

# Operationalizing Coordination of Mega-projects - a Workpractice Perspective

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## Outline

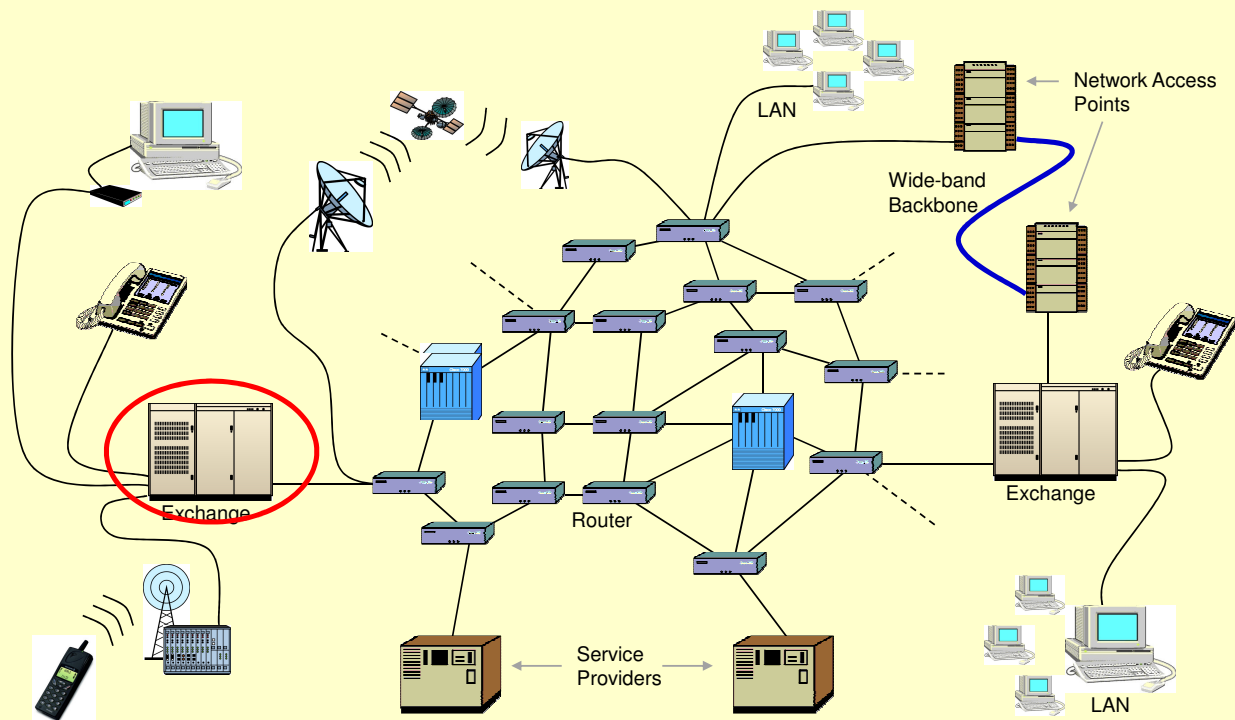
- **Challenges in mega-project coordination**
- **Weber, Rambo and Gaia projects**
- **Coordination needs**
- **Integration Centric Development**
  - Anatomy-Based Engineering
  - Domain Construction Process
- **Empirical results**
- **Summary and discussion**

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# Challenges

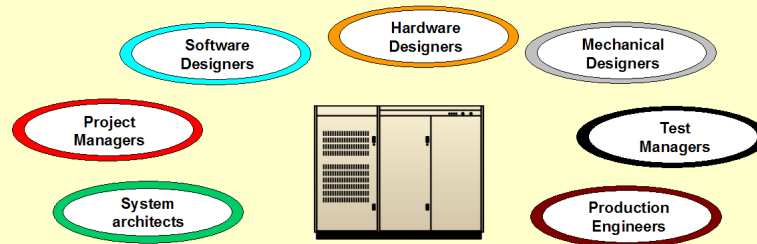
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## A telecom network



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## Complexity in system development



### Drivers

- Market push
- Shorter time to market
- More competitors
- Less margins
- Shorter product life cycles
- Technological complexity
- Standardization
- Change

### Emphasis on

- Development lead-times
- Coordination and dependencies
- Progress follow-up
- Culture - disciplines
- Geographical distribution
- Commitments and responsibilities
- Competence
- Quality

