Master's Thesis: Observing and Documenting Architecture Practices in a Large-Scale Agile Development Project

Soner Ercelik, Master's Thesis – Final Presentation, 23.07.2018

Chair of Software Engineering for Business Information Systems (sebis)
Faculty of Informatics
Technische Universität München
wwwmatthes.in.tum.de

Agenda

Motivation

Research Methodology

Literature Review

Case Study

Social Network Analysis

Discussion

Outlook

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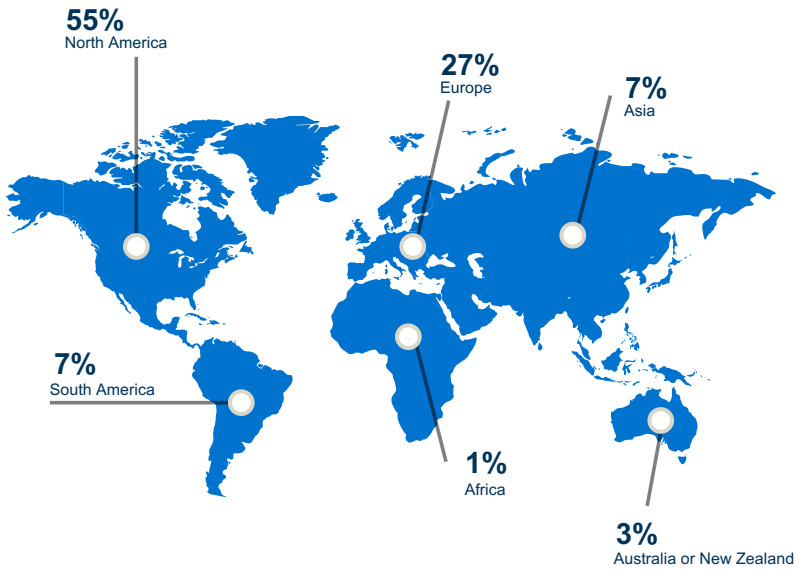
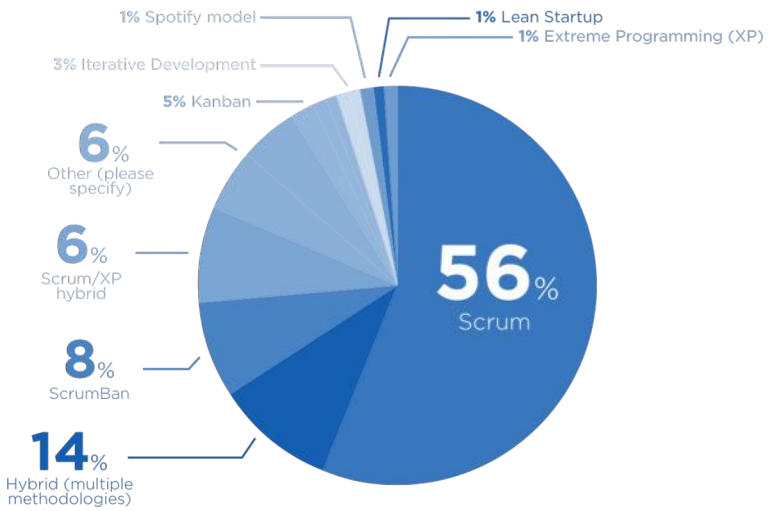
Motivation – VersionOne 2018

