Tailoring a Method for System Architecture Analysis

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Declaration of content

- A method to find architectural drivers, architectural design choices, and to evaluate alternatives
- Use in automotive hybrid system case – one example
- Lessons learned and experience

ProDrive 2

Efficient electrical drive system platform for heavy vehicles

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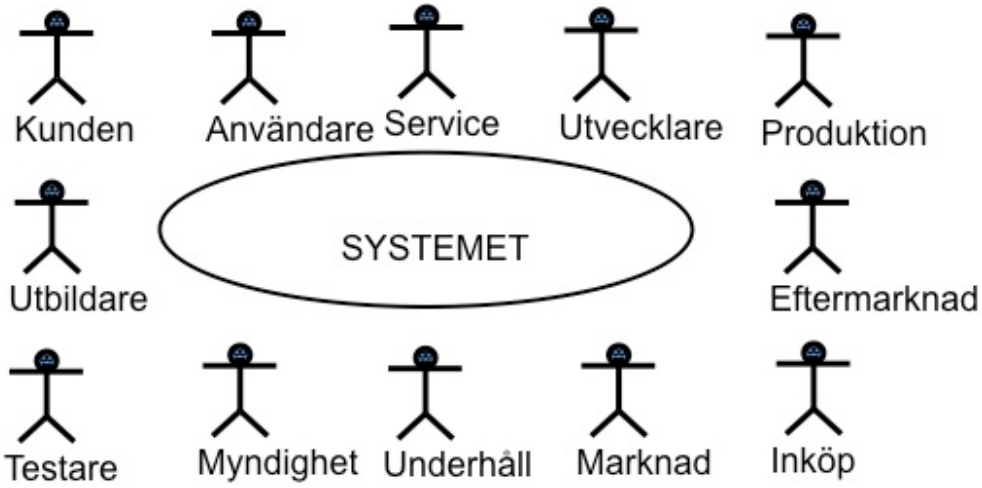
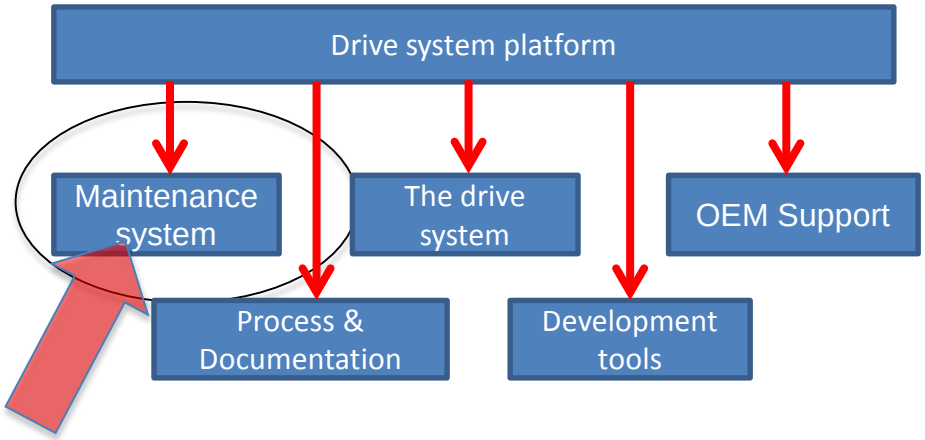
Stakeholder analysis and system boundary

A drive system platform

- 29 people/ 11 roles
- 1100 statements
- 200 process related
- Advanced lifecycle
- <10% architecturally significant





