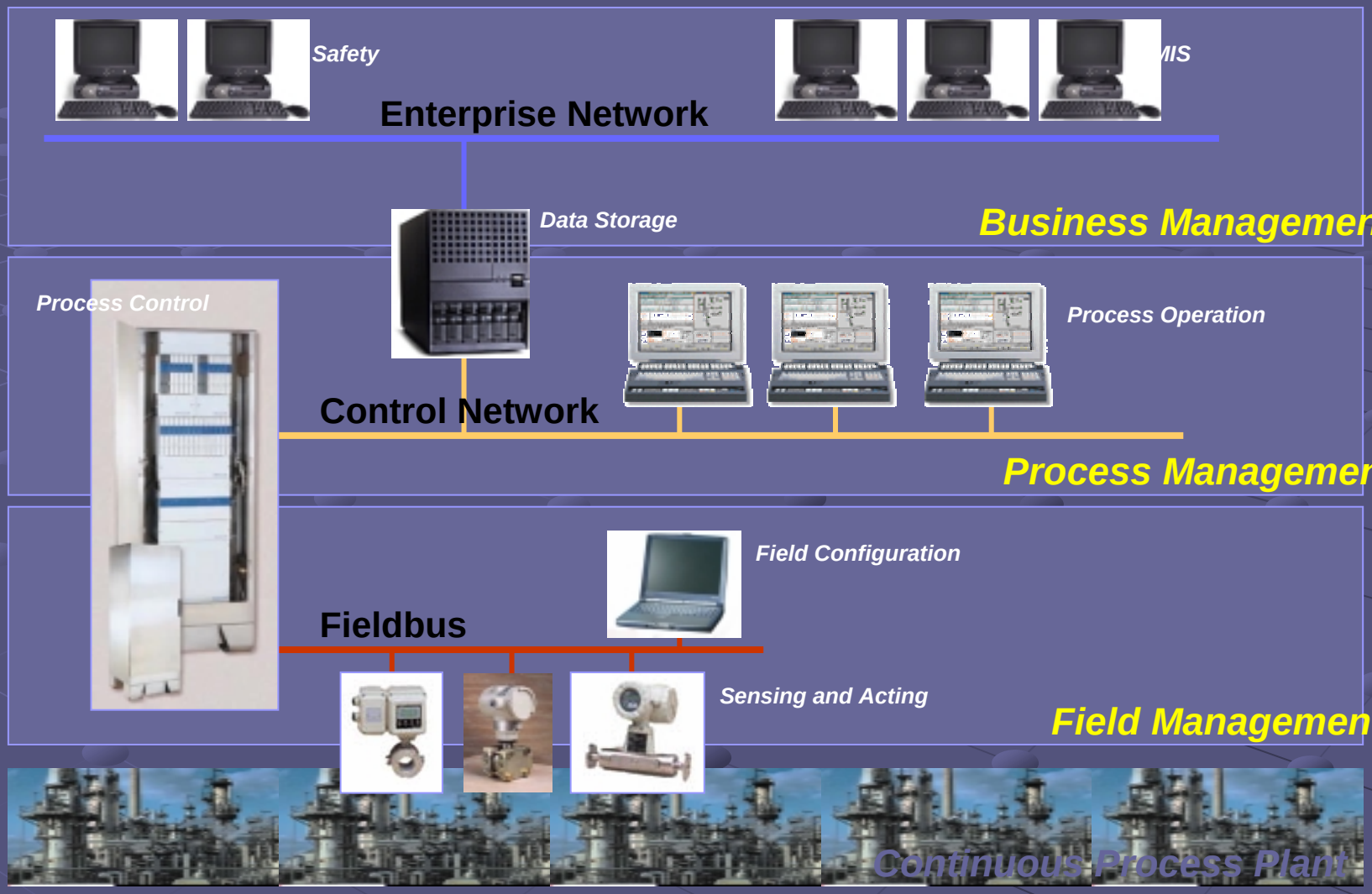
# The Control Landscape

## Trends and Perspectives in Software-based Control Systems

WP5 / R.Sanz / Helsinki 30 September 2002



# Software Intensive Control



# Design Issues / Challenges

- Predictability
- Performance
- Scalability
- Openness
- Coordination
- Transparency
- Naming
- Cost
- Consistency
- Failures
- Security
- Heterogeneity
- Mobility
- Load sharing
- Footprint
- Etc.




# Why CORBA ?

## Reasons for using CORBA in control systems engineering

# A Device Maps to an Object

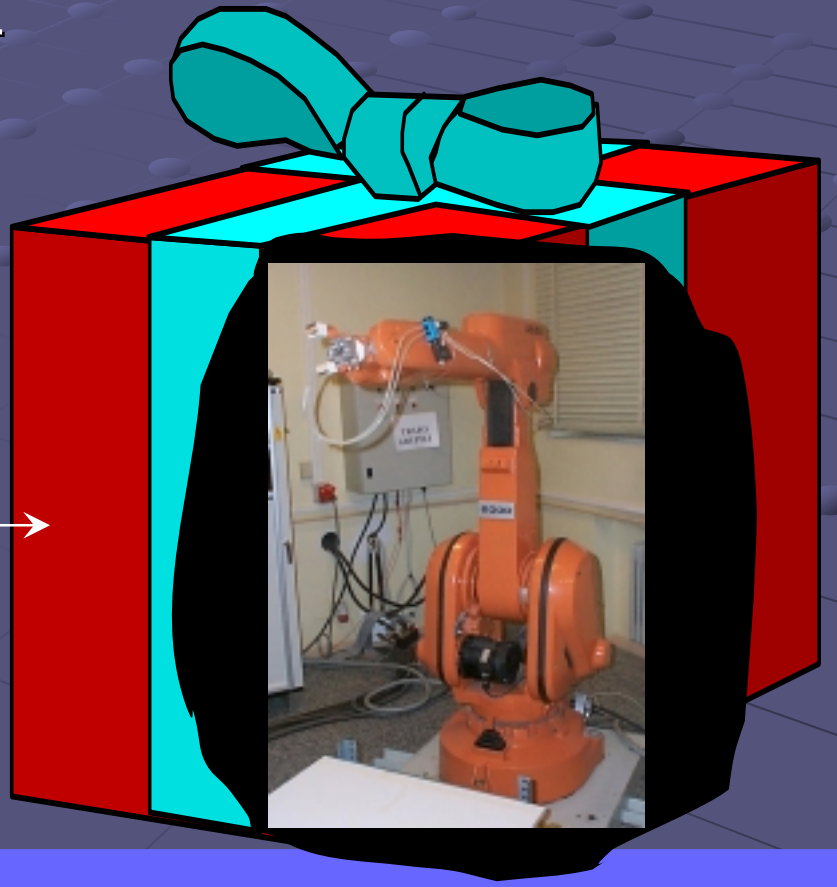

```
interface PS {
   ADC:double RO
   DAC:double RW
   status: bits RO
   on():      void
   off():     void
}

RampedPS : PS {
   start(): void
   stop(): void
}
```

