

*Software-Supported Collaborative Problem Structuring in the Context
of Morphological Analysis*

Bachelor's Thesis Kick-Off Presentation

Louisa Schermuly

Software Engineering für betriebliche Informationssysteme (sebis)
Fakultät für Informatik
Technische Universität München

www.matthes.in.tum.de

Software-Supported Collaborative Problem Structuring in the Context of Morphological Analysis

I. What is Morphological Analysis?

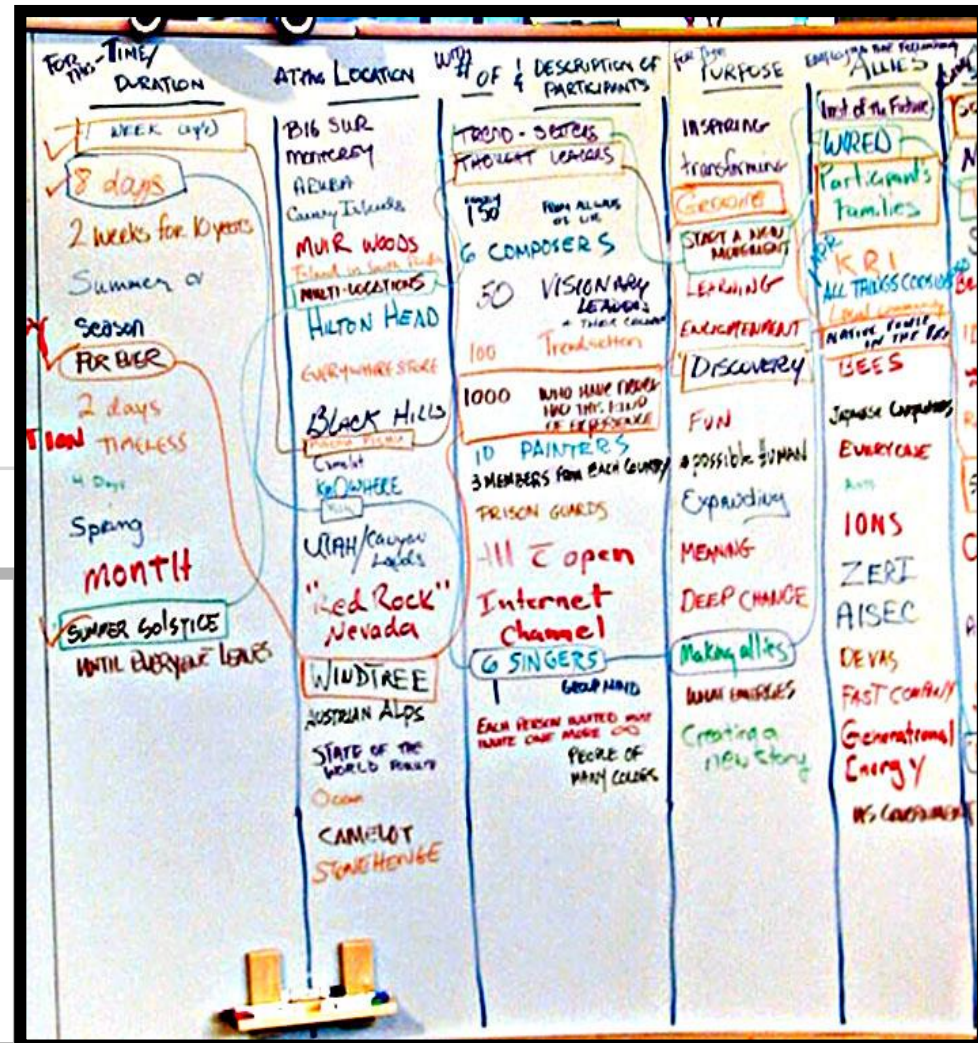
- History of Morphological Analysis
- Focus: Analysis Stage
- Example

II. Research Gap

III. Outlook & Discussion

Solution Design for Wicked Problems

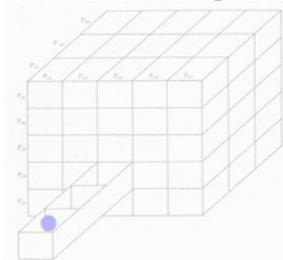
- complex, essentially unique problems
- no „best“ solution



"Morphological method essentially is nothing more than an orderly way of looking at things."

