

Information and quality from a PLM perspective

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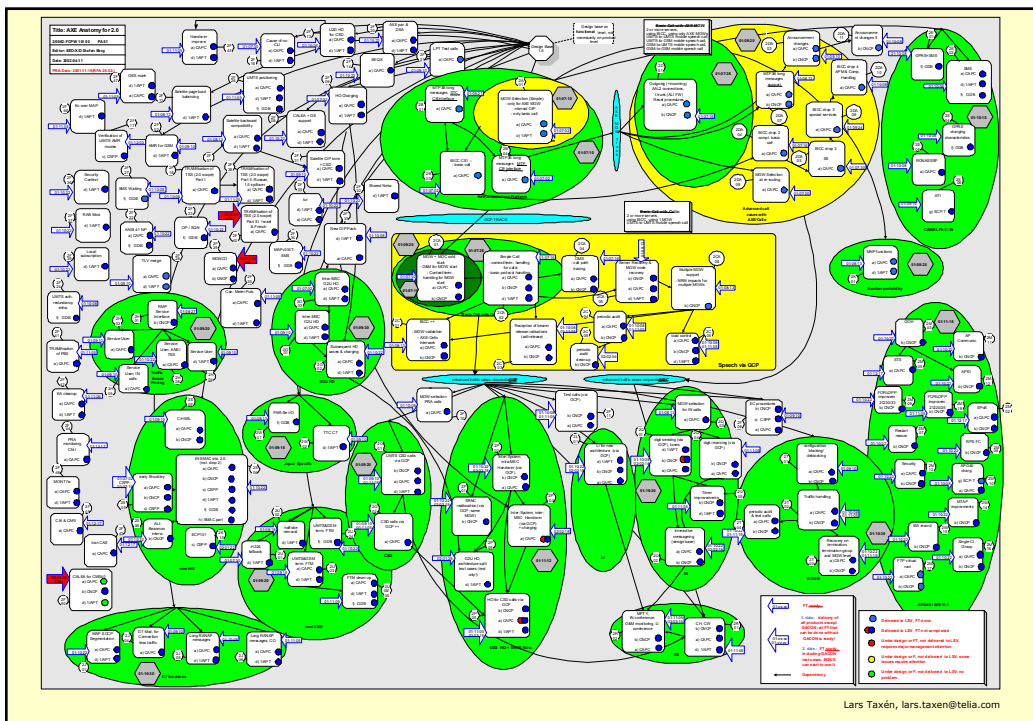
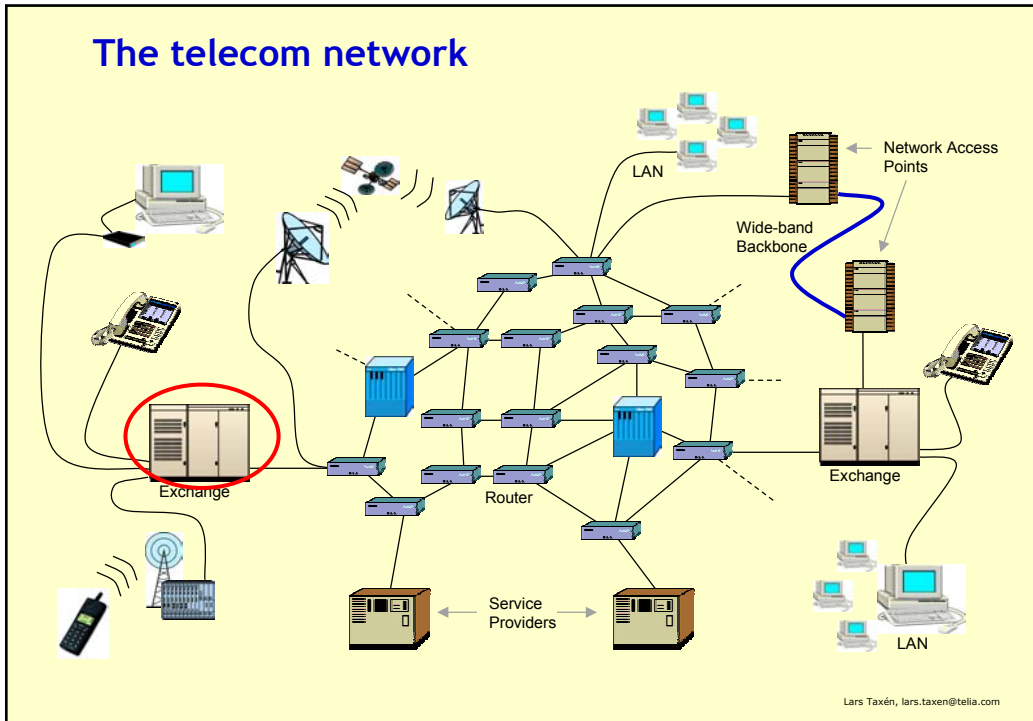
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Outline

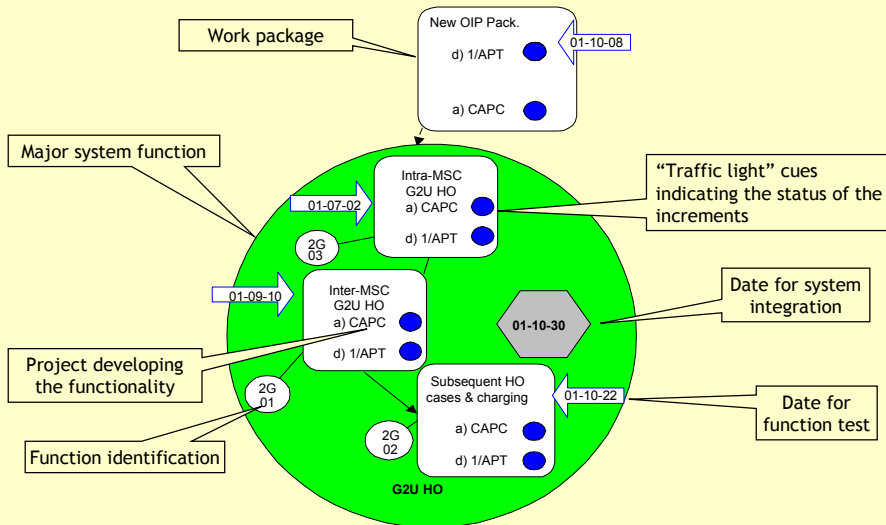
- The basic problem - shared meaning
- Approach - the workpractice
- Consequences for information and quality
- Product Life-cycle Management
- Some results from Ericsson
- Conclusions

