

Guided Research: Identifying and Structuring Challenges in Adopting Agile and Lean Practices in Large Organizations based on a Literature Analysis

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Motivation

Research Questions

Research Approach

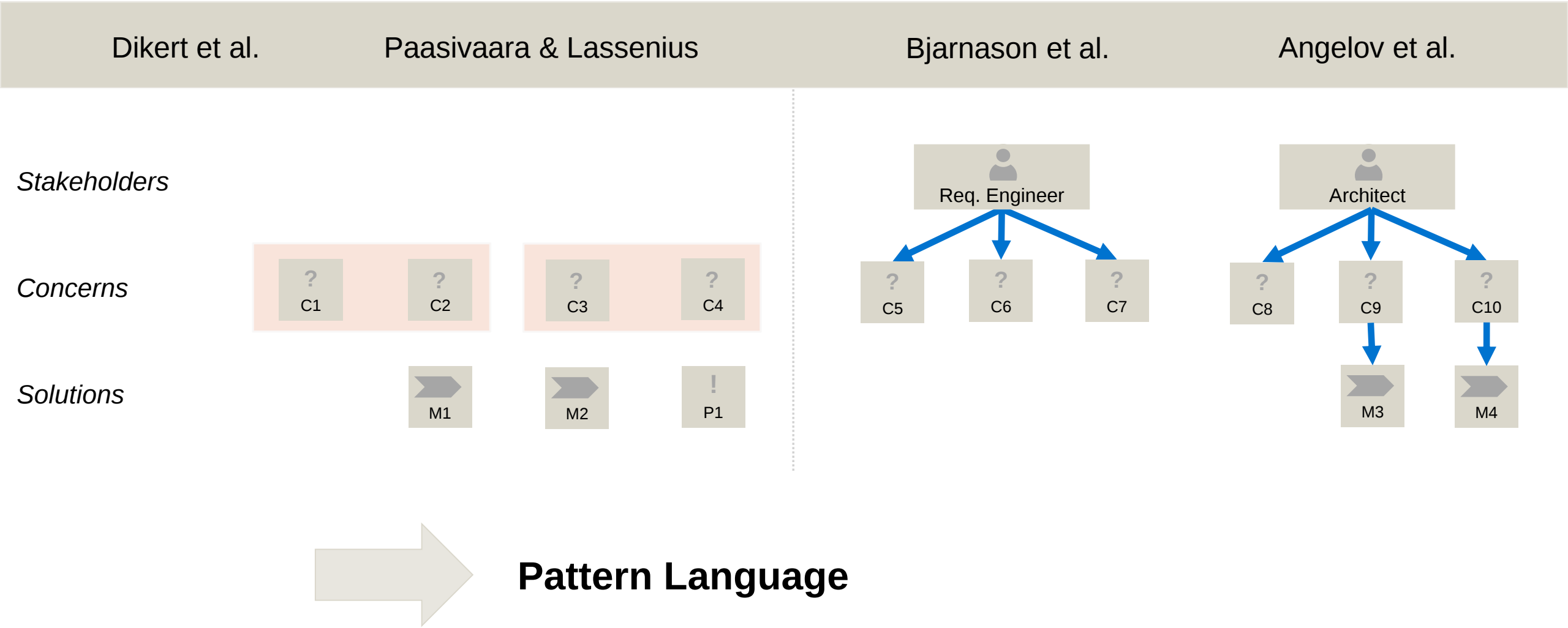
Key Findings

Summary & Outlook

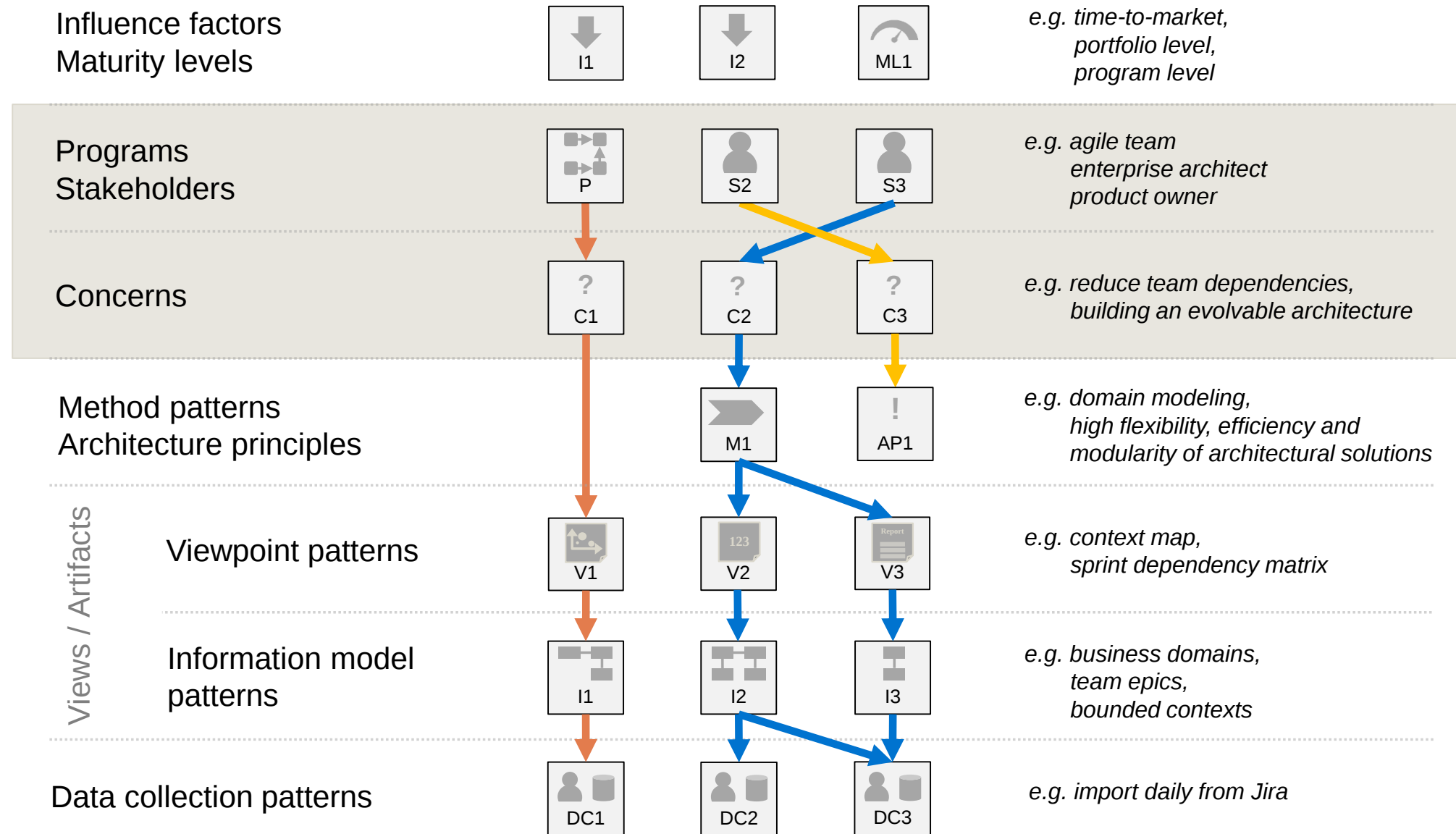


AGILE





Motivation (3)



Motivation

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Summary & Outlook

- RQ1 Which stakeholders exist in large-scale agile development endeavors?
- RQ2 What are challenges of stakeholders and programs in large-scale agile development efforts?
- RQ3 Which challenge categories are the most salient in large-scale agile development?
- RQ4 What are generalizable findings on stakeholder- and program-related challenges in large-scale agile development endeavors?

