PLM and incremental / parallel development

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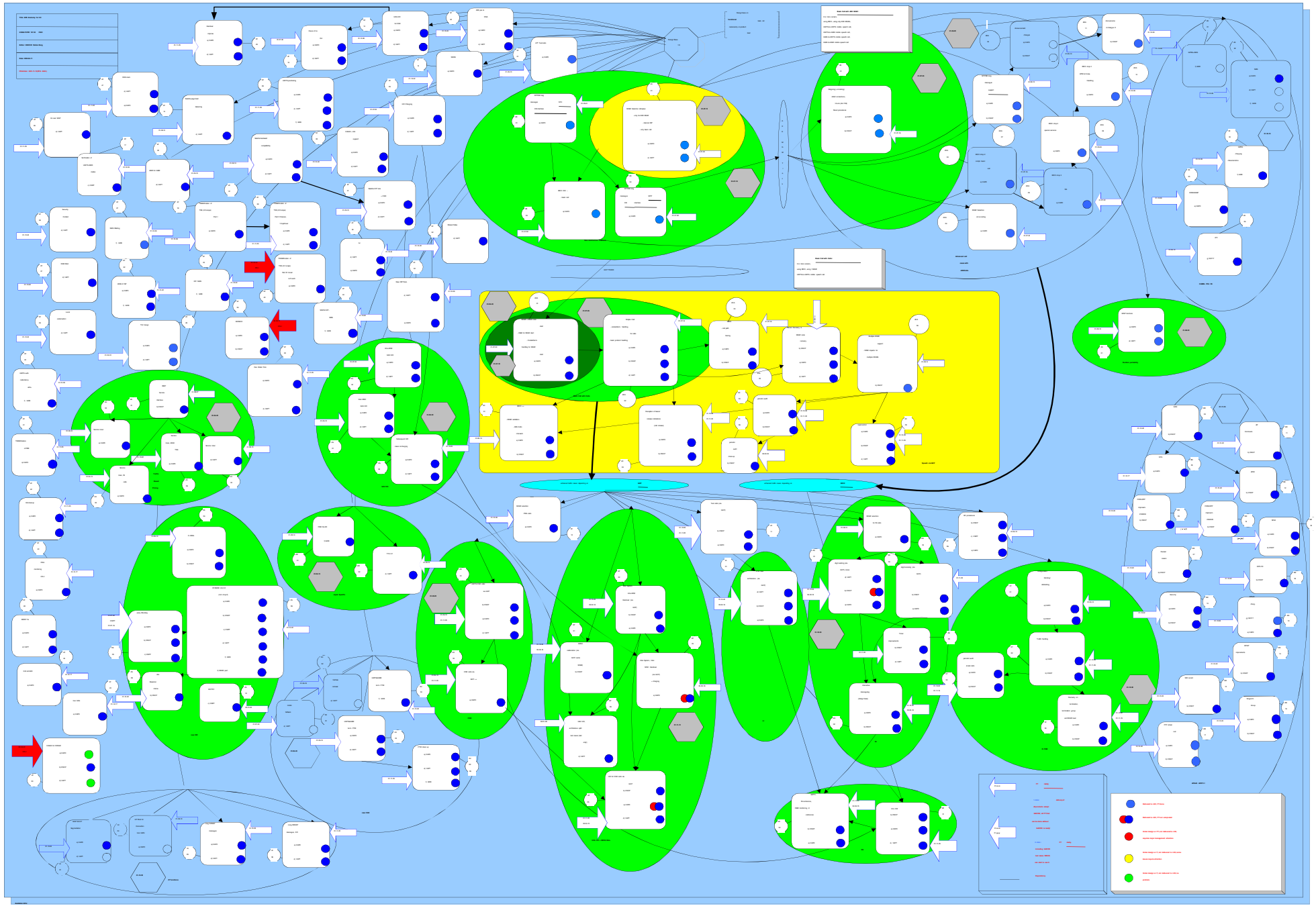


Trends impacting PLM ...

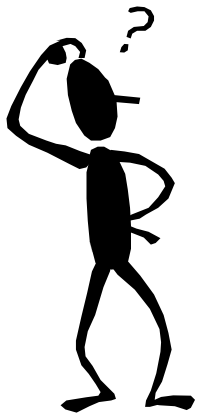
- Complexity
- Change
- Diversification
  - outsourcing, mergers, acquisitions
  - new in-house functions, e.g. Marketing & Sales, Services
  - extended enterprise, networks

… 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

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

people
collaboration
information

extended enterprise
company

Integration

backbone
information system

processes
concept to end of life
creation
management
dissemination

product
product related

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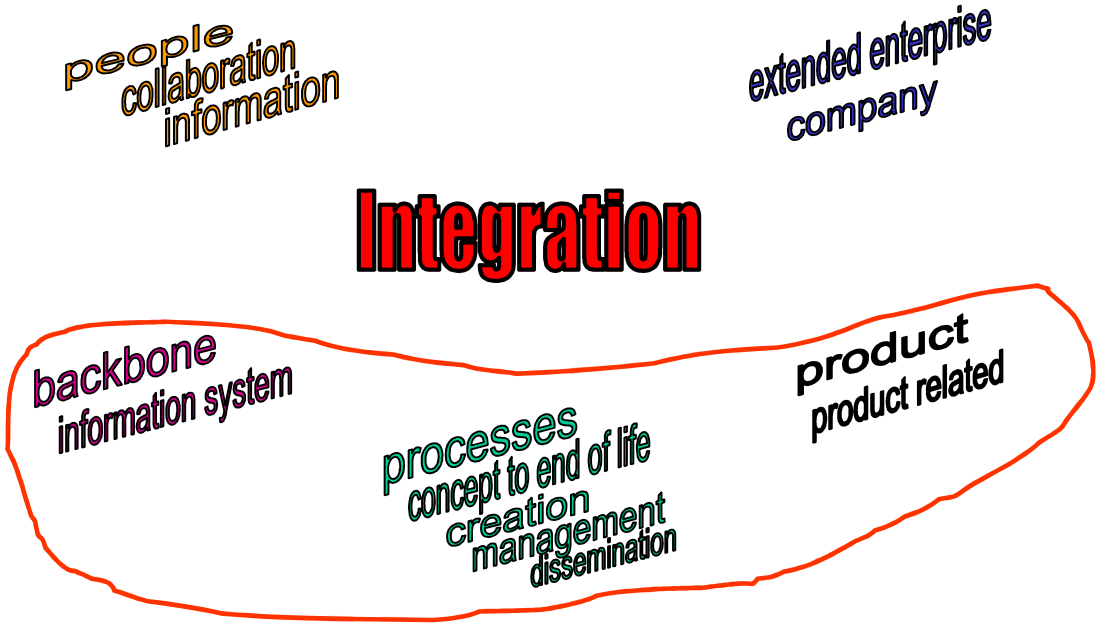
Traditional perspective on PLM

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



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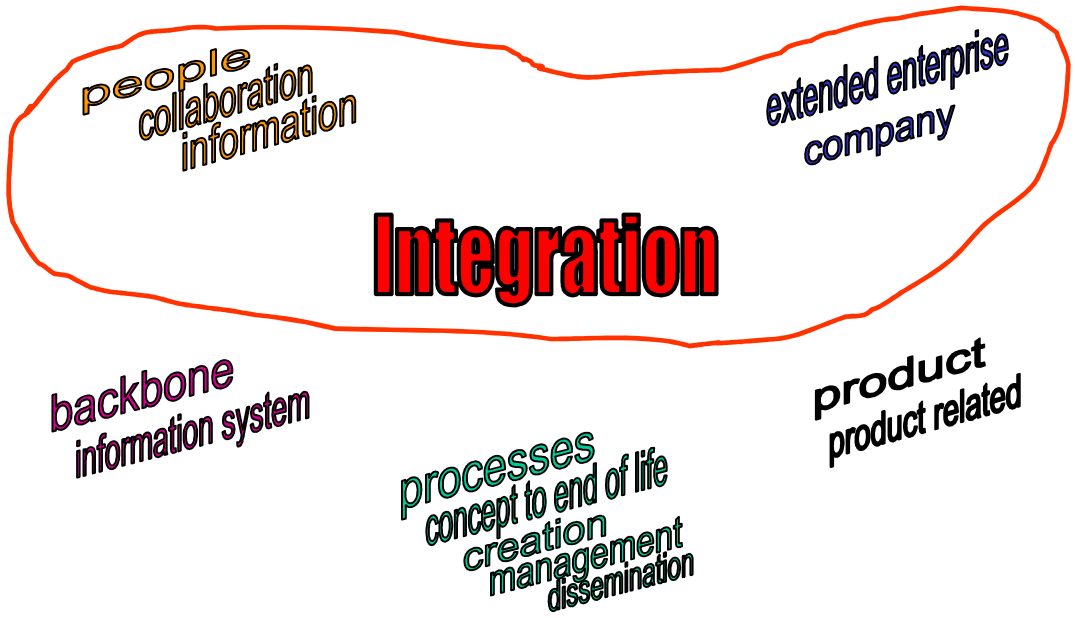
Alternative perspective on PLM

- Coordination of cooperating practices
  - Coordination: “The management of dependencies between activities”
  - Practice: a group of actors producing something for other actors
- Shared meaning
- Interdependencies
- Commitments and agreements



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The starting point - theory

- A search light - illuminates what is important
- See how things are related
- A common, shared framework in discussions
- Grounded in trustworthy knowledge
- Practical purposes
  - Analyse a confused situation
  - Developing information systems

"There is nothing so practical as a good theory." Kurt Lewin

The Activity Domain Theory

Building a house

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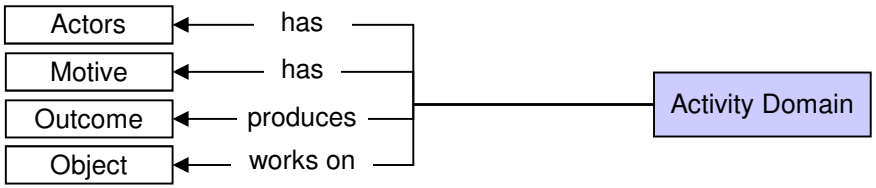
The Activity Domain Theory ...



- Examples on Activity Domains
  - A restaurant
  - A carpenter
  - House manufacturing company
  - ...

Example: Activity domains for building a house

- Turnkey contractor
  - Masens House Ltd.
- Carpeting and cement work
  - Nail & Cement Ltd. A
- HVAC
  - HVAC Consulting B
- Electricity
  - Electricity Unlimited C

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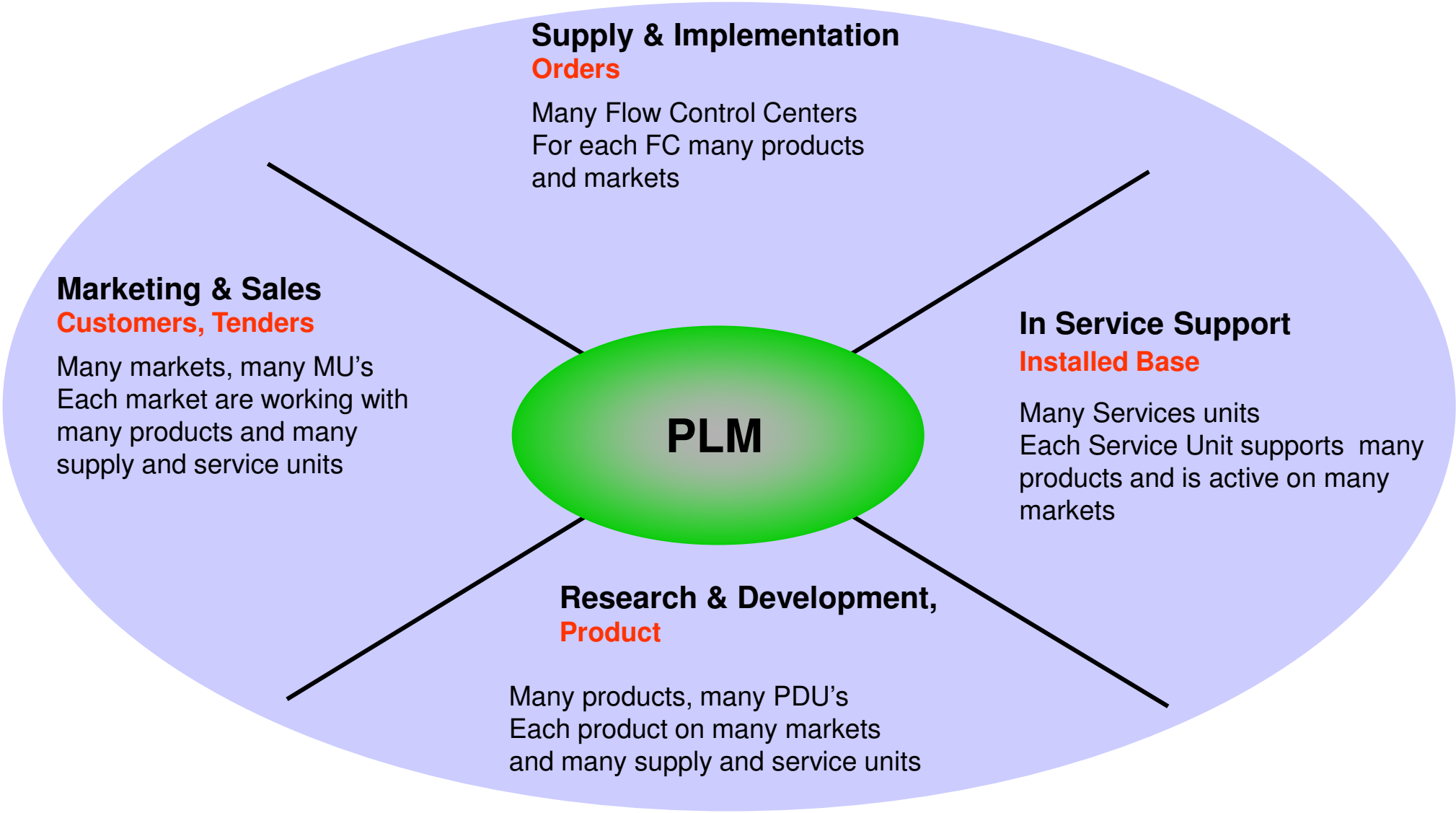
Main Activity Domains at Ericsson