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The telecom network

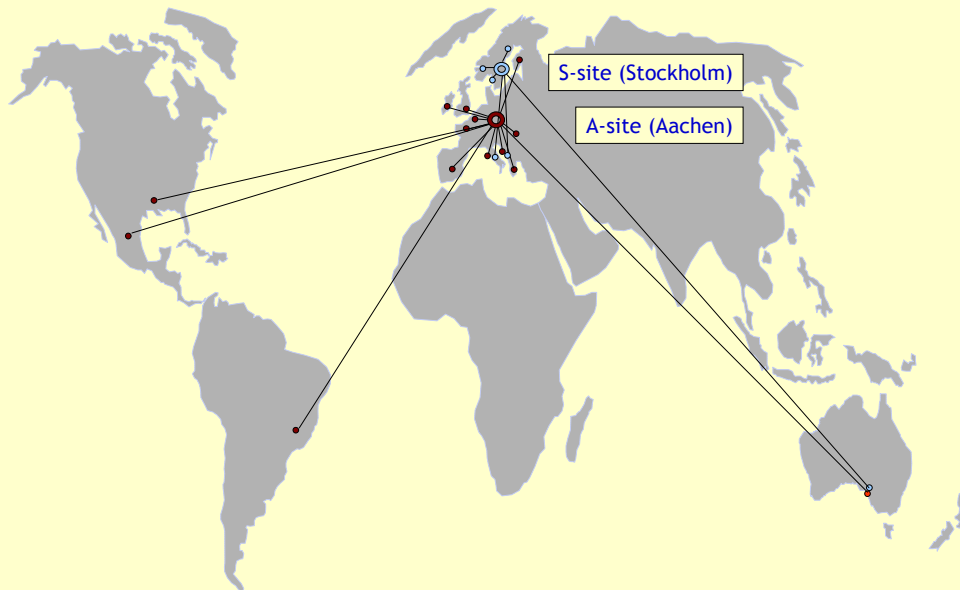


Details



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Globally distributed development



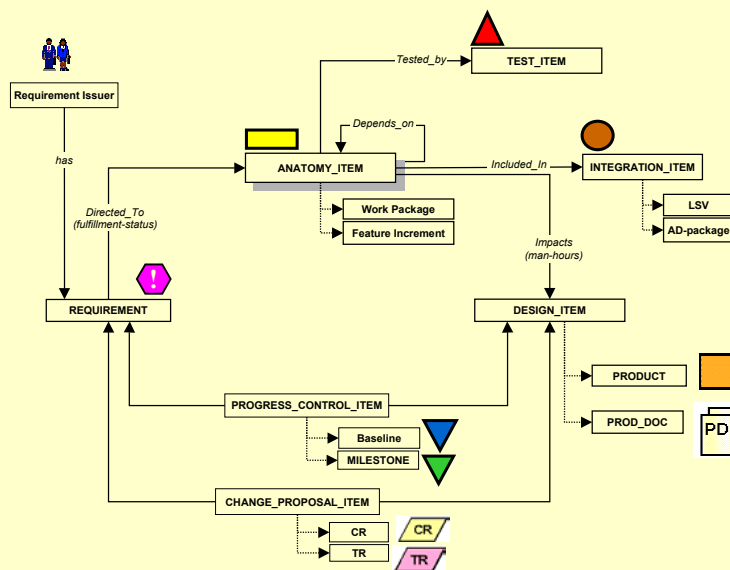
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Coordination

- “The management of dependencies btw activities”
 - Malone & Crowston, 1994
- Coordination items
 - requirements
 - engineering change orders
 - products
 - documents describing products
 - workpackages
 - test cases
 - baselines
 - milestones
 - error reports
 - ...
- Information system support for coordination

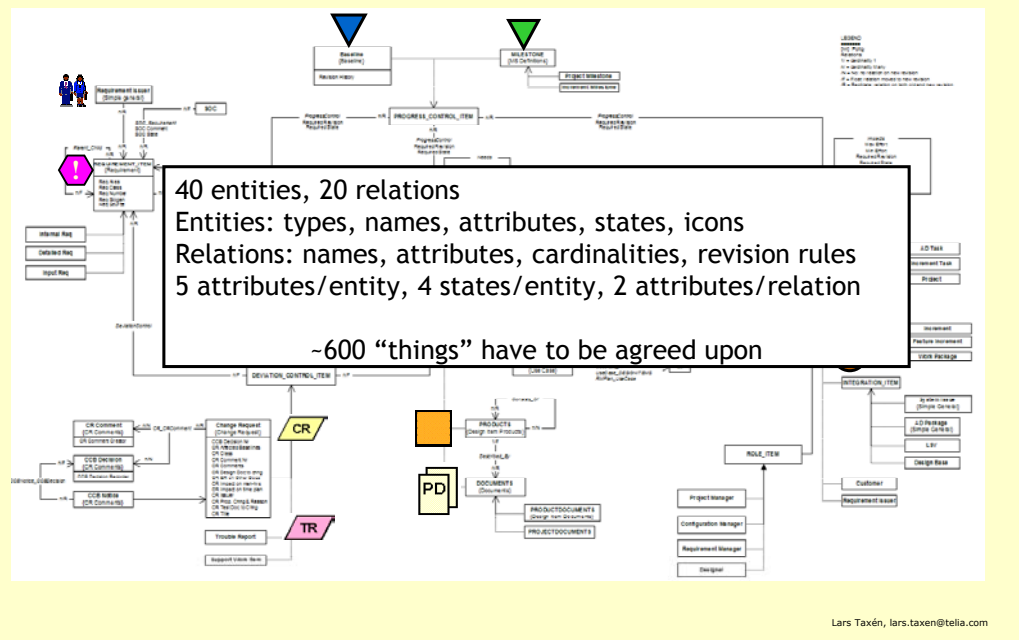
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Context model S-domain (Stockholm)



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Information system implementation



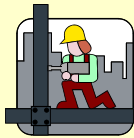
The issue - shared meaning

We also had *major discussion* about the attributes for each and every object, *what do they really mean* and *how are they to be used*. That was also something that *caused quite a lot of time*.