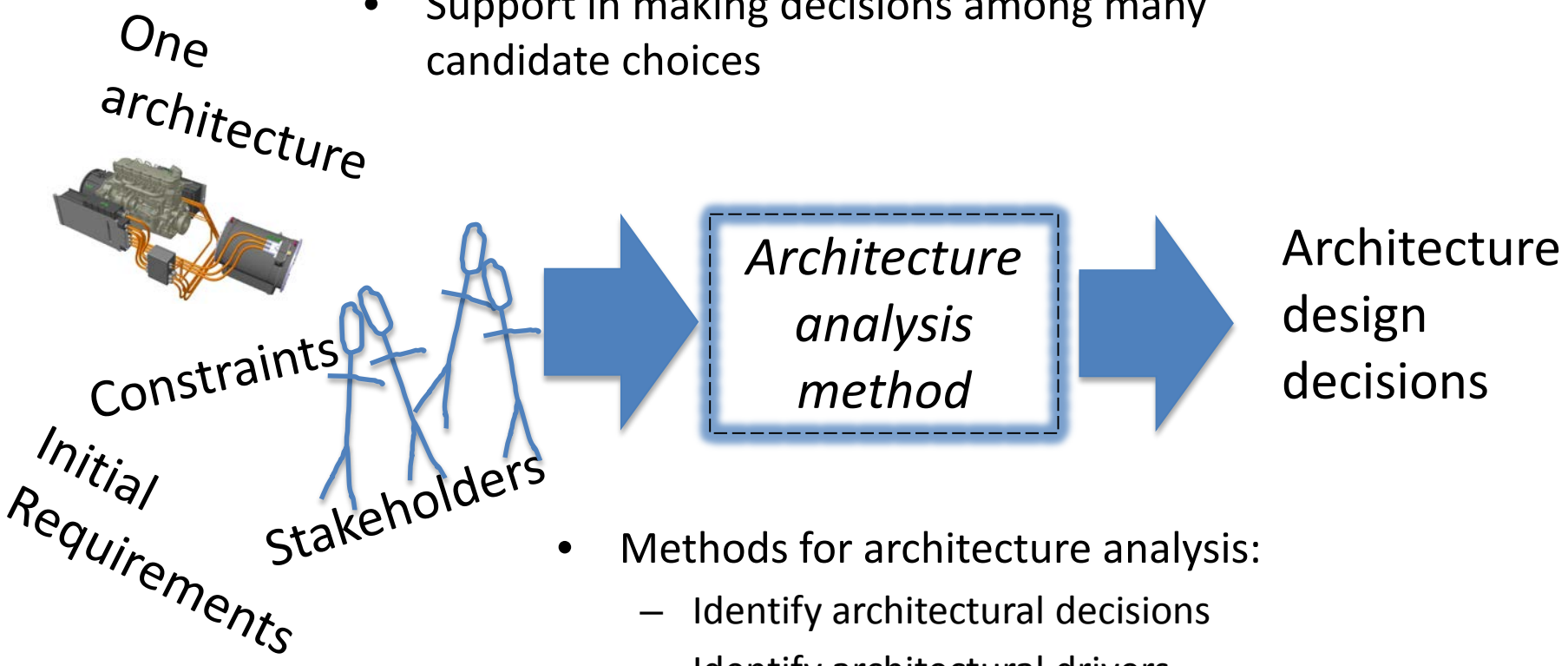
Success comes from many other things than drive system design

- The process to offer, simulate and test each system
- The maintenance system is crucial to usefulness

Architecture analysis and methods

Maintenance system

- Support in making decisions among many candidate choices



- Methods for architecture analysis:
  - Identify architectural decisions
  - Identify architectural drivers
  - Analyze relationships
  - Support decisions on architectural alternative