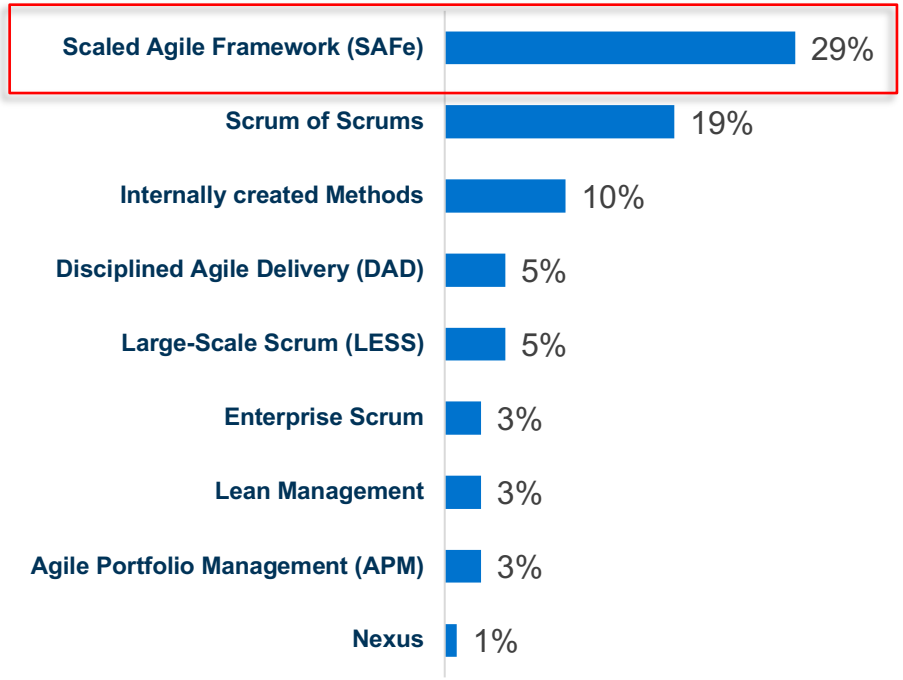
Locations of Respondents



Agile Methods and Practices



Scaling Methods and Approaches



VersionOne
2018

1,492
Respondents

VersionOne (2018): https://stateofagile.versionone.com

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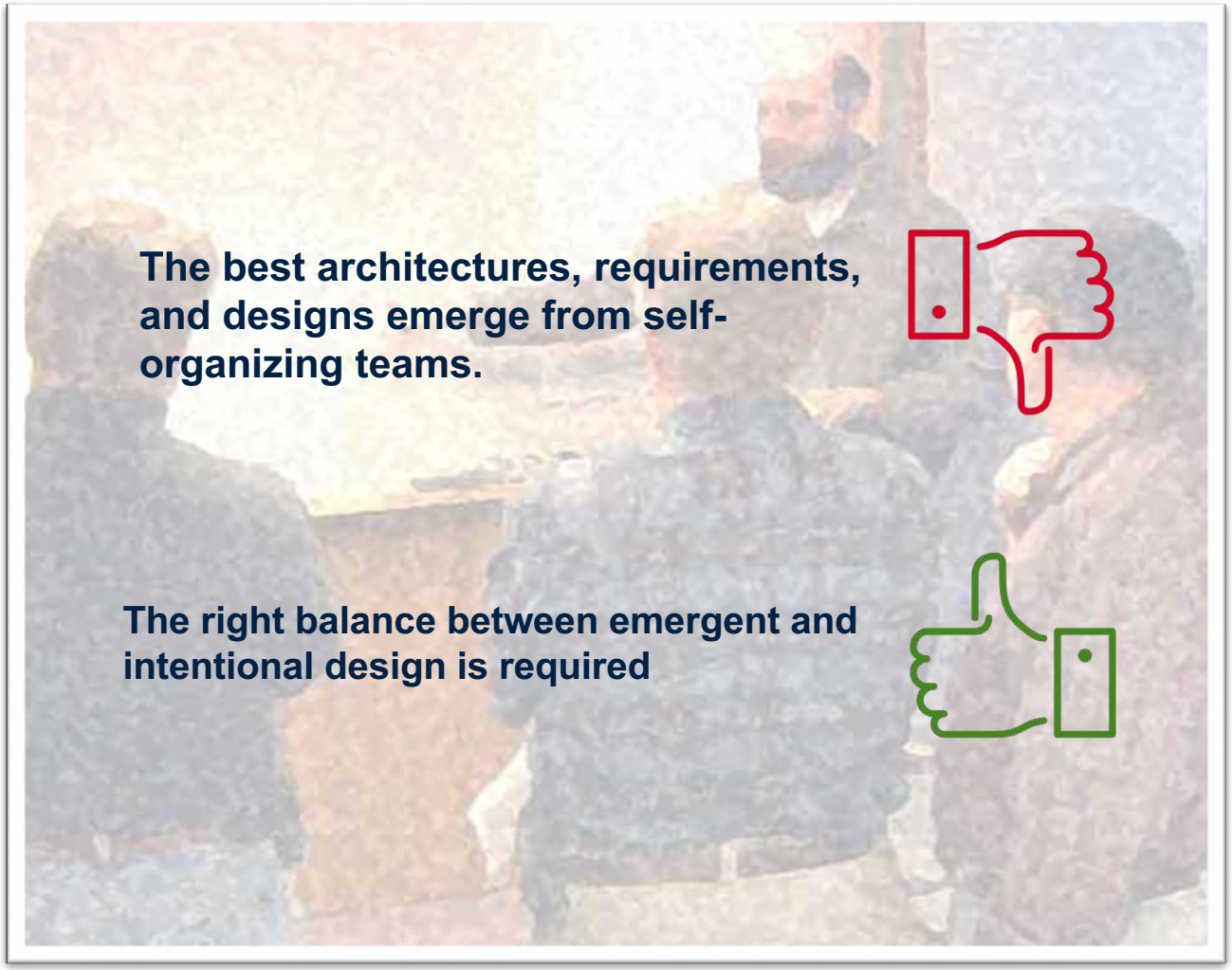
Motivation – Abrahamson & Agile Manifesto

- Existing Agile Methods have common characteristics:
  - Iterative and incremental life cycles
  - Focus on small releases
  - Collocated teams
  - A planning strategy based on a release plan
- They more or less agree to the values of the agile manifesto!