(Project Manager 3G)

Approach - the workpractice

”A workpractice means that some actors make something in favour of other actors.”



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Why workpractices?

- Human activity is organized in workpractices
- Meaning is constructed in workpractices
- Meaning differs with respect to workpractices
- Integrates the social and technical
- Constellations of workpractices
 - workpractices within workpractices, recursive construct
 - networks of workpractices
- Not the same as an organization
 - may coincide
- Continuous development

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Elements of workpractices - example 1

- **Motive, need**
 - why?
- **Actors**
 - who?
- **Order of activities**
 - when?
- **Things and relations**
 - what is relevant?
- **Tools, instruments**
 - with what?
- **Rules, norms, traditions, habits**
 - what is a valid way of working?
- **Change, development**



All elements are interdependent!

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Elements of workpractices - example 2

- **Why?**
 - sell mobile phones
- **Who?**
 - employees at Sony Ericsson
- **When?**
 - process models, ...
- **What is relevant?**
 - product structure models, information models, ...
- **With what?**
 - information systems, CAD tools, ...
- **Valid way of working?**
 - product identification rules, company ethics, ...
- **Change?**
 - product generations, organizational restructuring, ...



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Constitution of workpractices - Activity Domain Theory

- **Motive**
- **Actors**
- **Change and development**
- **Temporal elements**
 - signifies dependencies between activities
- **Spatial elements**
 - signifies relevant things and their relationships
- **Stabilizing elements**
 - rules, norm, procedures, traditions, habits, beliefs, etc.
- **Instrumental elements**
 - tools, symbols, signs, etc.
- **Transitional elements**
 - signifies how workpractices interact

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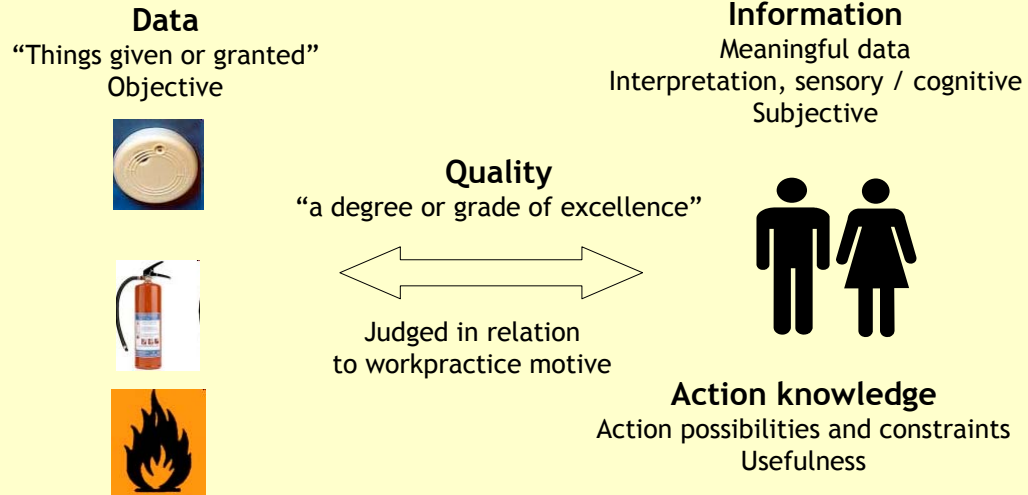
Pragmatic view on knowledge

- **Created in action**
 - Learning by doing - Dewey
- **Action oriented**
 - Achieve a goal
- **Situated**
- **Shared**
- **Usefulness rather than “true” of “false”**

“Man thus has no particular need for truth. However, there is a huge and unsatisfiable need for meaning”

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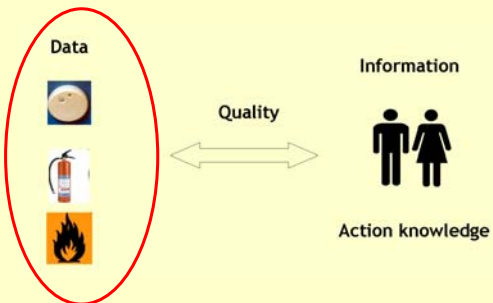
Quality from a workpractice point of view



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Data quality aspects

- Non-duplicated
- Trustable
- Accessible
- Secure
- Accurate
- Consistent
- ...



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Information quality aspects

- **Meaningful**

- Significant for the work
- Individual meaning
- Shared meaning

- **Interpretable**

- Expressiveness of signs

- **Experiential learning**

- Reflection and action

- **Workpractice dependent**

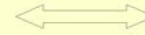
- **Translations between meanings in different workpractices**

- ...

Data



Quality



Information



Action knowledge

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Action knowledge quality aspects

- **Possible actions**

- **Consequences of actions**

- **Tools and instruments**

- **Rules**

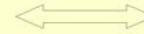
- **Coordinating actions between workpractices**

- ...

Data



Quality



Information



Action knowledge

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Trends impacting PLM ...

- **Complexity**
- **Change**
- **Diversification**
 - outsourcing, mergers, acquisitions
 - new in-house functions, e.g. Marketing & Sales, Services
 - extended enterprise, networks

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... cause emergent PLM problems

- **Concepts, terminology**
 - confusion about meaning and interpretation increases
- **Interdependencies**
 - increases btw. processes, product structures, information systems
- **Product structures**
 - separate structures in different areas
- **Coordination**
 - increased confusion about how coordination should be apprehended
- **Commitments and agreements**
 - unclear
- **Information System architectures**
 - evolve ad-hoc

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What is PLM?

