

# Designing sustainable tailorable systems – Supporting use as well as evolution.

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## Agenda

- Introduction
- Research approach
- Base line
- The cooperative design process
- Foundations of four tools
- Evaluation of the tools
- The tools

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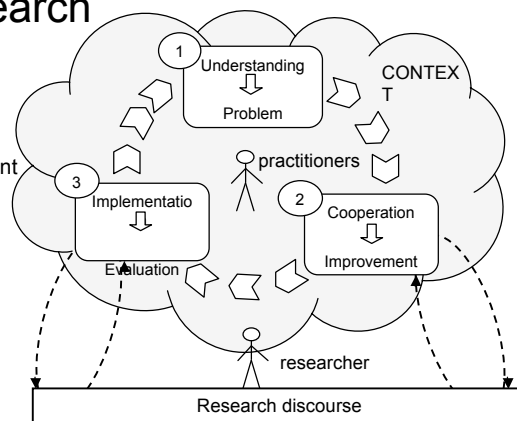


# Introduction

- Changing market
- Sustainable software have to change
  - User makes the changes
  - Developer makes the changes
- Tailoring
  - When the software is changed during use instead of during development time.

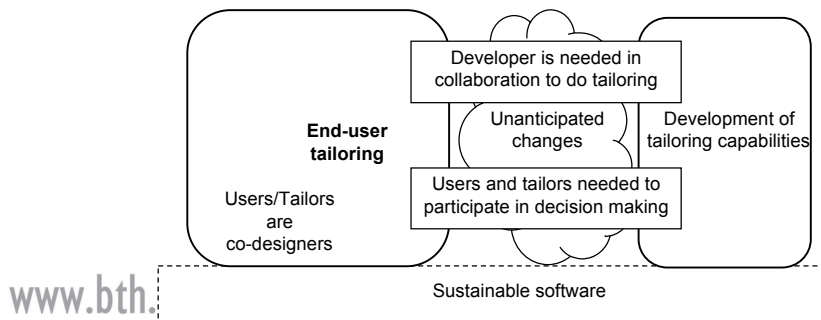
# Research approach

- Cooperative Method Development with Design Research
  - Prototypes
- Telenor
  - In-house development
  - Special purpose SW

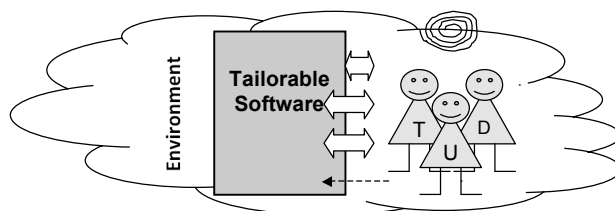
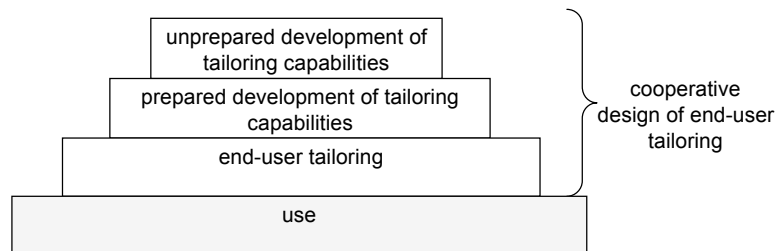


# Baseline

- Tailoring
- Software evolution
- Participatory design



# The cooperative design process



## Foundations of the tools

- Telenor
  - Collaboration to evolve tailorable software
  - Need of common language
- Support the cooperative design process
- Bringing users and developers together in discussions
- “Boundary Objects”
  - Tailorable to meet the context
  - Sufficient information across communities

## Evaluation of the tools

- Evaluated by expert group
- Framework of Collaborative Capacity
  - Competences and processes needed for successful collaboration
  - Member capacity
  - Relational capacity
  - Programmatic capacity
  - Organizational capacity

## The four tools

- Paper based prototypes
- Basis for discussions
- Categorization, Matrix, Usability and Design pattern tool