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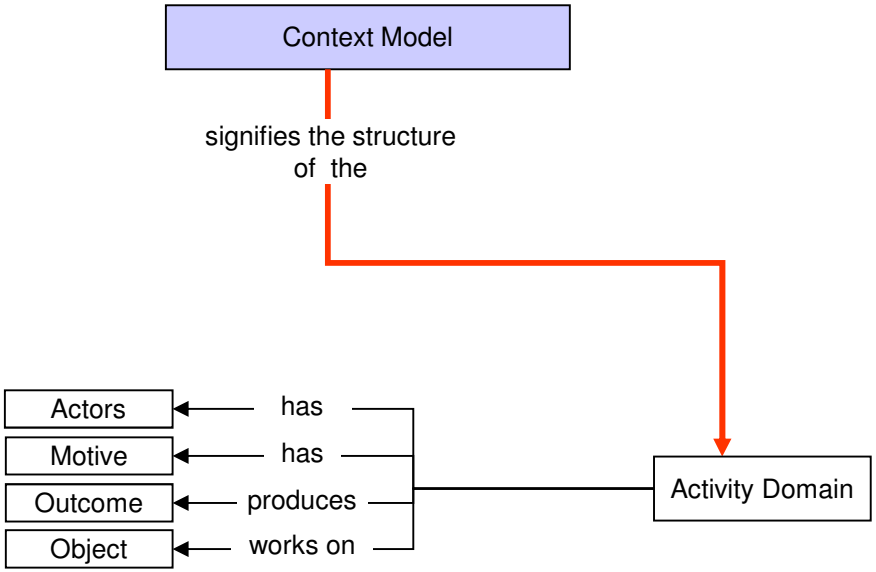
… The Activity Domain Theory …



- Examples on Context Models
  - Information model
  - Business model
  - Product structure
  - Data model
  - Information Architecture
  - …

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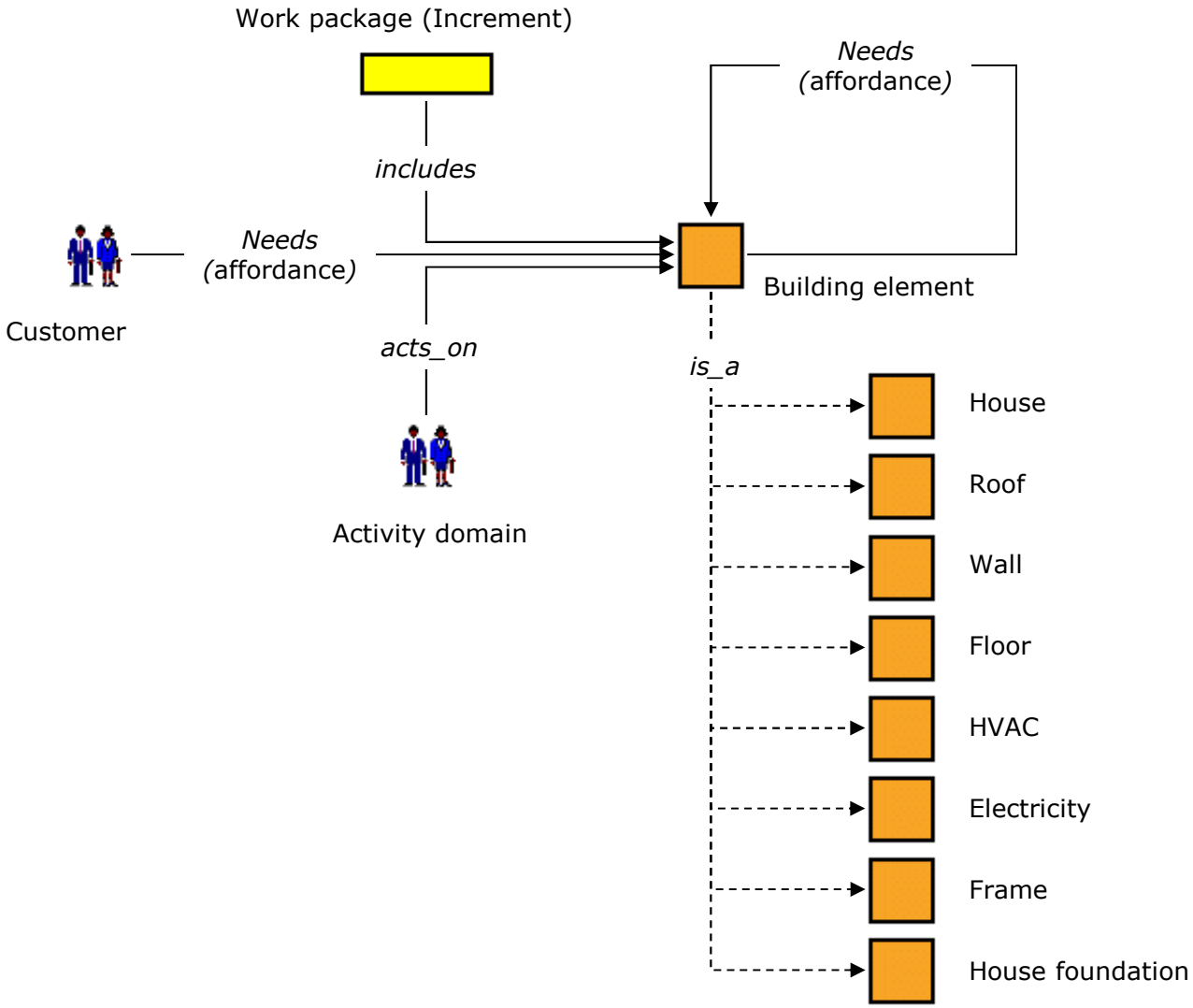
Context Model - Masens House Ltd.



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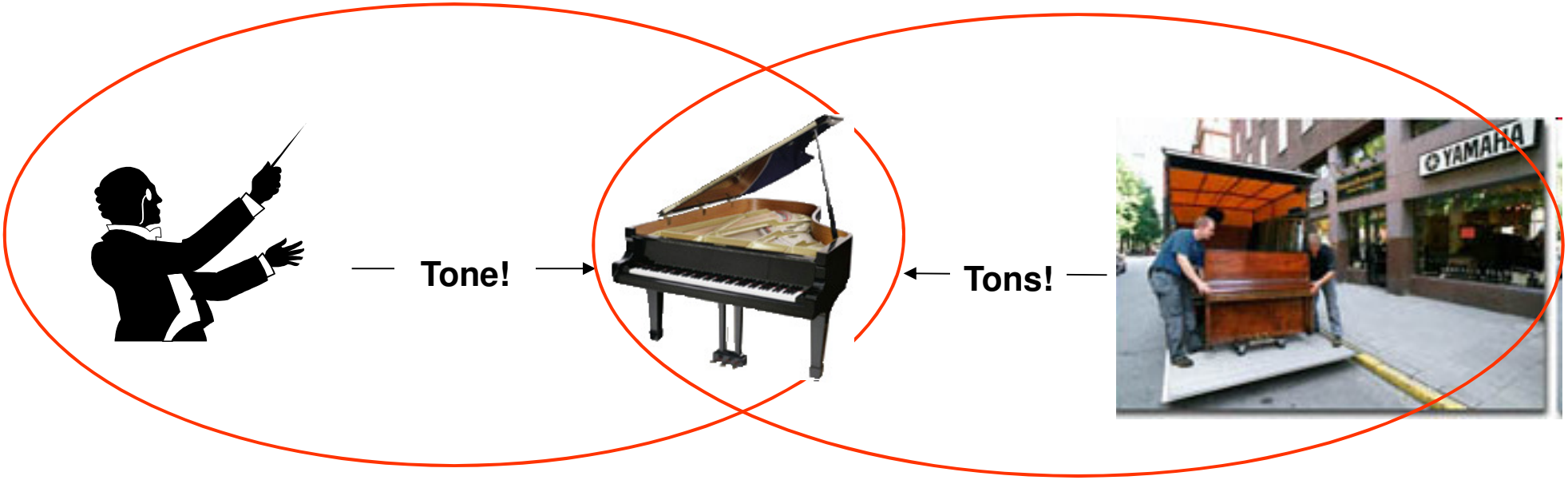
Context - what is a grand piano?



Same object – different qualities depending on context

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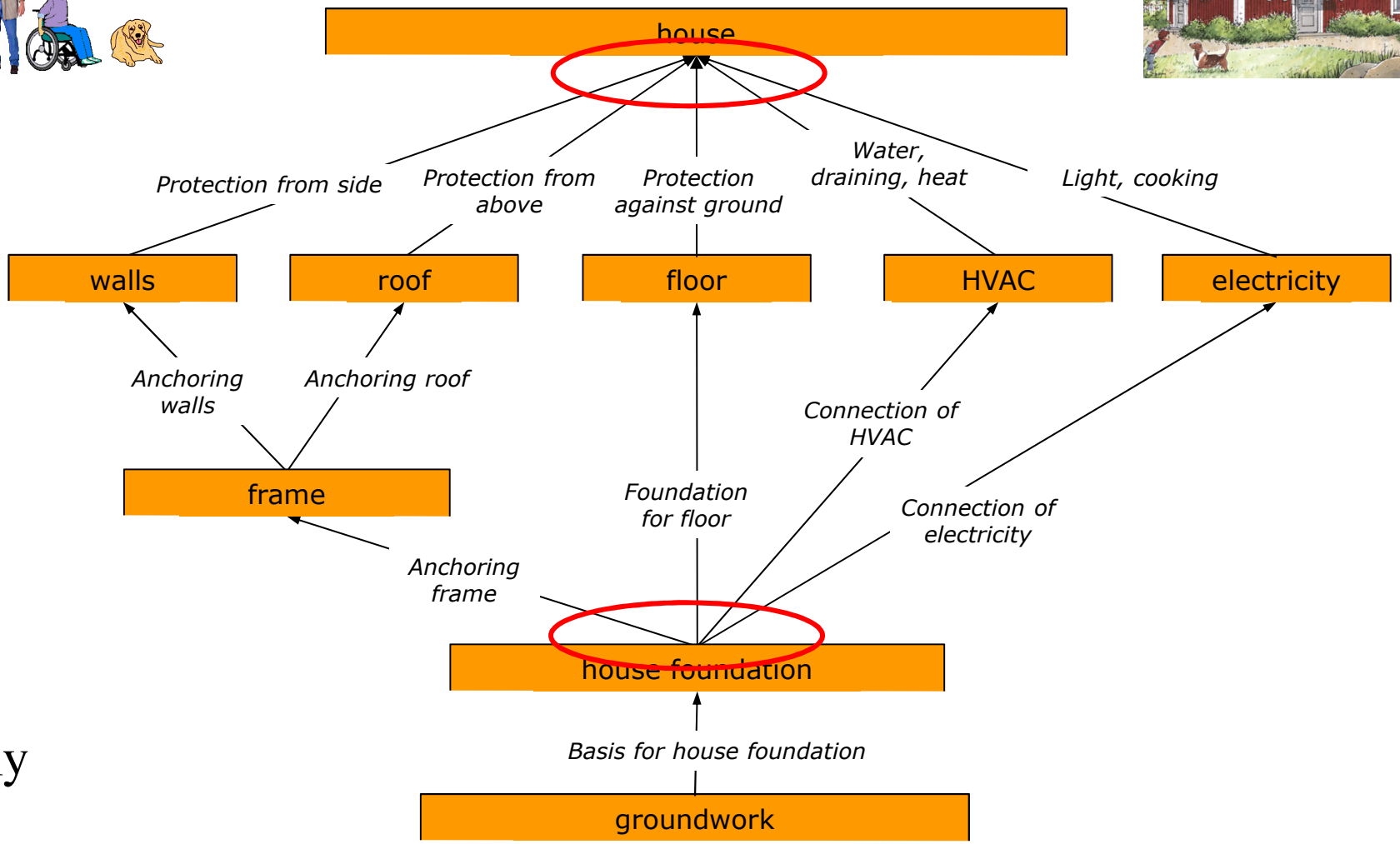
Dependencies



Anatomy

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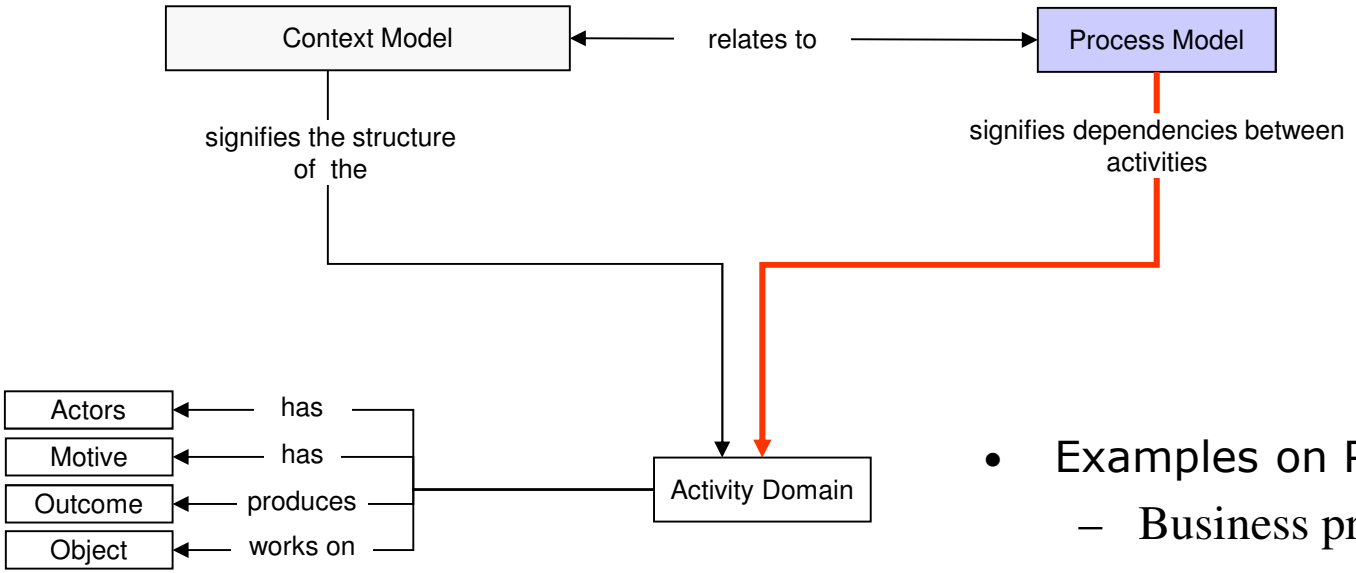
… The Activity Domain Theory …



- Examples on Process Models
  - Business process
  - Development process
  - Supply process
  - …

