

Connexion Cluster: Concepts and frameworks

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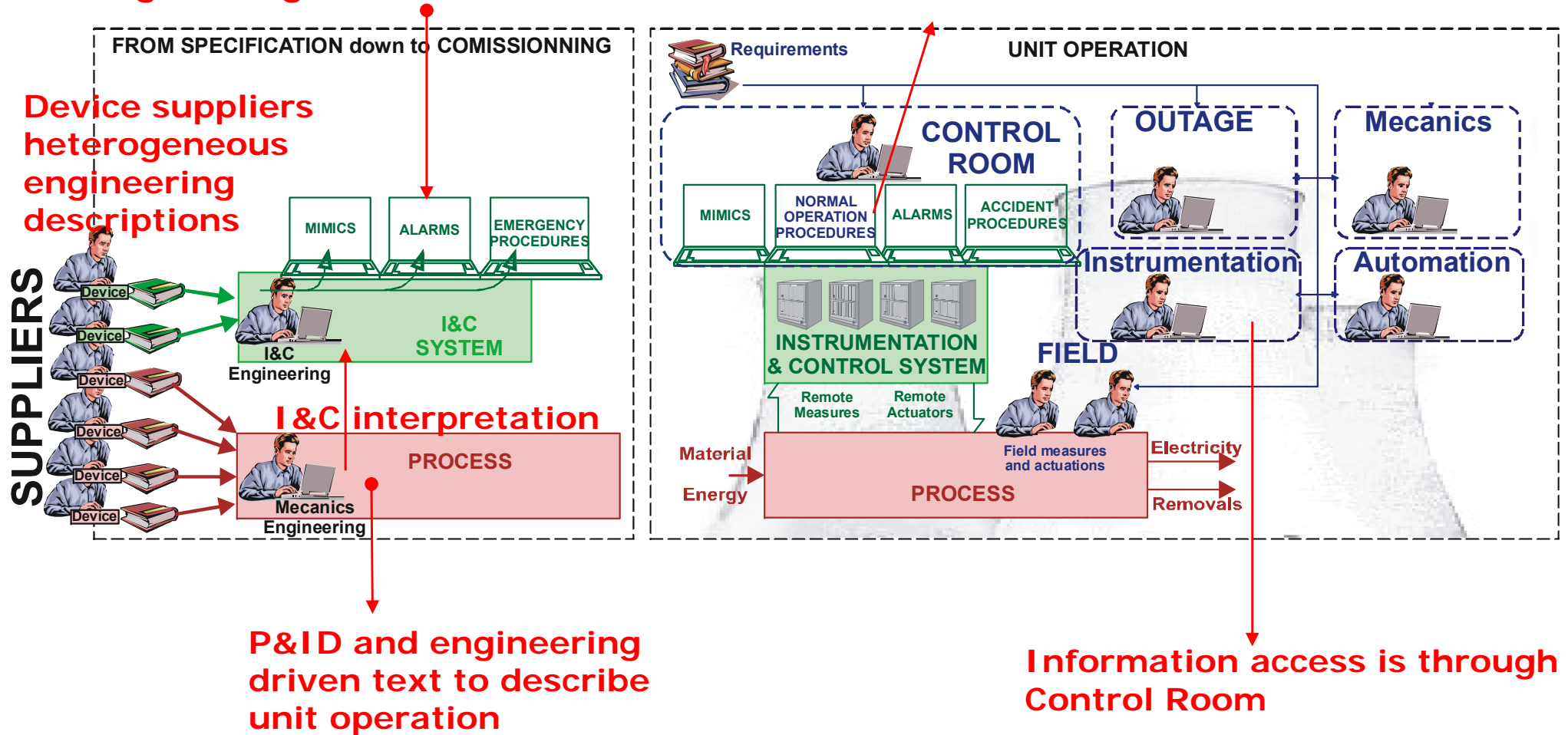
Outline