Problem:

- In complex systems this design might not work anymore

Principles behind the Agile Manifesto



Agile Manifesto Principles: https://agilemanifesto.org/

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Research Methodology I

RQ1

Research Question 1

Which activities, roles, artifacts and tools exist regards to architecture in SAFe?

RQ2

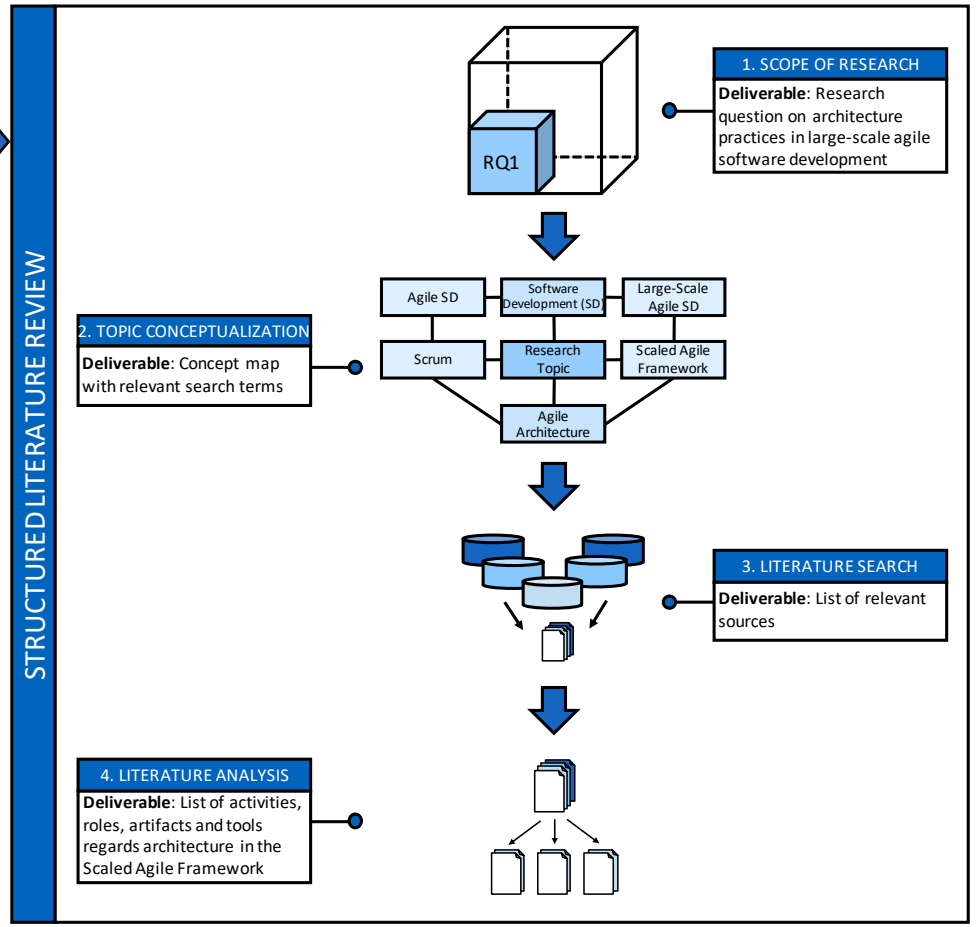
Research Question 2

Which architectural practices, artifacts, and tools are used in the large-scale agile development program, which is based on SAFe?

RQ3

Research Question 3

How does the collaboration take place between architects and agile teams in a large-scale agile development endeavor?



Brocke et al. (2009): Reconstructing the giant: On the importance of rigour in documenting the literature search process

Research Methodology II

RQ1

Research Question 1

Which activities, roles, artifacts and tools exist regards to architecture in SAFe?