Events – time dimension

House
Electricity
HVAC
Floor
Roof
Walls
Frame
House foundation
Groundwork

Not started
Delayed
On-going
Finished

A Nail & Cement Ltd.
B HVAC Consulting
C Electricity Unlimited

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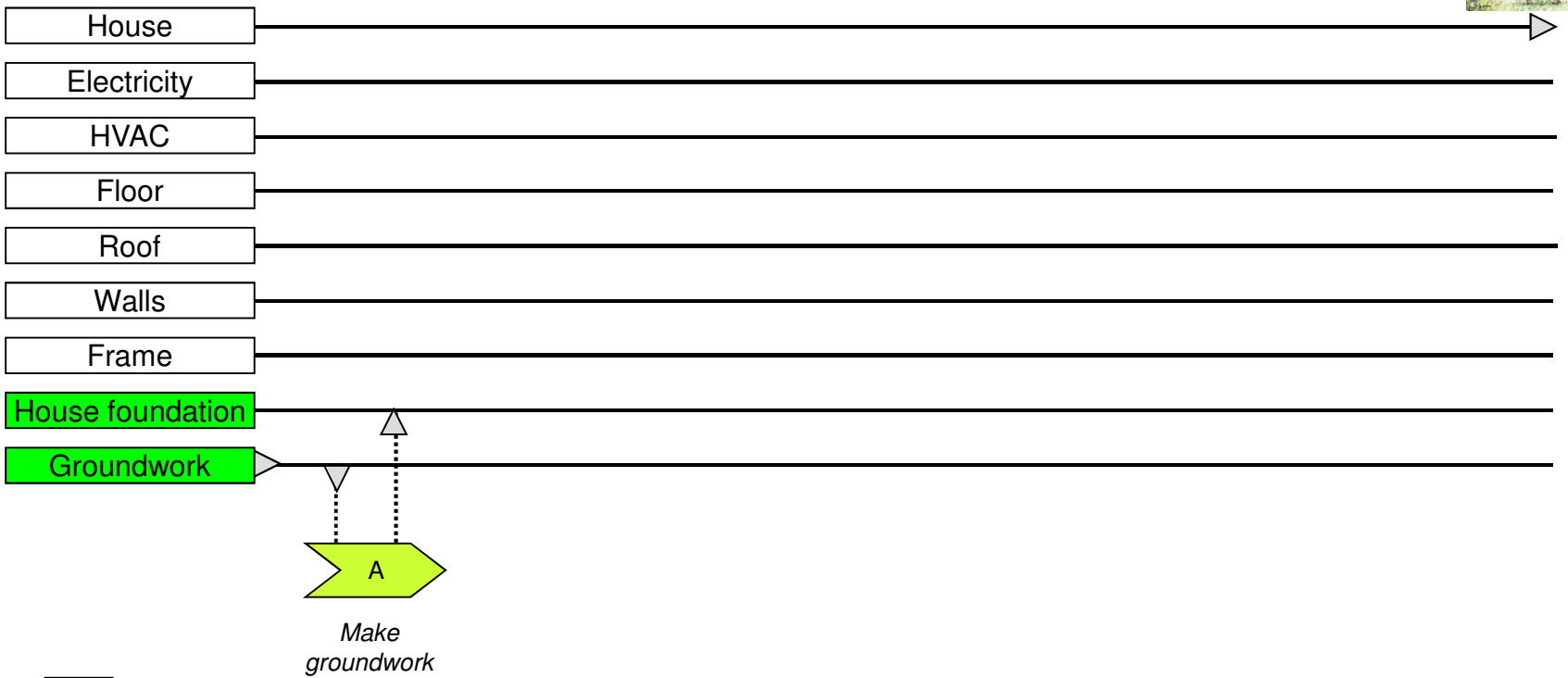
Events – time dimension



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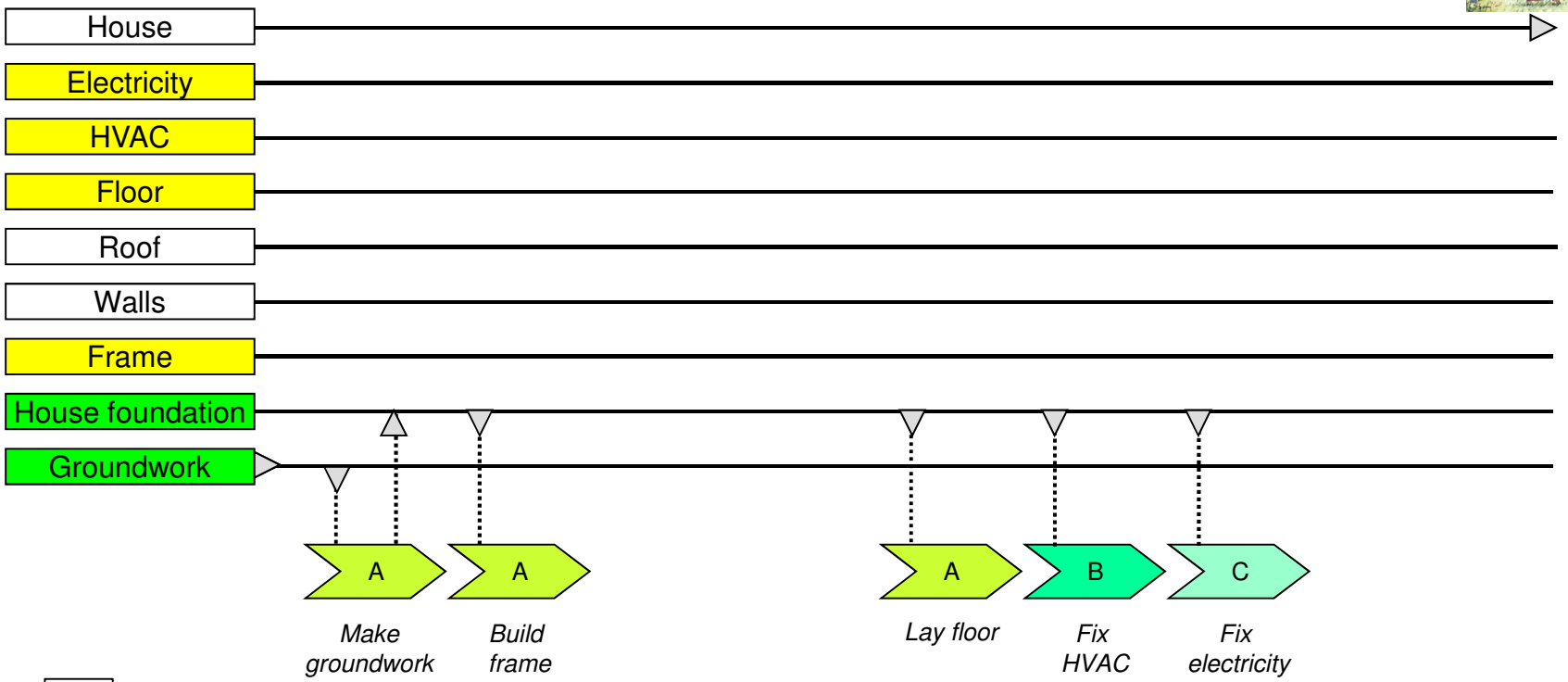

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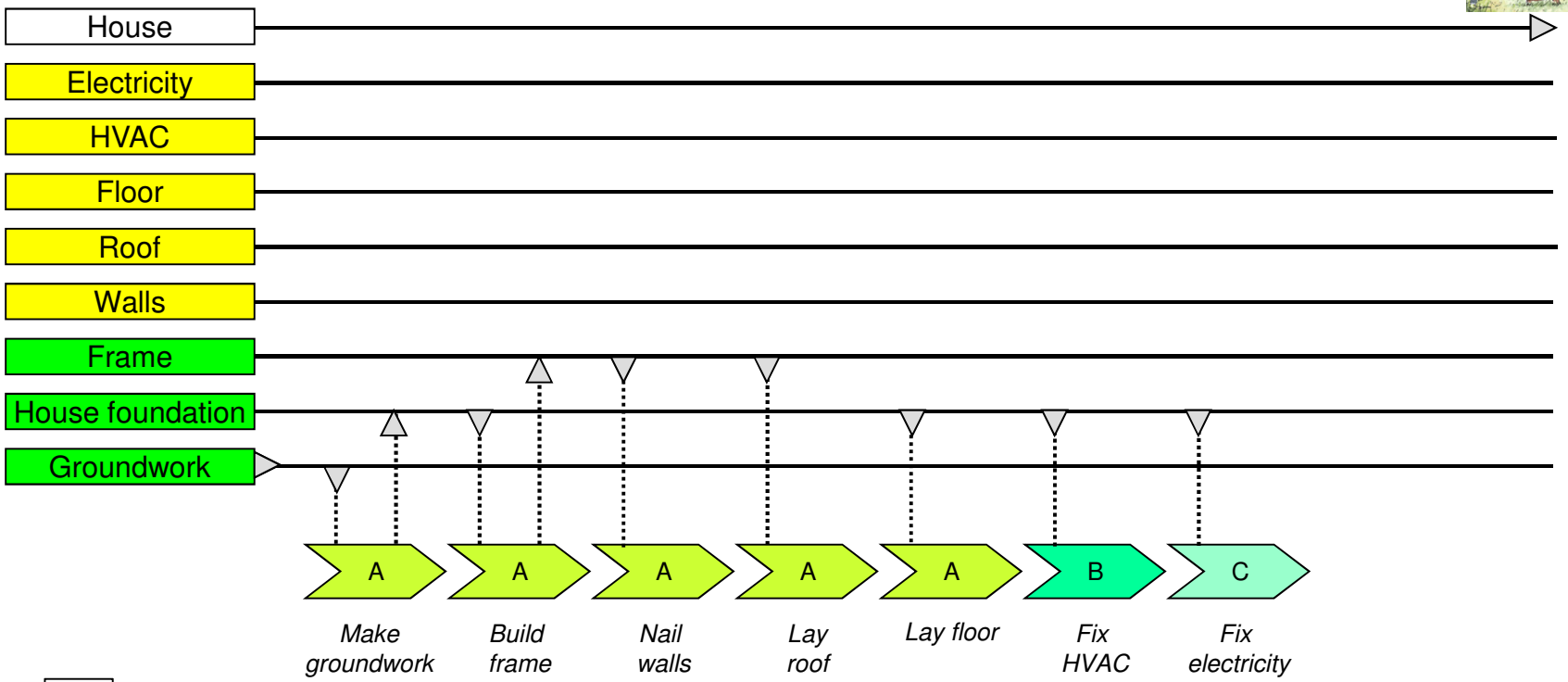

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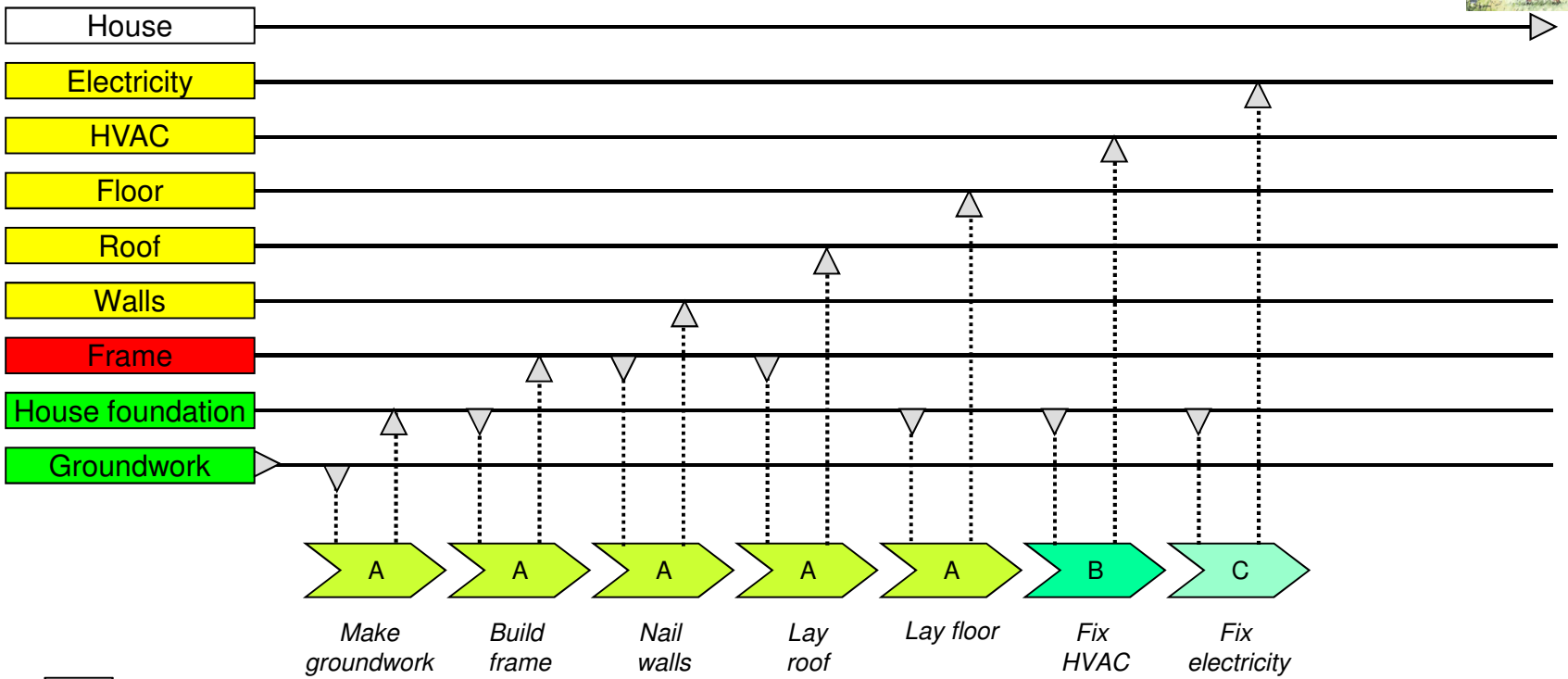

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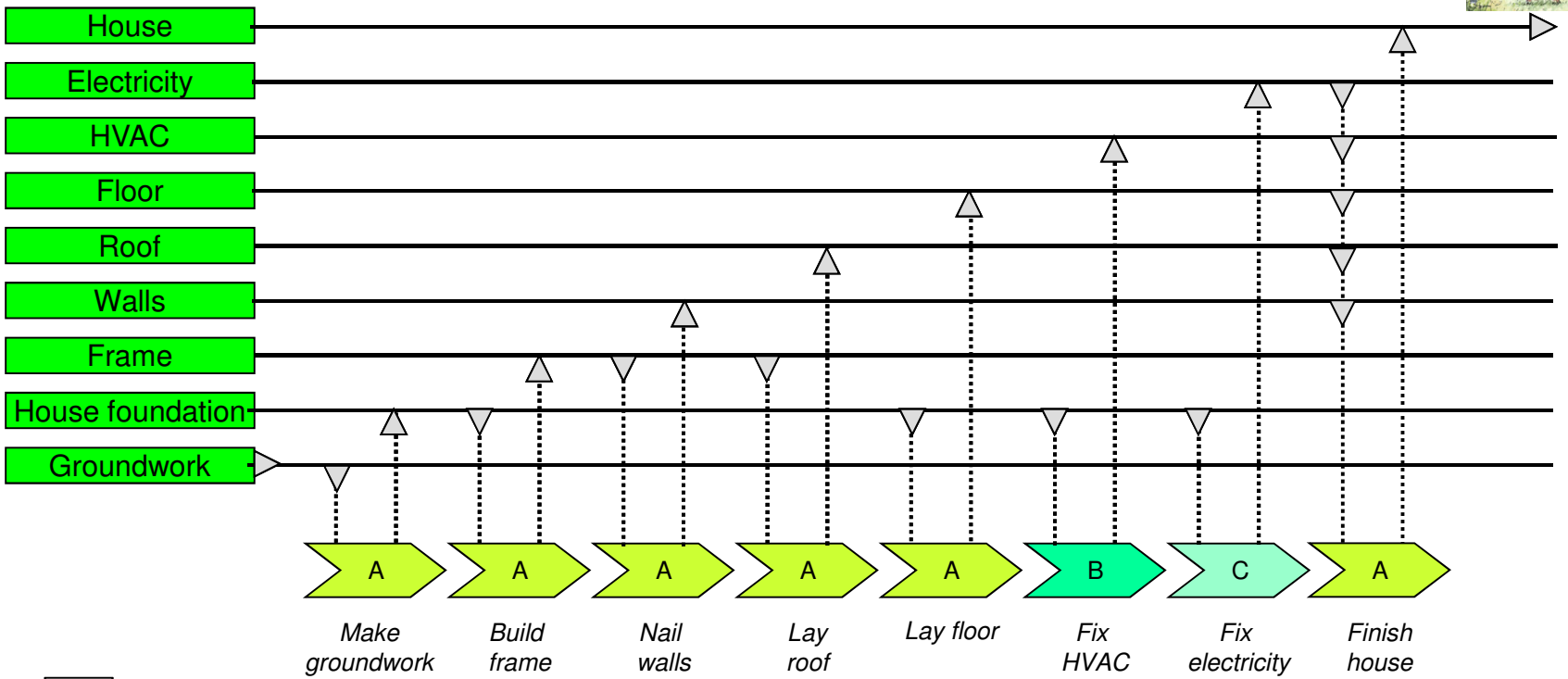