COLLABORATION ISSUES	IMPLEMENTATIONS		TOOLS
Misunderstandings in communication	Classification	Basis for discussion PD techniques	Categorization tool Matrix tool
Users want to learn about techniques	Levels of tools		Usability Pattern tool Design Pattern tool
Shared responsibility for product	Shared design decision		
Good software and architecture	Pattern		

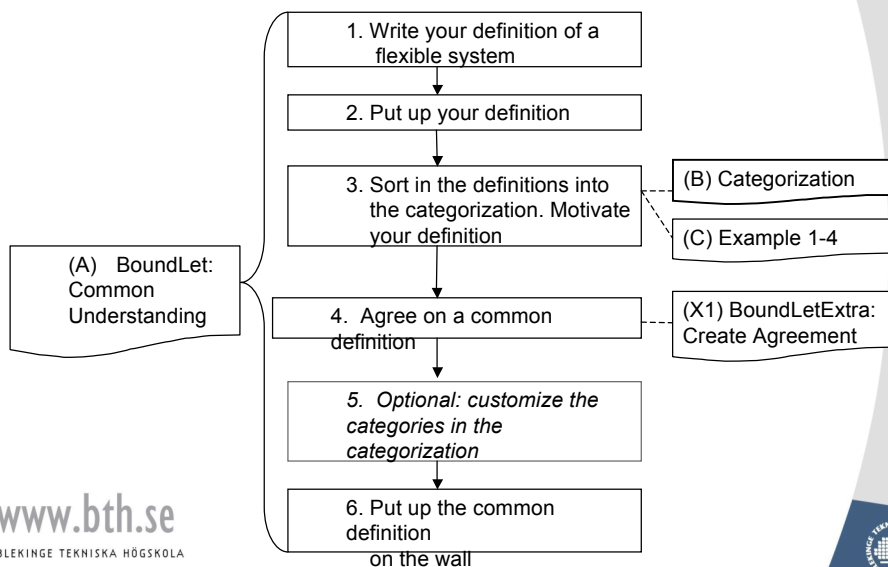
## The four tools

- Outline of the tools
  - Artefact
  - BoundLet – Instructions
  - Workflow overview
  - Support documents

# Categorization tool

Category	User Perspective	System Perspective
Customization	Set parameter values	Interpretation of existing code
Composition	Link different existing components	Definition of relationships between components Code Generation
Expansion	Creation of new component	(optional) Definition of relationships between components New and predefined components are treated uniformly Code Generation
Extension	Insertion of code	(optional) New code is added Code Generation (optional)

# Overview of workflow



# Matrix tool

Characteristics		Customization	Composition	Expansion	Extension
<i>Business Changes</i>	Frequency of change	M	M	H	H
	Anticipation of change	H	M	L-H	L
	System support of change	L	M	M-H	H
<i>Usability Issues</i>	User control	H	M-H	M-H	?
	Transparency	H	M-H	M-H	? <sup>2</sup>
	Realization speed	H	H	M	M-H
	Frequency of use	L	H	-	-
	User competence	-	-	M-H	H
<i>Software Attributes</i>	Fault tolerance	H	M-H	M	L
	Complexity	L	L- M	M	H

# Usability/Design pattern tool

Usability Pattern for end-user tailorable software	
<b>Introductory description</b>	
<b>Name</b>	
<b>Ranking</b>	
<b>Tailoring Categories</b>	
<b>Illustration</b>	
<b>Overall description of problem and solution</b>	
<b>Problem</b>	
• Forces	<b>Environment and task</b> <b>Human desires and capabilities</b> <b>State of the software</b>
<b>General Solution</b>	
<b>Detailed description of solution</b>	
•	<b>Specific Solution</b> • Prior design decisions
<b>Diagrams</b>	
<b>Consequences</b>	
<b>Danger spots</b>	
<b>Sample code</b>	
<b>Examples</b>	
<b>Related patterns</b>	

# Summary

- The empirical studies revealed a need to support:
  - the creation of a common base of understanding
  - a learning environment to make it possible for the users to understand technical decisions and their consequences for use
  - a learning environment that makes it possible for users to participate in the development project on equal terms
  - shared mental models
  - agreements of trade-offs
  - that all parties in the development project participate in the decision making

» Cooperative design process

» Toolkit

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# Discussion!?

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