# Simple Example

Object-Wrapping a robot to build a simple master-slave relation:

- Master: A 6-DOF Master
- Slave: A physical Robot

**Robot.Goto(x)**



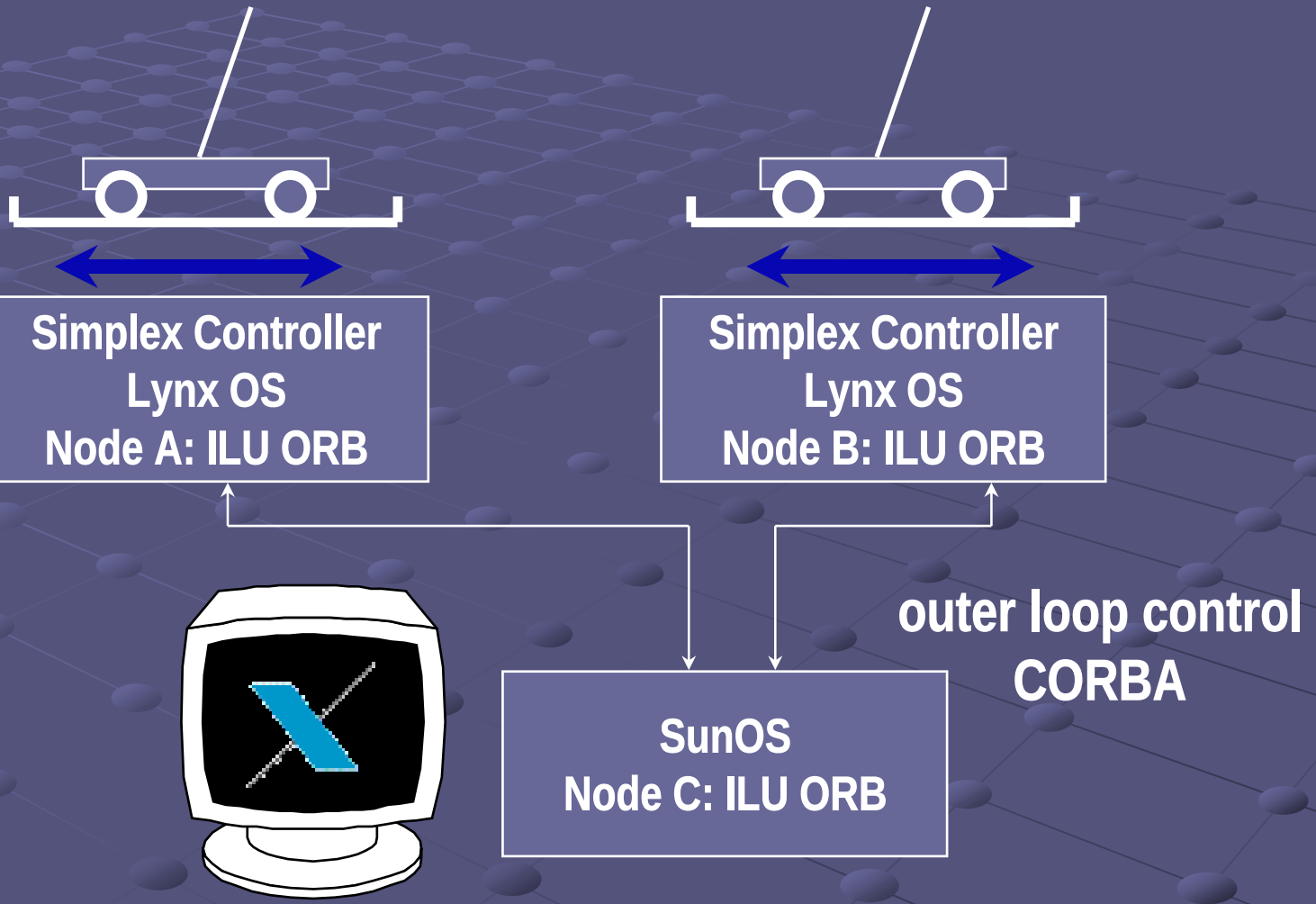

IST 37652 Hard Real-time CORBA

# CORBA in Control Systems

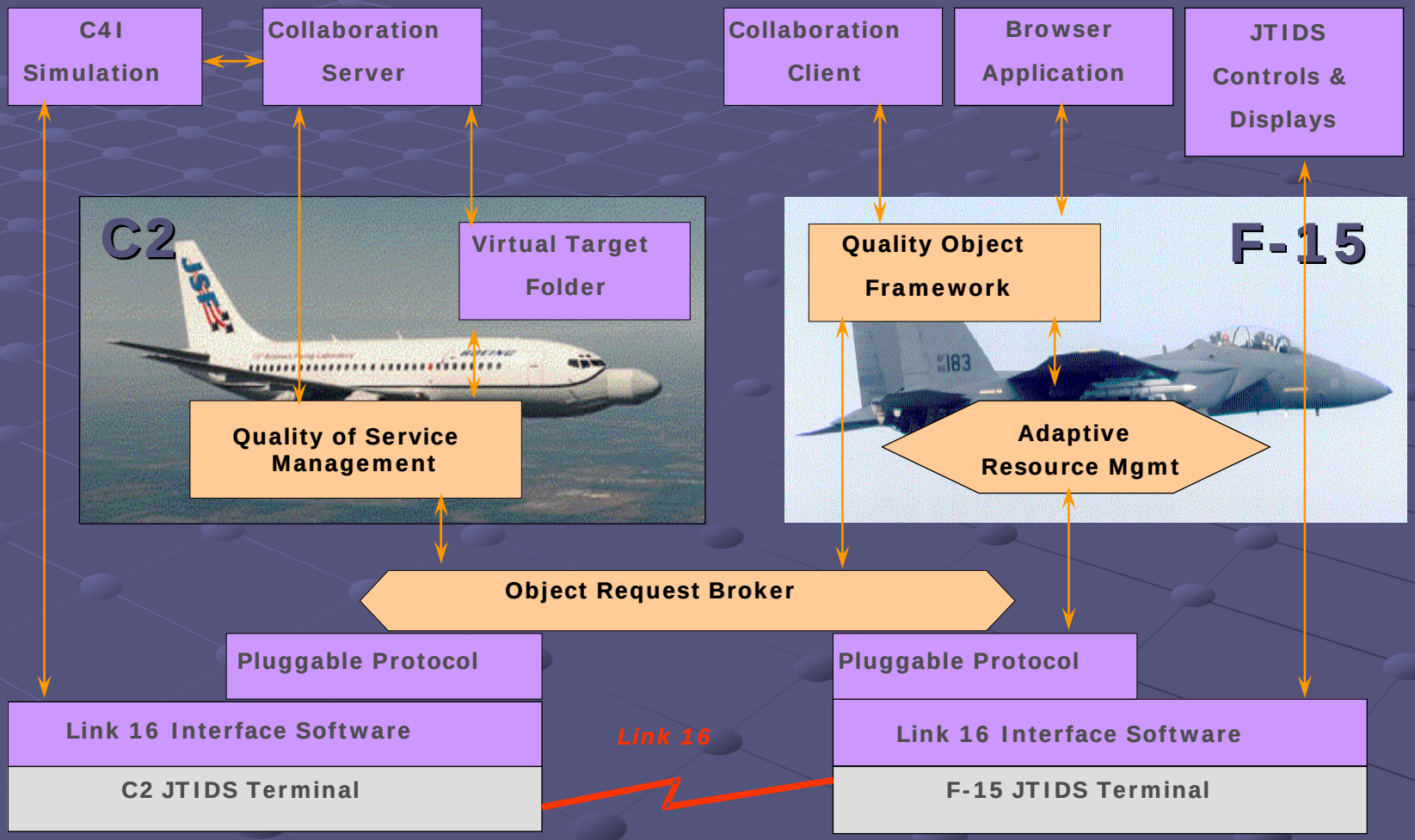
## Examples of Use

WP5 / R.Sanz / Helsinki 30 September 2002