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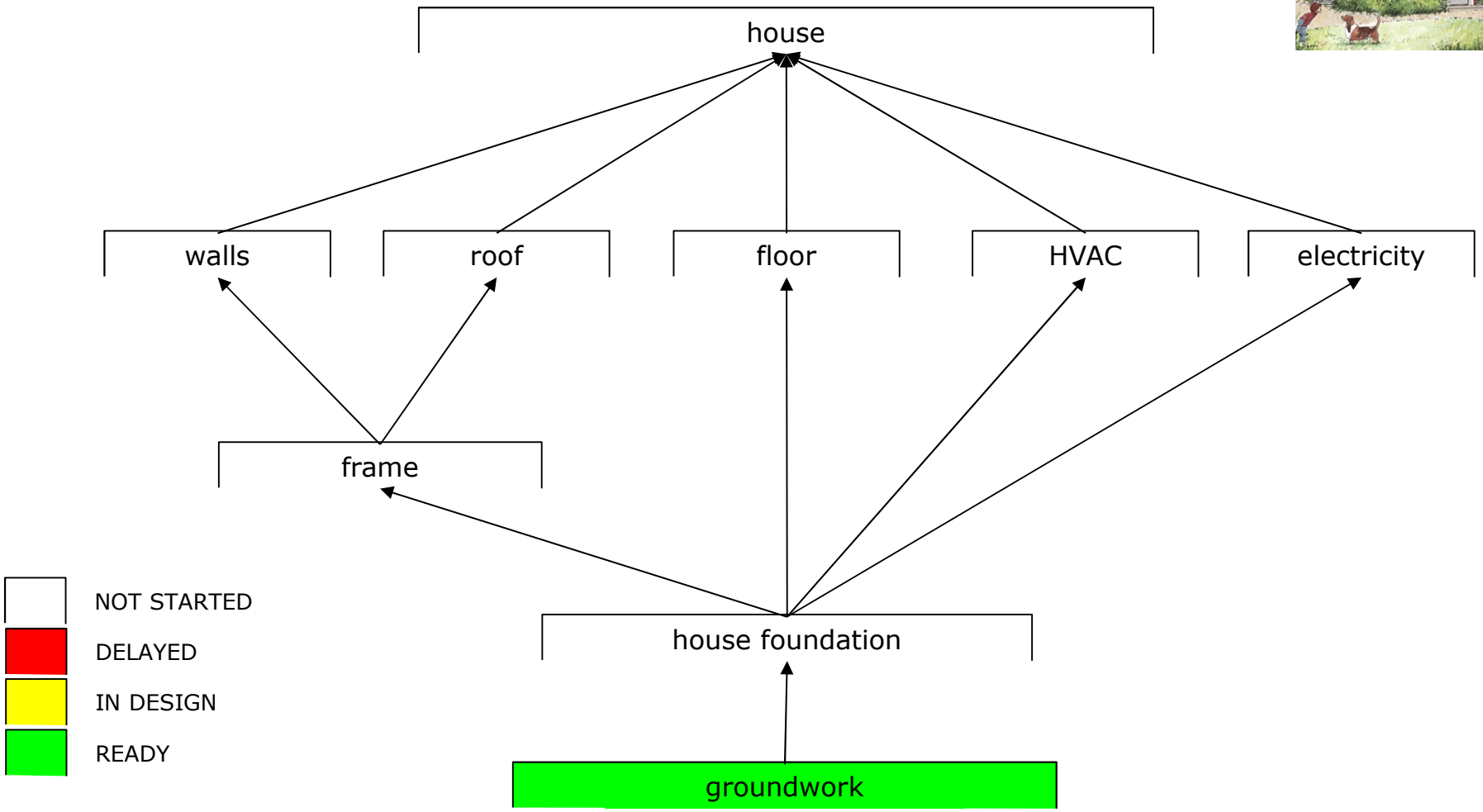
Progress



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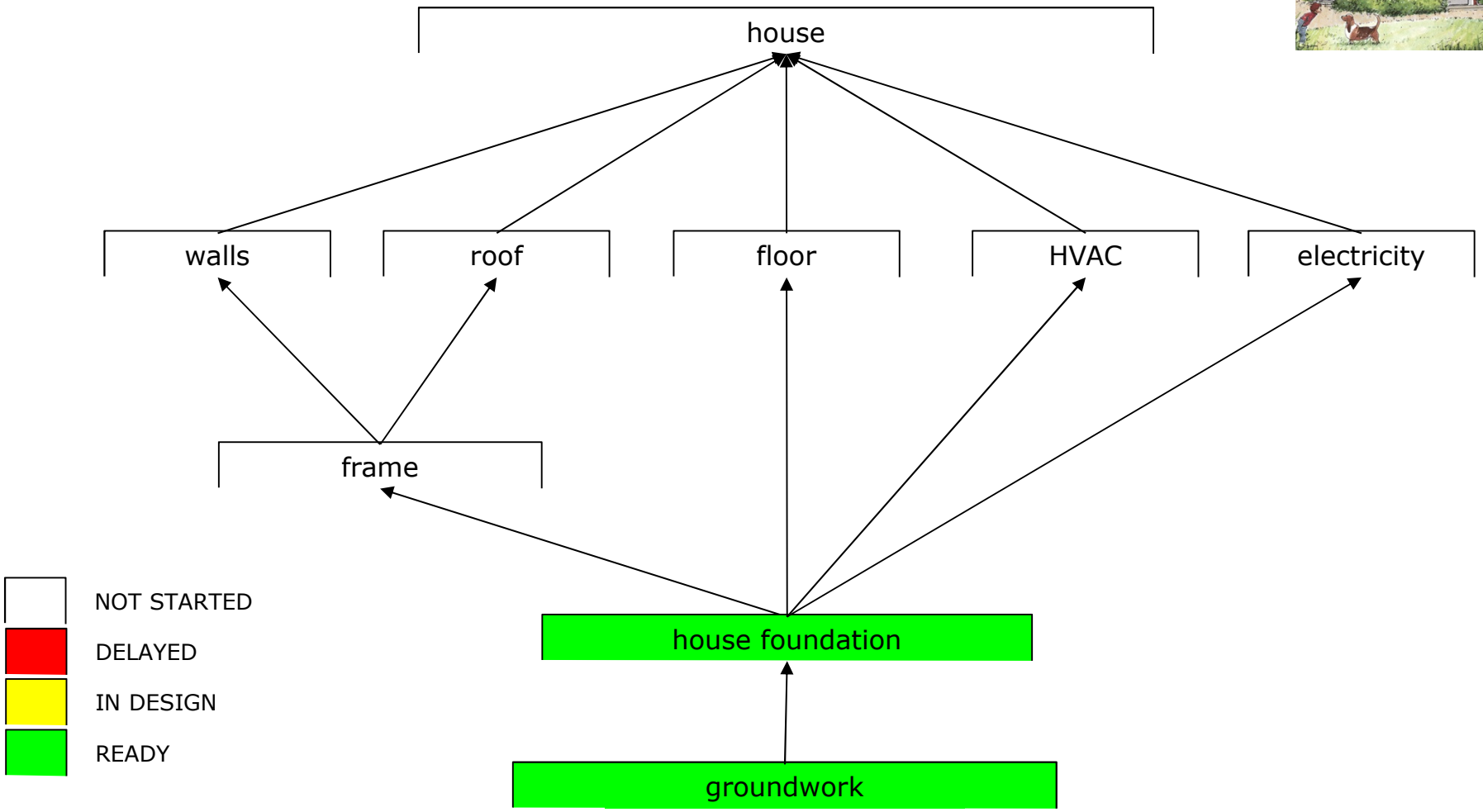

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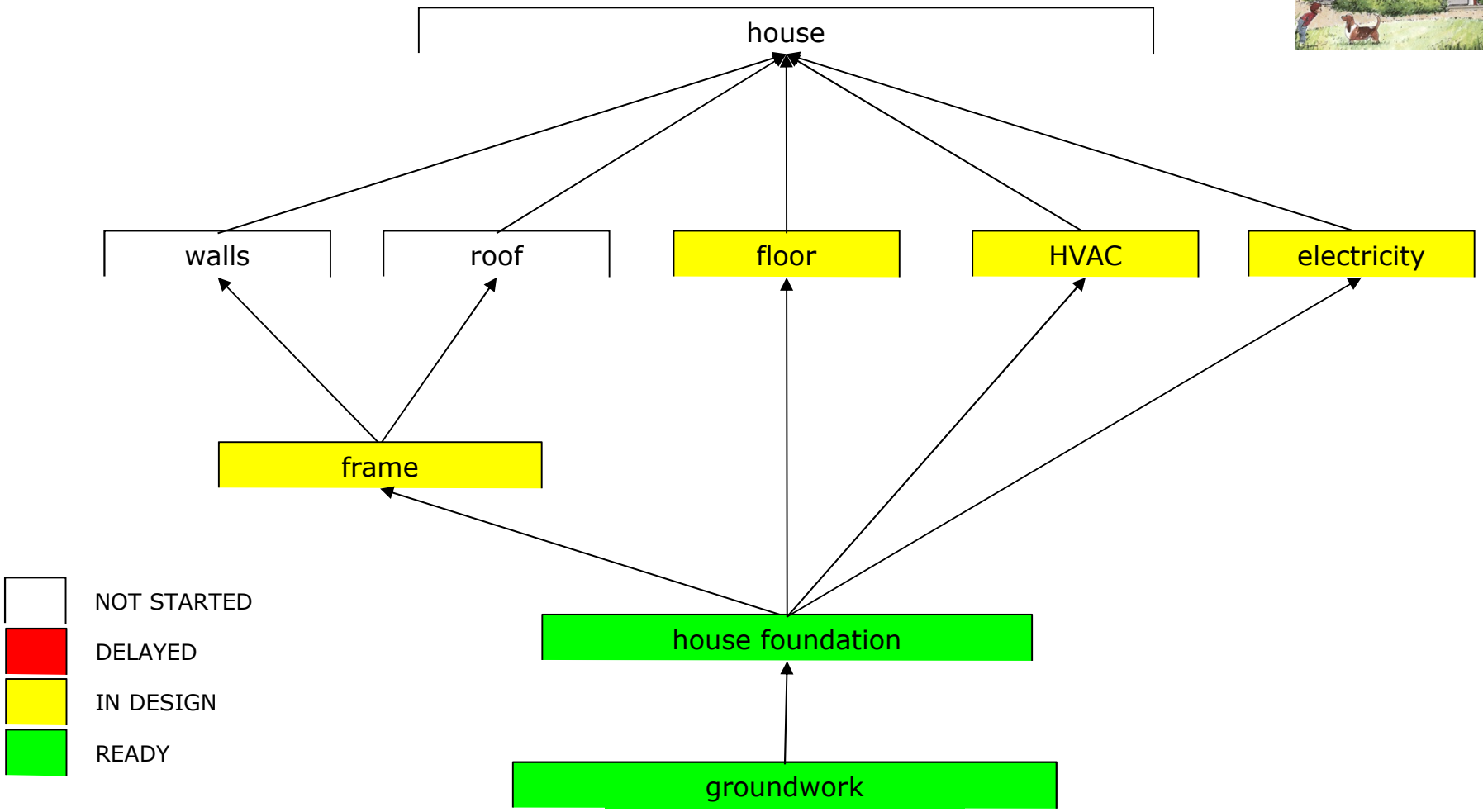

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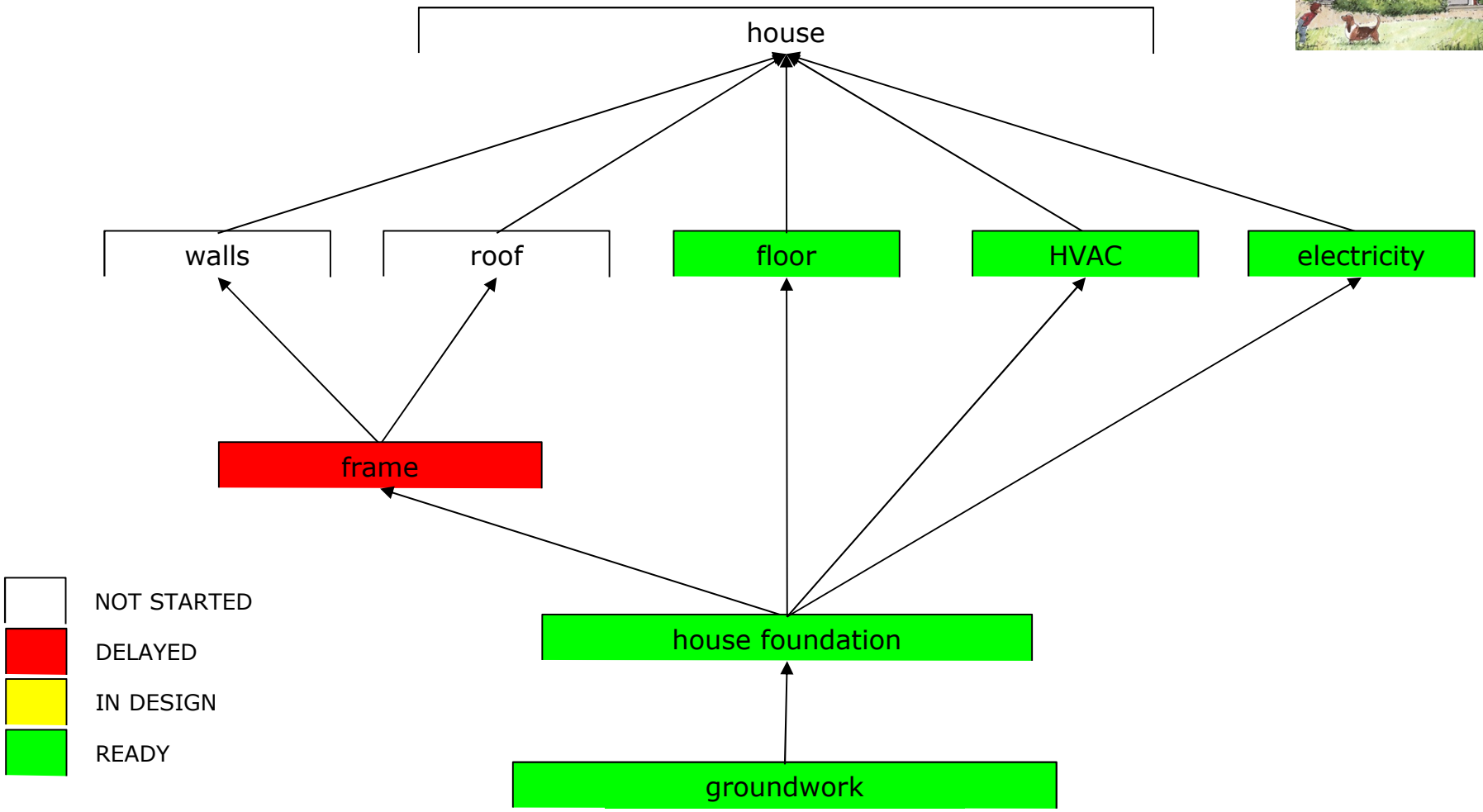