RQ2

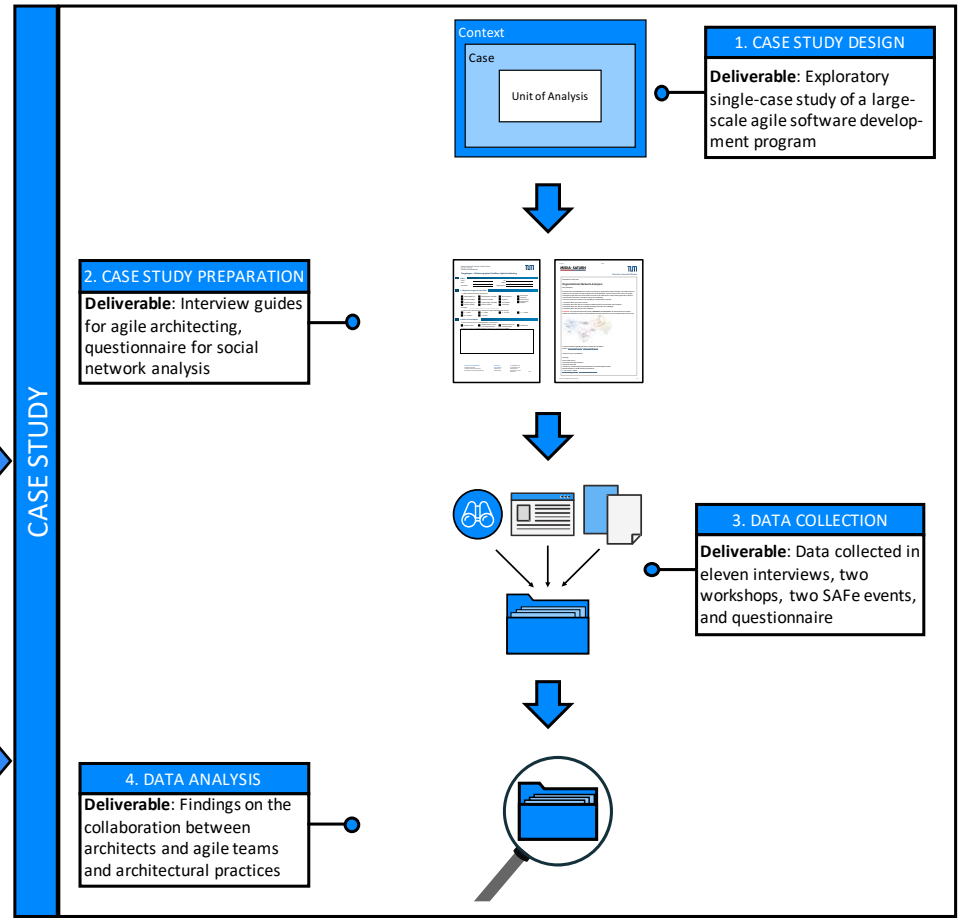
Research Question 2

Which architectural practices, artifacts, and tools are used in the large-scale agile development program, which is based on SAFe?

RQ3

Research Question 3

How does the collaboration take place between architects and agile teams in a large-scale agile development endeavor?



Yin (2008): Case Study Research: Design and Methods (Applied Social Research Methods)
Runeson and Höst (2009): Guidelines for conducting and reporting case study research in software engineering

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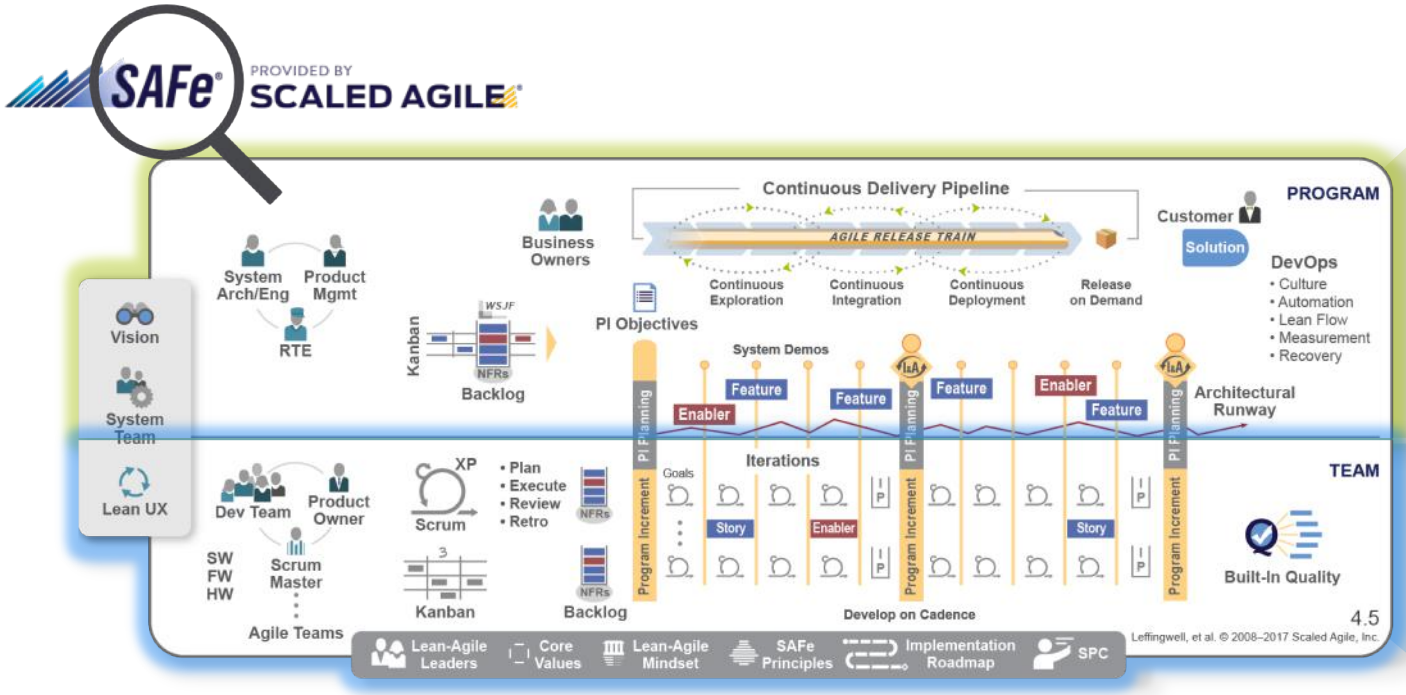
Literature Review – Roles, Events, Artifacts regards to Architecture in SAFe