(Fritz Zwicky, 1948, p. 121)

Problem structuring and heuristical evaluation of potential solutions



Further Research

More structured approach for solution exploration

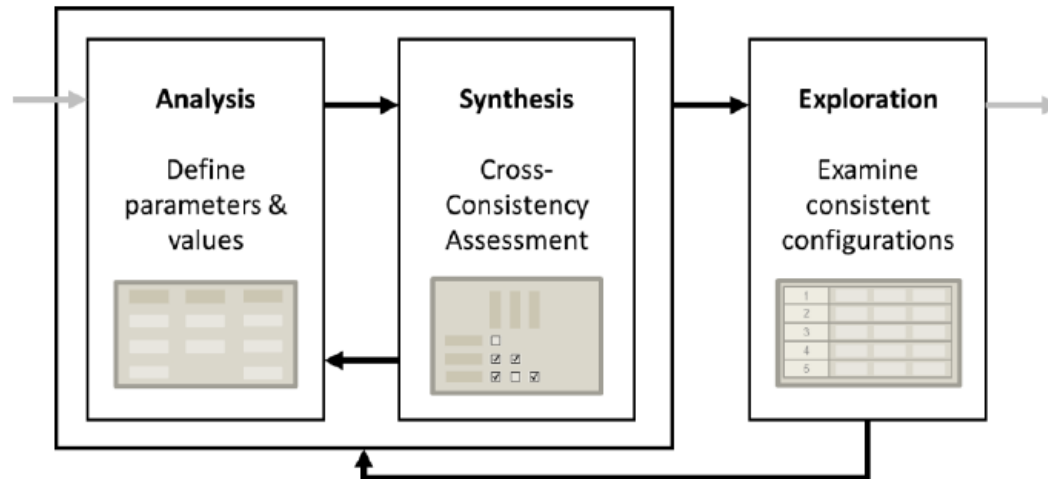
Definition of 3 iterative steps

1950

1970

1990

2010

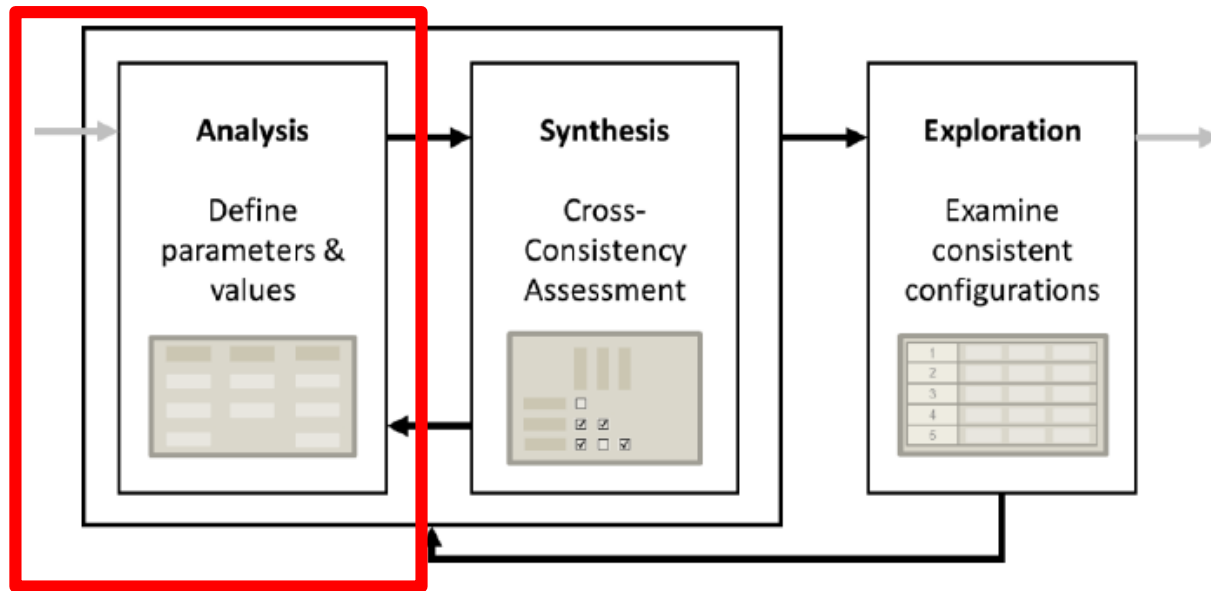


The general iterative process model of MA (Zec, 2015, p.2)