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## Third generation of mobile systems, 3G

“The **total technical changes** being implemented in this project **are enormous**. Such changes are needed in order for Ericsson to get a world-leading product first to market. Using **traditional methods** then the scope of change implemented in single steps will be too large and **can not be managed.**”

Total project manager, Ericsson, Dec 1999

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# Managing mega-projects

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## Project typology

- **Weber**
  - Management by breaking down the task into small pieces
  - More detailed planning - more control
  - Preferred approach in current management literature
- **Rambo**
  - Rigorous planning provides an illusion of being in control
  - Development driven by integration and verification
  - Coordination done by a small team around the total project manager
- **Gaia**
  - Similar to Rambo
  - Project groups organize and coordinate themselves
  - Coordination at proper level rather than at the top

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## Coordination aspects

- **Agility**
  - The need to manage changes during the project
- **Formality**
  - Formal procedures for coordination or informal "on the spot"
- **Distribution**
  - Central or distributed coordination decisions
- **Shared understanding**
  - The need for all participants to understand "the whole picture"
- **Operational**
  - The need for coordination specific support (methods and tools)

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## Coordination needs versus project types

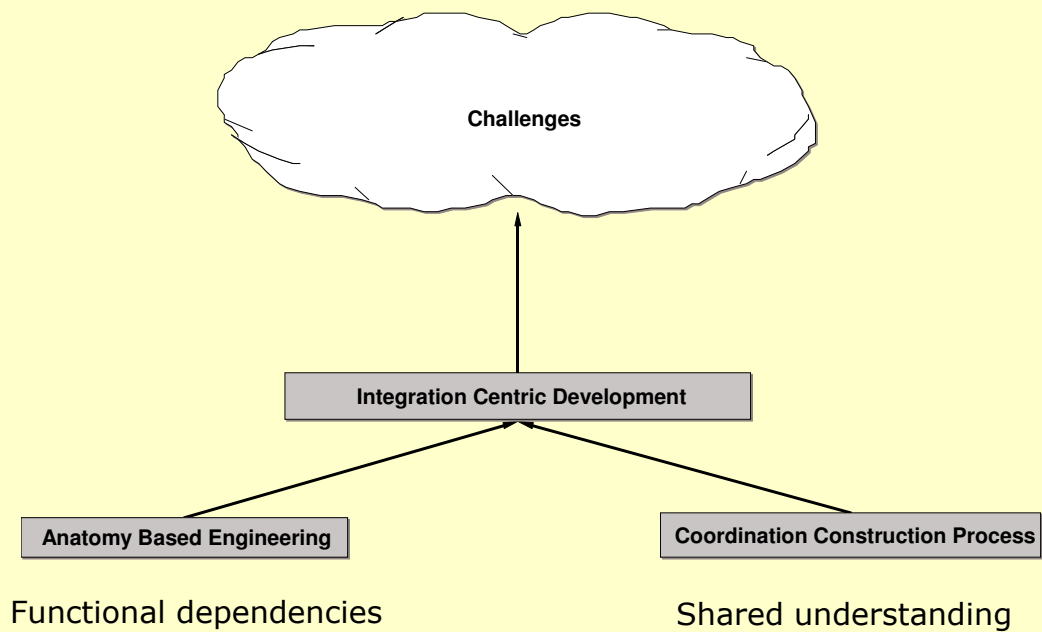
	<b>Weber</b>	<b>Rambo</b>	<b>Gaia</b>
<b>Agility</b>	Low	High	High
<b>Formality</b>	Formal	Formal	Informal
<b>Distribution</b>	Marginal	Marginal	Essential
<b>Shared understanding</b>	Marginal	Essential	Essential
<b>Operational</b>	Standard PM tools	Standard PM tools	High demands on CM tools

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# ICD approach

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## Approach



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## Definition of Integration Centric Development

To plan, verify, produce, install and industrialize **in the same order** as the completed system is **“coming alive”**

- System integration as soon as possible
- Utilize parallelism as much as possible
- Focus on dependencies
- Incremental (step-wise) development

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## Objectives

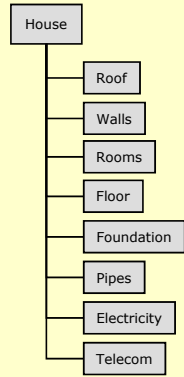
- Everybody works from the same image of the system
  - same view, same plan
- Everyone gets access to the same information simultaneously
- Everyone is responsible for their contribution
- “Soft Entries, but Hard Exits”
- High moral
- Decisions are focused on the final target