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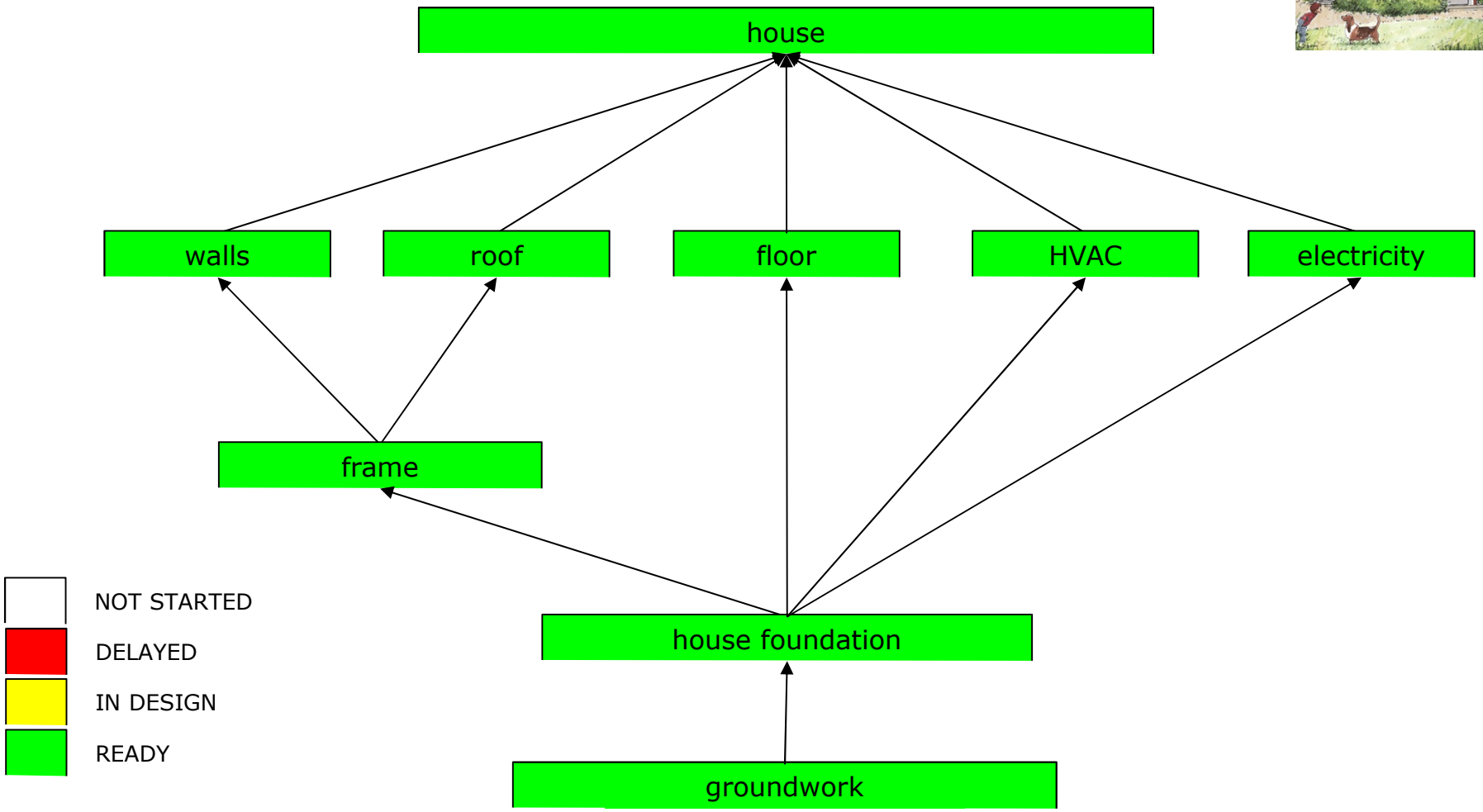

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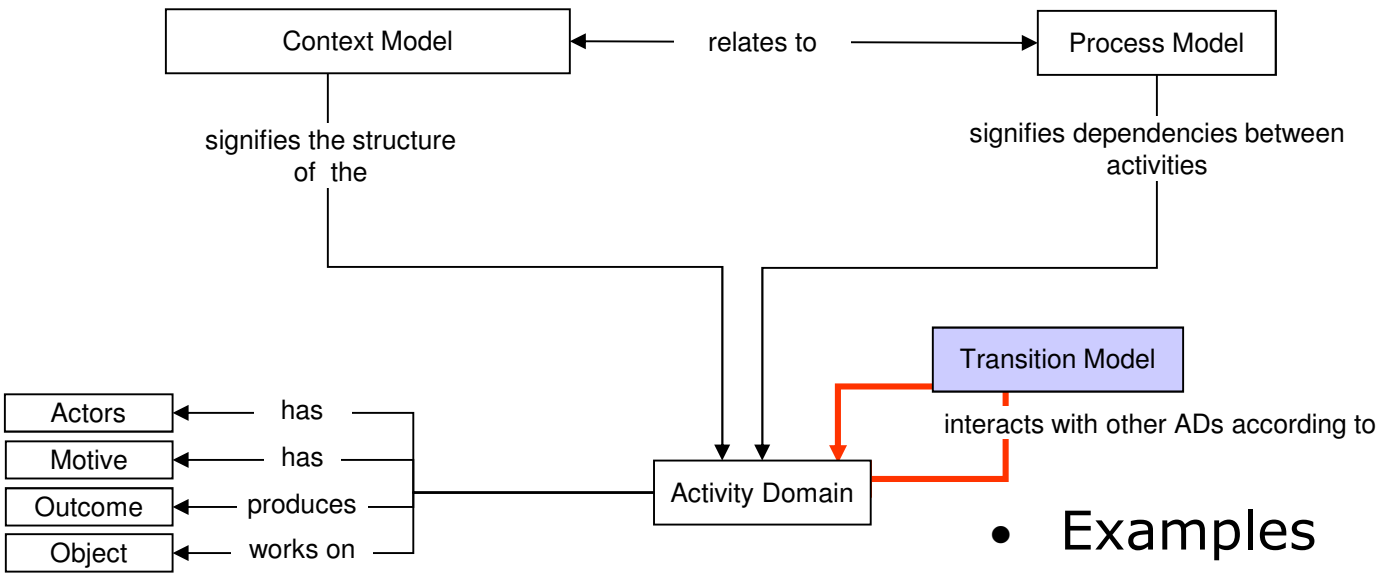
… The Activity Domain Theory …



- Examples
  - Different languages
  - Cultural differences
  - Different currencies
  - Product identification rules
  - …

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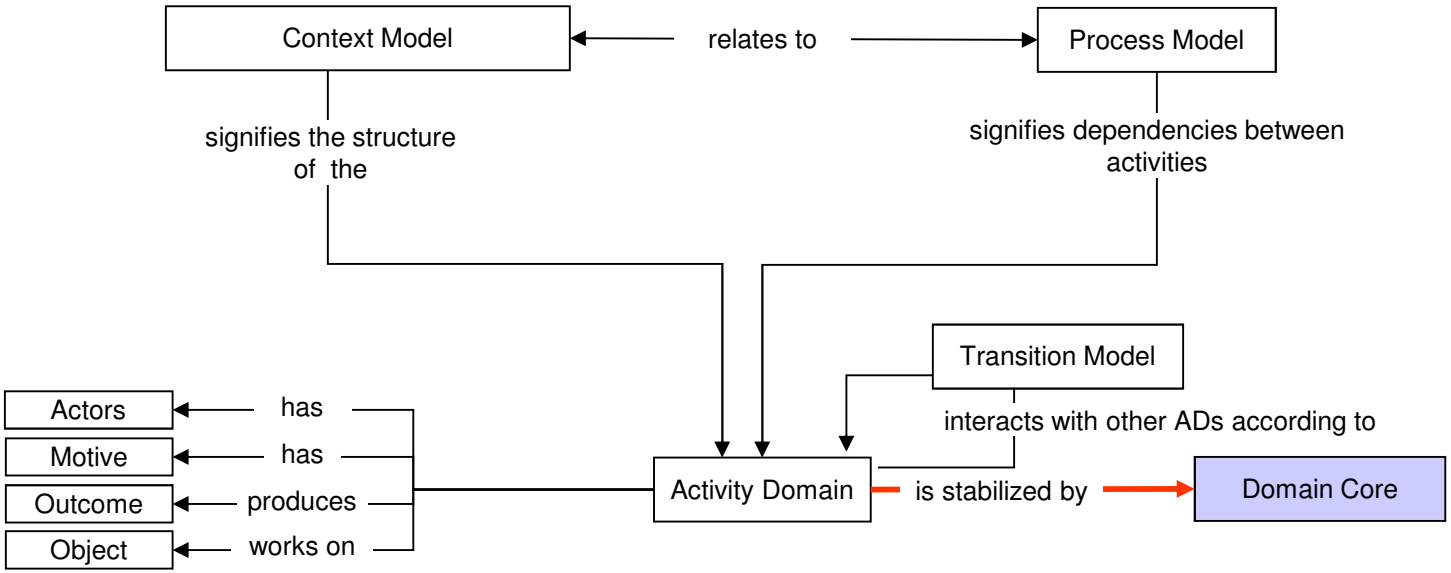
… The Activity Domain Theory …



- Examples
  - Rules
  - Standards
  - Norms
  - …

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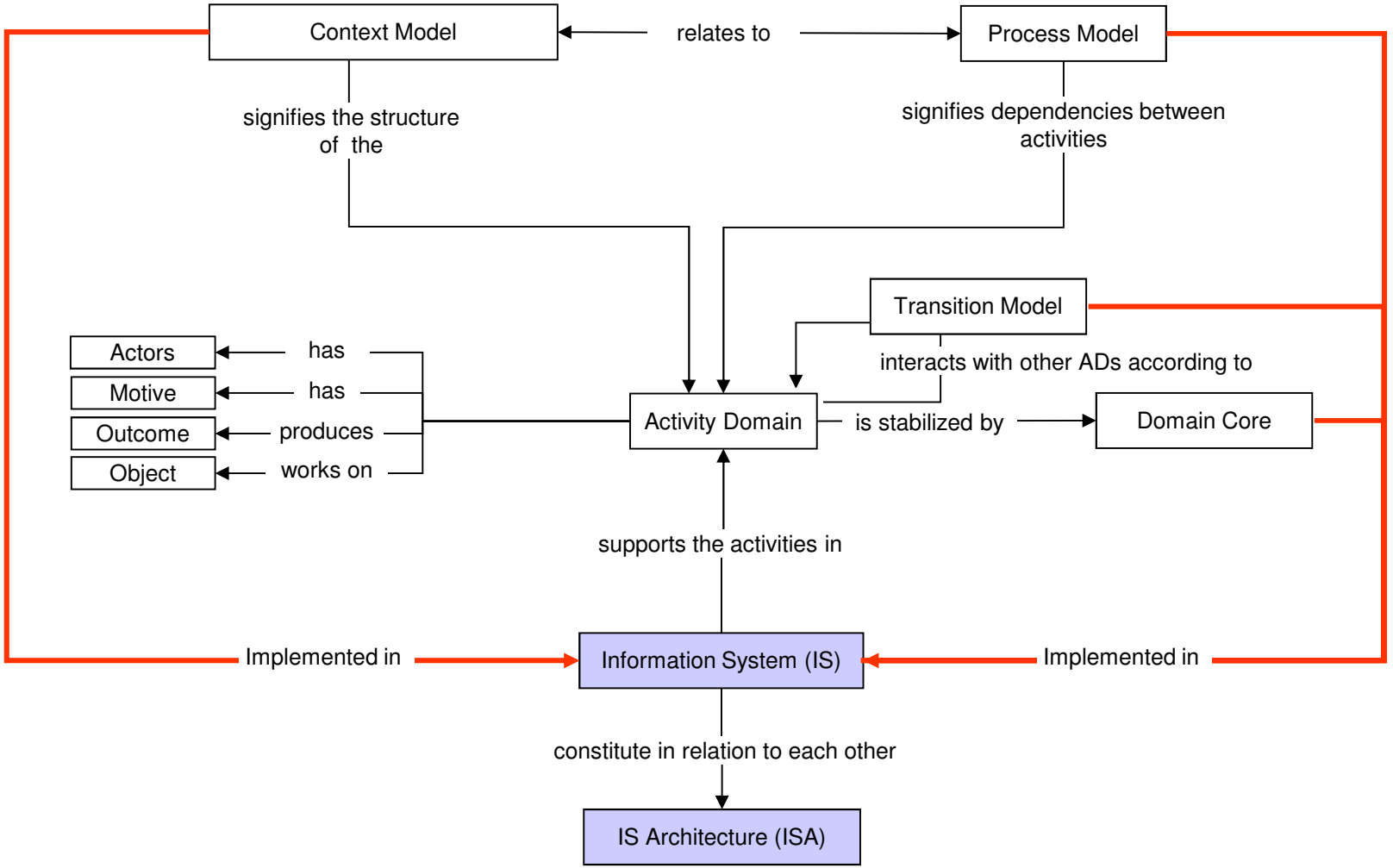
… The Activity Domain Theory …



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Demo - Information system support