- + Consistency Calculation
- + Visualization of Configurations
- No Collaboration Support for Distributed Teams (e.g. process losses)

10.08.2015 5



The general iterative process model of MA (Zec, Schneider, Matthes, 2015, p.2)

Decomposition of the problem

- Identification of components (**parameters**)
- Collection of possible alternatives for each parameter (**values**)

Outcome: **Morphological Matrix**

! No Filtering or Evaluation of ideas

Problem Statement *How to celebrate a wedding?*

Time	Location	Number of Guests	Food	Music
Spring				
Summer				
Fall				
Winter				

Problem Statement *How to celebrate our wedding?*

Time	Location	Number of Guests	Food	Music
Spring	Garden at Home	2	Homemade	Band
Summer	Ski Hut	20	Catering	DJ
Fall	Castle	50	Live Cooking	Orchestra
Winter	Restaurant	80		Radio
	Town hall	100		MP3/I-Pod
	Biergarten	120		Karaoke
		300		No Music

Software-Supported Collaborative Problem Structuring in the Context of Morphological Analysis

I. What is Morphological Analysis?

II. Research Gap

- **Process Losses and Gains in Groups**
- **Extended Process Model**
- **Implementation**
- **Evaluation**

III. Outlook & Discussion



1. Which **process losses** and **process gains** can affect the group performance in creating a Morphological Matrix?



2. How to **design the process** of the „Analysis Stage“ to minimize process losses and maximize process gains?



3. What are the functional requirements an **implementation** of the extended process model should meet?



4. Does the application of the extended process model in groups lead to **measureable improvements** in comparison to the traditional process model?



1. Which **process losses** and **process gains** can affect the group performance in creating a Morphological Matrix?

Group Performance = Group Potential
+ Process Gains
- Process Losses



Hackman, Morris, 1975 in Brodbeck, Guillaume, 2010, p. 33

Process Gains

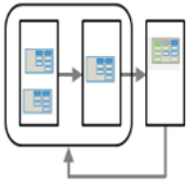
- Increasing Creativity
- More Expertise

Process Losses

- Production Blocking
- Social Loafing
- Social Inhibition



1. Which **process losses** and **process gains** can affect the group performance in creating a Morphological Matrix?



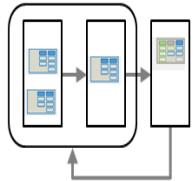
2. How to **design the process** of the „Analysis Stage“ to minimize process losses and maximize process gains?



