

Assignment 6, Theme A: Feature-Oriented Domain Analysis

University Zürich, Fall 2011
Requirements Engineering II

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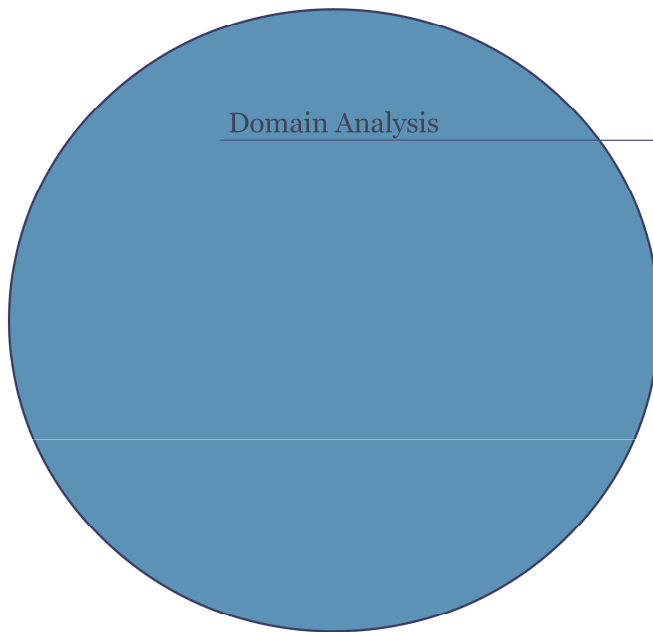
Kristin Kruse [presenting]

Outline

Feature-Oriented Domain Analysis

- Introduction and Terminology
- Modeling language (*Feature Diagrams*)
- Extension (*Multi-Level Feature Trees*)
- Conclusion

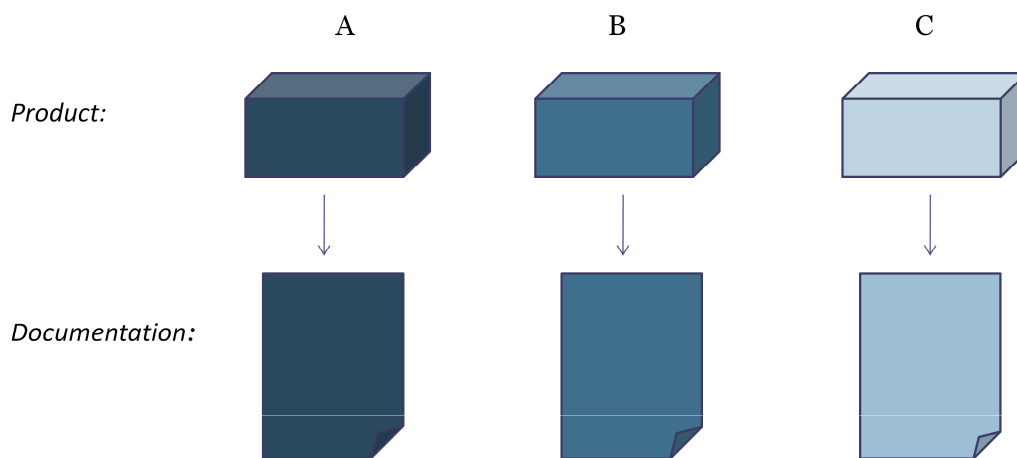
Domain Analysis



Domain Analysis is done by
“examining the existing and
related documentation and
applications (...) and [by] the
identification of reusable
concepts and components.”

(Zowghi 2005, p. 26)

Domain Analysis: Example



Annotation to Example

Case description:

A software company is producing three software product in the same domain for three different client companies (after each other).

