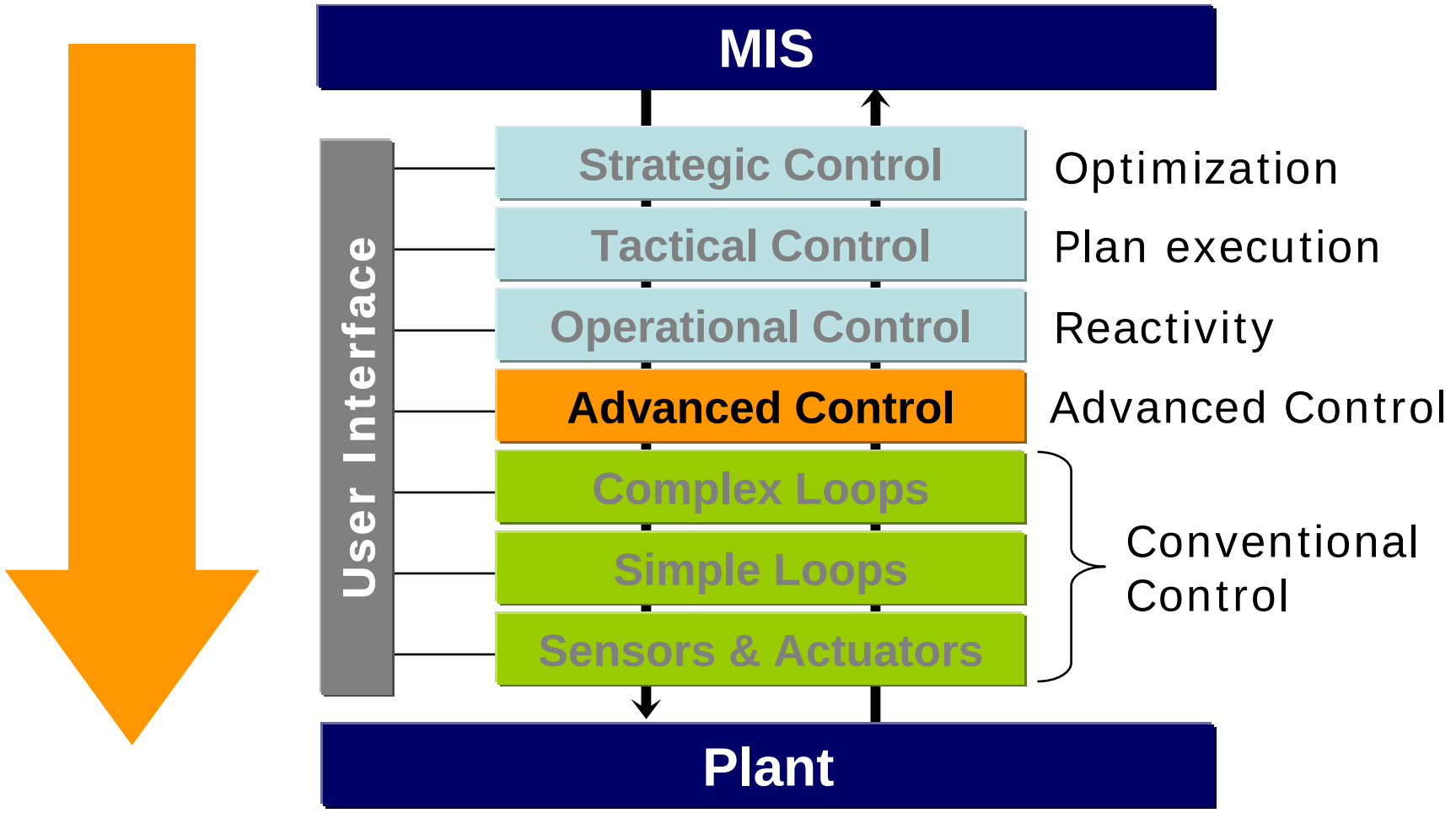
Control Systems WG (CSWG)

Ricardo Sanz

Going Down


MIS
User Interface
Strategic Control
Tactical Control
Operational Control
Advanced Control
Complex Loops
Simple Loops
Sensors & Actuators
Plant
Optimization
Plan execution
Reactivity
Advanced Control
Conventional Control

Why CORBA ?