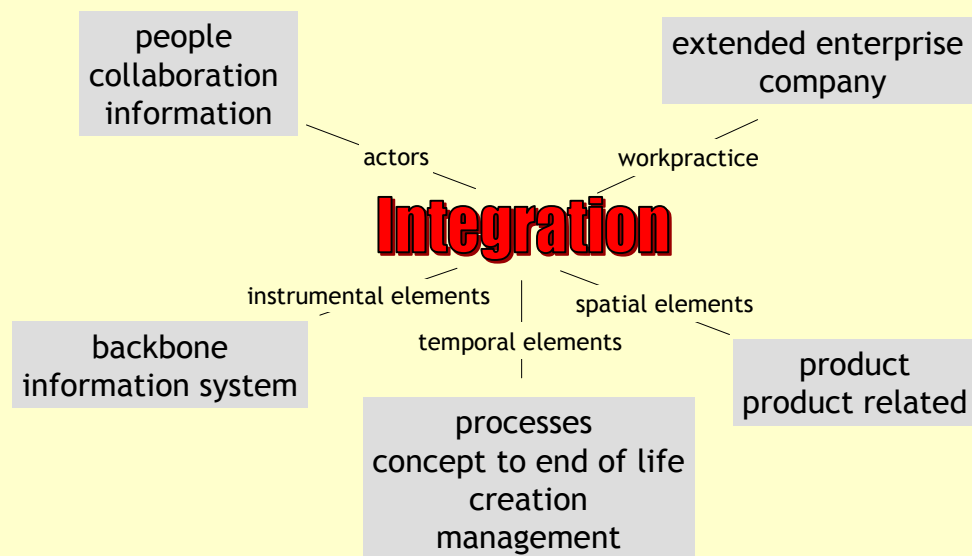
“PLM is a strategic business approach that applies a consistent set of business solutions in support of the collaborative creation, management, dissemination, and use of product definition information across the extended enterprise from concept to end of life - integrating people, processes, and information. PLM forms the product information backbone for a company and its extended enterprise.” (CIMdata, 2003)



Must be useful in practice - operational
Must address emergent problem areas

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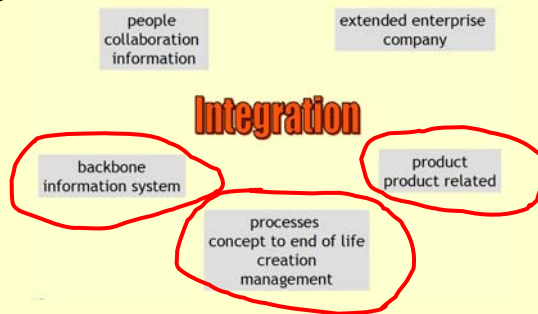
Elements of PLM



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Traditional perspective on PLM

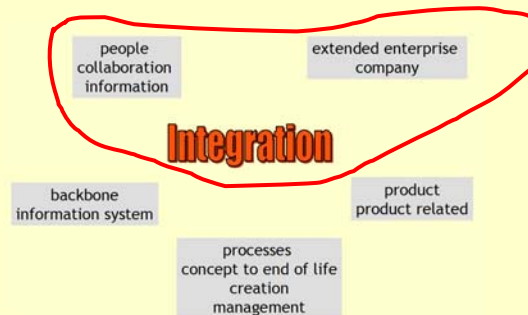
- **Processes (BPR)**
 - Business Process Reengineering
- **Information systems (ERP, PDM)**
 - Enterprise Resource Planning, Product Data Management
- **Product structures**
- **Mostly isolated initiatives**