For each project a corresponding requirements engineering process including a domain analysis of all previous projects is required:

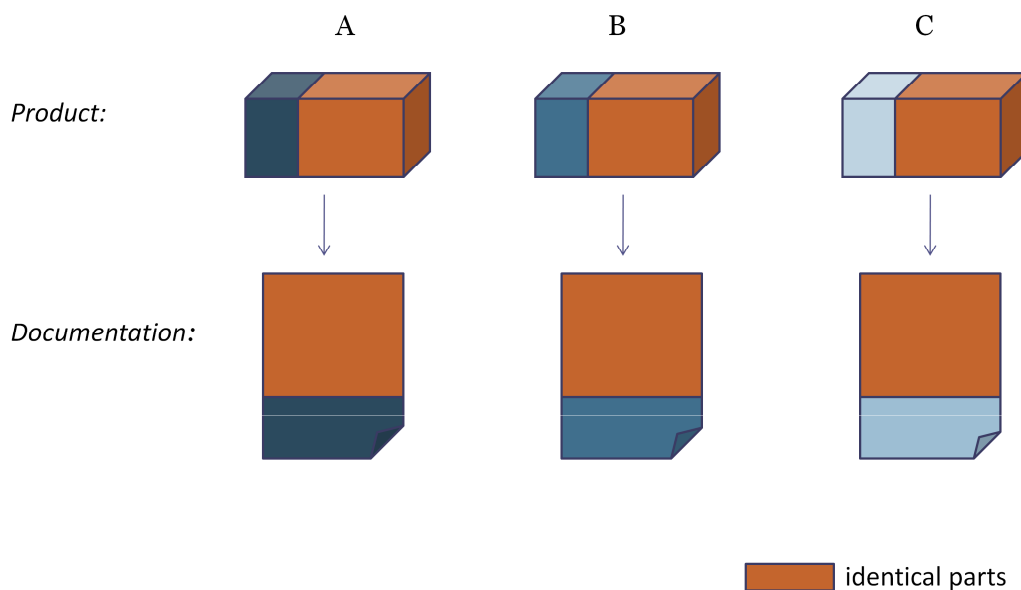
Domain Analysis A:

Domain Analysis B: Documentation A

Domain Analysis C: Documentation A & B

→ Point 1: the more project are made, the larger the domain analysis for a new project gets.

Domain Analysis: Example



Annotation to Example

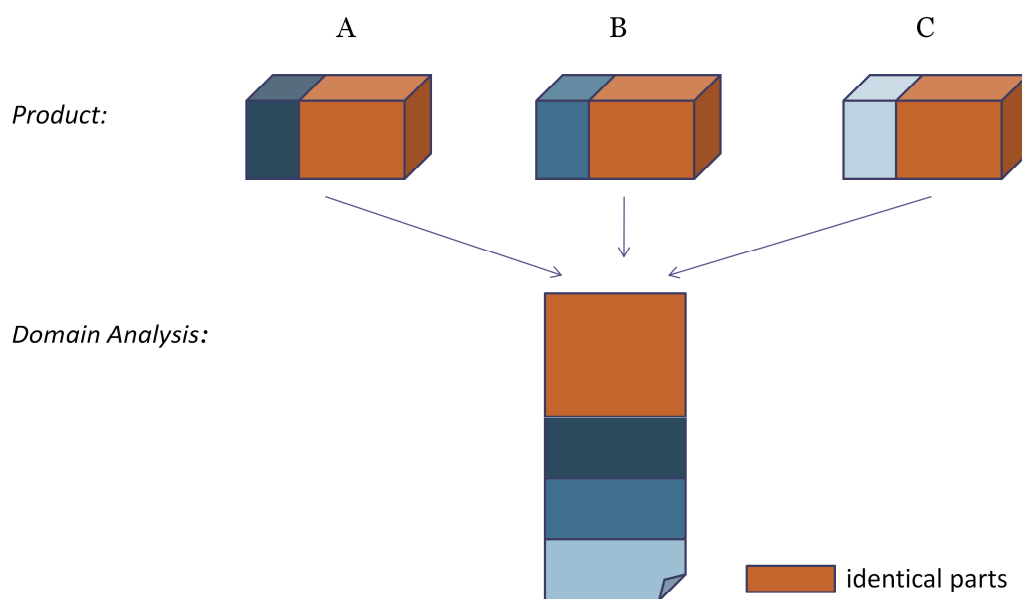
Case description (contd.):

The three projects are not only in the same domain, but in fact, there are almost identical.