1. Situation: heterogeneity of engineering and operation models and situations
2. Problem: how to structure and represent engineering and operation data in order to face complexity and to improve operational efficiency?
3. Resolution overview: towards a shared framework for engineering and operation
4. Resolution details: principles of structuration

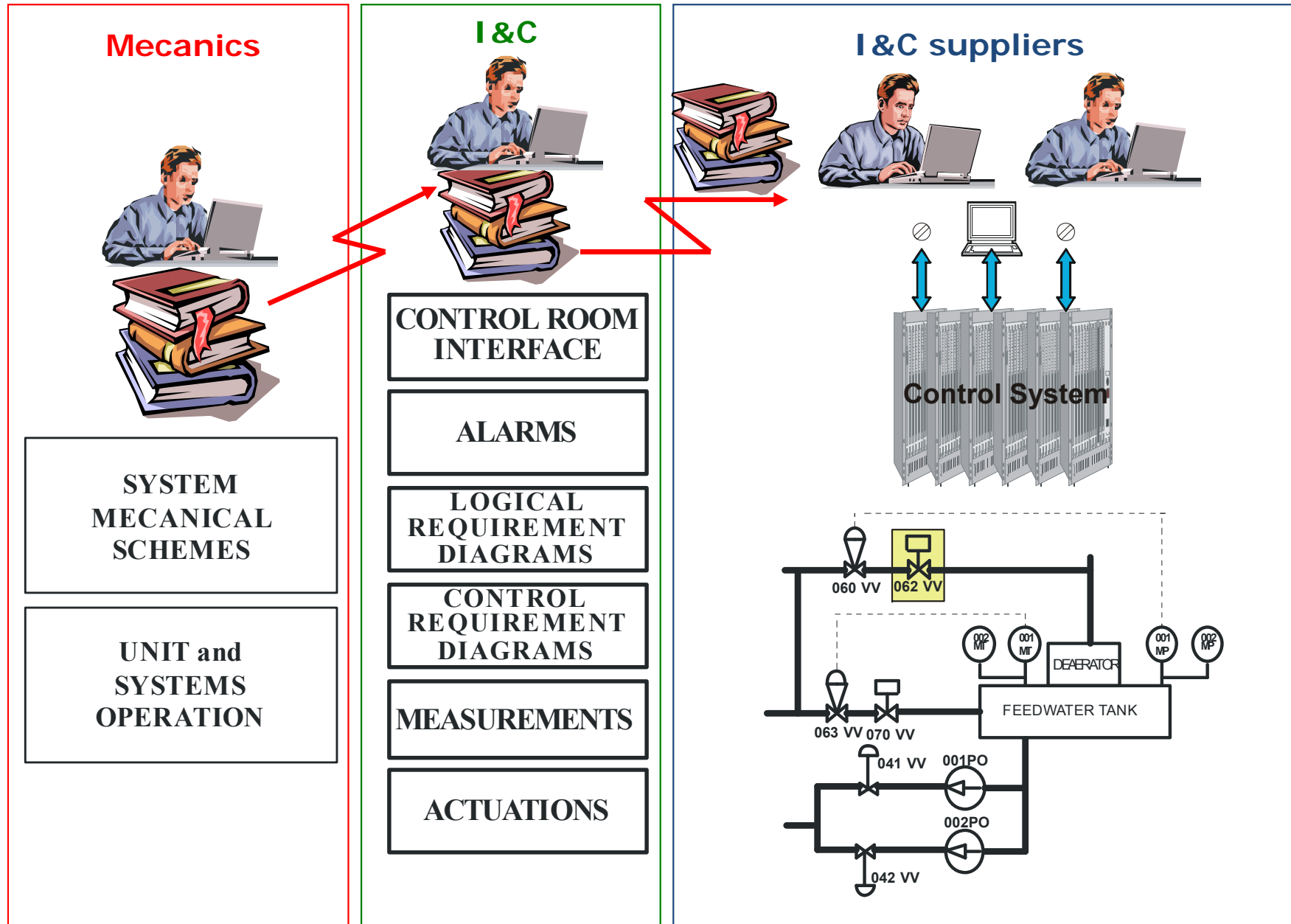
Situation : Engineering and operation

Engineering driven mimics

Mimics are Control Room driven



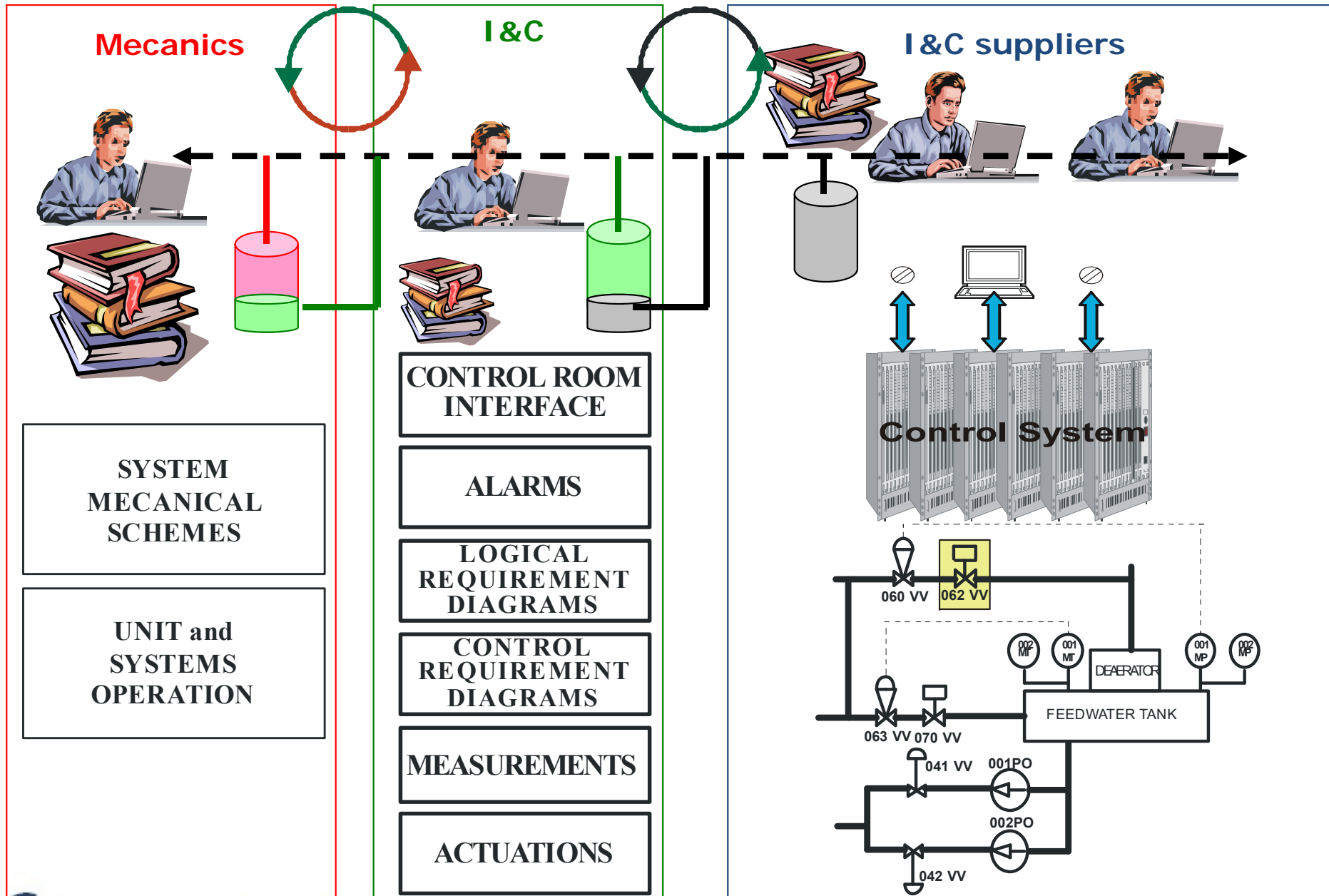
Situation : heterogeneous Engineering frameworks