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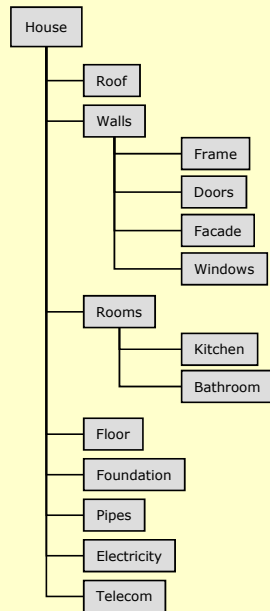


# Product structure



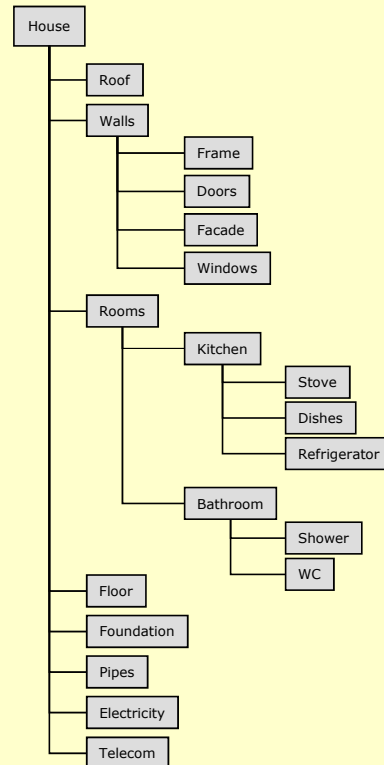
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# Product structure



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# Product structure



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## Product structure - not enough

- **Purpose - management of product content**
- **Shows only resources, not their dependencies**
  - the context of each resource
- **Unsuitable for development planning and control**

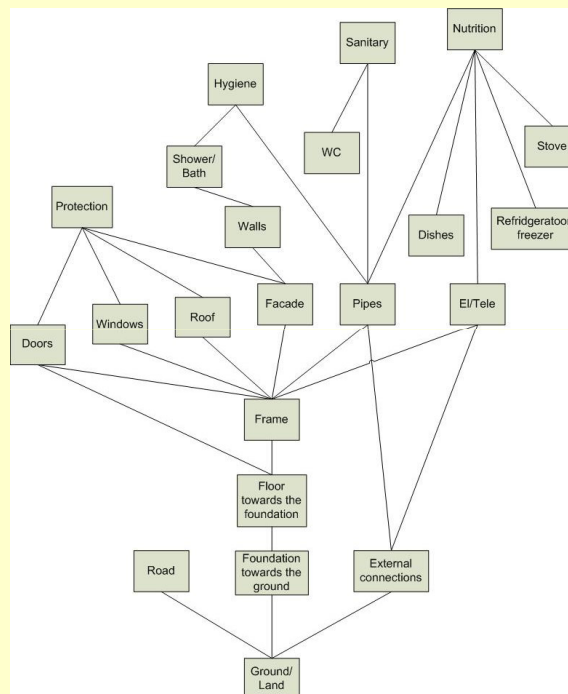
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## The anatomy

- **A one page illustration**
  - not hundreds of text pages
- **Functional dependencies and independencies**
  - between resources in the system
  - from prerequisites to customer needs
  - how to 'breath-life-in-a-system'
- **An architectural view**
- **Re-usable**
- **Basis for planning and controlling the development**
- **Complements the product structure**
  - not a replacement