But every project is special adjusted to each client company, so a requirement process is needed every time again (including a domain analysis).

→ Point 2: in addition to point 1, there is a lot of redundancy that will be covered in the domain analysis process.

Feature-Oriented Domain Analysis: Example



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Annotation to Example – Feature-Oriented Domain Analysis

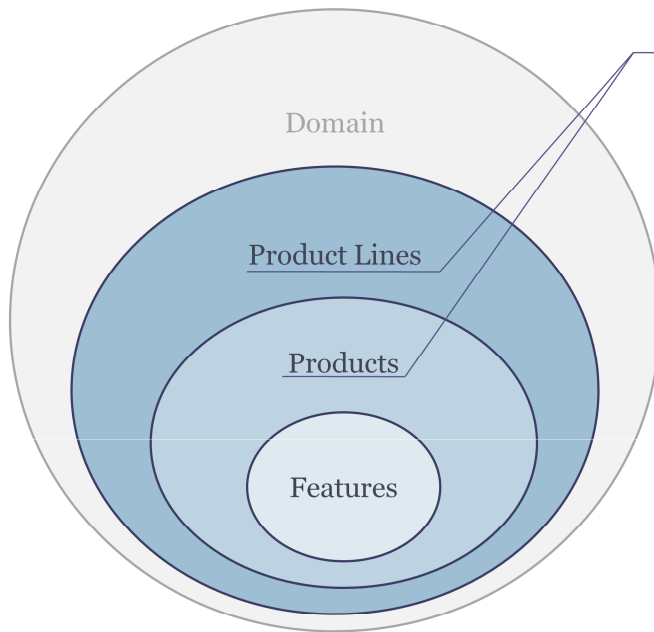
Required solution:

A documentation that covers the union of all important characteristics over all valid and similar projects.

Open questions:

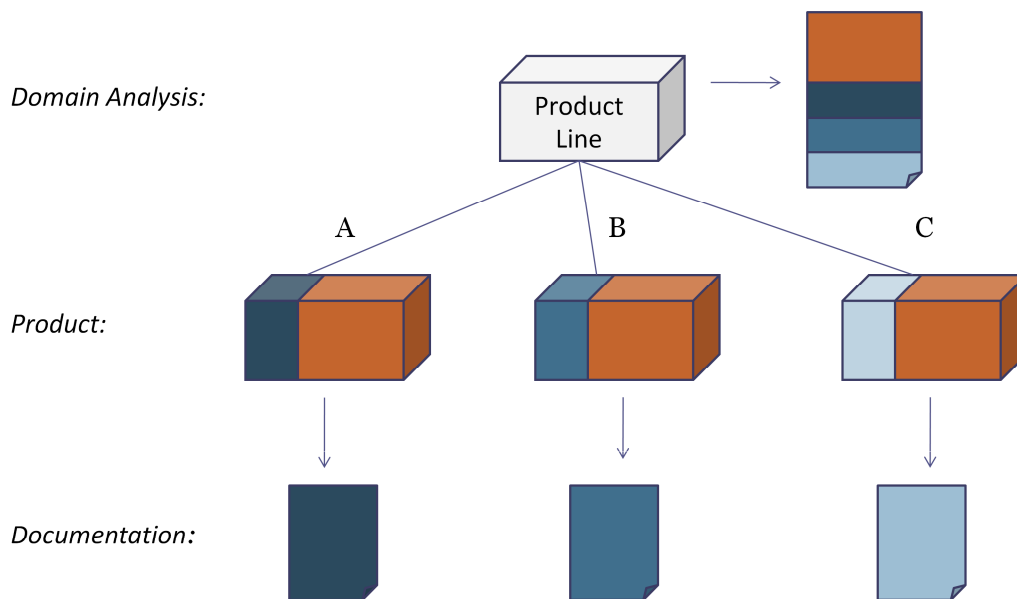
How to organize 'similar' projects?