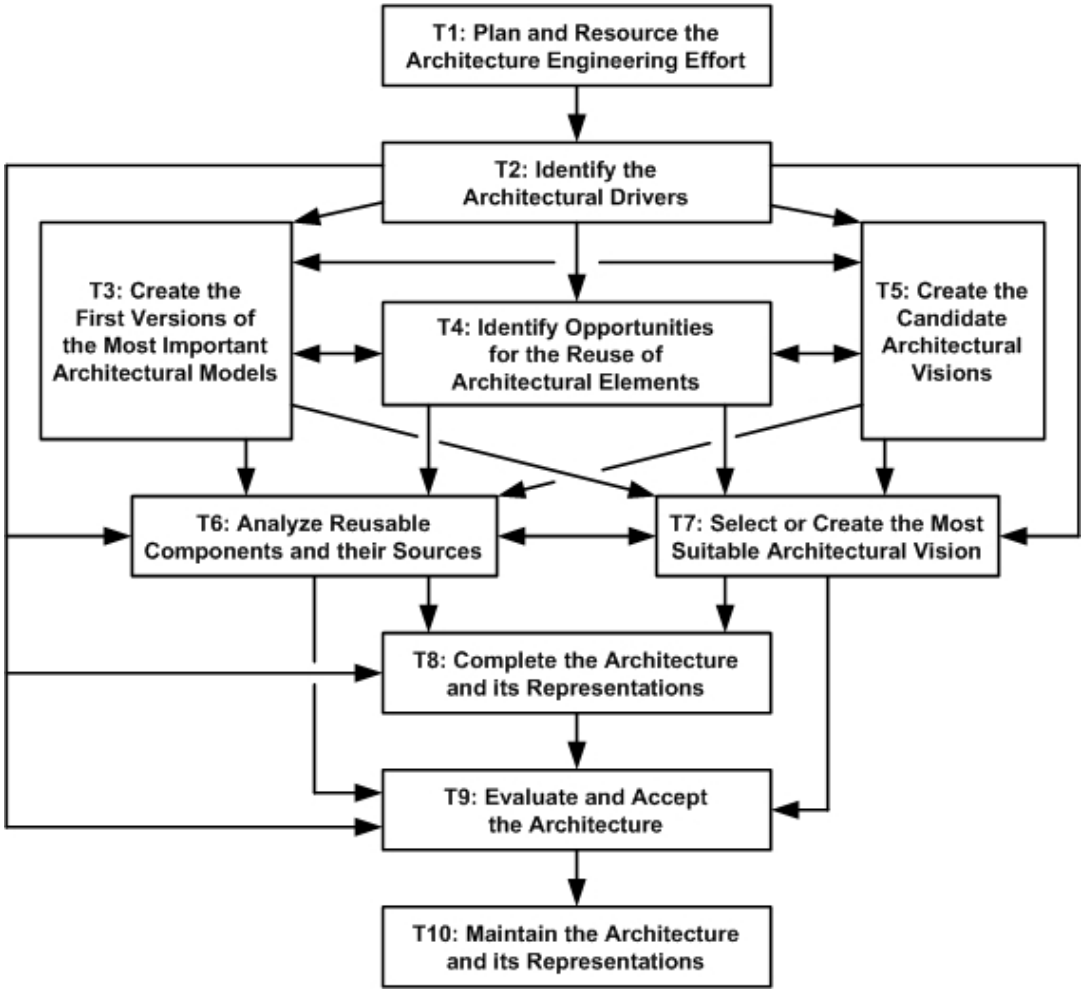
Practitioners define “usable”

- An architecture analysis method
  - Shall support selection of architecture alternatives
  - Low footprint
  - Cover the complete system usage and scope
  - Shall be based on quantifiable entities
  - Analysis results early in development