ROLE	EVENT	ARTIFACT
System Architect	PI Planning	Features
Product Management	System Demo	Enabler
Release Train Engineer	Scrum of Scrums	Program Backlog
Business Owners	PO Synch	Program Kanban
Customer	Community of Practice	PI Objectives
	Inspect & Adapt	Architectural Runway
		Continuous Delivery Pipeline
Dev Team	Iteration Planning	Stories
Product Owner	Iteration Execution	Enabler
Scrum Master	Daily Stand-Up	Iteration Goals
	Iteration Review	Team Backlog
	Iteration Retrospective	Team PI Objectives
	Backlog Refinement	
	Innovation and Planning Iteration	

Essential SAFe (2018): https://www.scaledagileframework.com/

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Case Study – Case Description

Architecture Practices

- Details of interviews & observations:

Id	Type	Event / Topic	Role	Duration
I1	Semi-structured Interview	Agile Architecting	Chief Solution Architect	34 minutes
I2	Semi-structured Interview	Agile Architecting	Solution Architect	42 minutes
I3	Semi-structured Interview	Agile Architecting	Solution Architect	53 minutes
I4	Semi-structured Interview	Agile Architecting	Release Train Engineer	22 minutes
I5	Semi-structured Interview	Agile Architecting	Agile Coach	1 hour and 13 minutes
I6	Semi-structured Interview	Agile Architecting	Developer	31 minutes
I7	Semi-structured Interview	Agile Architecting	Developer	18 minutes
I8	Unstructured Interview	Kick-Off Meeting	-	2 hours
I9	Unstructured Interview	Feedback Meeting	Agile Coach	2 hours and 30 minutes
I10	Unstructured Interview	Feedback Meeting	Agile Coach	1 hour and 43 minutes
I11	Unstructured Interview	Feedback Meeting	Agile Coach	1 hour and 4 minutes
I12	Workshop	Scaling Agile Practices	-	4 hours and 30 minutes
I13	Workshop	Scaling Agile Practices	Agile Coach	2 hours and 30 minutes
I14	Observation	PI Planning	-	18 hours
I15	Observation	PI Planning	-	17 hours

- Total amount of interviews and observations: 15
- Total amount of semi-structured interviews: 7
- Total hours of interviews & observations: ~ 54 hours
- Total pages of notes, transcripts etc.: ~ 153 pages

Social Network Analysis

- Online survey through Questback
  - How frequently do you exchange information with this person?
  - How frequently do you exchange architectural advices with this person?
- Total amount of teams: 5
- Total amount of program members: 62
- Response rate: 47%
- Visualization of survey data through Gephi
- 962 information sharing & 752 architecture sharing connections
- Total amount of created graphs: 116