- Reasons for using CORBA in control systems engineering:
  - Total Integration
  - Modularity
  - Composability
  - Complexity handling
  - Dealing with change
  - Standardization

Hard Requirements

- Control systems do pose tight requirements:
  - Constant delay between sampling and actuation
  - Synchronization of multiple sampling and/or actuation
  - Jitter minimization
  - Large-scale real-time behavior
  - Reliable ordered group communication
  - Etc.

- *These –and other– requirements are not being addressed today at the OMG*

CSWG Context

- Control systems do perform a dynamical interaction with real world entities (they are closed loop systems).
- Their complexity can range from a simple *thermostat* or *pacemaker* to an *Airbus AFCS* or a *country-wide energy management system*.
- Control systems do pose problems of wider and deeper scope than many other systems: e.g. distribution, hard real-time behavior, fault-tolerance, embedded, long life-span (10-40 years), model-based construction, formal verification, scalability, dependable systems of systems, complexity, etc.
- The approach needed by control systems engineering is integrative (for all these issues now scattered in OMG technological processes).

Topics of the OMG CSWG

- Focus: Distributed Control Systems

- Hard real-time behavior
- Consideration for dynamics of reality
- Model-based (system/environment) construction
- Formal verification / Fault-tolerance
- Maintainability: Long life-span (10-40 years)
- Design patterns: Cost-effective, predictable engineering
- Scalability and Dependable Composability
- Systems engineering complexity handling
- etc.

CSWG Charter

- The purpose of the **Control Systems WG** is to foster the availability and suitability of OMG specifications in relation with the construction of **distributed control systems**.
- The technology needed falls more-or-less inside RTESS scope, but the CSWG is basically **domain oriented** but with a **cross-cutting approach** (manufacturing, utilities, aerospace, automotive, C4I, transport, etc). Of major importance are the relations with: AD, MARS, Systems Engineering, MDA and Simulation.
- The main activity of the WG should be **catalytic**, encouraging existing groups in the OMG to consider if their specs are useful to control systems and trying to redirect their evolution.
- The **CSWG** will address these issues by means of **three main types of activities** in themes *relevant to control systems engineering*:
  - **Foster** new specifications for the controls domain (with an eye on other bodies' specs: ISO, IEC, ISA, IEEE, etc).
  - **Catalyze** OMG specification processes (new & existing) in different groups (including core OMG specs).
  - **Increase** coherence of specification efforts in different OMG groups.

People interested so far

- Allan Kennedy, Kennedy-Carter
- Barret Bryant, U. Alabama
- Ben Calloni, Lockheed-Martin
- Ben Watson (Ch), Lockheed-Martin
- Bran Selic, Rational
- Bill Beckwith, Objective Interface Systems
- David Haverkamp, Rockwell Collins
- David Sharp, Boeing
- David Smith, Deere & Company
- Gerardo Pardo, Real-time Innovations
- Dock Allen, MITRE
- Doug Jensen, MITRE
- Doug Schmidt, DARPA
- Jacob Jones, general Dynamics
- Jim Kulp, Mercury Computer
- Lars-Ola Osterlund, ABB Utilities
- Mario de Sousa, U. Porto
- Ricardo Sanz (Ch), U.P. Madrid
- Thomas Losert, T.U. Vienna
- Virginie Watine, Thales

Initial Focus

- White paper on
  CORBA for Control Systems

- Real-time Interoperability Protocol (RIOP)
- Total (System/environment) MDA
- Design Patterns
- PLC Models and Interfaces

Initial Roadmap

- Identify and recruit people
- Start organization
- White paper (January'03)
- Control Systems Meeting at Burlingame (Jan'03)
- RFIs
  - Real-time Interoperability Protocol
  - PLC Languages
  - Control Patterns
  - Joint Modeling

Chairmen

- Ricardo Sanz
  - Universidad Politécnica de Madrid, Spain
  - Ricardo.Sanz@etsii.upm.es
- Ben Watson
  - Lockheed Martin Aeronautics, USA
  - Bennet.C.Watson@lmco.com

Good Luck !