Engineering and unit operation diversity

- Device suppliers and operation point of views:
 - Heterogeneity of practices and models
 - Engineering domains (mechanics, electricity, I&C...)
 - Operations domains (control, maintenance, outage, tag out...)
 - Difficulty for operators to interpret engineering models
 - Cognitive load to build operation mental schemes
- Need to structure a unique engineering and operation model
 - At system levels (Unit / Elementary System / Equipements...)
 - Based on the process as the « pivotal » element
 - Considering mental schemes of operators
 - Enabling simulation (for verification, validation and anticipation purposes)
 - Accessible for all engineering and operations actors

Towards a shared framework for engineering and operation



Operation activities driven information network

Remote operation activities

Maintenance



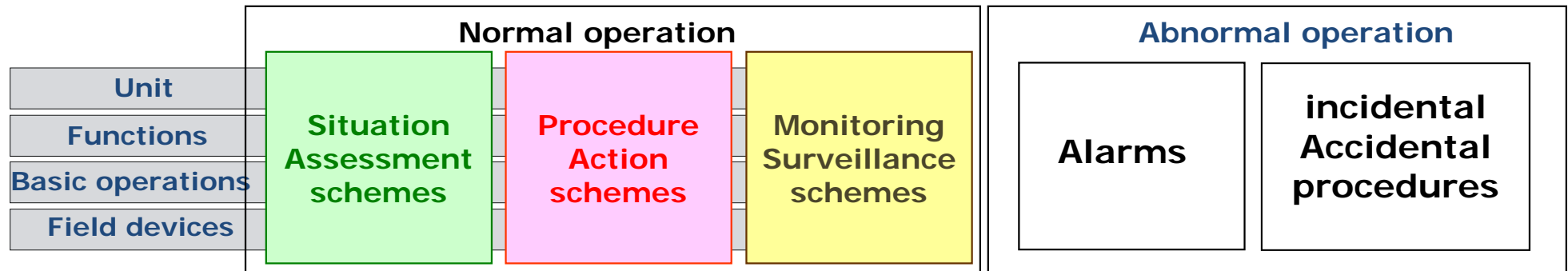
Outage



Tag out



Operation driven information network



Field activities, maintenance and technical management

Scientific Problem overview

- System specification
 - System specification methods:
 - Based on industrial return of experience
 - Based on prescriptive workflows
 - System specification languages (SysML...):
 - Semi formal: many possible interpretations
 - Without associated methods
- Identification and formalization of methodological components:
 - Modelling artefacts (specification, problem/solution spaces, prescription/description...)
 - Representation of artefacts using system specification languages
 - Enrichment of languages with formalization and method
- Proposal of architecture patterns based on:
 - Physics of the process to be modelled and controlled
 - Mental schemes

Requirements for architecture pattern proposal

- To satisfy engineering and operation activities
 - Different complementary point of views
 - Operation (operation requirements)
 - Functional (process functions)
 - Physical (hierarchical structure: Unit / Elementary System / Equipements)
 - Need of a unified metamodel
 - Based on Systems Engineering objects metamodel
 - Considering (functional and physical) architecture of the process
 - Considering operational specific features (situation, action...)
 - Used as a common base for architecture patterns
 - Need of a method to use architecture patterns