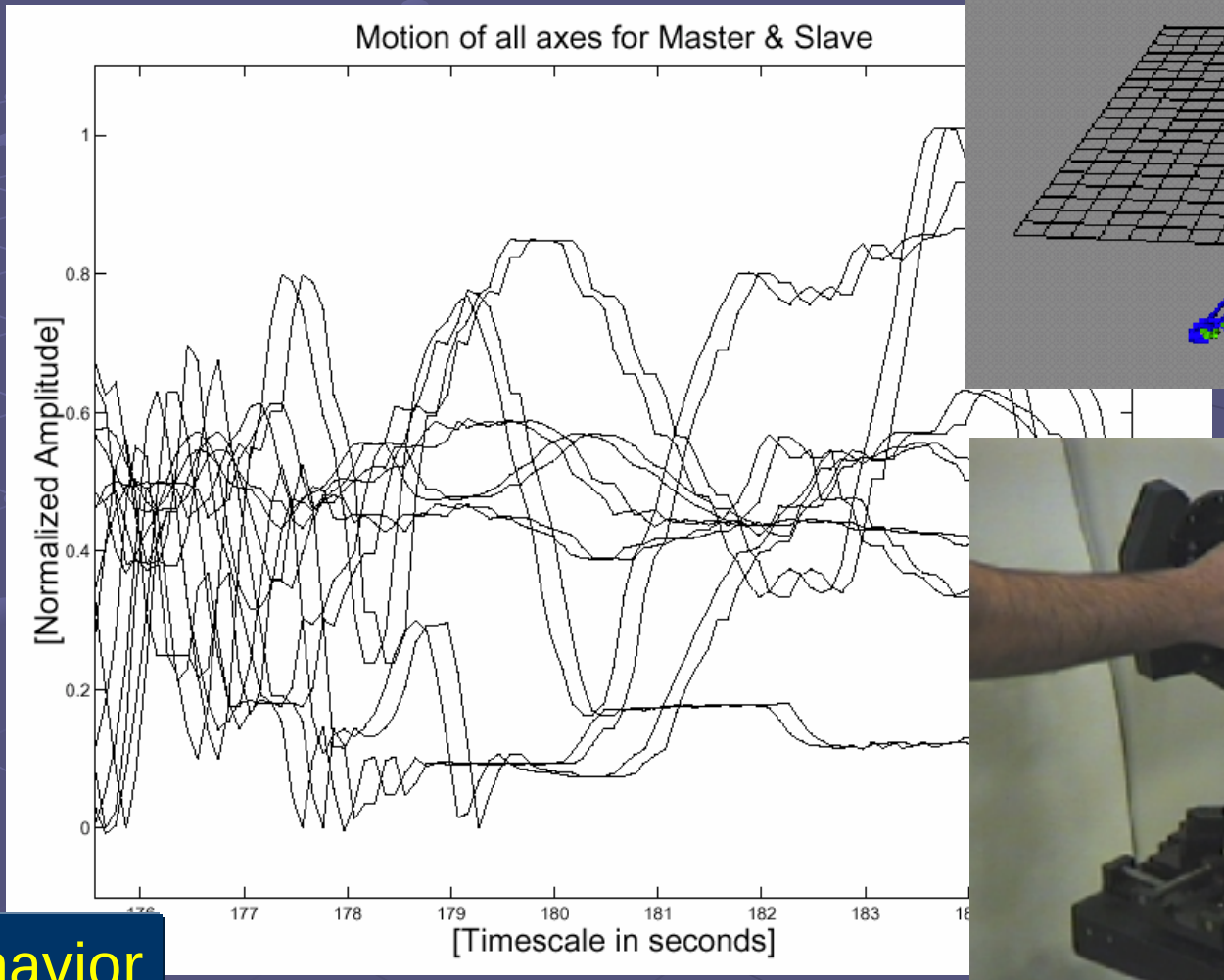
# Synchronized Pendulums



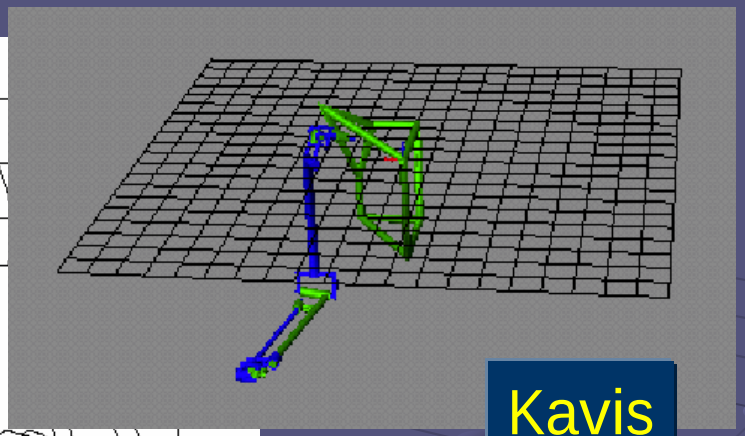
# Open Weapon Systems



# Virtual Arm Teleoperation



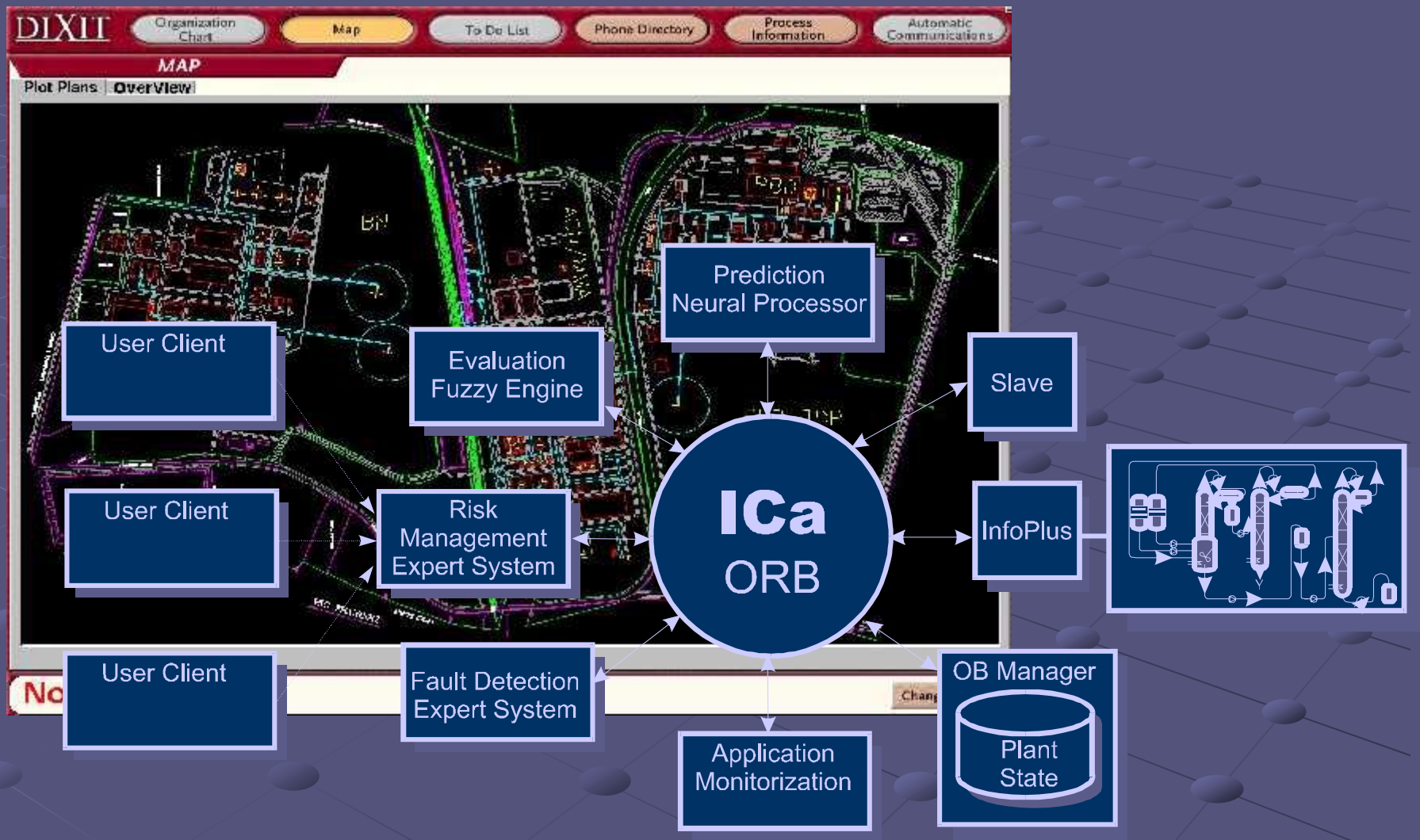

Behavior



Kavis

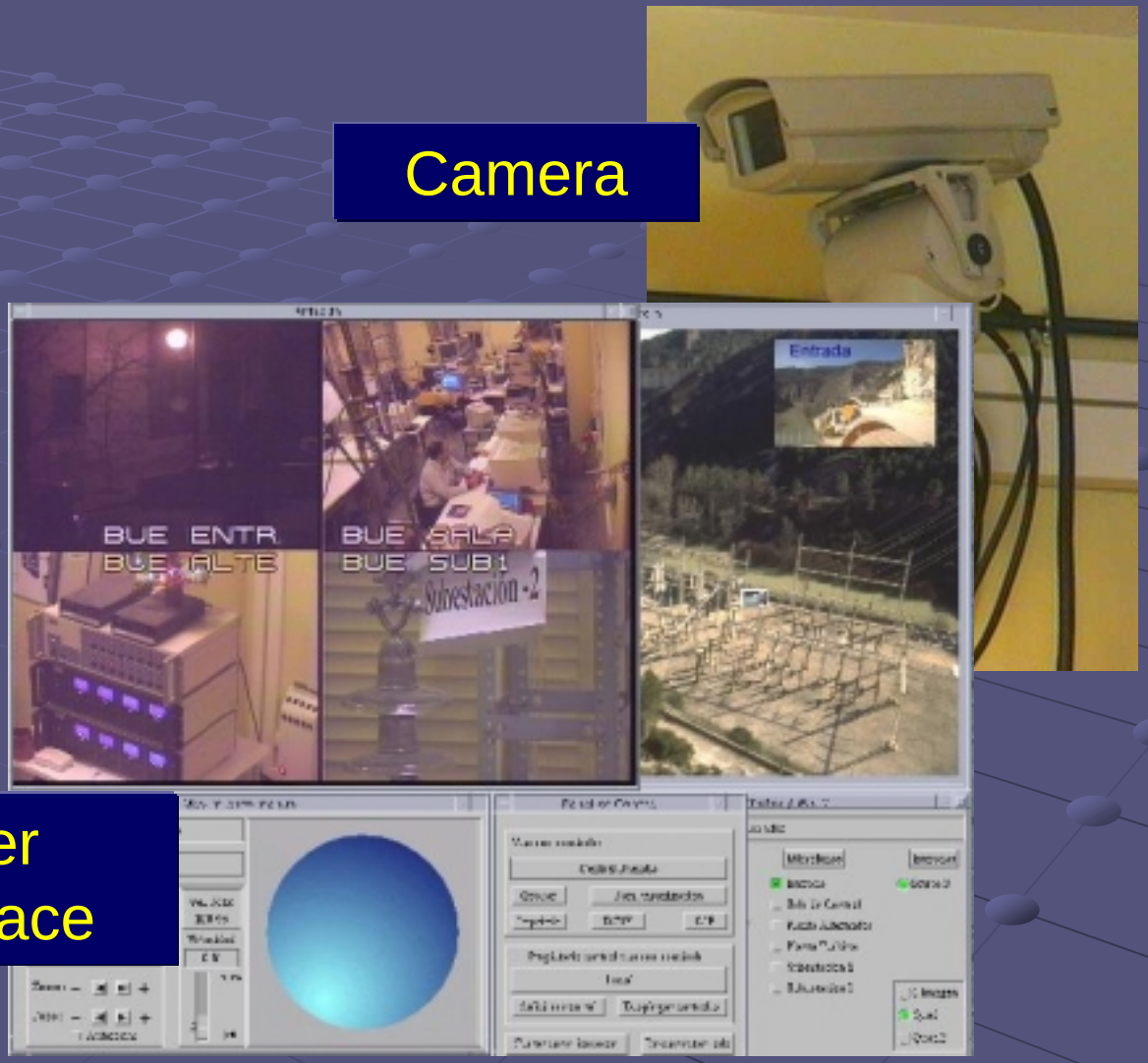
6 DOF Master

# Plant-wide Risk Management

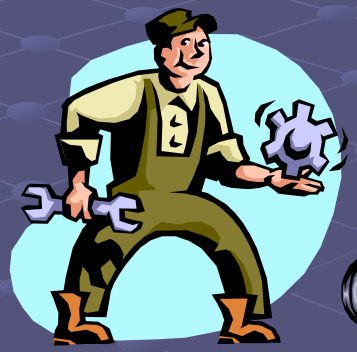