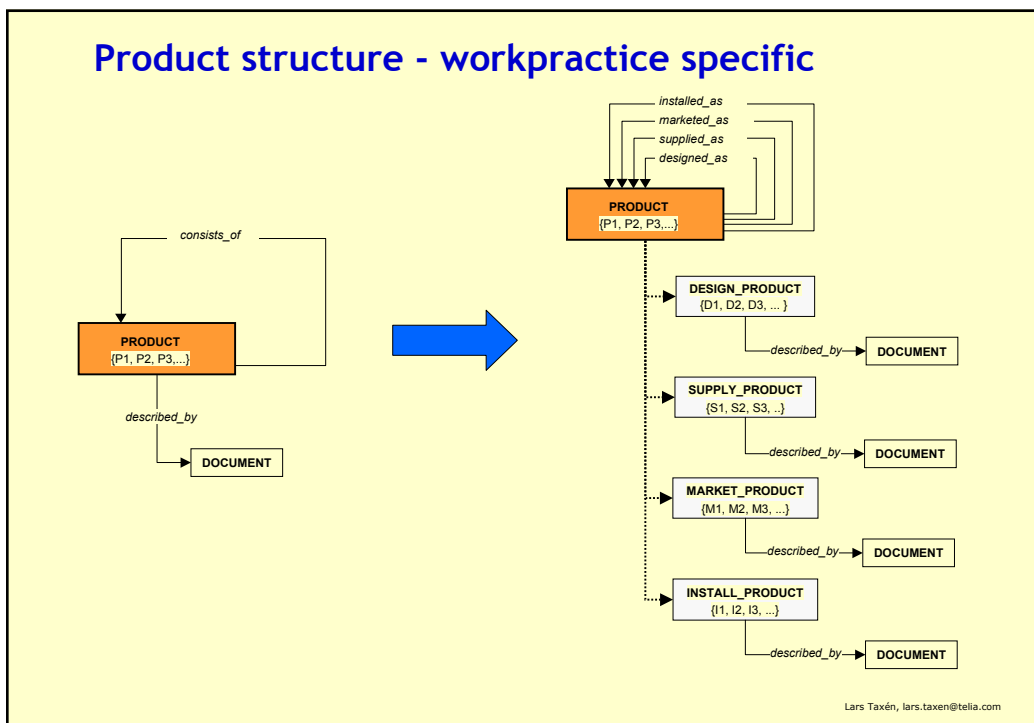
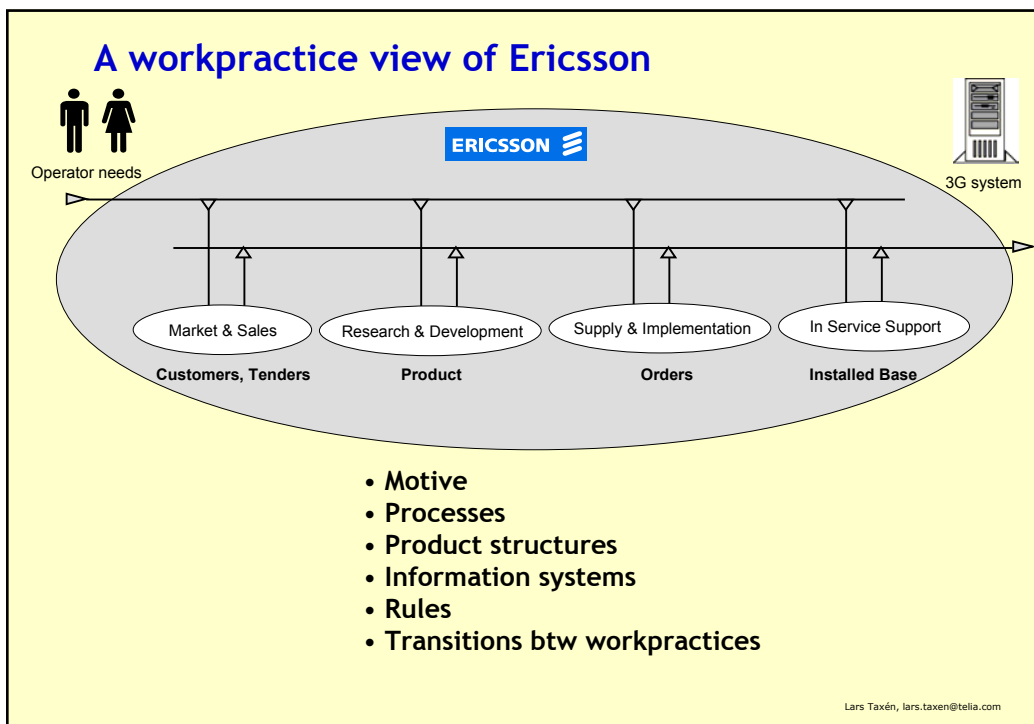
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Alternative perspective on PLM

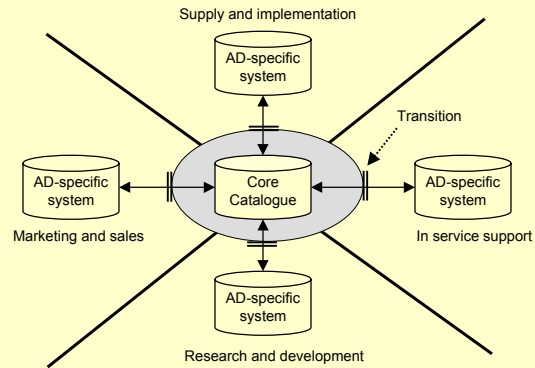
- **Coordination of cooperating workpractices**
- **Shared meaning**
- **Interdependencies**
- **Commitments and agreements**



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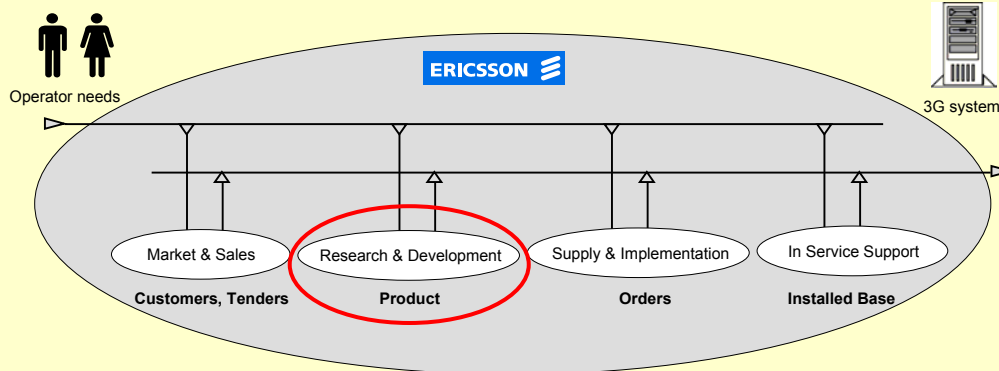


Information system architecture



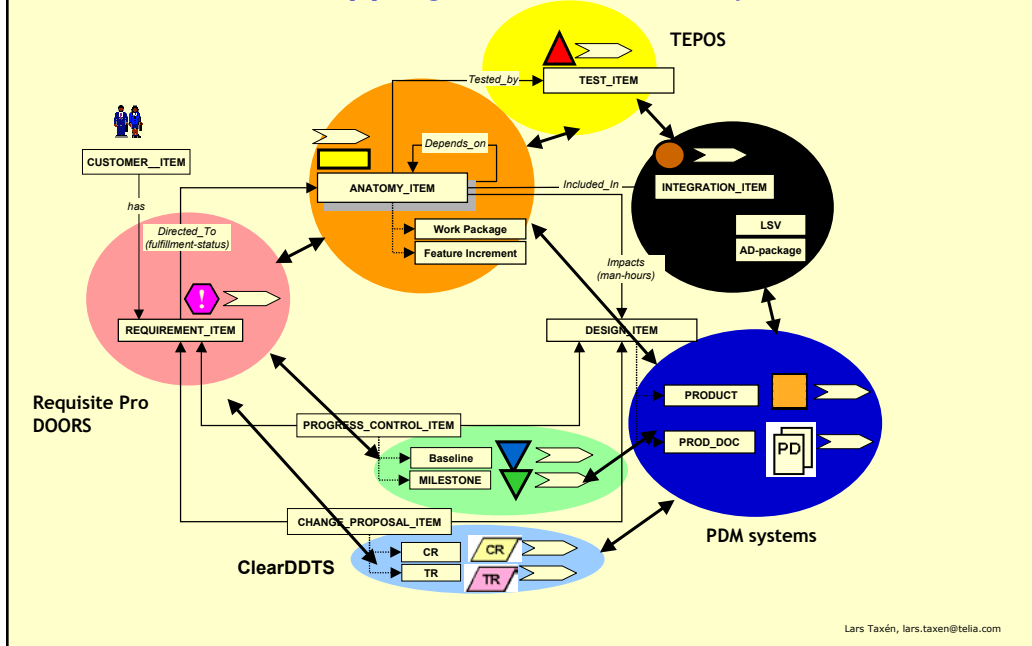
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Inside Research & Development