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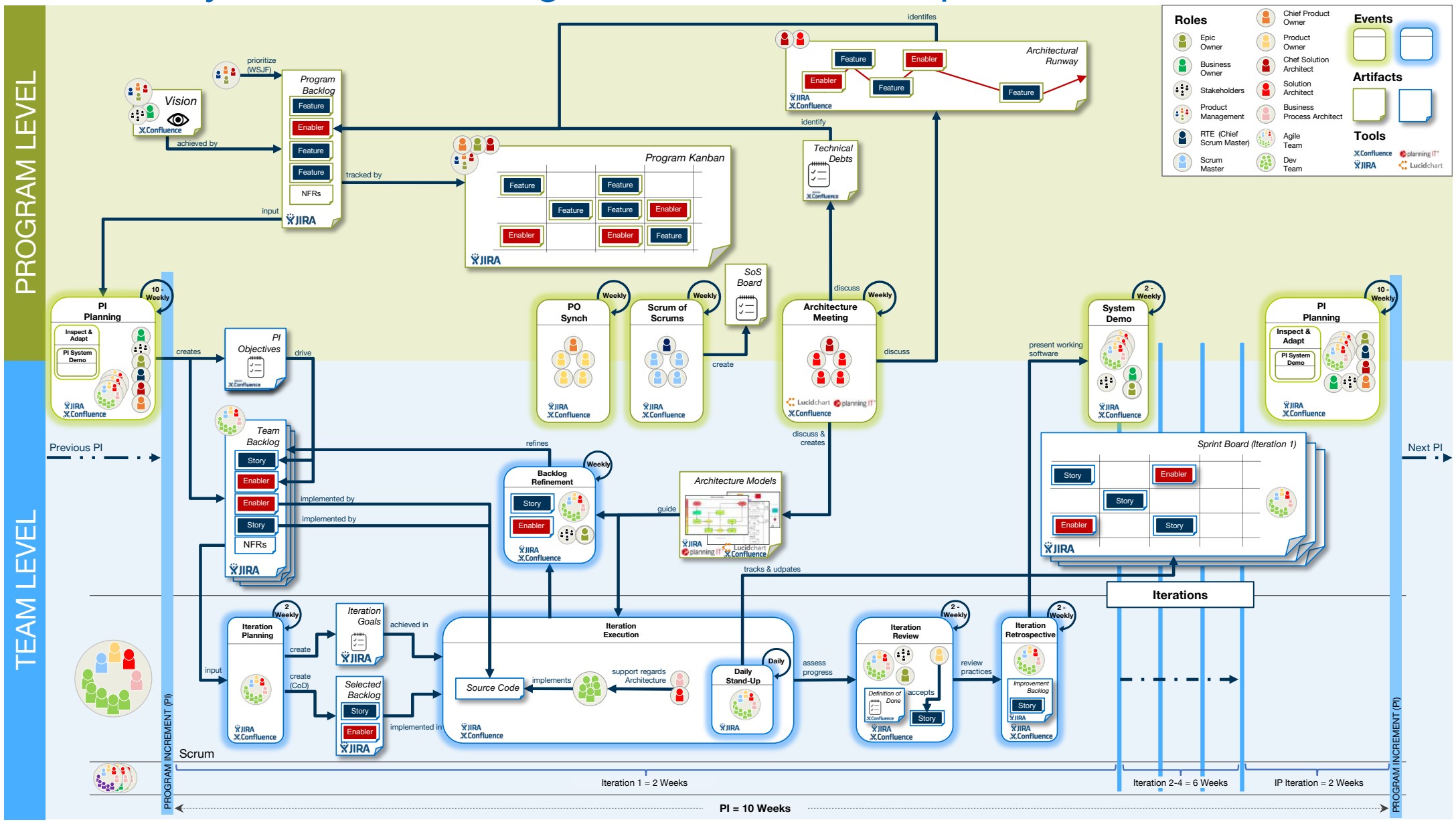
Case Study – Framework regards to architecture practices



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Social Network Analysis – Inter-Team Communication (Architecture Sharing)