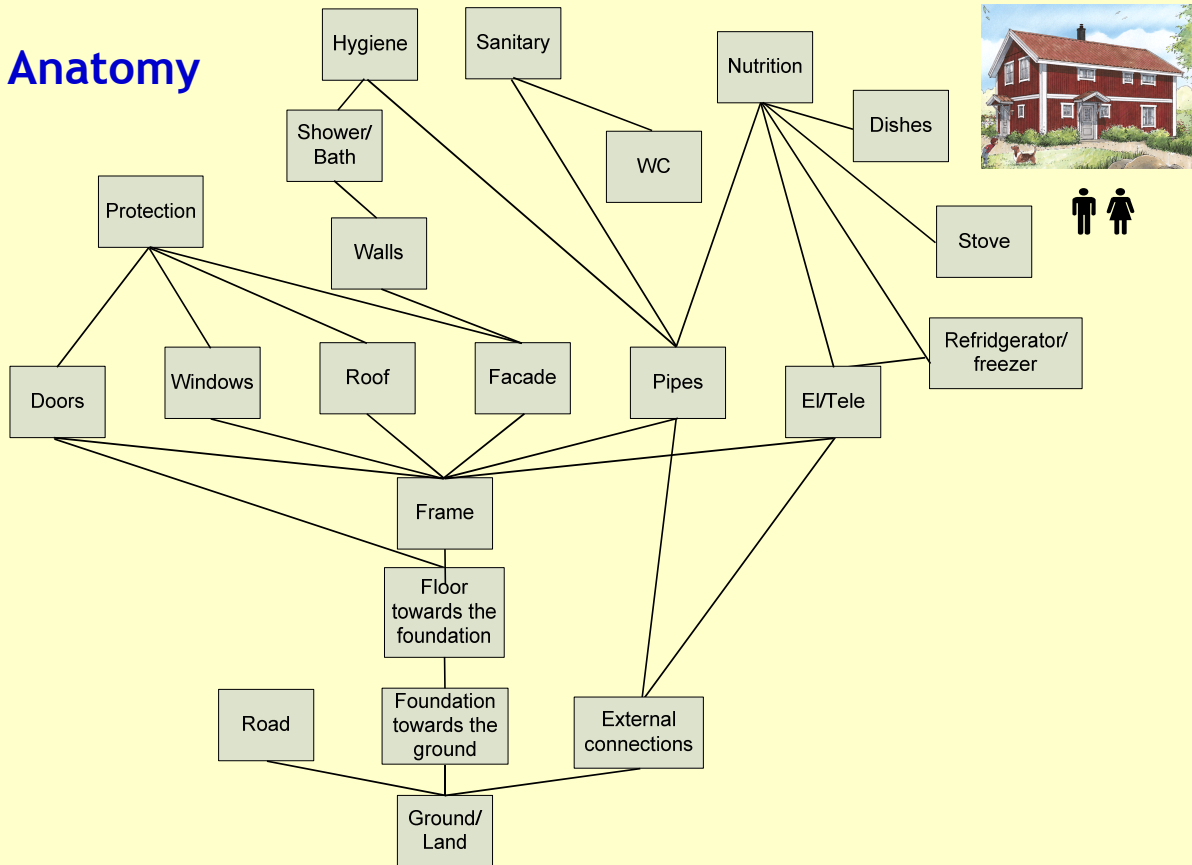
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## Anatomy



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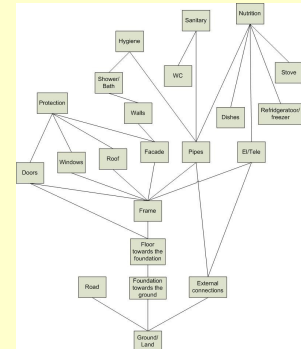
# Anatomy



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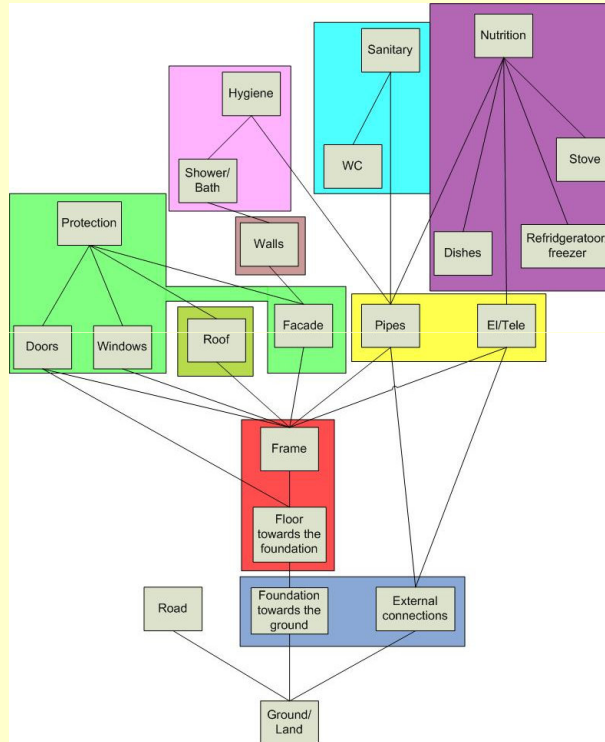
## Anatomy definition