Engineering and operation driven information network

Engineering activities

Operation Remote activities

mecanics

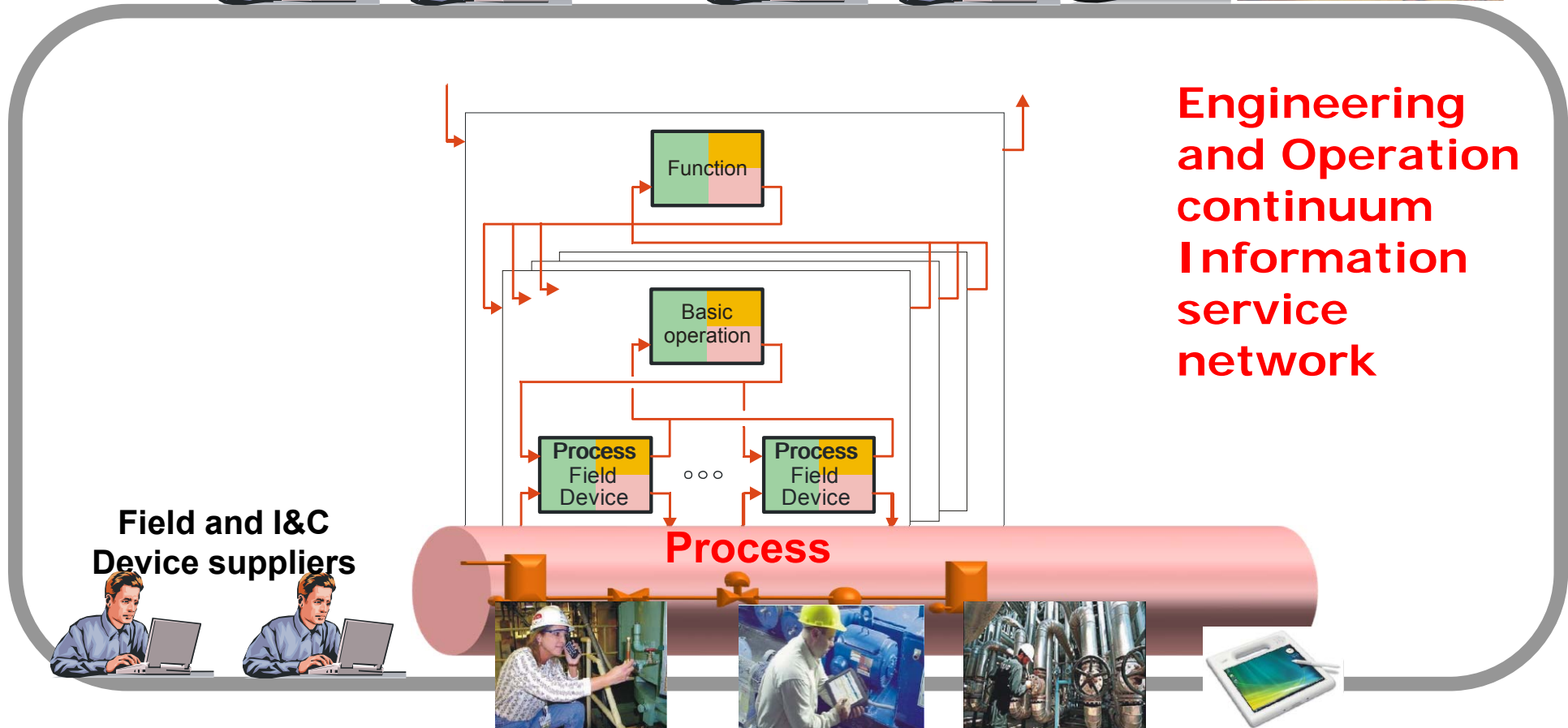
I&C

maintenance

Outage

Tag out

Control room



Engineering and Operation continuum Information service network

Field and I&C Device suppliers



Engineering Field devices activities

Operation Field activities (operation, maintenance...)

Conclusion

- Structuring engineering and operation views is central for the Connexion Cluster
 - Shared during the system life cycle (engineering, operations, training)
 - Used by various actors of the project working on
 - Innovative HMI
 - Control
- Connexion Cluster is formalizing this framework
 - Metamodel
 - Specification/modelling method
- Problems
 - Heterogeneity of formalisms used → difficulty to ensure consistency

CONNEXION Cluster

Thank you very much for your attention!