Outline



Motivation

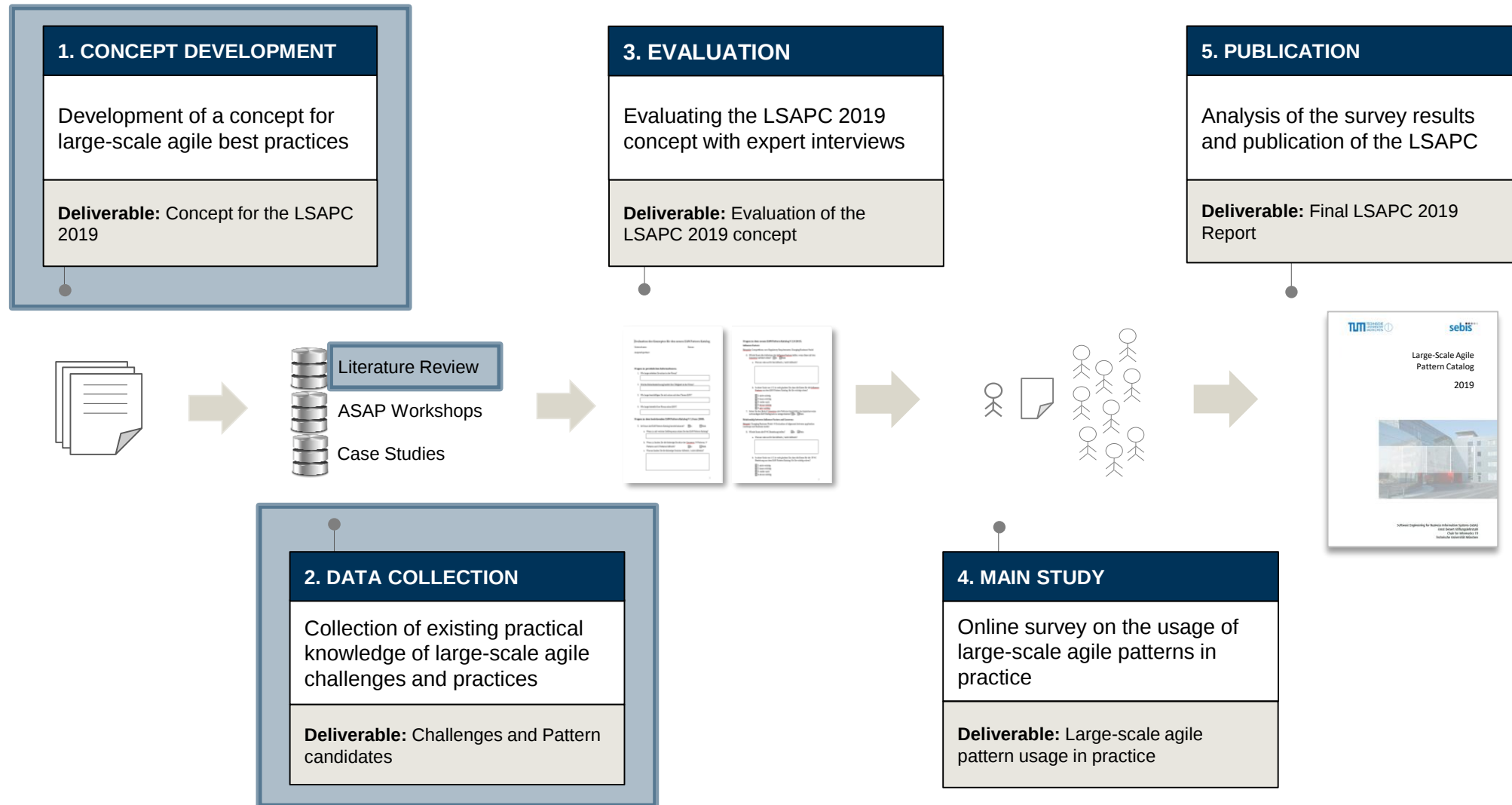
Research Questions

Research Approach

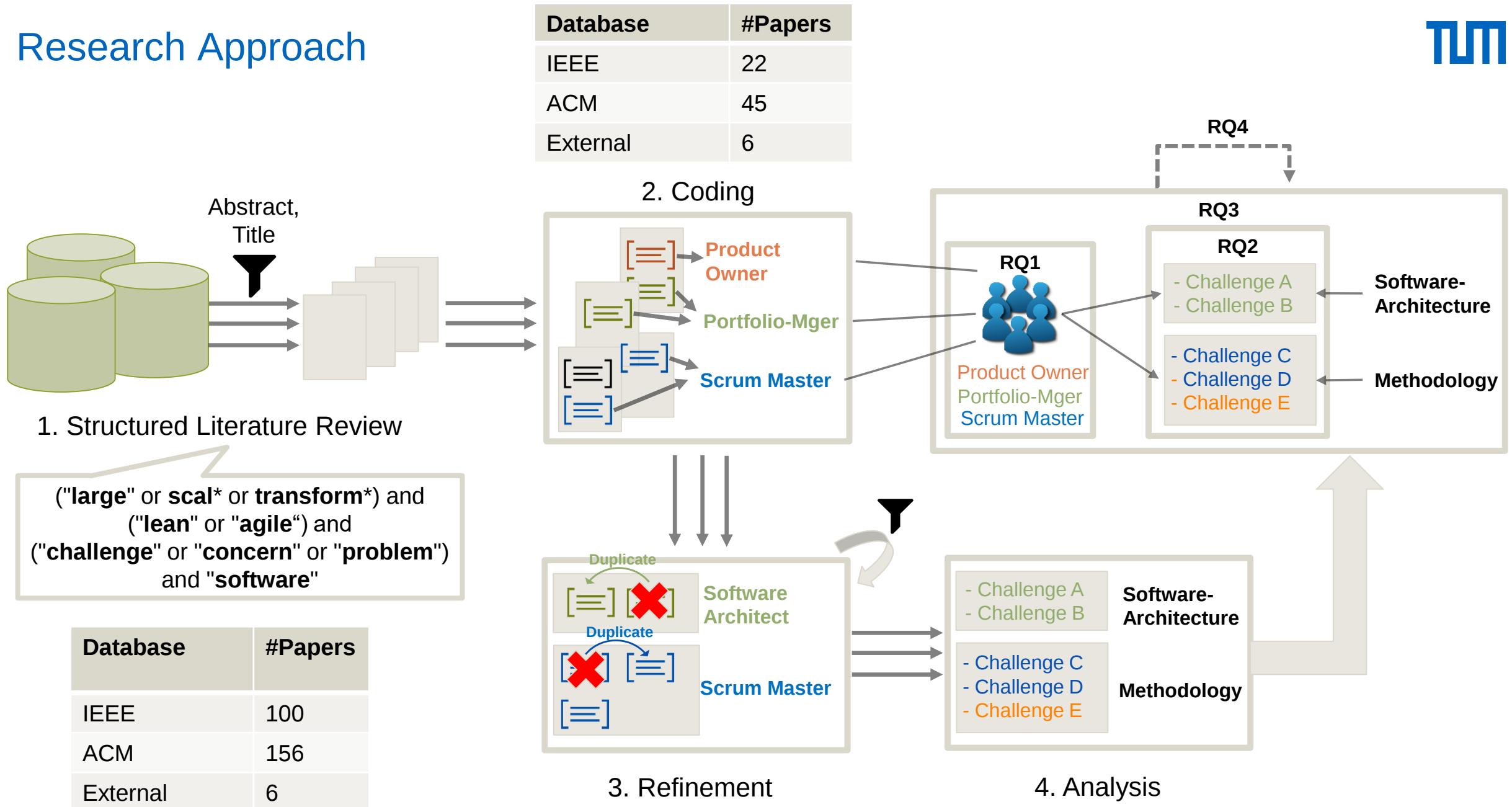
Key Findings

Summary & Outlook

Placement in the development of the new LSAPC



Research Approach



The image shows the MAXQDA software interface. The top pane displays the project overview with a list of documents and their word counts. The bottom pane shows the code manager with a hierarchical view of codes and their occurrences.

Document	Word Count
06681340	10
06910403	8
06928795	2
07158498	14
07965342	0
agile2006-13	18
sheth2009	34
Overall questions from work...	3
Emerging Research The...	3
ACM	986
Towards an Understandi...	13
Is Scrum Fit for Global S...	28
Agile Development with ...	0
A Pattern Language for ...	1
Adopting Safe to Scale...	70
Agile Development: Issu...	8

Code	Occurrences
Virtual daily stan...	2
C-76 Forming and mana...	2
C-75 Empowering agile ...	3
C-74 Establishing a com...	6
C-73 Establishing a cult...	2
Patterns	8
Discussion Sessi...	0
Retrospective	3
Creating action ...	1
C-72 Creating team spiri...	4
Patterns	1
Applying consen...	1
Feedback sessio...	1
Collocating agile...	1
C-71 Dealing with incorr...	10

The image shows the MAXQDA document viewer and text editor. The top pane displays the document viewer with a list of documents. The bottom pane shows the text editor with a document titled 'Challenge Names\C-73 ...continuous improvement'.