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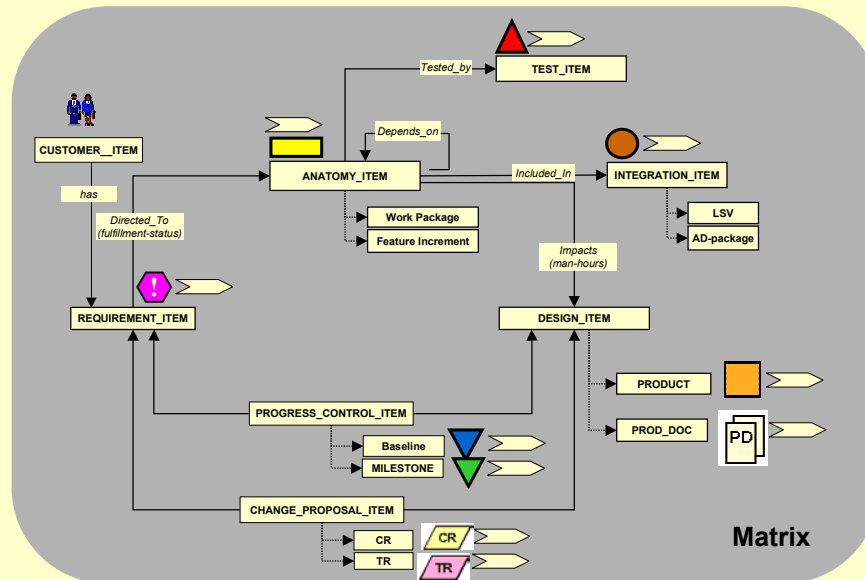
Traditional mapping to information systems



Poor data quality

- Interfaces between the tools must be implemented
- Manual data transfer between tools
- Each tool has its own user interface and 'worldview'
- Changes impacting all mgmt areas are hard to make

Mapping to one information system



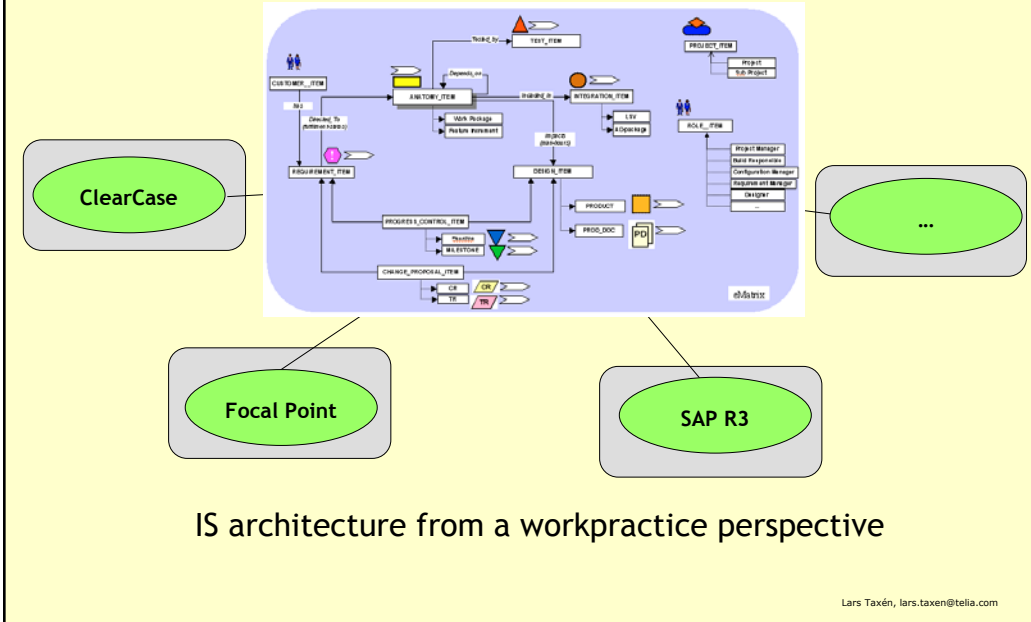
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One management tool - improved data quality