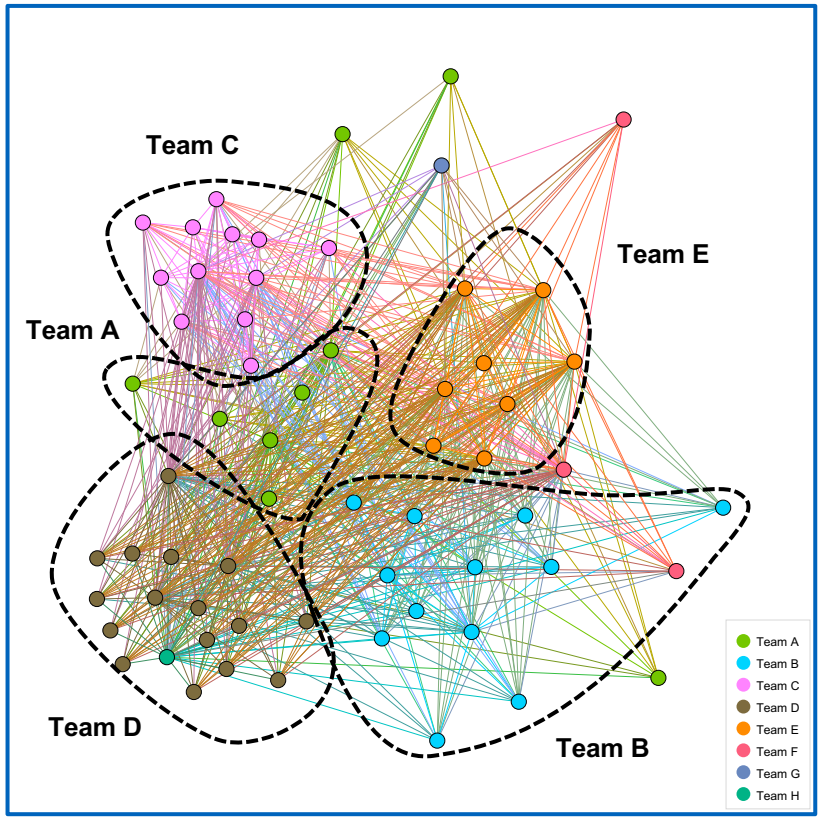

Figure 1: Architecture sharing – program overview

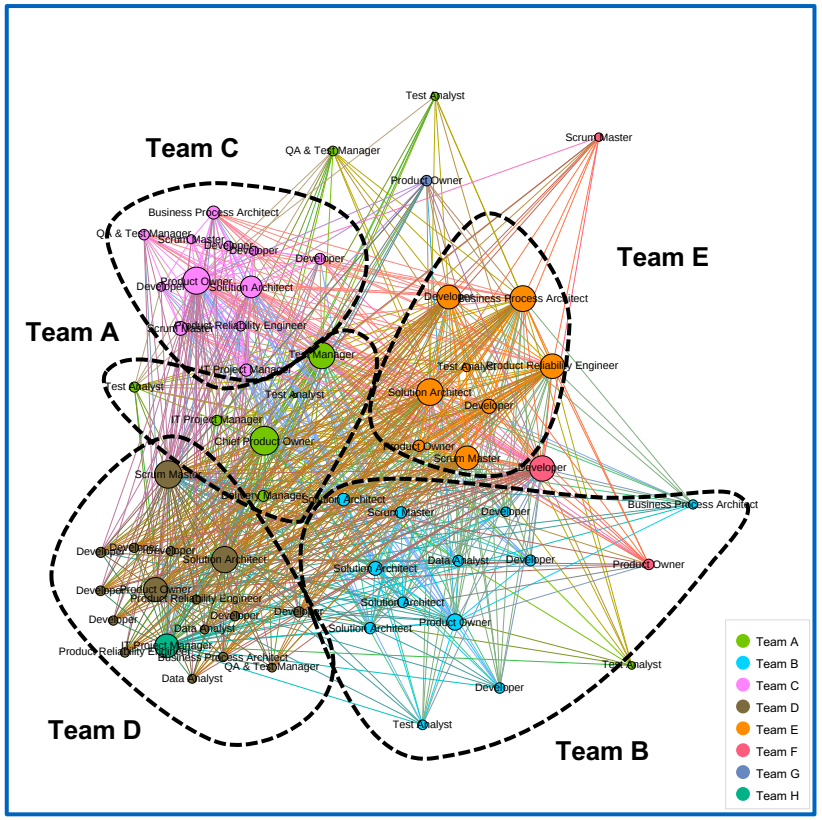

Figure 2: Architecture sharing – salient roles

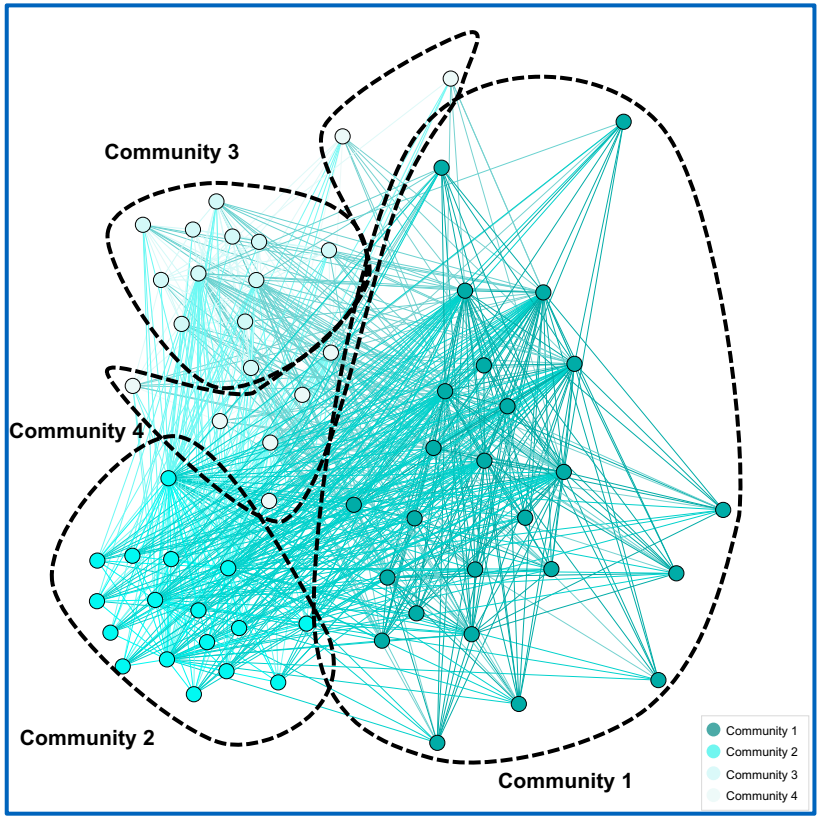

Figure 3: Architecture sharing – architecture communities

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Social Network Analysis – Inter-Team Communication (Architecture Sharing – Time-dependent with focus on architects)