- Achieving shared understanding of how the system works
- Functional dependencies
- System architects
- Mindset: If you "power-on" what happen then and then..
  - Repeat the question until you reach the end functionality



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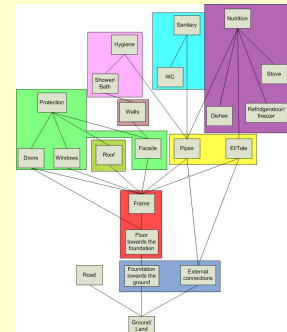
# Increment plan



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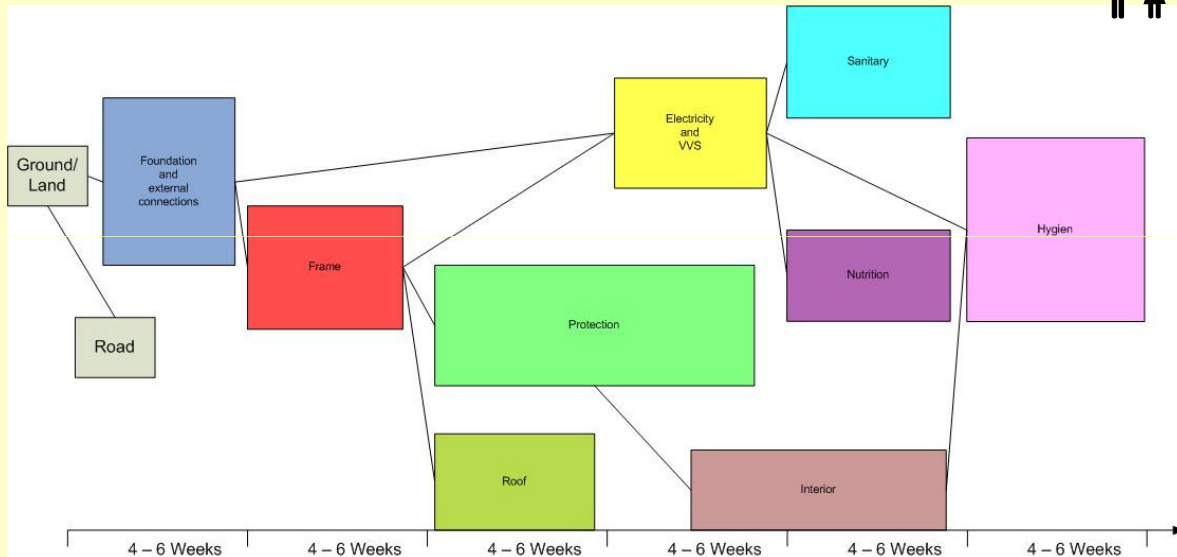
# Increment planning

- **Define increments**
  - Developed, verified and integrated as units
- **Distribution of increments**
- **Early system integration**
  - early warnings of major faults
- **System integrators, system testers, project managers**



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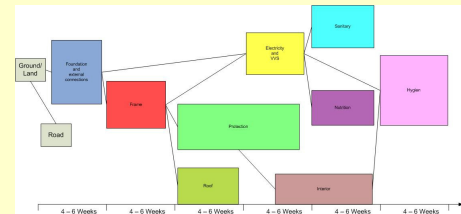
# Integration plan



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## Integration planning

- Plan and control the project
- Project managers
- Assigning projects to increments
- Scheduling and re-planning
- Progress control
  - Green - On Plan, Yellow - Warning, Red - Off Track
- Deliveries - from whom, when
- Dependencies btw subprojects
- Domino effects
- Input to project plan



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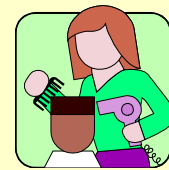
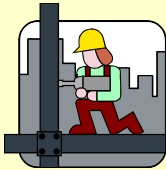
## You need two types of plans

- **Anatomy - based**
  - For everyone to understand the system and the status in the project
- **Detailed plans on all levels**
  - To keep track of the necessary logistics

## The Coordination Construction process

## Approach - the workpractice

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



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## Workpractice example - a firebrigade