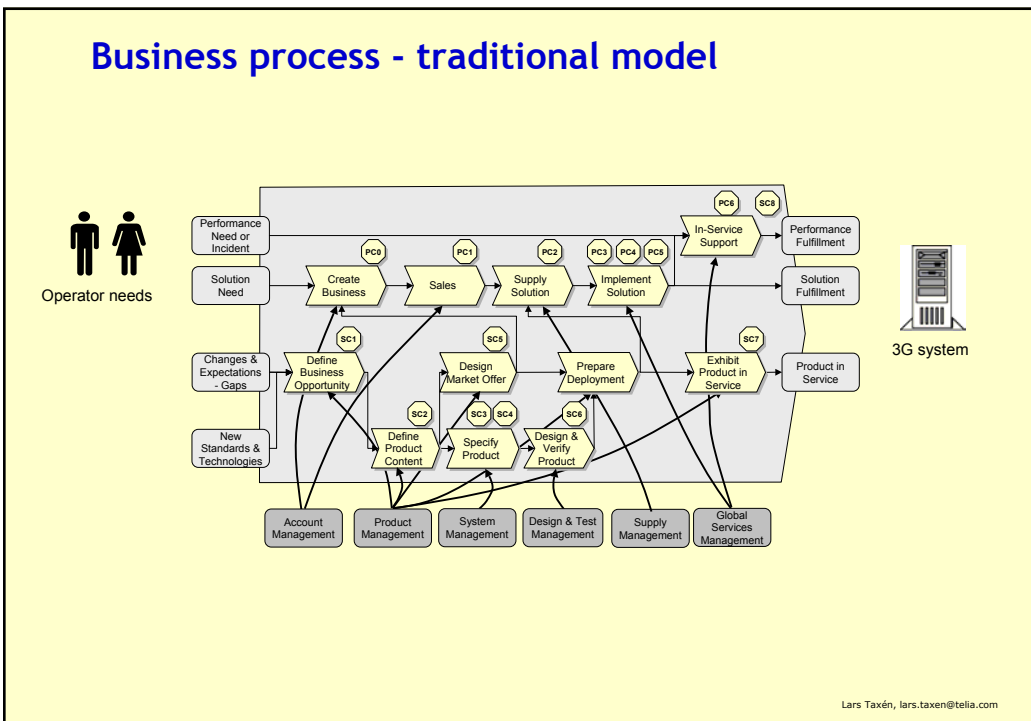
- Data consistency
- Complete traceability between all managed items
- Interfaces between *management* tools are not needed
 - other interfaces will still exist!
- A number of tools can be replaced by one
- Homogeneous view of the mgmt domain
- Changes which are common to all mgmt areas are simplified
- The ability to react to imposed changes is higher

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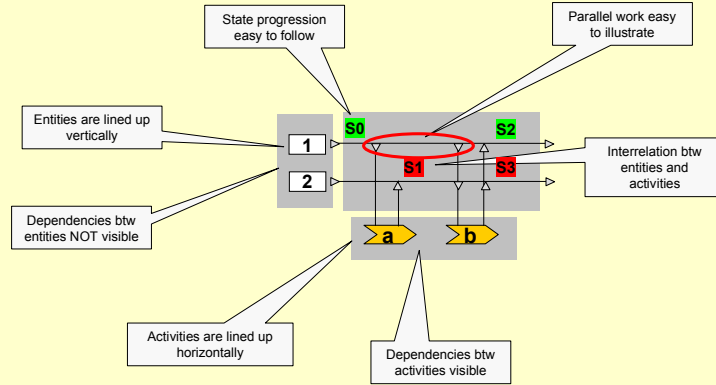
Interfaces to other information systems



Business process - traditional model

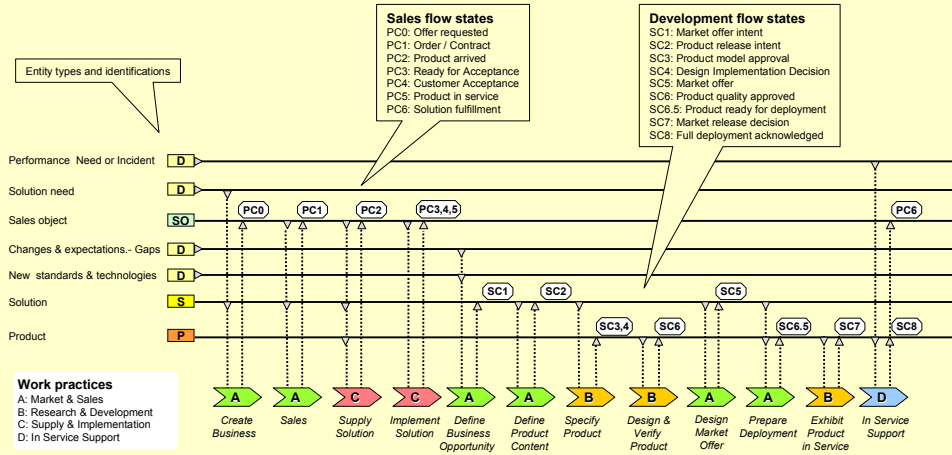


Processes - Information Flow Diagrams



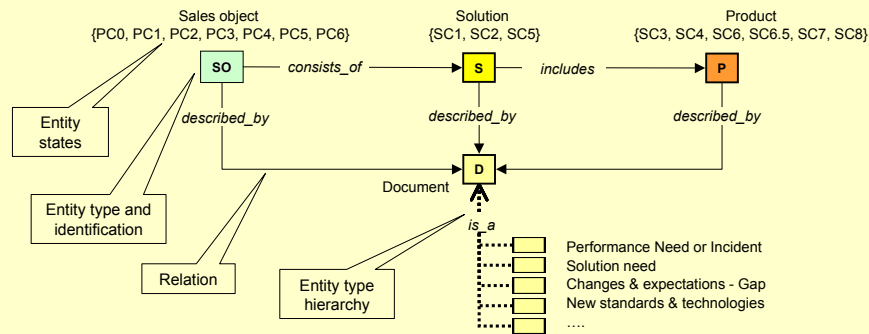
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Business process - IFD model



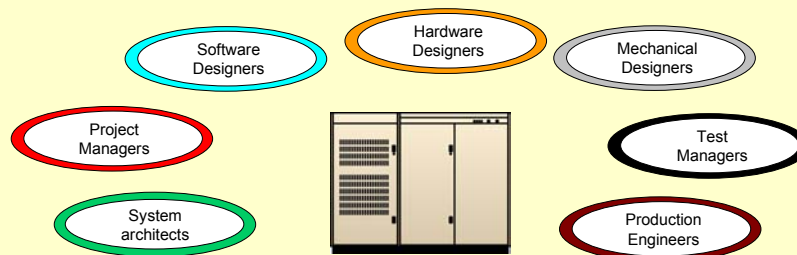
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Information architecture - spatial element