Challenge Names\C-73 ...continuous improvement

SAFE and understood the reasons of its adoption before the first PI planning event; the first PI planning was successful; if problems or improvement items regarding the adoption emerged, they were solved right away, which kept people satisfied; and finally the team members did not experience big changes compared to their previous way of working.

3) *Change agents*: Case 1 had a couple of change agents, a manager in Finland and an RTE in Malaysia who were leading the change. However, both were doing this only part-time and thus not could give this role as much time as they would have liked to. More, and more visible change agents were hoped for. Case 2 had several change agents, e.g., the head of the R&D, external coaches and an RTE, who were visibly pushing the change forward, giving trainings, and contributing to the customization of SAFe and to the continuous improvement. The RTE in Case 2 worked full-time in leading the change.

4) *External coaches*: In Case 1 no external coaches were helping in the beginning. Half a year after the adoption an external coach was invited to workshop with the teams and give feedback, which was experienced as useful. Our interviewees mentioned that more coaching would have been useful. In Case 2 an external SAFe consulting company supported the adoption by arranging SAFe trainings and workshops for the managers and the POs, as well as by coaching the RTE in planning and arranging the first PI planning event.

The reason why this succeeded surprisingly well was that we had a really good consultant to coach our Product Managers, beforehand. We had workshops where we did different kinds of exercises [...] she made us to do exercises during which we would understand by ourselves what we should improve.

— Manager, Case 2

5) *Release train engineers*: In Case 1 the RTE took care

agendas and instructions for the participants on how to prepare. Several interviewees commented that while they expected the first event to be chaotic, partly due to rumors they had heard from Case 1, to their surprise it turned out to be a successful event. This positively affected on the attitude of the participants towards SAFe in general.

7) *Continuous improvement*: In Case 1 people were somewhat unhappy with SAFe and one concern seemed to be that even though improvement issues were raised, not much was really improved.

We issue some retro concerns, [...] but then nothing is really done about them. [...] there's a lack of drive.

— Interviewee, Case 1

In Case 2 the RTE had concentrated on improving the ways of working as soon as the improvement items were raised either in retrospectives or otherwise. She created action plans, assigned responsible persons and followed implementation. People were quite happy, as even though they faced problems, they knew that improvement work was ongoing.

8) *Satisfaction*: In Case 1 the work satisfaction, measured by employee surveys, had decreased after the SAFe adoption and several mentioned SAFe as the reason. Our interviewees suspected that people had not yet seen the benefits of SAFe, instead, they had experienced most changes as negative, e.g., teams felt lack of autonomy, as they could no longer decide some things on their own, such as the sprint length. With fixed increments they felt moving backward, towards the old waterfall. Some interviewees commented that team members see SAFe more like an overhead to them.

If you ask people they will just say that this is one more process [...] I don't think they perceive that their work has changed so much. [...] I don't think they've seen much benefit.

Outline



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Name	Example	# Identified Elements
Stakeholders	Product owner, scrum master	14
Challenges	Ensuring that non-functional requirements are considered by the development team	79
M-Patterns	Scrum of scrums, community of practices	122
Architectural Principles	Reuse of functionalities, buy before make	4
V-Patterns	Burndown chart, context map	9
Anti-Patterns	Don't put individual goals over team goals	17

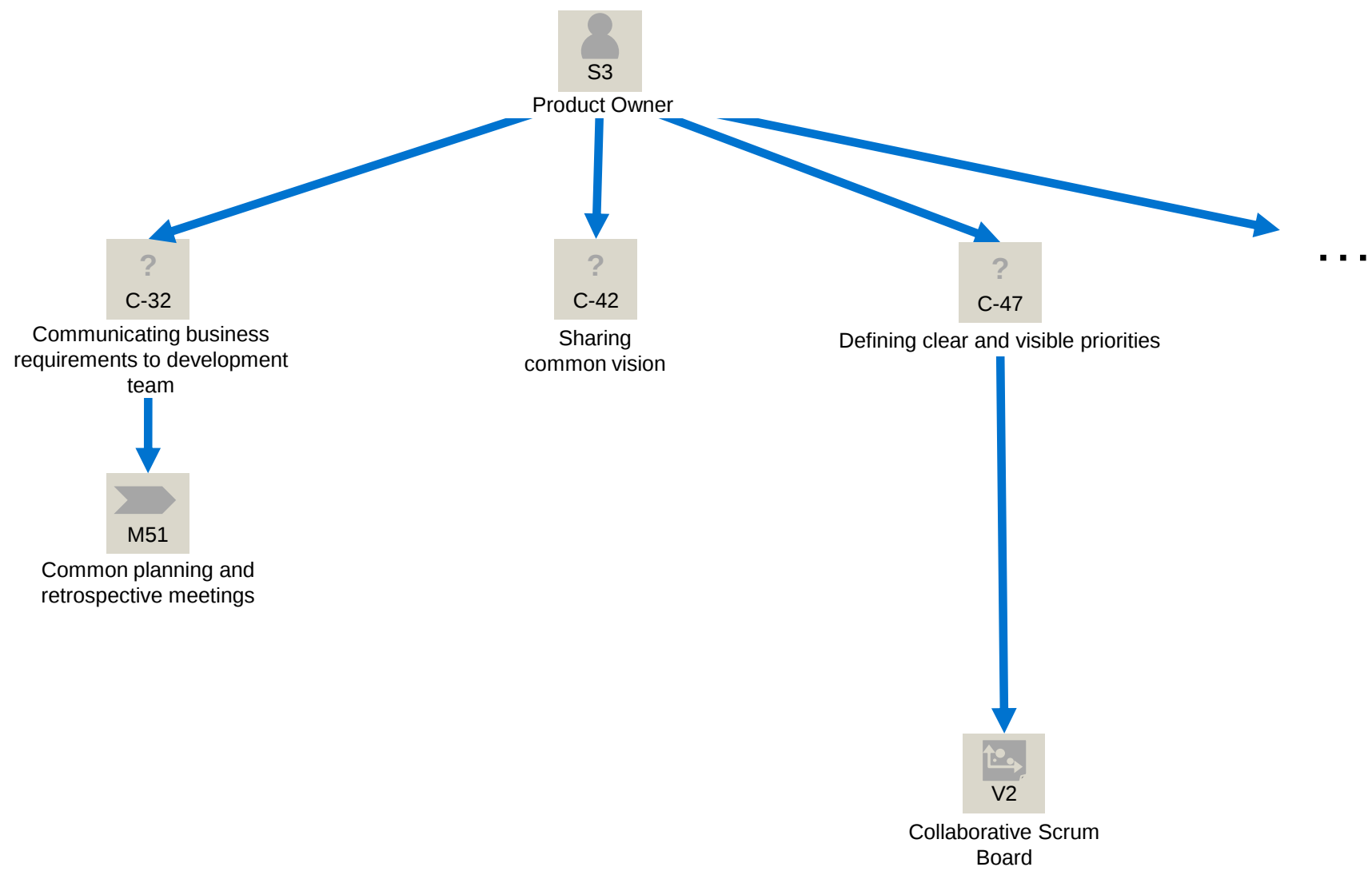
Key Findings (2)