- **Motive, need**
  - put out fire
- **Actors**
  - firefighters
- **Things and relations**
  - fire, building, fire-engine, ...
- **Order of activities**
  - alarm, transport, role out fire-hoses, raise ladders...
- **Tools, instruments**
  - fire-hoses, ladders, water, ...
- **Rules, norms, standards, habits**
  - fire regulations, alert rules, ...
- **Change, development**

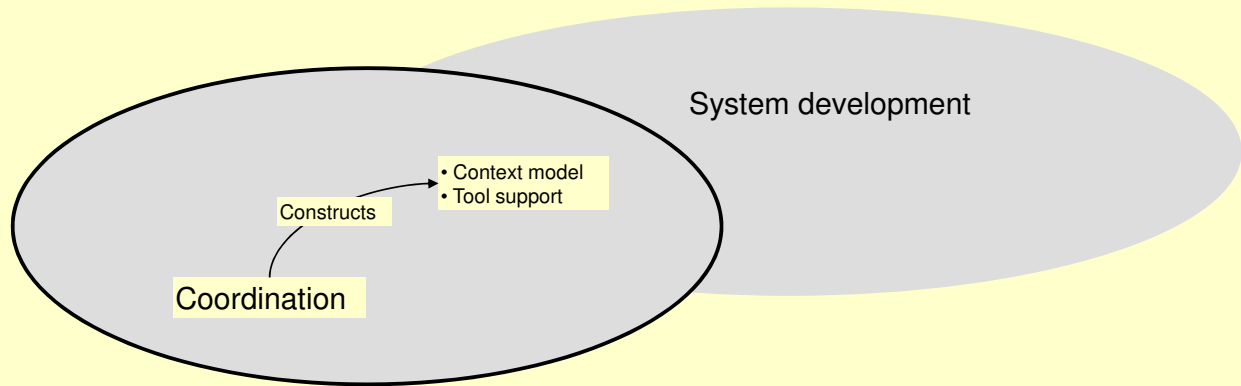


All elements are interdependent!

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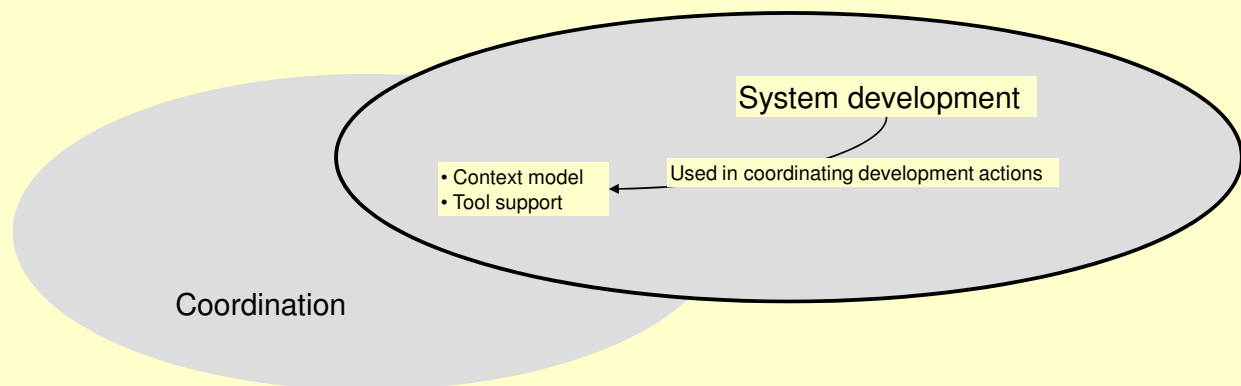


## System development workpractice - coordination focus



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## System development workpractice - development focus