# Real time WAN video

Remote operation of hydraulic power plants



# Electric Utilities / IEC 61850



Pushbutton

Doorbell

GPS

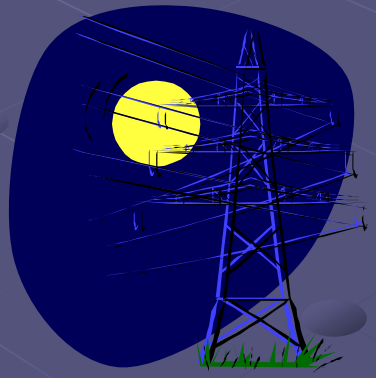
Operator Terminal

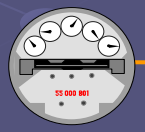
Camera

Configuration Terminal

10BaseT

10BaseT





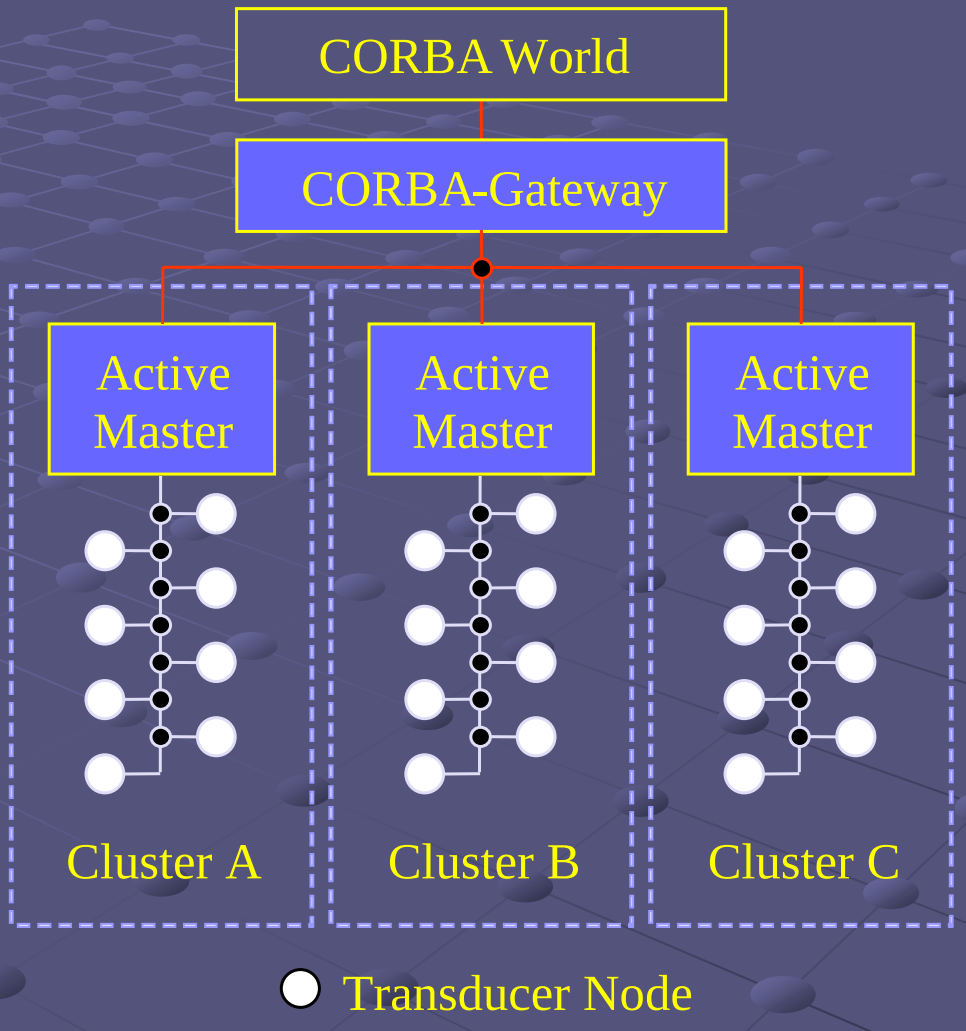