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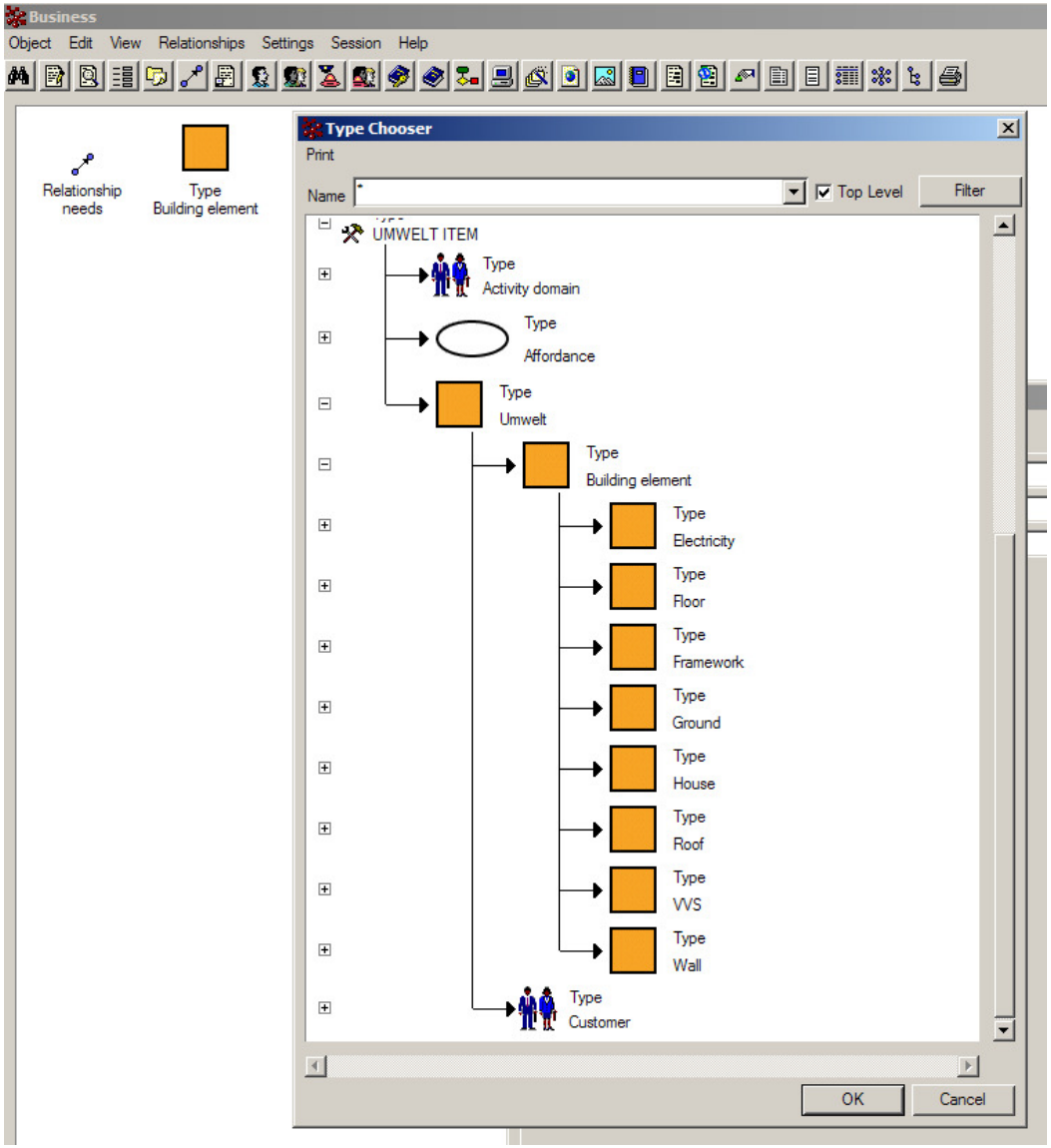
Information system - context model definition



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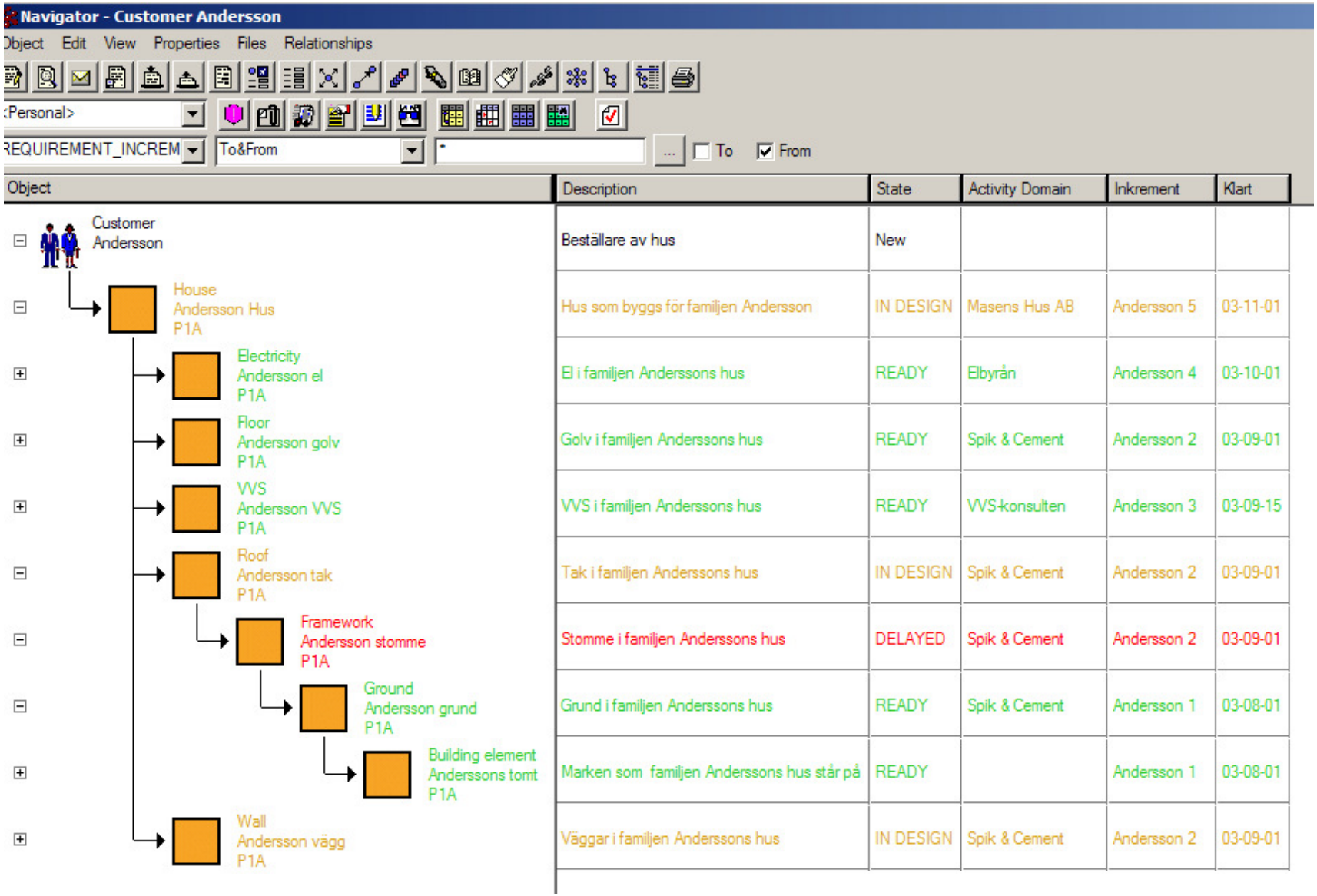
Information system - related objects, data



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Beroendematris

file://localhost/C:/DOCUME~1/lars/LOCALS~1/Temp/HTML_Report.htm

No name

Matrix HTML Relation Viewer

Relation: Floor(Column) Roof(Column) House(Column) Electricity(Column) Framework(Column) Ground(Column) VVS(Column) Wall(Column) Building_element(Column) *needs* Floor(Row) Roof(Row) House(Row) Electricity(Row) Framework(Row) Ground(Row) VVS(Row) Wall(Row) Building_element(Row)

Created 2003-11-11 11.03.57 by Lars Taxen

NOT STARTED | IN DESIGN | DELAYED | READY

	Floor, Andersson golv, P1A	Roof, Andersson tak, P1A	House, Andersson Hus, P1A	Electricity, Andersson el, P1A	Framework, Andersson stomme, P1A	Ground, Andersson grund, P1A	VVS, Andersson VVS, P1A	Wall, Andersson vägg, P1A	Building element, Anderssons tomt, P1A
Andersson golv, P1A									
Andersson tak, P1A									
Andersson Hus, P1A									
Andersson el, P1A									
Andersson stomme, P1A									
Andersson grund, P1A									
Andersson VVS, P1A									
Andersson vägg, P1A									
Anderssons tomt, P1A									

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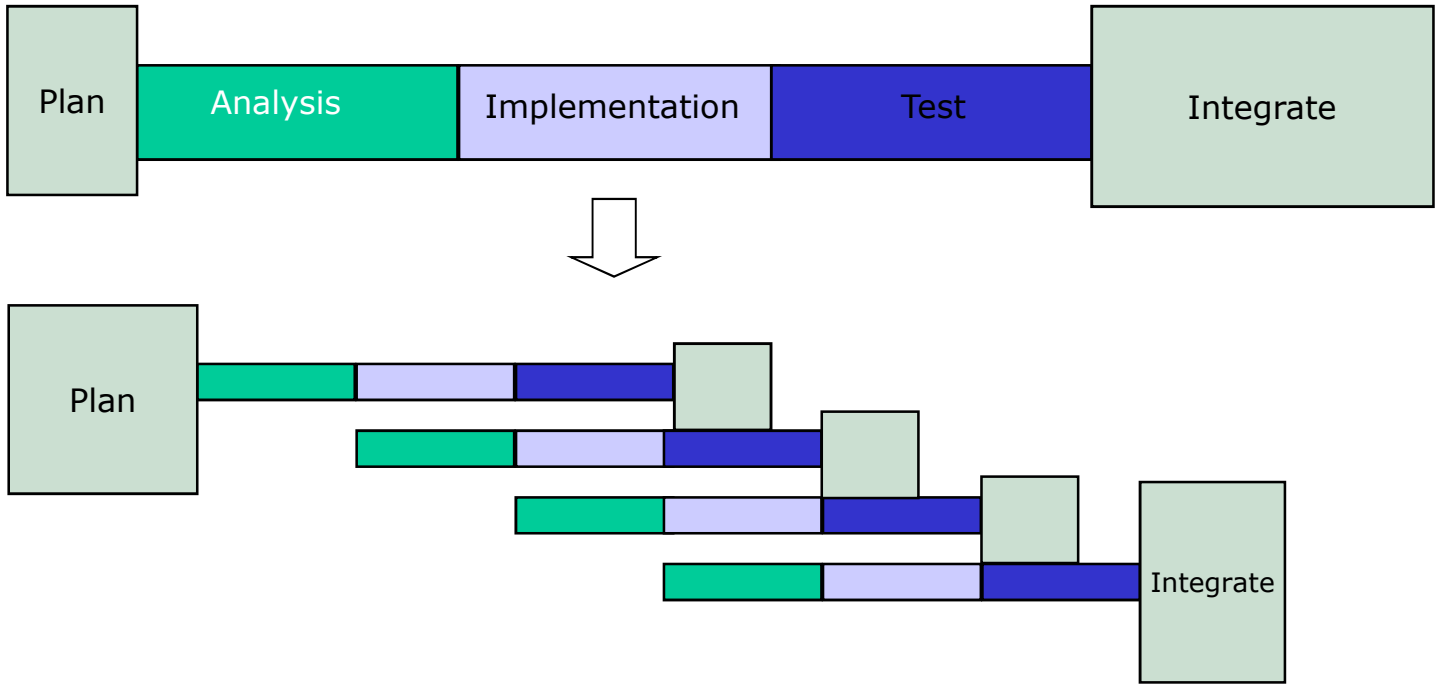
What about incremental development?

- Increment
  - a development task split in smaller parts
  - builds on a verified base
  - is a verifiable addition to the system
  - is a development task: a “mini-project”
  - has a ready date



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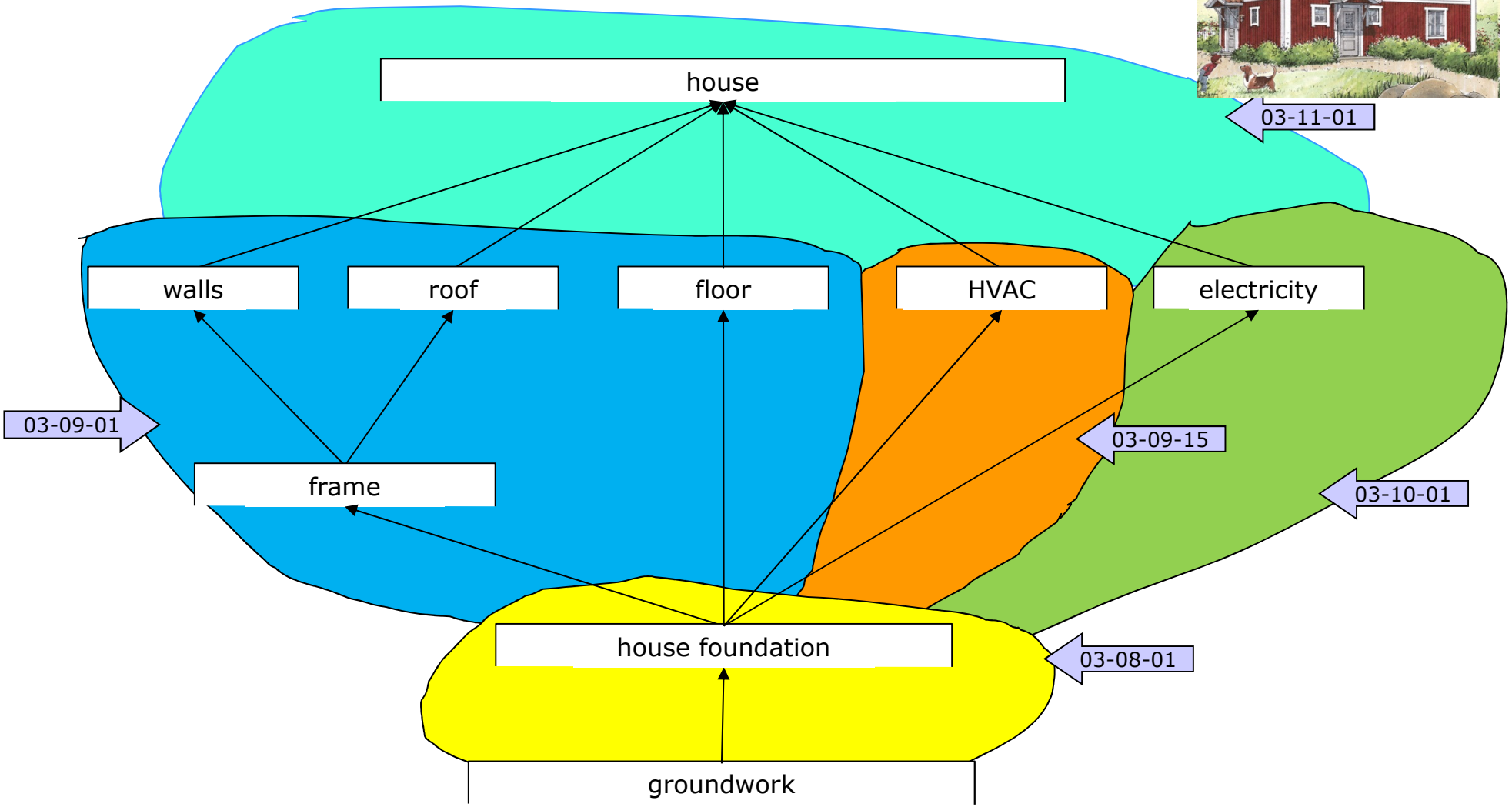
Possible increments