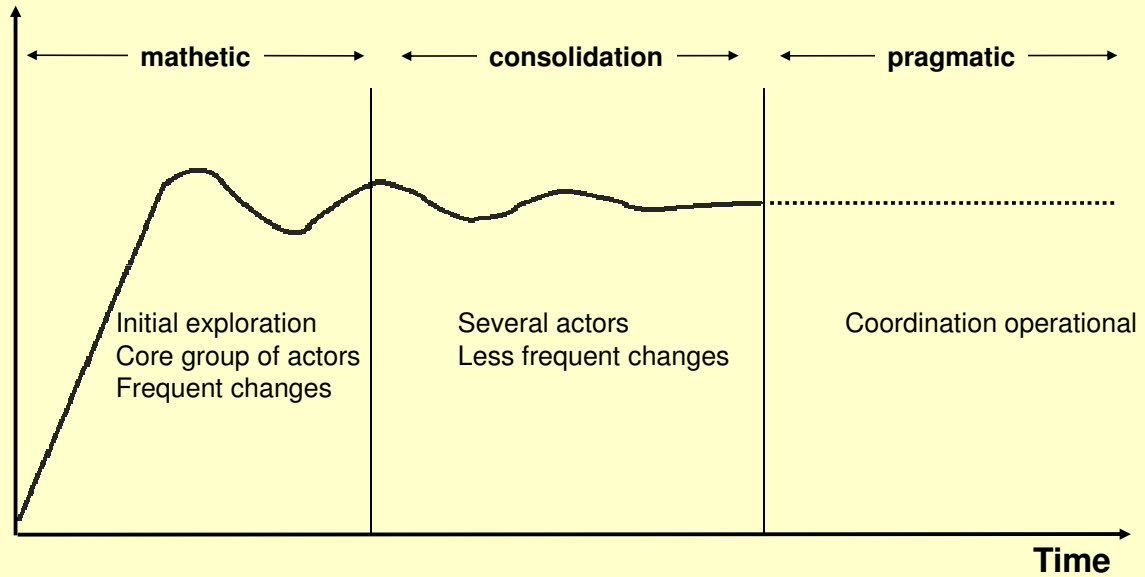


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# Coordination Construction Process