IED-1

IED-2

10BaseFL

Ethernet Hub

# Smart Transducers



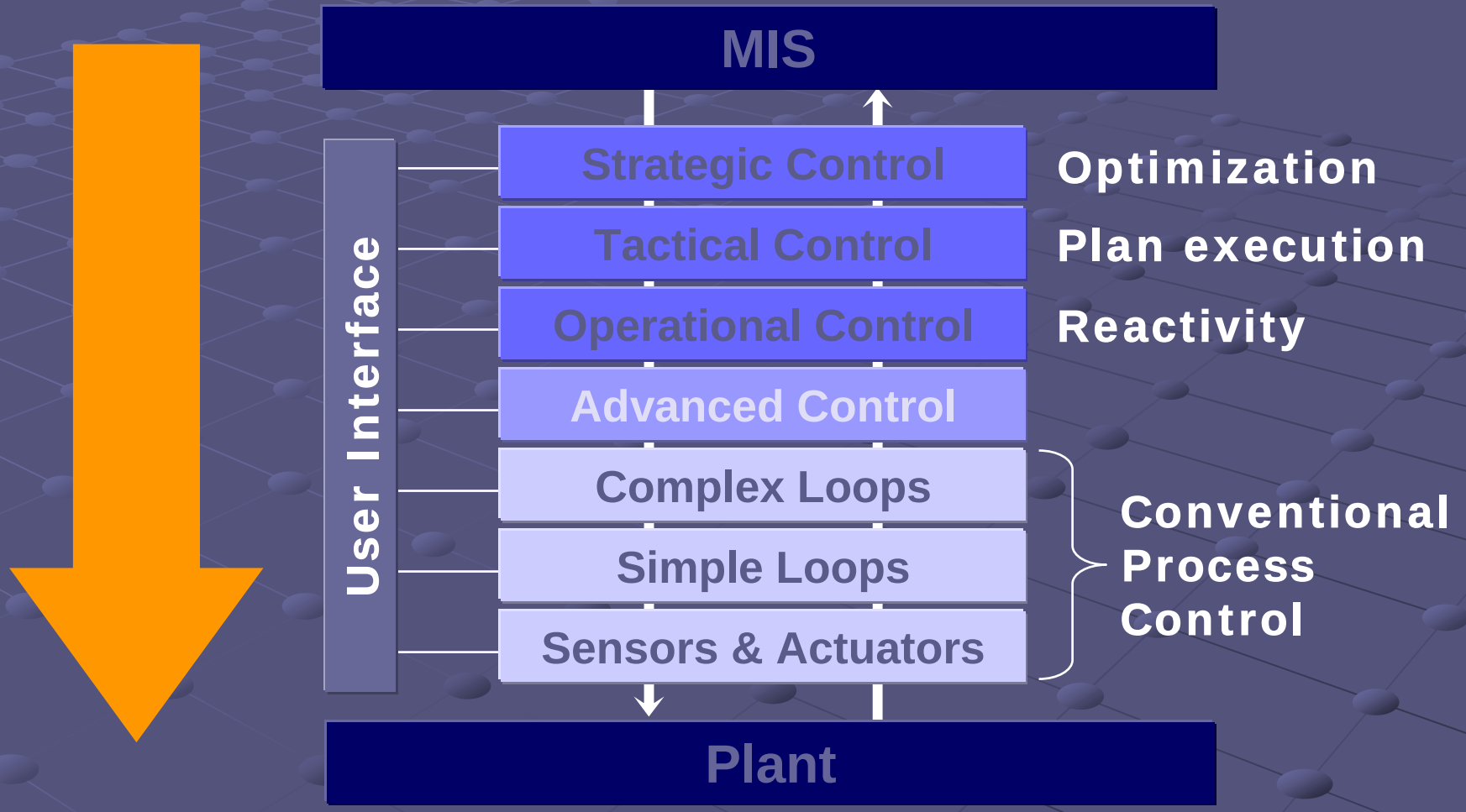

IST 37652 Hard Real-time CORBA

# The HRTC Project

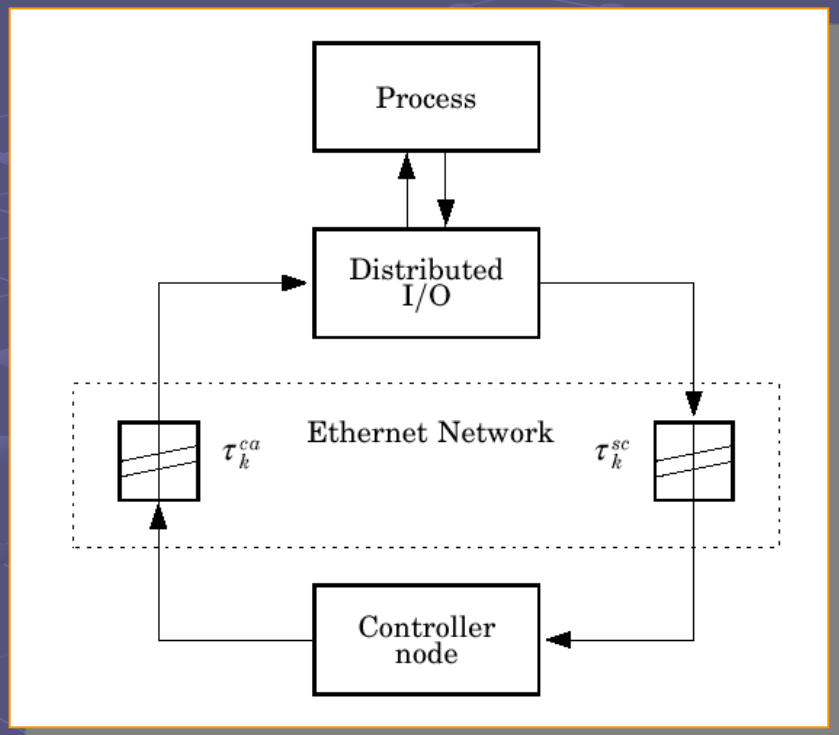
## Hard Real-time CORBA

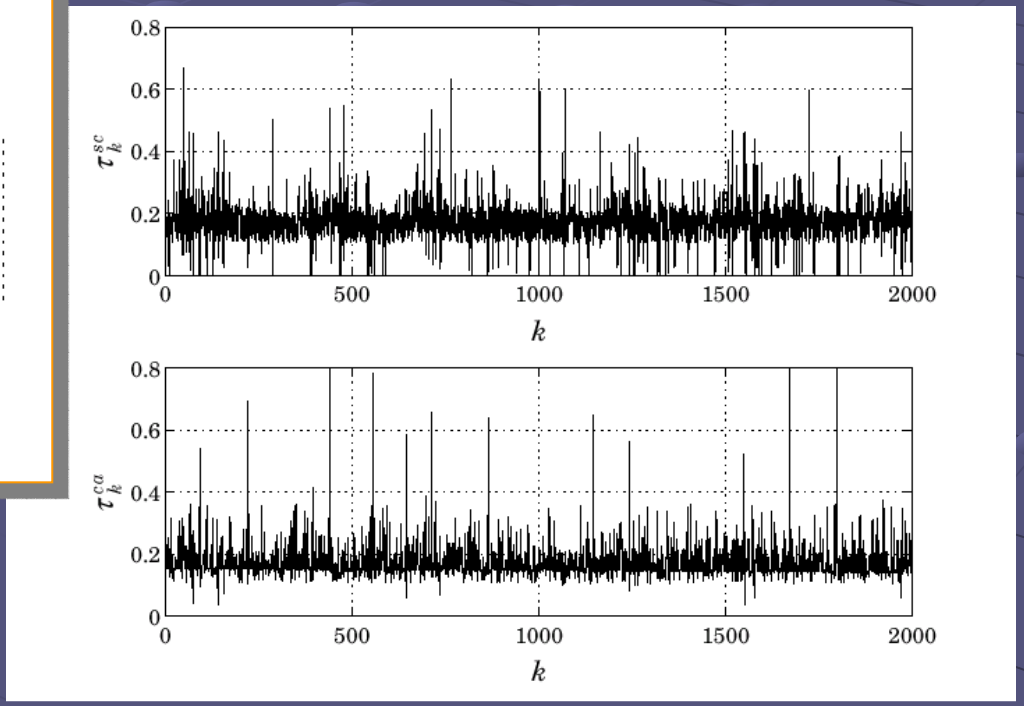
WP5 / R.Sanz / Helsinki 30 September 2002