Product Lines



"A **product line** is a set of several **products** which share many common characteristics but also show certain substantial differences."
(Reiser 2006, p.1)

Feature-Oriented Domain Analysis: Example



Annotation to Example – Feature-Oriented Domain Analysis

Required solution (contd.):

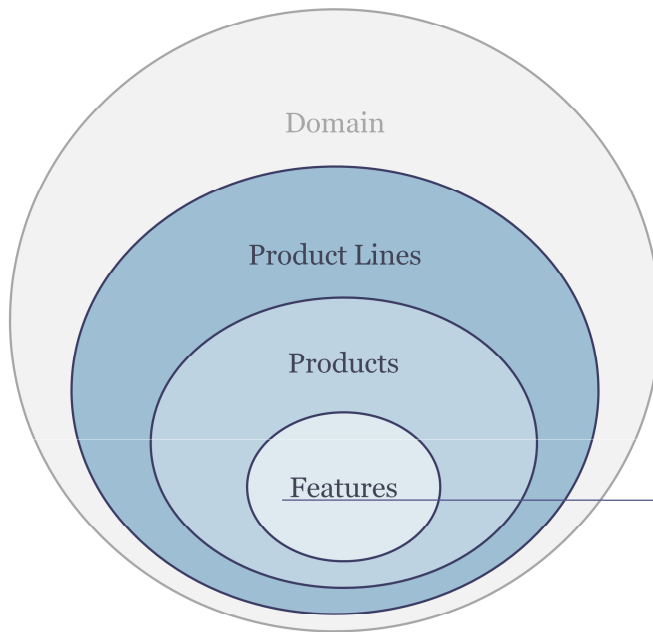
With the inclusion of the 'Product Line' concept, similar projects can be treated together.

And to each Product Line this required documentation with the union of all valid characteristics can be associated.

Open question:

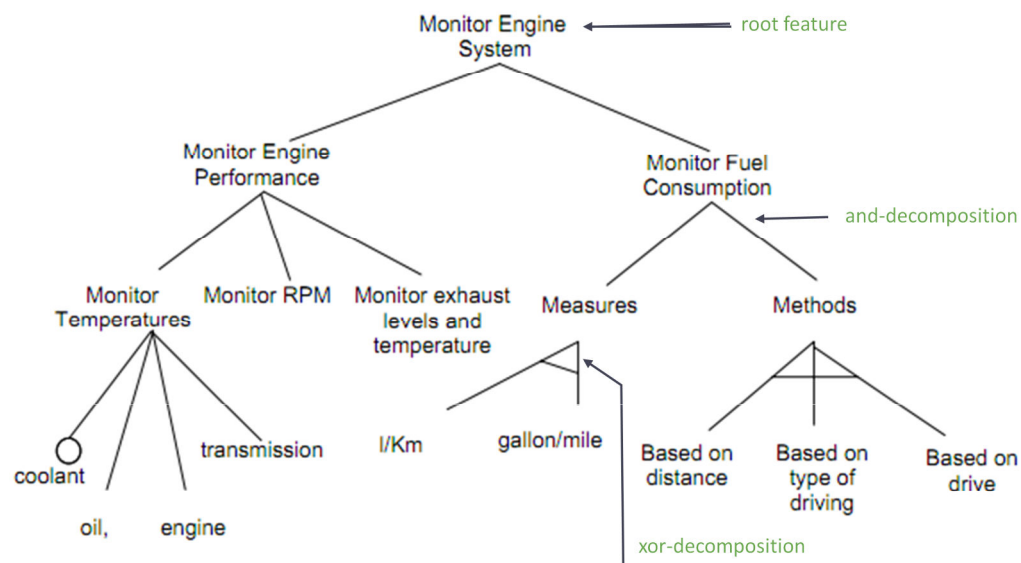
How to organize 'characteristics'?

