

Fakultät Informatik - Institut Software- und Multimediatechnik - Softwaretechnologie – Prof. Aßmann – Model-Driven Softwrae Development in Technical Spaces

32. Staged Configuration with Key Partners and Stakeholders

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- 1) Staged configuration of value, feature, and component trees
- 2) The triple-layer BMC

- [Reiser] Mark-Oliver Reiser and Matthias Weber. Multi-level feature trees. Requirements Engineering, 12(2):57--75, 2007.
 - https://link.springer.com/article/10.1007%2Fs00766-007-0046-0
- [Joyce] Joyce, A., Paquin, R.L., The triple layered business model canvas: A tool to design more sustainable business models, Journal of Cleaner Production (2016), http://dx.doi.org/10.1016/j.jclepro.2016.06.067
- [Czarnecki] Krzysztof Czarnecki, Simon Helsen, and Ulrich W. Eisenecker. Staged configuration using feature models. In Robert L. Nord, editor, Software Product Lines, Third International Conference, SPLC 2004, Boston, MA, USA, August 30-September 2, 2004, Proceedings, volume 3154 of Lecture Notes in Computer Science, pages 266--283. Springer, 2004. https://doi.org/10.1007/978-3-540-28630-1_17
 - Explains how to extend a feature model over a supply chain.

Any good business model (also an MVP) should be improved by new variants or extensions.

Other Literature

- Kwanwoo Lee, Kyo C. Kang, and Jaejoon Lee. Concepts and guidelines of feature modeling for product line software engineering. Lecture Notes in Computer Science, 2319:62--78, 2002. Good overview on feature models, and how to develop feature groups in different concerns
- Don S. Batory. Feature models, grammars, and propositional formulas. In J. Henk Obbink and Klaus Pohl, editors, Software Product Lines, 9th International Conference, SPLC 2005, Rennes, France, September 26-29, 2005, Proceedings, volume 3714 of Lecture Notes in Computer Science, pages 7--20. Springer, 2005.
 - Explains the relationship of feature models and propositional logic.
- Hans de Bruin and Hans van Vliet. Quality-driven software architecture composition. Journal of Systems and Software, 66(3):269--284, 2003.
 - Introduces feature-solution graphs, the bipartite graph between feature trees and product-component trees.



Shortcomings of Lean Startup from the Viewpoint of Software Product-Line Engineering

4 Model-Driven Software Development in Technical Spaces (MOST)

No support for consistent modeling of product lines (no support for feature modeling and feature variation)

No support for canvas modeling (composition and engineering)



No support for grading and metrics

No support for staged feature configuration with suppliers





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32.1. Staged Configuration of Feature Models and Triple Bigraphs

Suppliers in a Supply Chain

6 Model-Driven Software Development in Technical Spaces (MOST)

Key Partners Work on a ref replative? Work hey Accuraces are we acquiring from partners? Work hey Accuraces are we acquiring from partners? Work hey Accuraces are we acquiring from partners?	When we kethold the boltom of the stream of	Ctivities s da cur Value Propositions require anneli? shipp?	Value Proposition	titions ref are we believing to calm? are we offering to each Customer Segment? g?	Customer Relation Seprets operation is a substantian with More are have we established? How are thy regard with the rest of our basines to costly are the? We are the substantiant of the substantiant of the substantiant of the substantiant of the substantiant of the substantiant of the substantiant of the substantiant of the substantiant of the	neships	Customer Segments For a control important customers? What are unset important customers? Remain With an and the second second second second second second second se
	K y R. When wy Recent	PSOUITCES es do au: Value Propositions requi annele? Customer Relationships? _{Optimes Ann}			Channels Through which Channels do our Customer Segments water to the reached? How are we reached? How are we channels integrated? Which cones work best? Which cones wo	2	
Cosst Structure What are the most important costs inferent in our business model? Which for Activities are most expensive? Which for Activities are most expensive? EXPENSIVE Mathematical and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the second expension ender a standard conduct and the format and the second expension ender a standard conduct and the second expension ende			(initial	Revenue Street	ams willing to pay? contribute to overall revenues?		

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Bridging three Worlds: From Value Trees via Feature Trees to Product Component Trees

7 Model-Driven Software Development in Technical Spaces (MOST)

Values can be traced via features to components of the product in the triple bigraph over values, features, and product components



Different Classes of Configurations in the Triple Bigraph

- Value Trees, Feature Trees, Product Component Trees need to be configured
 - XOR configuration
 - IOR configuration
 - Optional part configuration
- Value configuration is the process of choosing a value
 - Features and product components are selected too (via the relations delivered-by and produced-from)
- **Feature configuration** is the process of choosing a feature
 - Product components are selected too (via the relation produced-from)
- Product component configuration is the process of choosing a product component implementation



Subtrees in Configuration can be Attribted to Key Partners (Suppliers)

- Feature trees can be decomposed into feature subtrees
- If subtrees are left to a supplier, a supply chain results
- Definition of test suite proving feature

- Product component trees can be decomposed into component subtrees
- These subtrees can be bought from a supplier (key partner)
- Definition of functional interfaces
- Definition of tests proving subsystem functionality



Buying Feature or Component Subtrees from a Supplier

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- Requirements document for the feature or component subtree
 - Definition of functional interfaces
 - Definition of tests proving subsystem functionality
- Pricing of the subtree supply
- (Sub-)Contract about these points

- See courses
 - Softwaretechnologie
 - Softwaretechnologie II
 - Requirements Engineering und Testen

 Multi-Stage configuration is the process of confining subconfigurations to all supplierbased subtrees of the triple bigraph (values, features, components) [Reiser] [Czarnecki]





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32.2 Triple Layer BMC (TLBMC) for Sustainability of Key Partners and Key Resources

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12 Model-Driven Software Development in Technical Spaces (MOST)

No support for consistent modeling of product lines (no support for feature modeling and feature variation)

No support for canvas modeling (composition and engineering)



No support for green

and social aspects

No support for grading and metrics

No support for staged feature configuration with suppliers



Designing economic, sustainable and social products









Environmental Life Cycle BMCanvas (environmental, Umwelt layer)

15 Model-Driven Software Development in Technical Spaces (MOST)

What is the environmental value of the product (U.VP)?



Social Stakeholders BMCanvas (social layer)

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What is the social value of a social business company?



- There is a simple consistency algorithm:
- forall field in Fields: compare E.field to U.field to S.field
- The TMBMC generates much larger value trees that the BMC.
 - How are feature trees influenced from these larger value trees?
 - Some economic values become red due to the social and environmental values. What does this mean?
- Excercise: in the paper [Joyce], Nespresso TLBMC is discussed with aluminium capsules. Put up a new TLBC for coffee pads in filter bags (compostable), and compare the TLBMC, in particular the environmental layer.



The End

- Explain the difference of a BMC and a TLBMC. What is vertical consistency?
- How do you distribute features to your supply chain?
- Which tests do you need if you delegate a subtree of the feature model to a supplier?

C Prof. U. Aßmann