Communal meaning

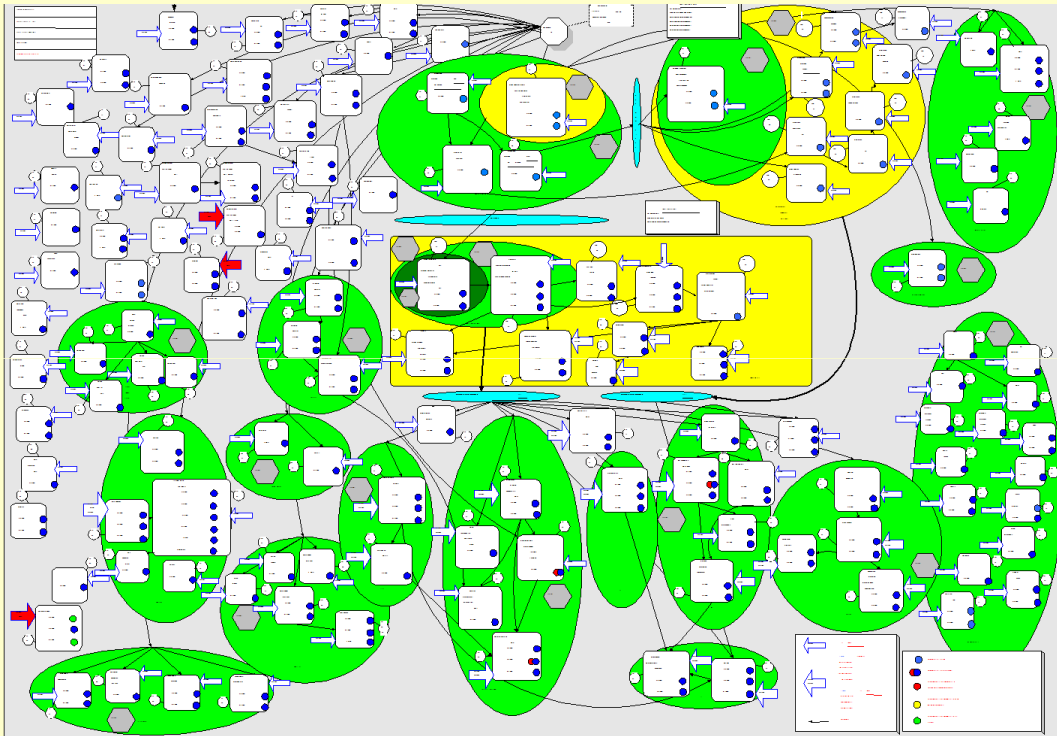


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## Coordination effects

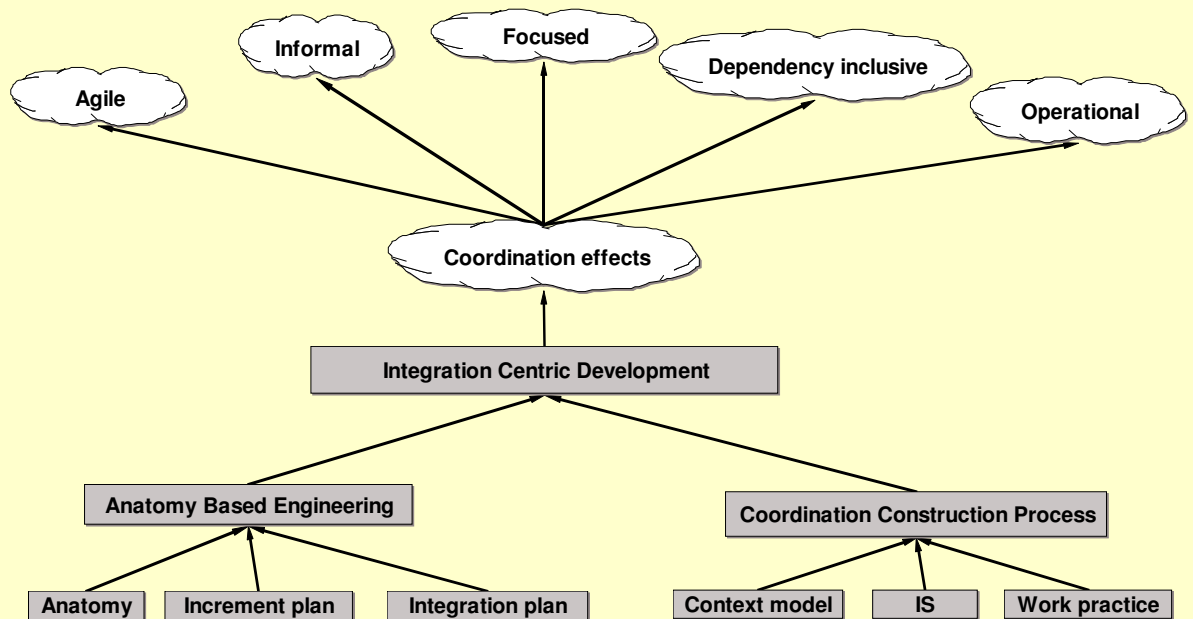
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# Integration Plan - Mobile Switching Center Node, 3G



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## Coordination effects



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## Agile planning

"If a trouble report has been found in this block, you have to make sure that in previous versions or later releases, that you correct the same fault. Then, ok how the hell are we going to follow up on this? And then, we entered an extra measure attribute to the block type. We really used that, and yes, that was put in at a later stage. **It is implemented within 5 minutes** and also rolled out in the same speed almost."

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## Informal coordination

"I think that the tool allows us to have a better understanding of impacts of own part of the impacts it could have on other parts and the other way around. The need for coordination was more or less identified by the tool. They could equally see, OK I'm working on this work package which are the other work packages involved, and so on."

Project manager, 3G development

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## Distributed coordination

"Yes, what is the great benefit is that you have one common place where all the project area stored the information. It means that a lot of the coordination, which previously went via the main project, now can go directly."

Project manager, 3G development

## Communal understanding

"Before, every role maintained a piece of information it was responsible for. But in the end [...], they should build an overall picture and what Matrix enables us to get, this full picture, also to cross the border and see "aha this is information somebody else in another role thinks is connected to this one" that is a complete picture of the overall view. That is the main benefit I think."

Methods and tools coordinator, 3G development

## Operational

"Especially for the execution part I think we would not have been able to run this project without the tool. If you simply look at the number of work packages, the number of products that we have delivered, if we would have to maintain that manually, **that would have been a sheer disaster.**"

Project manager, 3G development

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## Discussion

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## Risks and limitations

- Too much focus on functional dependencies
- More persons from different disciplines involved from the start
- Ambition to do too much in parallel
- Resistance to work according to the increment plan
  - “I’ll start with the most difficult parts!”
- Enhanced visibility not always appreciated
- Implementation of tool support may become fragmented
- “Daily build” of tool support a strain for users
- Applied fully so far at Ericsson only
  - Others are beginning to catch up

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## Future research

- Grounding the ICD approach theoretically

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## Conclusions

- **A workpractice approach towards coordination of mega-projects**
- **Focus on managing dependencies and constructing shared understanding**
  - The Anatomy Based Engineering process
  - The Coordination Construction process
- **Applied in coordinating extraordinary complex development projects in the telecom industry**