Features



Features have been defined as
“a distinguishable
characteristic of a concept
(e.g. system, component...)”
that is relevant to some
stakeholder of the concept”
(Schobbens 2007, p.456)

Feature Diagrams



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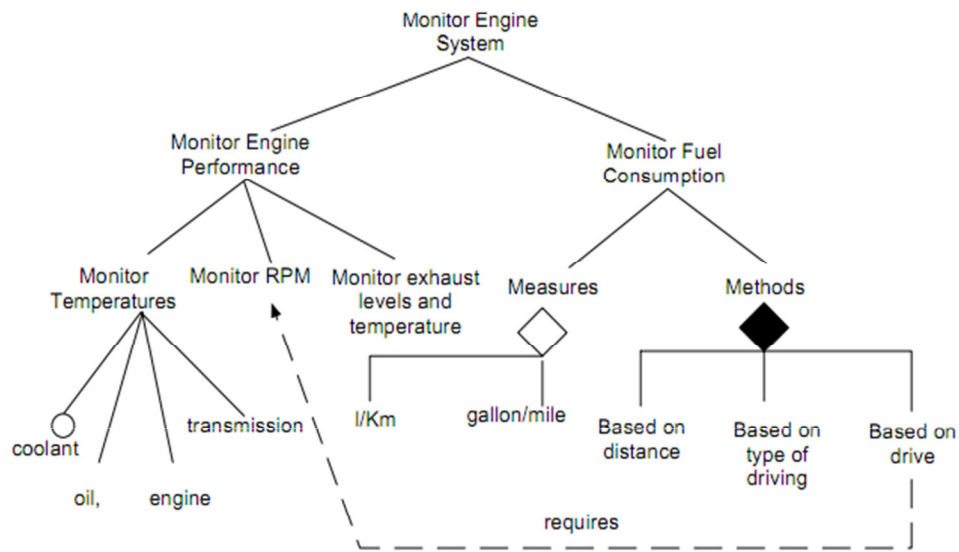
Practical Solution: Modeling Language FODA

The general idea is to store the features (characteristics) in so called 'Feature Diagrams'. Such a diagram is a tree (and later also graph) that organizes the union of valid features inside a specific product line.

→ This feature diagrams are the required documentation for each product line.

Image: Original 'FODA'

Feature Diagrams (Extensions)



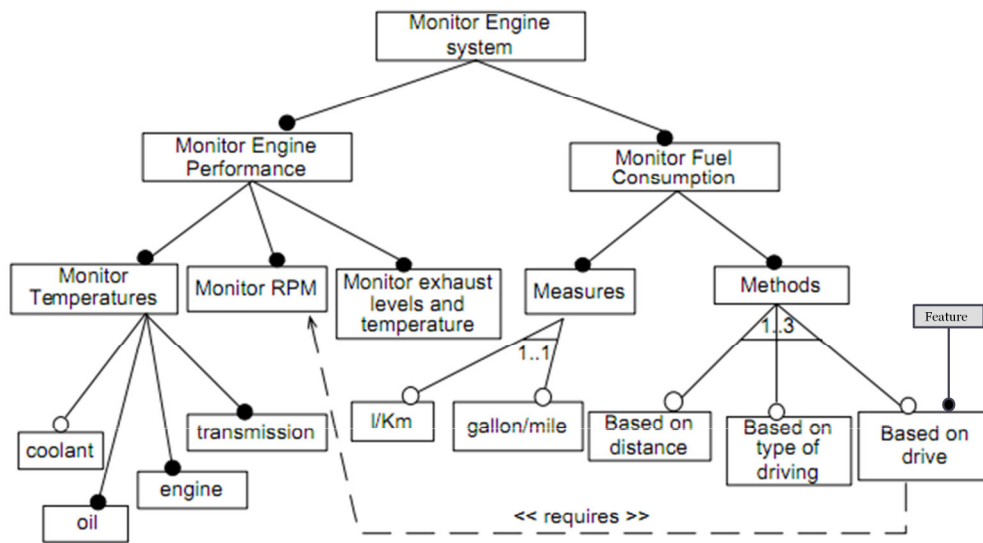
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Image: Extension 'FeaturSEB'

- (FORM) are arguably also relevant for software design not only for requirements modeling purposes.
- Feature names appear in boxes, hell of an extension! :)
- xor and or variation points are represented as
- white and black triangles, respectively.