# Going Down in CORBA-Control



# Network Control



# Project Objectives

- Start R+D activities on CORBA for Hard Real-time Control
- Build two testbeds
  - Robot Control Testbed: tight timing, performance
  - Process Control Testbed: heterogeneity, scalability, dependability
- Build a pluggable transport over predictable networking hardware (TTP/C)
- Elaborate requirements for CORBA-based Control Systems

# Project Partners

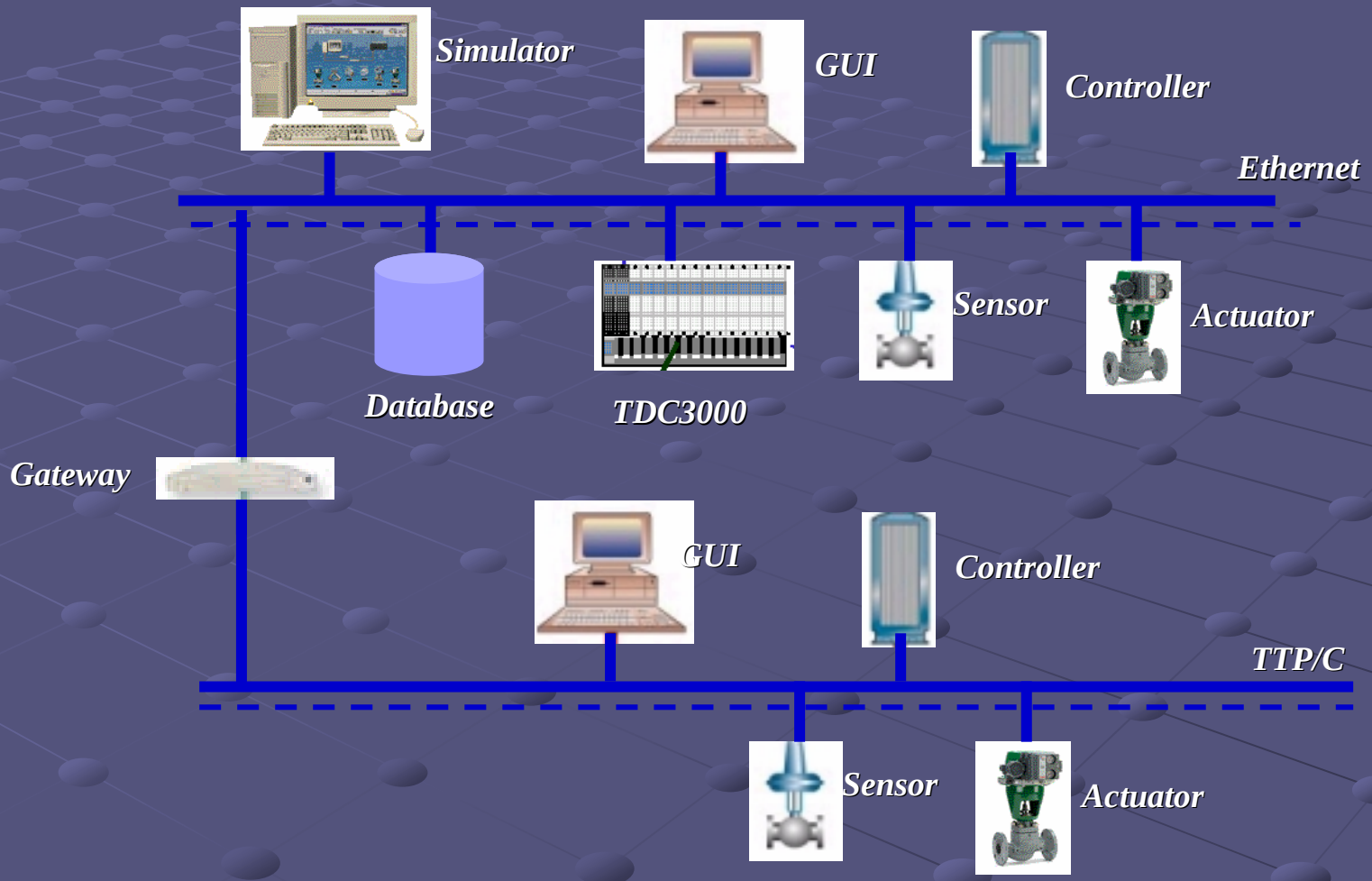
- Universidad Politécnica de Madrid
  - Complex distributed controllers
- Lund University
  - Networked control systems
- Vienna University of Technology
  - Hard real-time communications
- SCILabs Ingenieros S.L.
  - ORB Manufacturer