RQ1

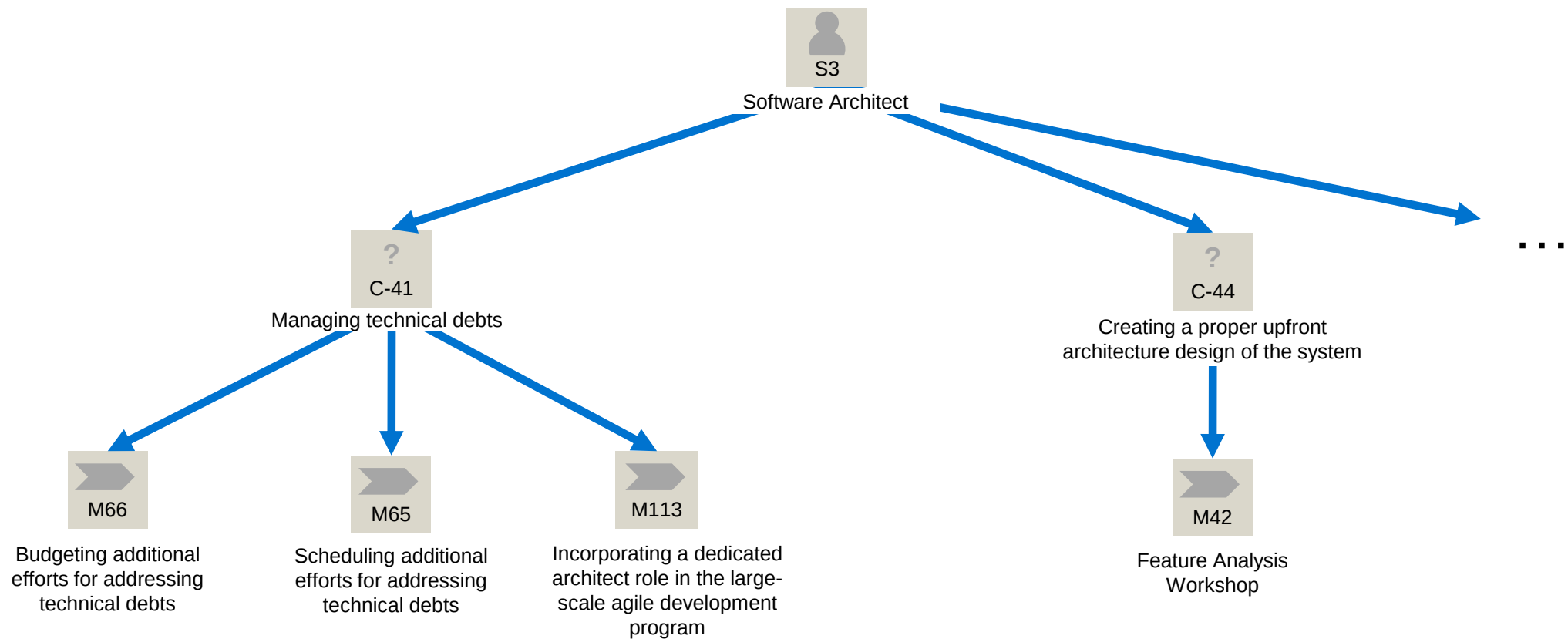
RQ2

ID	Name	Category	Novelty	Affected stakeholders or program	#Origins
C-1	Ensuring that non-functional requirements are considered by the development team	Software-Architecture	Yes	Software Architect, Solution Architect	6
C-2	Creating precise requirement specifications for the development team	Requirements Engineering	No	Product Owner	3
C-3	Managing and integrating heterogenous subsystems of different development teams	Software Architecture	Yes	Solution Architect	1
C-4	Defining a lightweight formal review process for new technologies	Enterprise Architecture	Yes	Enterprise Architect	4