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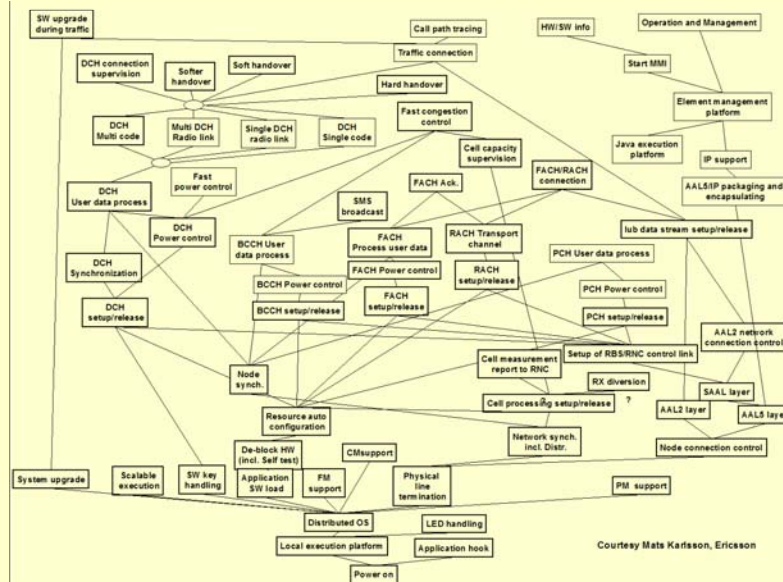
Complexity in system development



- Many workpractices
- Multicultural
- Geographically distributed
- Actions must be co-ordinated

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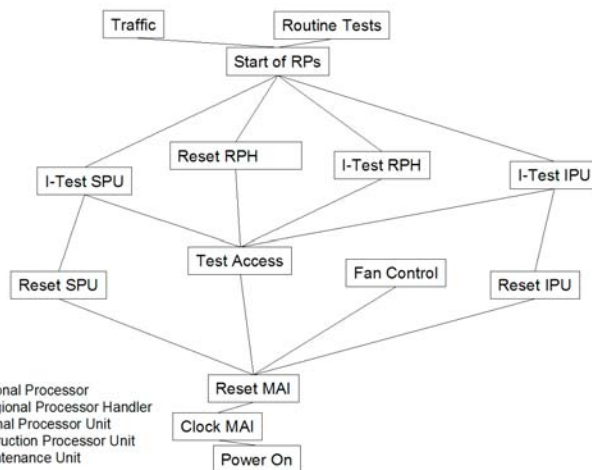
The anatomy of a processor



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ICD approach phase 1 - Anatomy definition

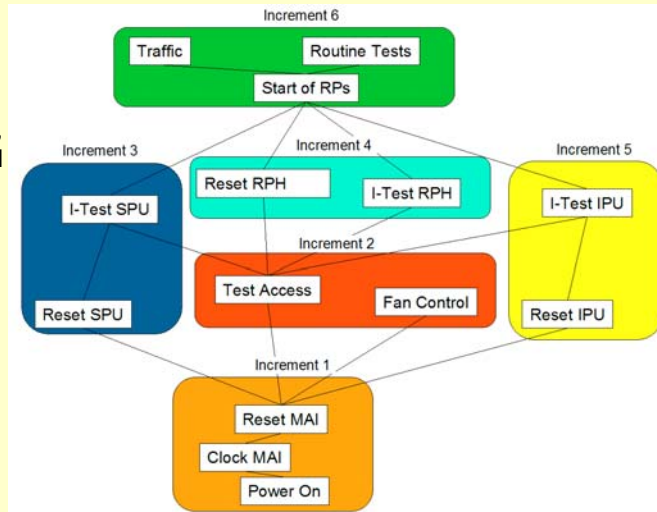
- **Purpose**
 - Common understanding about how the system works
- **Focus**
 - Functional dependencies
- **Main actors**
 - System architects



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ICD approach phase 2 - Increment planning

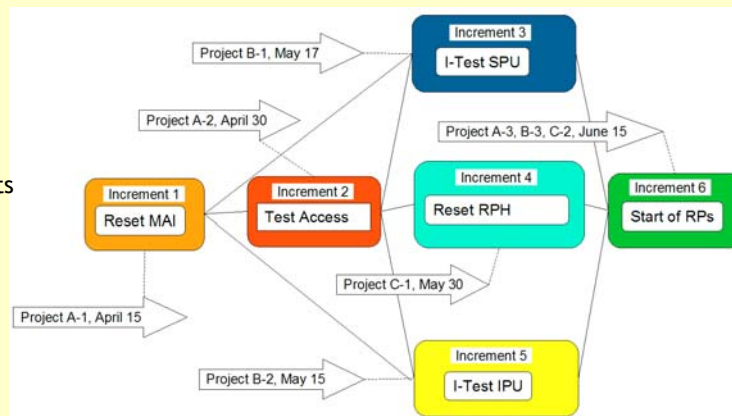
- **Purpose**
 - Defining increments that can be developed, verified and integrated as units
- **Focus**
 - Distribution of increments
- **Main actors**
 - System integrators
 - System testers
 - Project managers



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ICD approach phase 3 - Integration planning

- **Purpose**
 - plan and control the project
- **Focus**
 - allocating projects to increments
 - progress control
 - scheduling
 - re-planning
- **Main actors**
 - total project manager
 - sub-project managers



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Action knowledge quality

- **Everyone's contribution becomes visible**
- **Identifies "stinking" activities early**
- **Identifies system faults early**
- **Visualizing real progress**
- **Easy to identify critical paths**
- **Facilitates parallel work in a controlled way**
- **Production involved early**
- **Be prepared for unexpected happenings**

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Conclusions

- **A workpractice perspective as basis for quality improvements**
- **Quality judged in relation to workpractices**
- **Quality in three dimensions**
 - data quality
 - information quality
 - action knowledge quality
- **Shared meaning a major issue in improving quality**

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