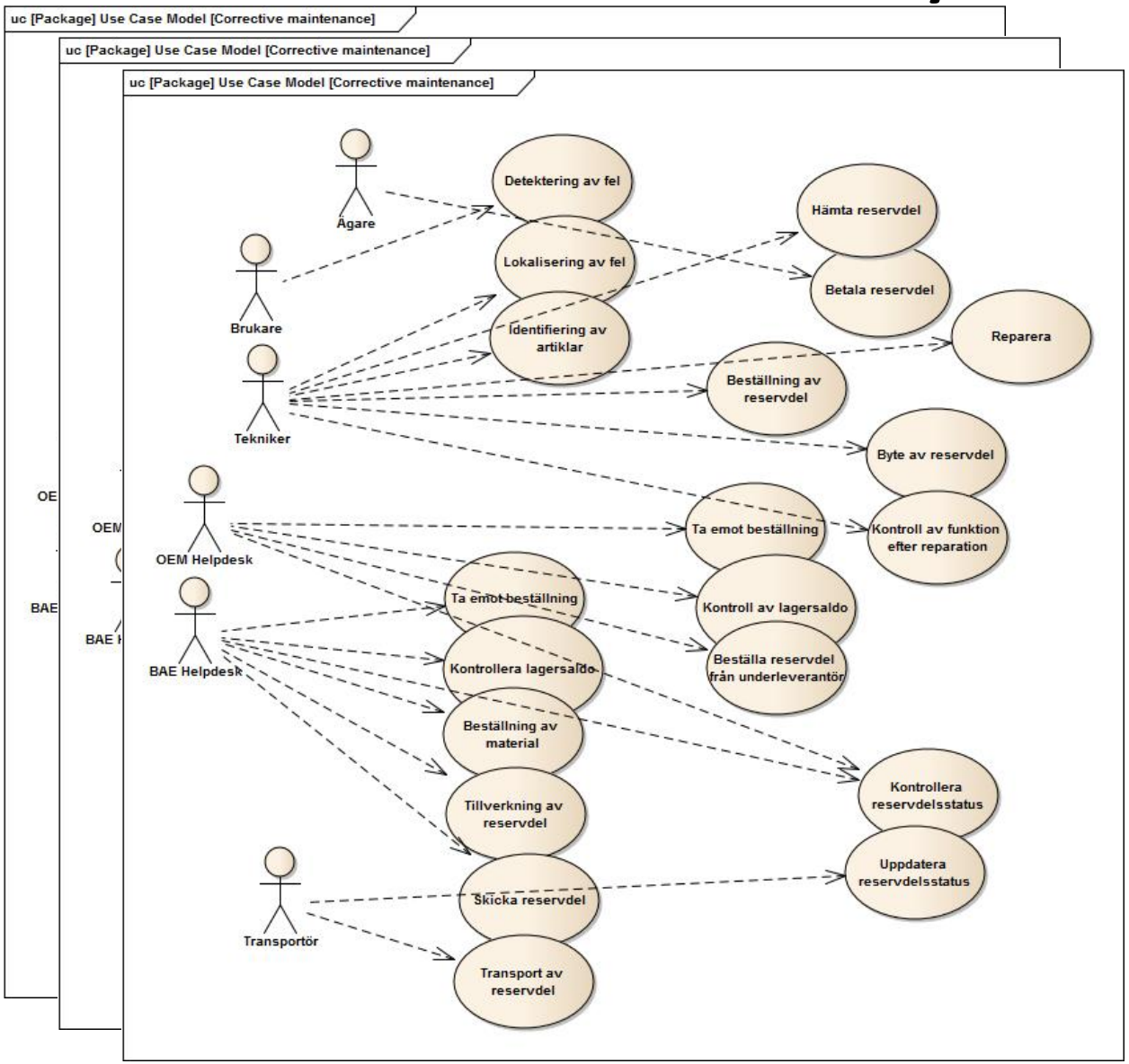
Available methods

- Firesmith – MFESA
- Kazman – ATAM
- Axelsson – ALCEA
- Muller – CAFCR
- SE guidelines, Incose