Key Findings - Example



Key Findings – Example(2)



Key Findings - Categorization

- C-40 Facilitating shared context and knowledge
- C-42 Sharing common vision
- C-52 Establishing a common scope for different stakeholder groups
- C-54 Creating lightweight documentation
- C-91 Dealing with internal silos

Culture & Mindset	C-8	C-9	C-10	C-11	C-12	C-15	C-31
	C-34	C-43	C-68	C-72	C-73	C-75	C-90
Communication & Coordination				C-6	C-13	C-29	C-69
				C-76	C-93	C-94	C-95
Enterprise Architecture				C-4	C-7	C-24	C-45
				C-46	C-65	C-70	C-87
Geographical distribution		C-35	C-36	C-38	C-39	C-84	C-85
Knowledge Management			C-40	C-42	C-52	C-54	C-91
Methodology					C-71	C-74	C-89
Project Management		C-53	C-60	C-61	C-62	C-66	
			C-69	C-74	C-80	C-92	
Quality Assurance				C-49	C-50	C-51	C-81
Requirements Engineering		C-2	C-27	C-32	C-47	C-55	
			C-56	C-58	C-78	C-79	
Software Architecture		C-1	C-3	C-14	C-25	C-18	
		C-21	C-28	C-41	C-44	C-77	
Tooling					C-33	C-48	C-88

- 1 Architecture becomes more important the more complex the task or system is
- 2 New stakeholder roles are involved when scaling agile development
- 3 Scaling agile development entails new communication and coordination challenges
- 4 Challenges in agile development still exist in large-scale agile development
- 5 Stakeholders that are successfully isolated by the scrum master from external influences have less concerns in large-scale agile development.

Outline



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Key Findings

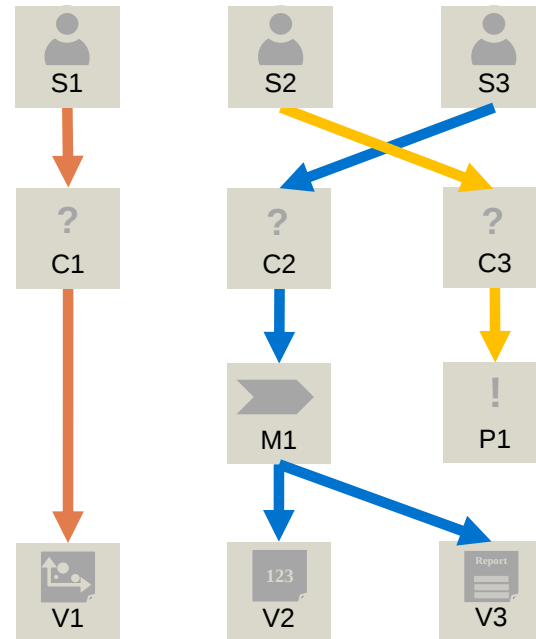
Summary & Outlook

14 Stakeholders

69 Challenges in
11 Topics

122 M-Patterns &
17 Anti-Patterns &
7 Architectural Principles

9 V-Patterns



+

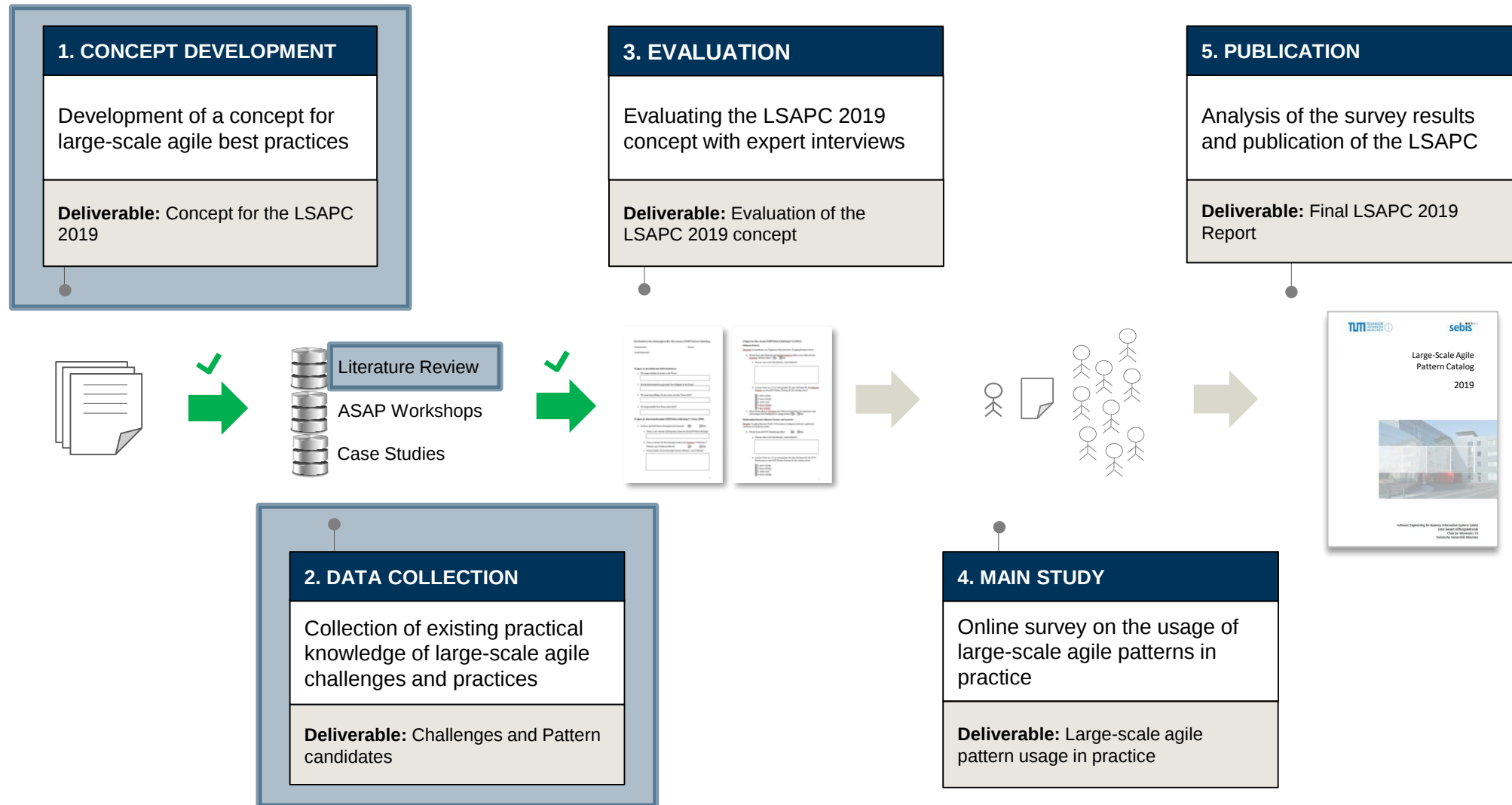
Architecture becomes more important the more complex the task or system is