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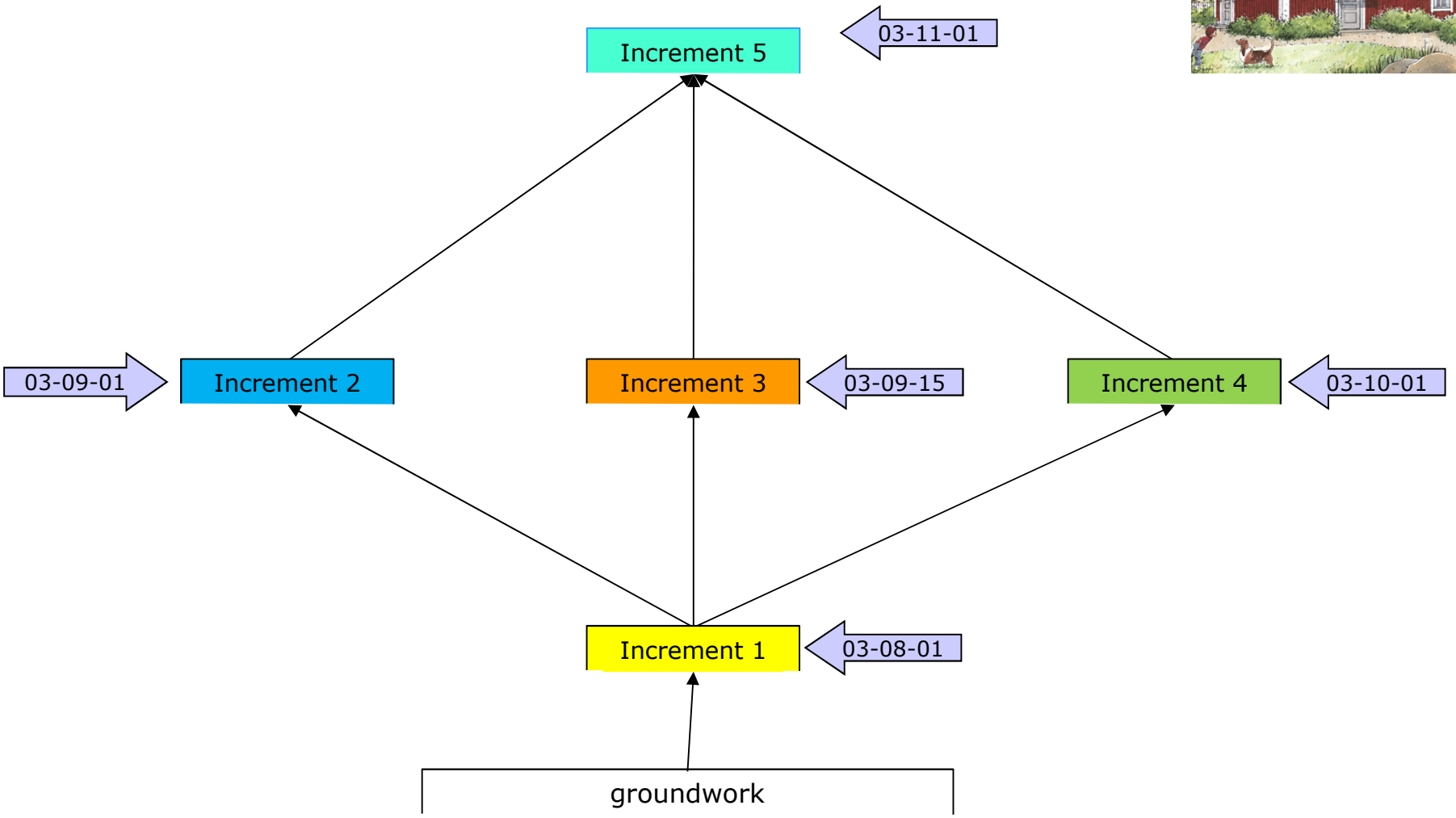
Dependencies - increments



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Coordination of 3G development projects

ERICSSON

- Four Activity Domains (Sweden, Germany)
- Global information system support (eMatrix)
- Continuous change of information system implementation
  - ~500 / year
- Used by ~140 main and sub-projects between 1998-2002

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Profound impacts

ERICSSON

"Especially for the execution part I think we would not have been able to run this project without the tool. I think if you simply look at the number of work packages, the number of products that we have delivered, the number of deliveries that we have had, if we would have had to maintain that manually, that would have been a sheer disaster."
(Project manager, MSC node, 3G mobile system)

Restructuring PLM

ERICSSON

- Activity domains in the organisation
- Clean-up of terminology
- Multi-domain product structure
- Prototype of a core information system
- Balancing between control and autonomy
- Alternative business process model

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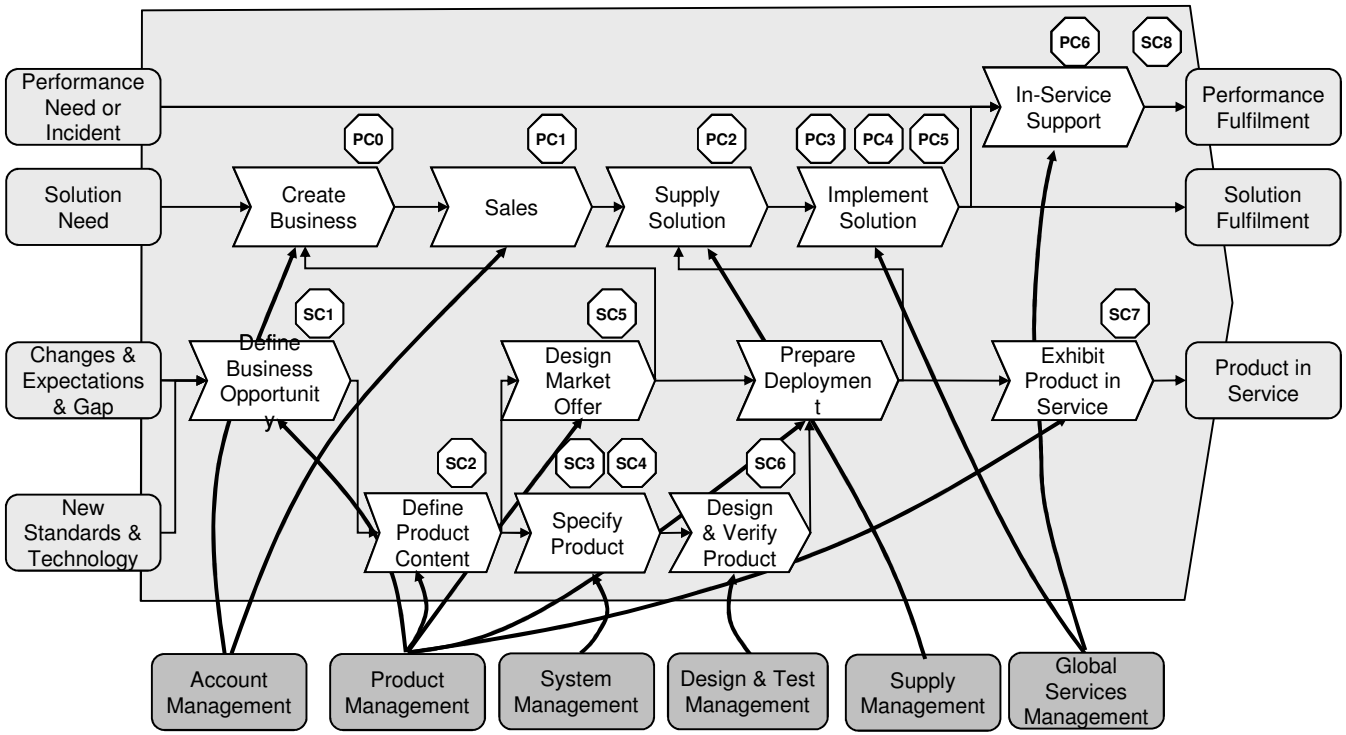
Business process - traditional



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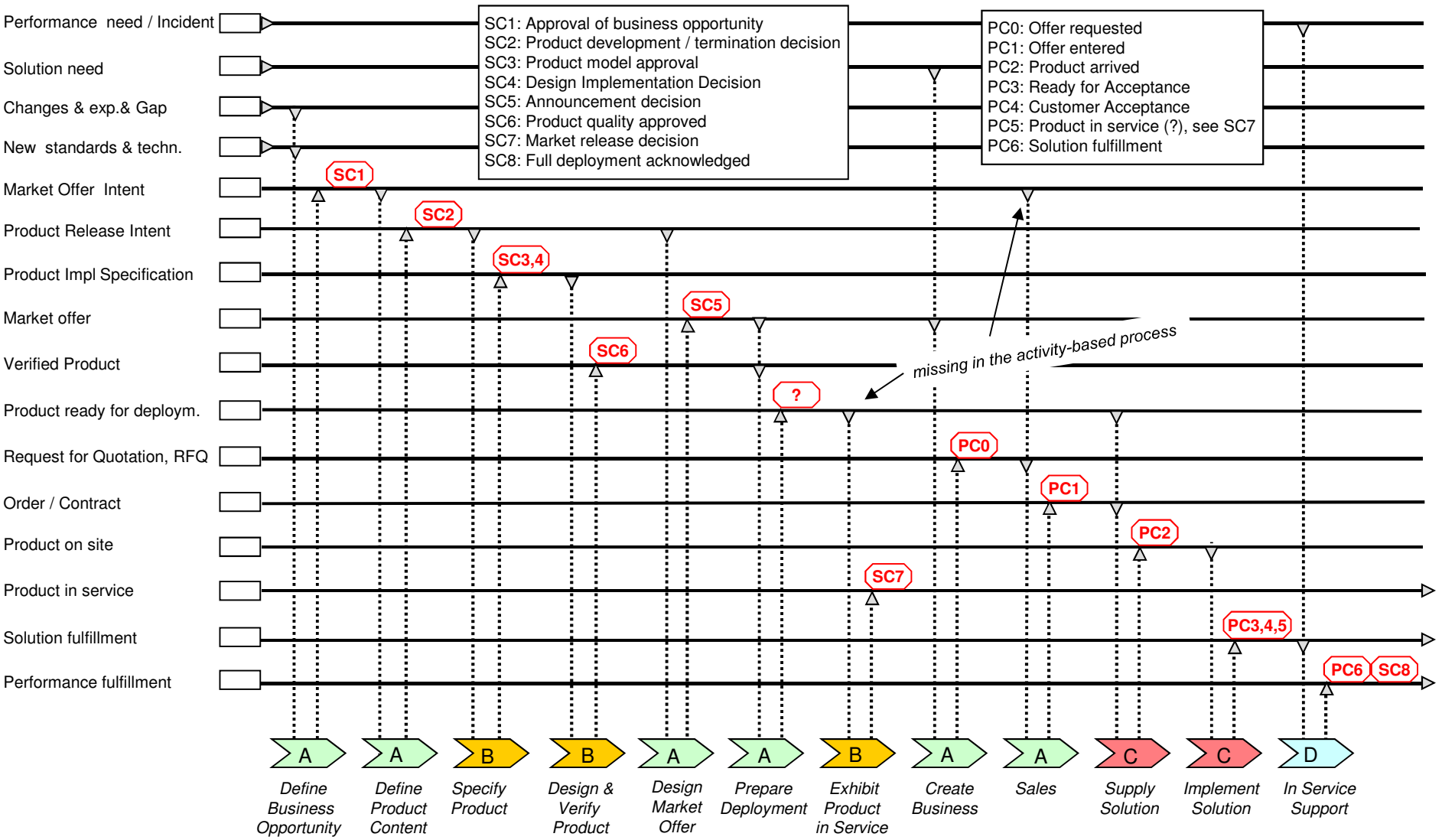
Business process - alternative



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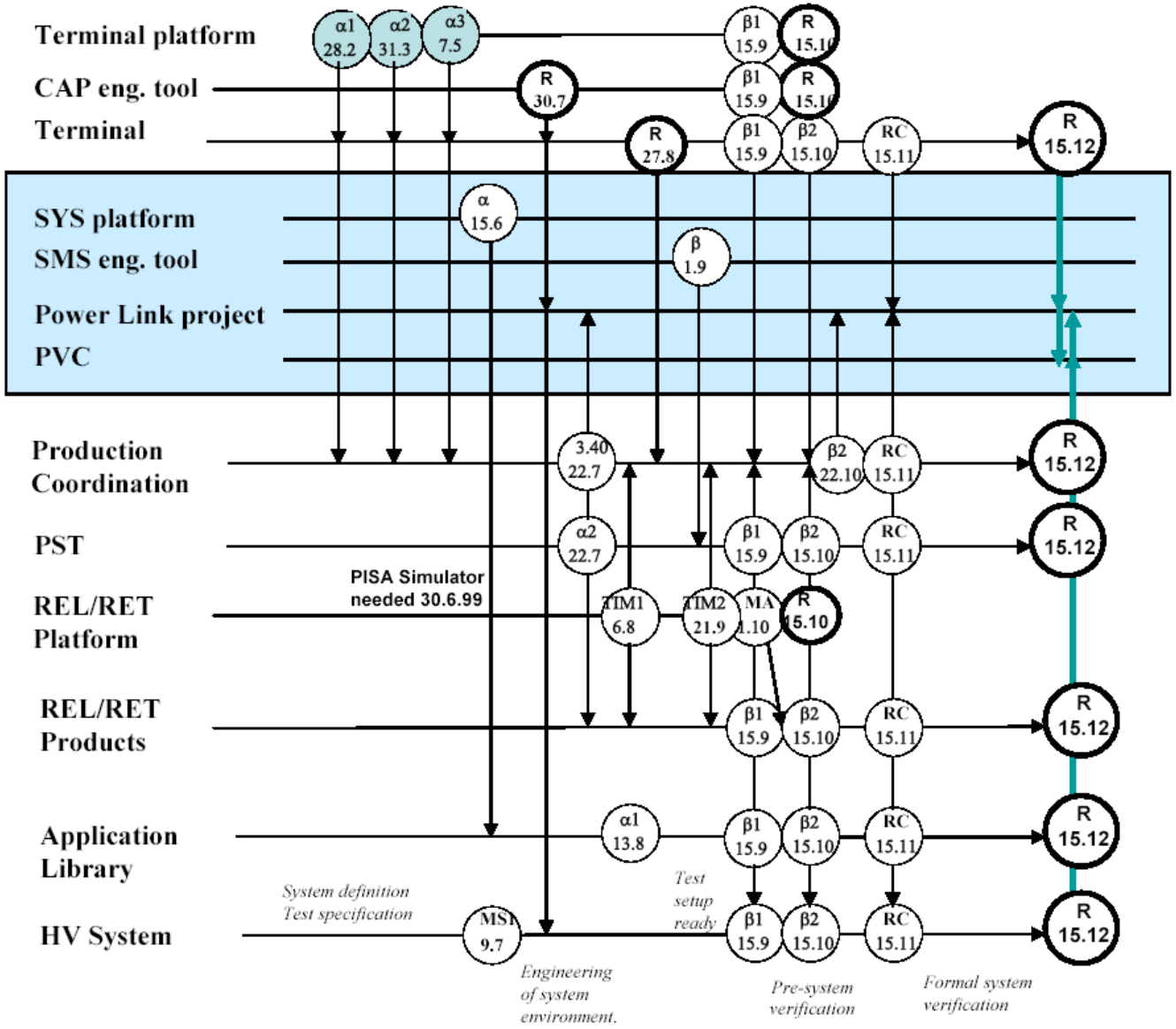
Dependency diagram ABB