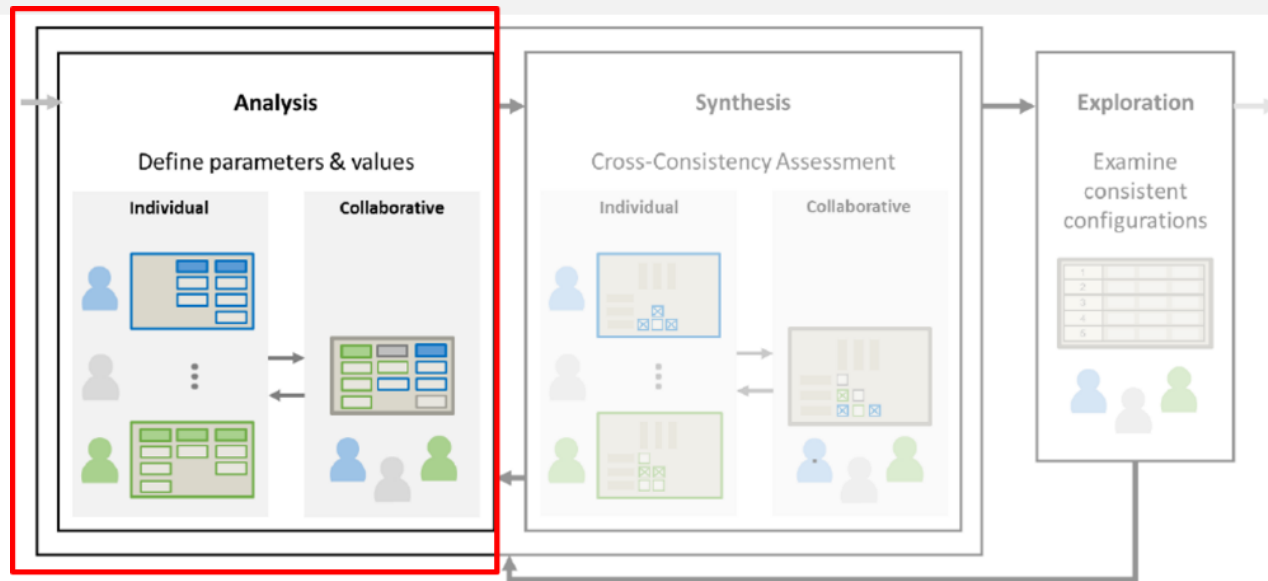
3. What are the functional requirements an **implementation** of the extended process model should meet?



4. Does the application of the extended process model in groups lead to **measureable improvements** in comparison to the traditional process model?



2. How to **design the process** of the „Analysis Stage“ to minimize process losses and maximize process gains?



The proposed process model for CMA (Zec, Schneider, Matthes, 2015, p.8)

Scope for design

- Process Flow Control
- Communication
- Building Consensus



1. Which **process losses** and **process gains** can affect the group performance in creating a Morphological Matrix?



2. How to **design the process** of the „Analysis Stage“ to minimize process losses and maximize process gains?



3. What are the functional requirements an **implementation** of the extended process model should meet?



4. Does the application of the extended process model in groups lead to **measureable improvements** in comparison to the traditional process model?



3. What are the functional requirements an **implementation** of the extended process model should meet?

Collaborative Web Application for Distributed Teams

Features

- ✓ Conflict Identification
- ✓ Voting Procedures
- ✓ Communication

Web Framework

Meteor JS

- full stack for real-time apps
- JavaScript
- MongoDB





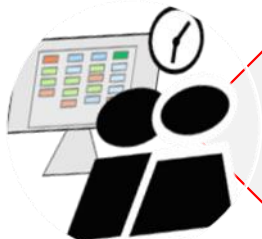
1. Which **process losses** and **process gains** can affect the group performance in creating a Morphological Matrix?



2. How to **design the process** of the „Analysis Stage“ to minimize process losses and maximize process gains?



3. What are the functional requirements an **implementation** of the extended process model should meet?



4. Does the application of the extended process model in groups lead to **measureable improvements** in comparison to the traditional process model?



4. Does the application of the extended process model in groups lead to **measurable improvements** in comparison to the traditional process model?

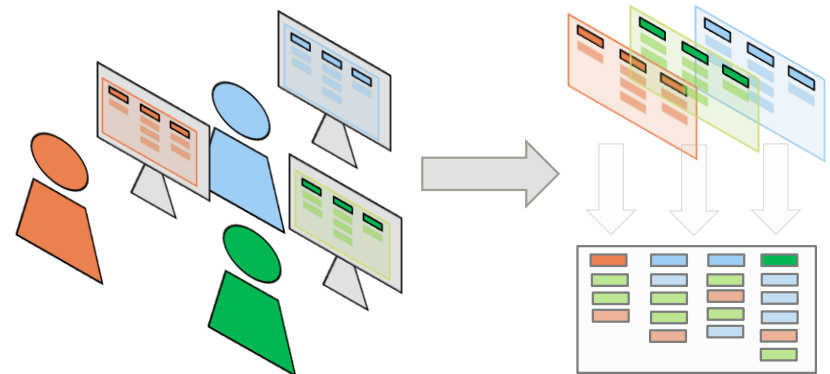
Controlled Laboratory Experiment

Experiment 1



Standard Process Model (collaborative)