New stakeholder roles are involved when scaling agile development

Scaling agile development entails new Communication and coordination challenges

Challenges in agile development may still exist in large-scale agile development

Stakeholders that are successfully isolated by the scrum master from external influences have less concerns in large-scaled agile development.





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Backup: MAXQDA (1)



Document System

Documents0

Sets0

Document System

Code System

Code System0

Sets0

Code System

Document Browser

Document Browser

Retrieved Segments

Retrieved Segments

Backup: MAXQDA (2)

Code System

Code System

540

Challenges

0

Life Strategy

0

Self Growth

0

Pivotal Moments

0

Day-to-Day Issues

94

Interview Guide Topics

85

People

74

Video Interview

3

Autocode: satisfaction

248

Key Quotes

23

Health

1

Twitter Autocode

12

Sets

0

Document Browser: Mary

10

11

Recreation:

Going to parties, exercising makes up most of what I do. I am VERY upset by my lack of time to relax. Basically, I don't have any. I have a lot of homework that never stops and I am very resentful for that. For instance, this week is little 5 week, and I cannot go to any of the parties because I have exams to study for and papers to write. I can feel that I am tense all of the time because I do not have time to relax. Hopefully, it will get better during the summer when I will only be working and not taking any classes.

Backup: MAXQDA (3)

Word frequencies

In 4 documents (33189 words total)3650 Words (TTR = 0,1100)



Display top ranks





	Word	Word length	Frequency	%	Rank	Documents	Documents %
◆	jesus	5	641	1,93	1	4	100,00
◆	son	3	315	0,95	2	4	100,00
◆	father	6	292	0,88	3	4	100,00
◆	man	3	279	0,84	4	4	100,00
◆	disciples	9	214	0,64	5	4	100,00
◆	lord	4	196	0,59	6	4	100,00
◆	people	6	136	0,41	7	4	100,00
◆	john	4	129	0,39	8	4	100,00
◆	kingdom	7	123	0,37	9	4	100,00
◆	house	5	112	0,34	10	4	100,00
◆	crowd	5	101	0,30	11	4	100,00

GR Caprano - Identifying and

Key Findings - Stakeholders

RQ1

Which stakeholders exist in large-scale agile projects?

	A	B	
1	ID	Name	Origin
2	S-1	Team Architect	Martini & Bosch 2015
3	S-2	Governance Architect	Martini & Bosch 2015
4	S-3	Chief Architect	Martini & Bosch 2015
5	S-4	Program Manager	Laanti 2008
6	S-5	Product Analyst	Moore & Spense 2008
7	S-6	Support Engineer	Paasivaara 2017
8	S-7	Release Train Engineer	Dyba & Dingsoyr 2015
9	S-8	Developer	Dyba & Dingsoyr 2015, etc.
10	S-9	Senior Developer	Dyba & Dingsoyr 2015
11	S-10	Junior Developer	Dyba & Dingsoyr 2015
12	S-11	Chief Engineer	Rodriguez et al. 2013
13	S-12	Proxy Product Owner	Rodriguez et al. 2013
14	S-13	Technical Documentation	Kircher & Hofman 2012
15	S-14	Risk Manager	Kircher & Hofman 2012
16	S-15	Usability Engineer	Kircher & Hofman 2012
17	S-16	Lead Product Owner	Bick et al. 2016
18	S-17	Tech Liaison	Nyrud & Stray 2017
19	S-18	Lean Coach	Viswanath 2016
◀ ▶ ... Stakeholders Concerns (c) M-Patterns(c) V-Patterns (c)			

Key Findings – Concerns

RQ2

What are project- or stakeholder specific challenges/concerns?