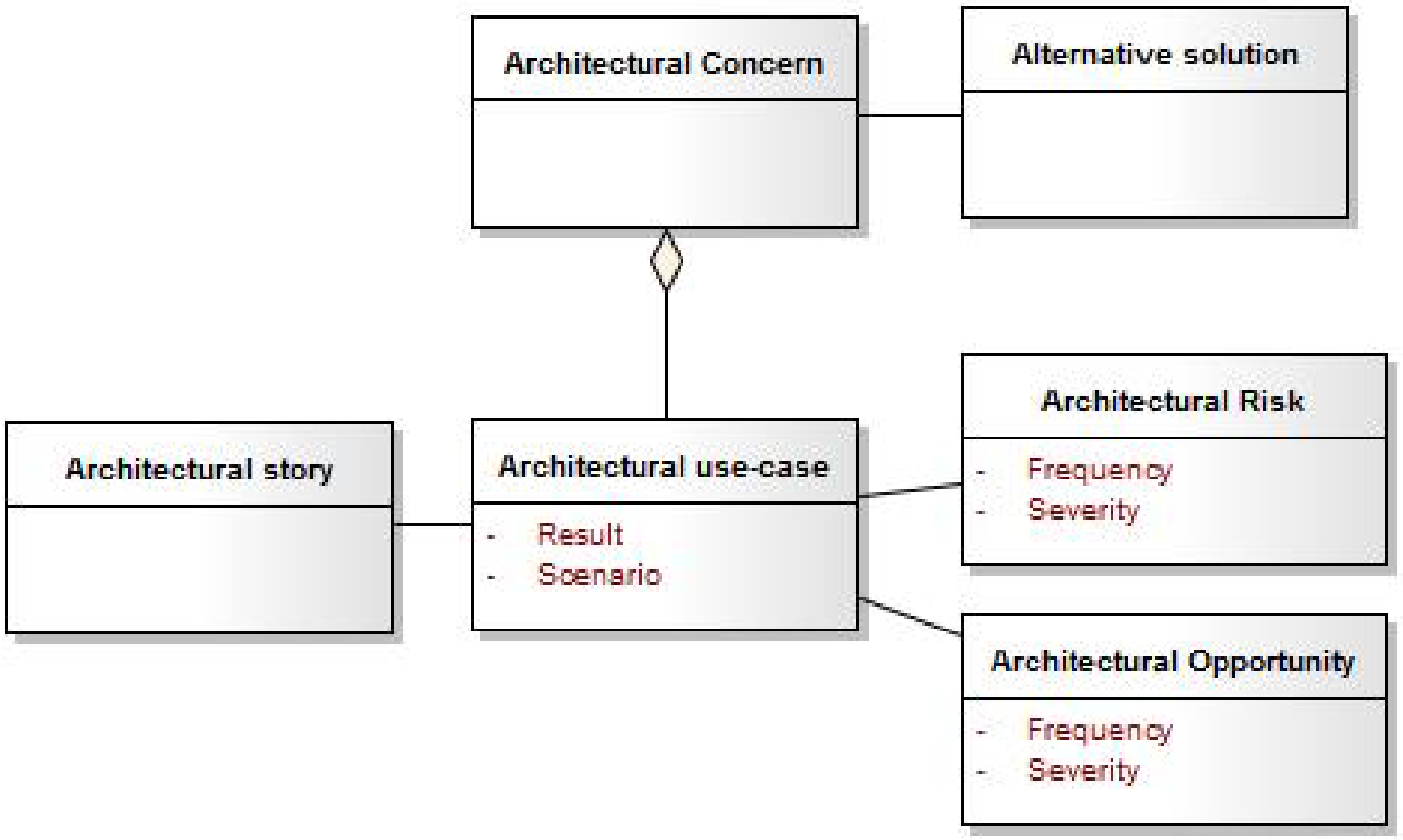
MFESA



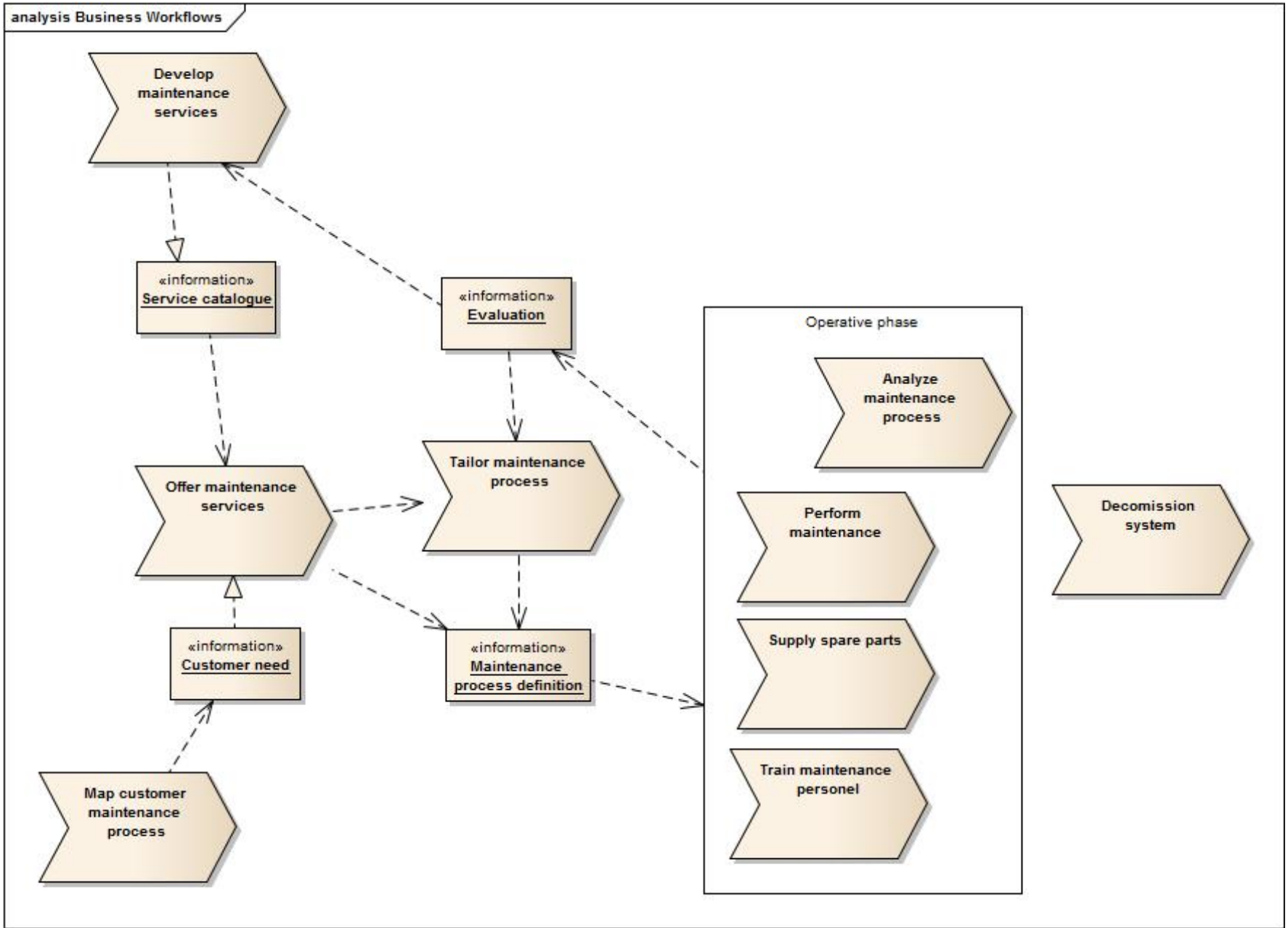
Use-case models for all system use



Analysis structure



Lifecycle model for the maintenance system



Architecture Evaluation

- Estimate/Measurement of concrete result
- Unit is money per year

- Example: Should the system be equipped with telematics solution 1,2, or 3?

LC Phase	Type of value	Arch 1	Arch 2	Arch 3
Develop Maintenance	Investment	-0,1	-1,5	-7,5
Perform Maintenance	Cost reduction	1,5	0,35	0,35
Perform Maintenance	Faster	5	10	10
Deliver spare parts	Correctly	2	10	10
Offer to customer	Quality	1	3,5	0
		9.4	22.35	12.65

Method summary

- ✓ Identify stakeholders, lifecycle, system boundary
- ✓ Identify architectural decisions and drivers
- ✓ Use quantifiable data
- ✓ Support evaluation of architecture alternatives

Conclusions

- Method defined, used
- One architectural concern evaluated w candidates
- Usable in case
  - More evaluations to come
  - The progression to find alternatives could be improved
  - The method does allow evaluation of architectural alternatives based on quantifiable measures
- Defining a method takes time! (and iterations)