Experiment 2



Extended Process Model

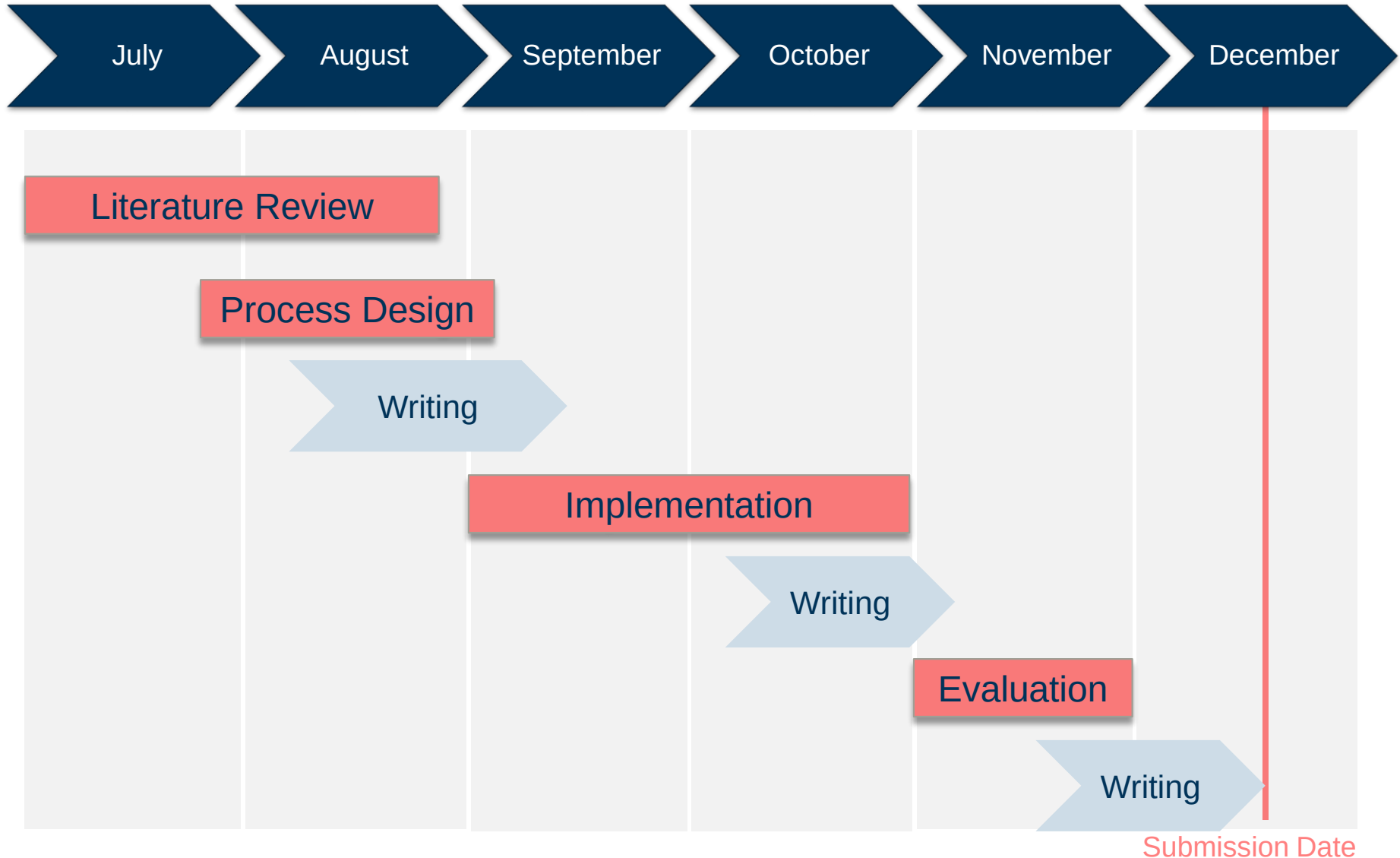
Software-Supported Collaborative Problem Structuring in the Context of Morphological Analysis

I. What is Morphological Analysis?

II. Research Gap

III. Outlook & Discussion

- **Timeline**
- **Questions**



Thank you for your attention

Any questions?