Courtesy: Joakim Lilliesköld, KTH

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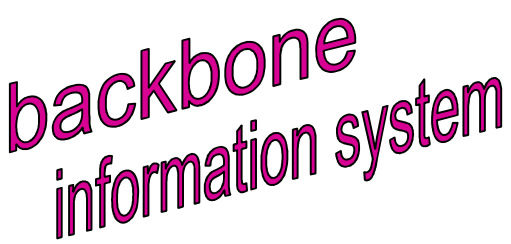
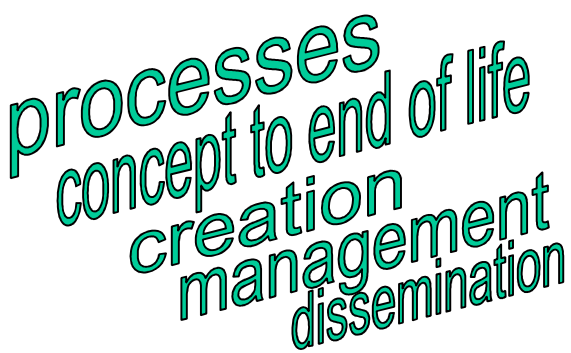
Towards an alternative PLM foundation

Integration





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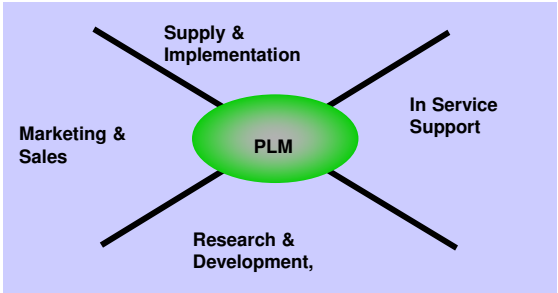
Towards an alternative PLM foundation

people
collaboration
information

Activity Domains



Integration

backbone
information system

processes
concept to end of life
creation
management
dissemination

product
product related

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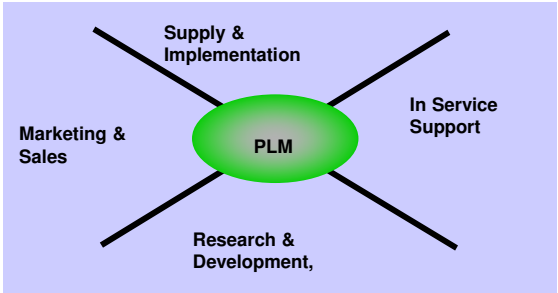
Towards an alternative PLM foundation

people
collaboration
information

Activity Domains



Integration

backbone
information system

processes
concept to end of life
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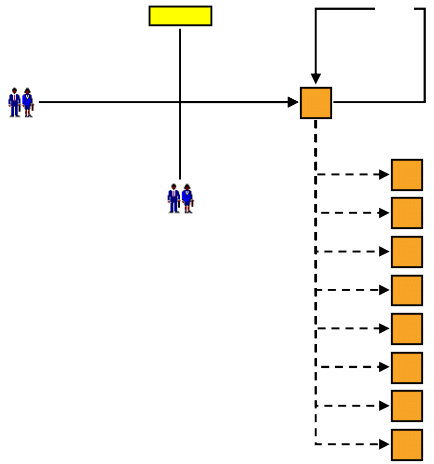
management
dissemination

Context Model



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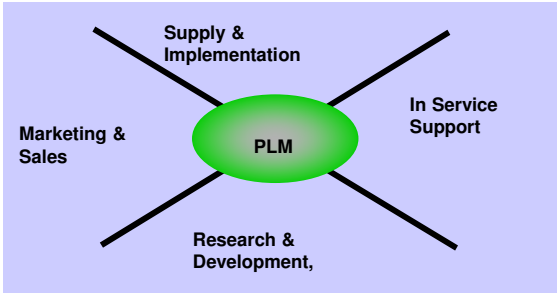
Towards an alternative PLM foundation

people
collaboration
information

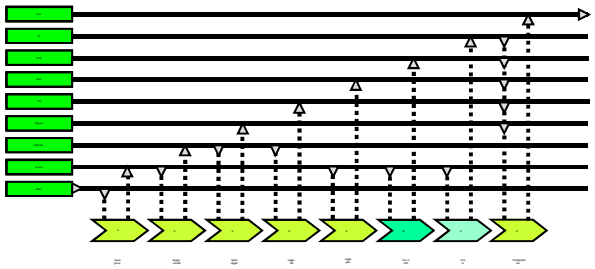
Activity Domains



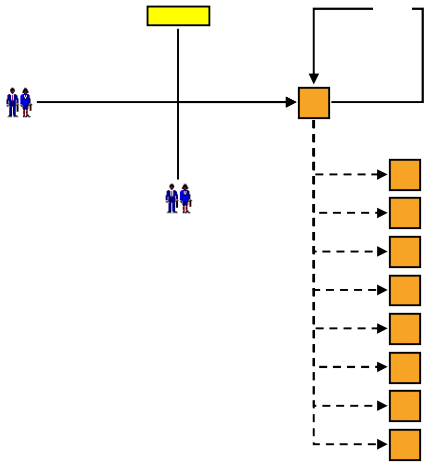
Integration

backbone
information system

Process model



Context Model



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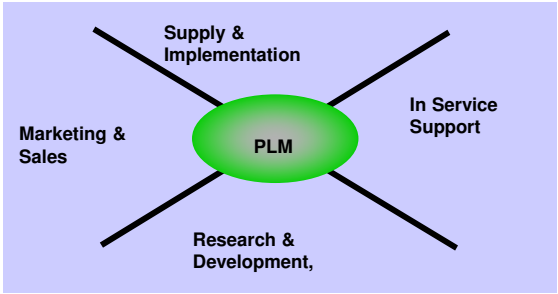
Towards an alternative PLM foundation

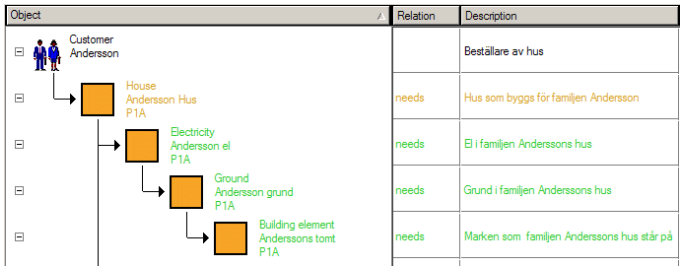
people
collaboration
information

Activity Domains

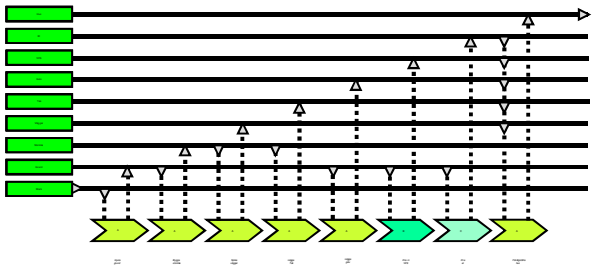


Integration

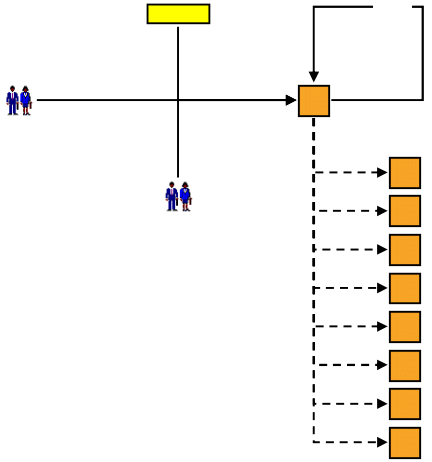
Information System



Process model



Context Model



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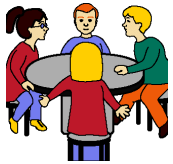
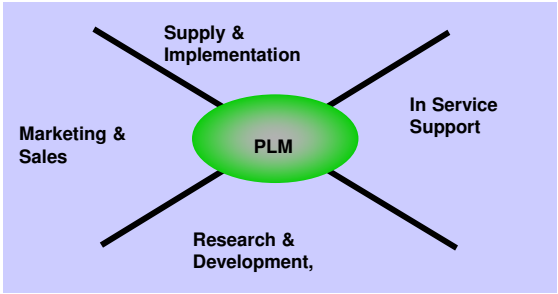
Towards an alternative PLM foundation

Focus on shared meaning

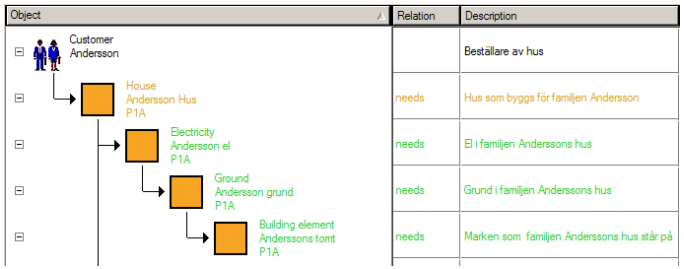


Activity Domains

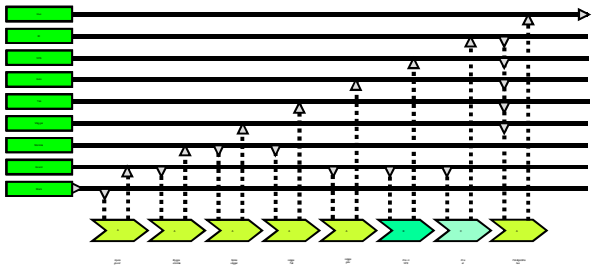


Integration

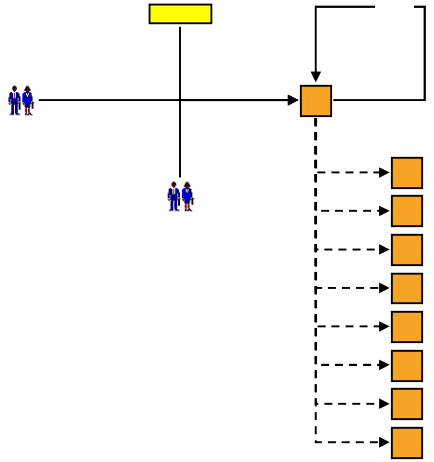
Information System



Process model



Context Model



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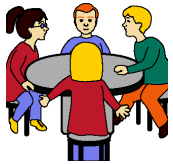
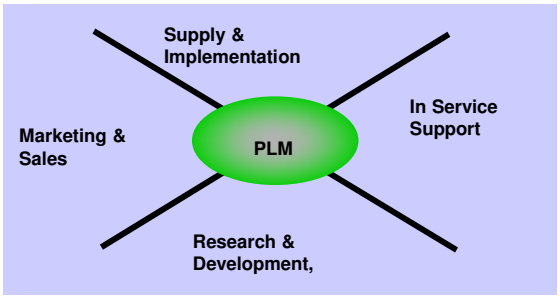
Towards an alternative PLM foundation

- **Confusion about meaning ?**
- **Control of dependencies ?**
- **Different product structures ?**
- **Confusion about coordination ?**
- **Commitments and agreements ?**
- **IS architectures ad-hoc ?**

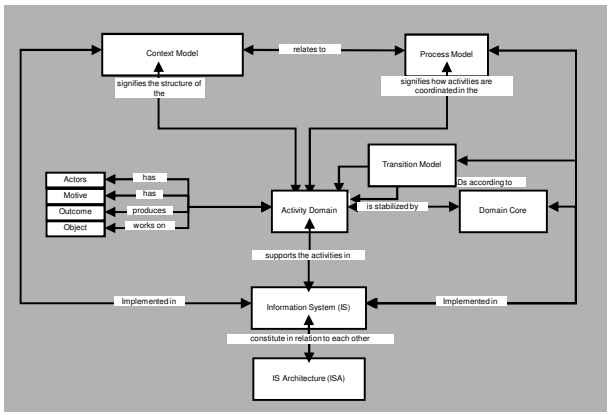
Focus on shared meaning



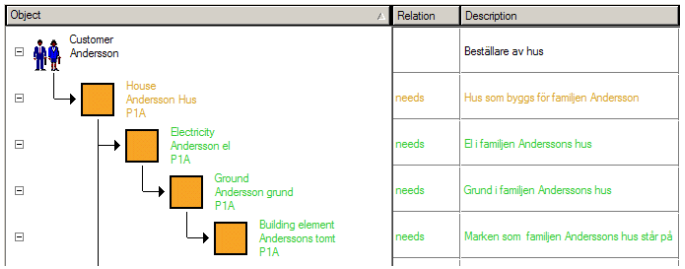
Activity Domains



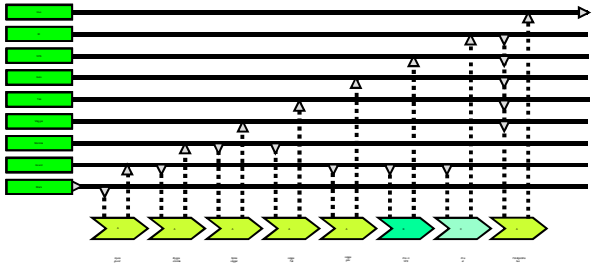
The Activity Domain Theory



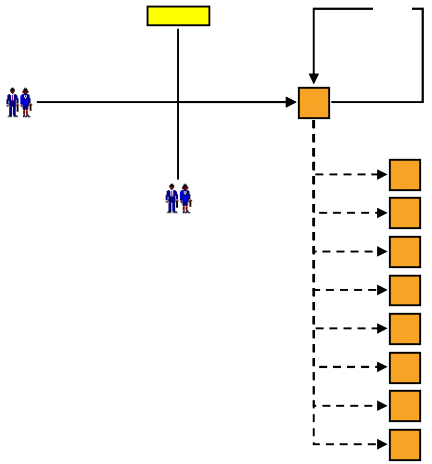
Information System



Process model



Context Model



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Thank you!