	A	B	C	D	E
1	Id	Name	Category	Scaling	Origin
2	C-1	Ensuring that non-functional requirements are considered by the development team	Architecture	yes	Boehm & Turner 2005, Paasivaara & Lassenius 2016, Rolland 2015, Babar 2009, Roopa et al. 2017, Dikert et al. 2015
3	C-2	Creating precise requirement specifications for the development team	Requirements Engineering	no	Boehm & Turner 2005, Paasivaara & Lassenius 2016, Ayed et al. 2014, Budwig et al. 2009, Dikert et al. 2015
4	C-3	Managing and integrating heterogenous subsystems of different development teams	Architecture	yes	Boehm & Turner 2005, Martini & Bosch 2015, Dikert et al. 2015
5	C-4	Defining a lightweight formal review process	Quality Assurance	yes	Mahanti 2006
7	C-6	Facilitating communication between agile teams and other teams using traditional practices	Communication & Coordination	yes	Mahanti 2006, Heje & Krohn 2017, Budwig et al. 2009, Dikert et al. 2015
8	C-7	Managing dependencies to other existing environments	Architecture	yes	Mahanti 2006, Rolland 2015, Budwig et al. 2009, Dikert et al. 2015
9	C-8	Obtaining management buy-in	Culture & Mindset	no	Mahanti 2006, Rodriguez et al. 2012, Paasivaara & Lassenius 2016, Heje & Krohn 2017, Dikert et al. 2015
10	C-9	Dealing with doubts in people about changes	Culture & Mindset	no	Mahanti 2006, Rodriguez et al. 2012, Paasivaara & Lassenius 2016, Rodriguez et al. 2012, Paasivaara 2017, Lous et al. 2017, Dikert et al. 2015
11	C-10	Dealing with black and white mindsets	Culture & Mindset	yes	Mahanti 2006, Dikert et al. 2015
12	C-11	Dealing with office politics	Culture & Mindset	no	Mahanti 2006
13	C-12	Dealing with closed mindedness	Culture & Mindset	yes	Mahanti 2006, Dikert et al. 2015
	C-13	Coordinating multiple agile teams that work on the same product	Communication & Coordination	yes	Rautiainen et al. 2011, Maranzato et al. 2011, Dyba & Dingsoyr 2015, Gupta et al. 2017, Moore & Spense 2008, Vivian et al. 2015, Moe et al. 2016, Dingsöyr et al. 2017, Crowston et al. 2016, Bick et al. 2016, Paasivaara 2017, Rolland 2015, Nyrud & Stay 2017, Martini &

Key Findings – Topics

RQ3

How can the challenges be categorized?



	A	B	C	D	E
1	Id	Name	Category	Scaling	Origin
2	C-1	Ensuring that non-functional requirements are considered by the development team	Architecture	yes	Boehm & Turner 2005, Paasivaara & Lassenius 2016, Rolland 2015, Babar 2009, Roopa et al. 2017, Dikert et al. 2015
3	C-2	Creating precise requirement specifications for the development team	Requirements Engineering	no	Boehm & Turner 2005, Paasivaara & Lassenius 2016, Ayed et al. 2014, Budwig et al. 2009, Dikert et al. 2015
4	C-3	Managing and integrating heterogenous subsystems of different development teams	Architecture	yes	Boehm & Turner 2005, Martini & Bosch 2015, Dikert et al. 2015
5	C-4	Defining a lightweight formal review process	Quality Assurance	yes	Mahanti 2006
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Key Findings – M-Pattern Candidates

RQ?

Additional



1	Id	Name	Type	Origin	Relationship to Concerns
2	M-1	Specification of non-functional requirements in user stories	Activities	Boehm & Turner 2005	C-1
3	M-2	Approving communicated refactoring ideas by development teams	Activities	Mahanti 2006	C-5
4	M-3	Organizing cross-team communication facilitation workshops	Activities	Mahanti 2006	C-6
5	M-4	Demonstrating the benefits of agile principles by conducting pilot projects	Activities	Mahanti 2006, Dikert et al. 2015, Paasivara & Lassenius 2016, Mahanti 2006, Talby & Dubinsky 2009	C-8, C-11
6	M-5	Integrating agile principles to external processes	Activities	Mahanti 2006	C-9
7	M-6	Reporting and adapting agile practices	Activities	Mahanti 2006	C-9, C-11
8	M-7	Educating people dealing with agile practices	Activities	Mahanti 2006, Paasivara 2017	C-9, C-10, C-11, C-43
9	M-8	Identifying and convincing agility blockers	Activities	Mahanti 2006	C-12
10	M-9	Establishing scheduled and unscheduled meetings	Activities	Paasivaara et al. 2008, Dingsöyr et al. 2017, Sindghatta et al. 2011	C-13, C-20, C-22, C-36, C-84
11	M-10	Metascrum	Meetings	Dingsöyr 2017	C-13
	M-11	Scrum of Scrums	Meetings	Dingsöyr 2017, Dyba & Dingsöyr 2015, Gupta et al. 2017, Moore & Spens 2008, Paasivaara 2017, Budwig et al. 2009, Biornson &	C-13, C-28, C-95

◀ ▶ ... Stakeholders Diagramm1 Concerns (c) **M-Patterns(c)** V-Patterns (c) Architecture Principles (c) ... ⛶ ⋮ ⏪

Key Findings – V-Pattern Candidates

RQ?

Additional



	A	B	C	D	E	F	G
1	Id	Name	Type	Origin	Relationship to Concerns	Übergeordneter M-Pattern	Anmerkungen
2	V-1	Persona		Broschinsky & Baker 2008	C-32		Class: Customer with attributes: name, mentality, demands
3	V-2	Collaborative Scrum Board		Gupta et al. 2017	C-47		Alias: Wagon Wheel Dashboard Class: Issue with attribute: name, progress Class: team Class: team member (als Slices) Class: tasks with attributes: estimation and priority (mit color coding)
4	V-3	Family model		Kircher & Hofman 2012	C-52	M-50	Class: Product Class: Platform Relationship zwischen Product und Platform
5	V-4	Task board		Ayed et al. 2014			