Feature Diagrams (Extensions)



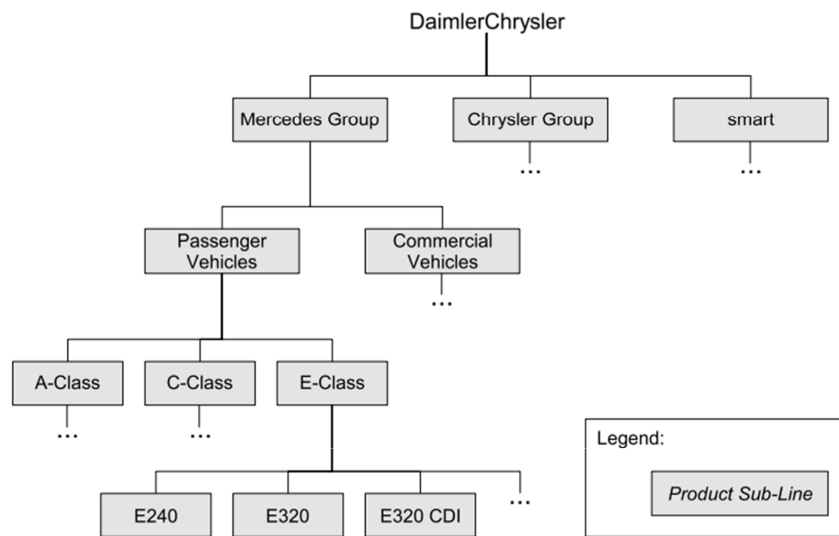
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Image: Extension 'Riebisch et al.'

- Empty and filled circles represent mandatory and optional features.

Multi-Level Feature Tree

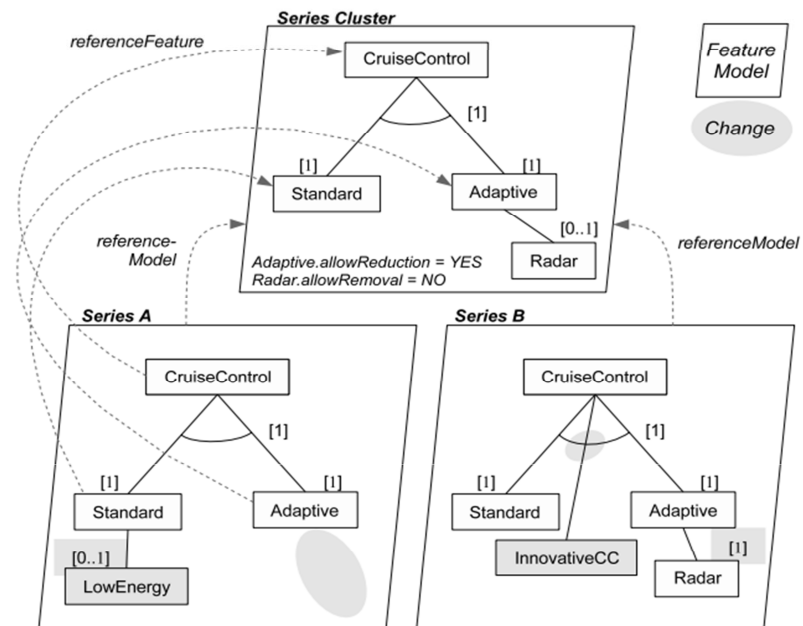


Extensions 'Multi-Level Feature Tree'

Feature Diagrams get too complex in large scale projects. Many such projects are found in the automotive industry

They are used to document what characteristics are common to all product instances and which characteristics differ from one product instance to another.

Multi-Level Feature Tree



Conclusion

- Feature-Oriented Domain Analysis documents feature combinations inside product lines.
- This documentation is growing with new product.
- The original FODA method provides a modeling language.
- Many extensions followed.
- The extension Multi-level Feature Trees provides the possibility to manage the FODA in complex company structures.