# Robot Control Testbed

Two labs:

1. Advanced **control**; fully reconfigurable controller, replacing all ABB SW.
2. Advanced **applications**; extendable (during run-time) controller utilizing ABB controller (HW&SW).

# Process Control Testbed

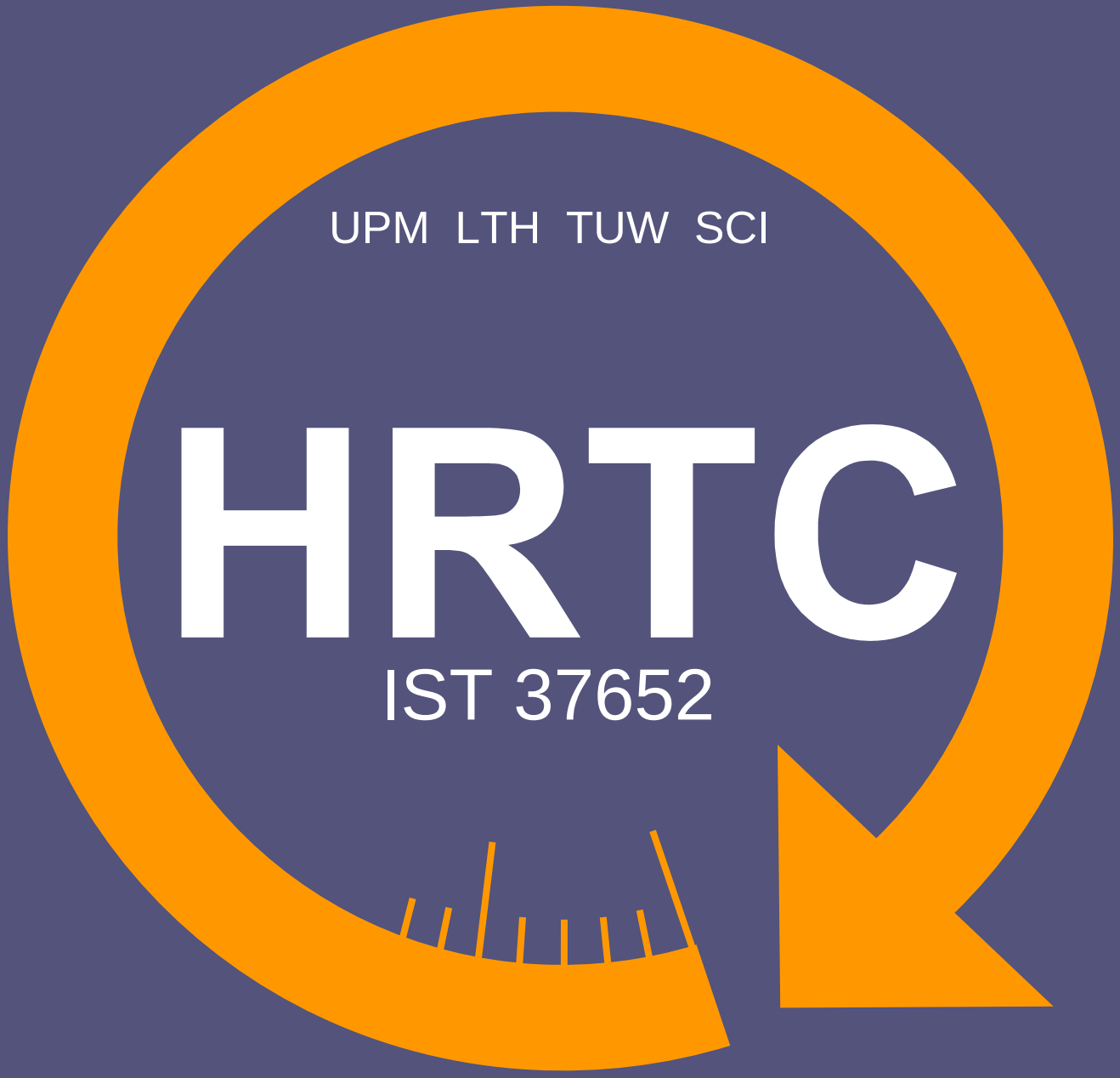


# Why are we here?

(OMG Technical Meeting Helsinki)

- We want to organize a group inside the OMG to address the issues of HRT CORBA Control Systems

- Some Doubts:
  - Is anyone interested?
  - What type of group?
  - Where to place it?


UPM LTH TUW SCI
HRTC
IST 37652