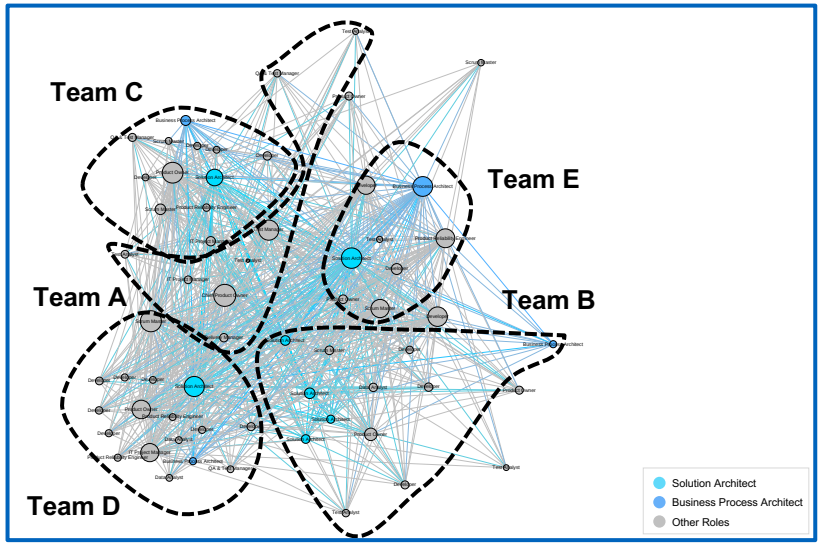

Figure 1: Architecture sharing – min. every PI

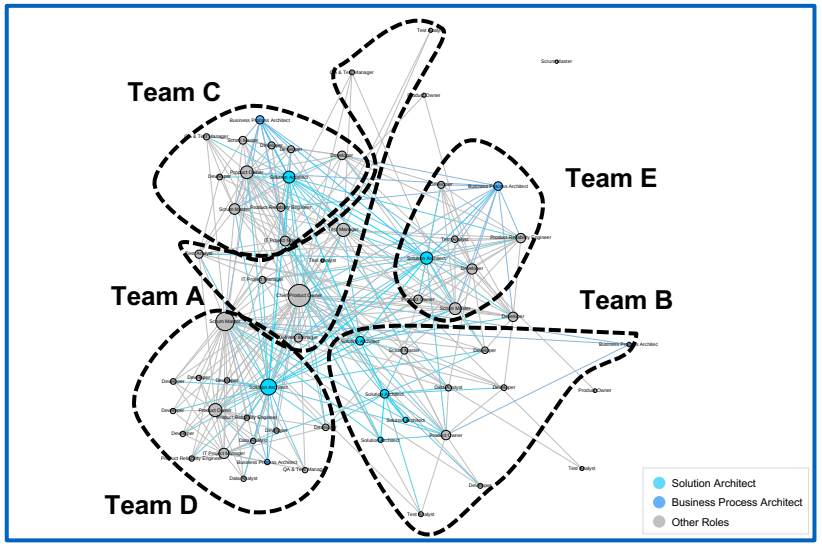

Figure 2: Architecture sharing – min. 1x Iteration

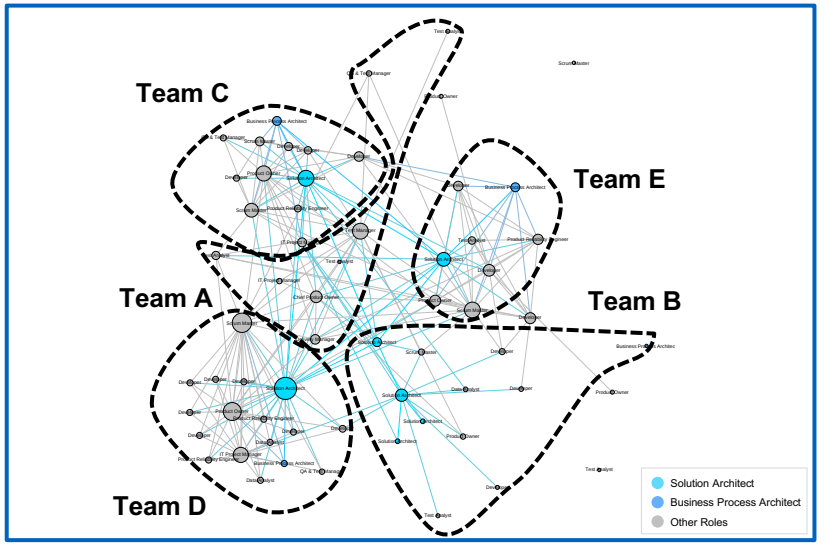

Figure 3: Architecture sharing – min. 2-3 x Iteration

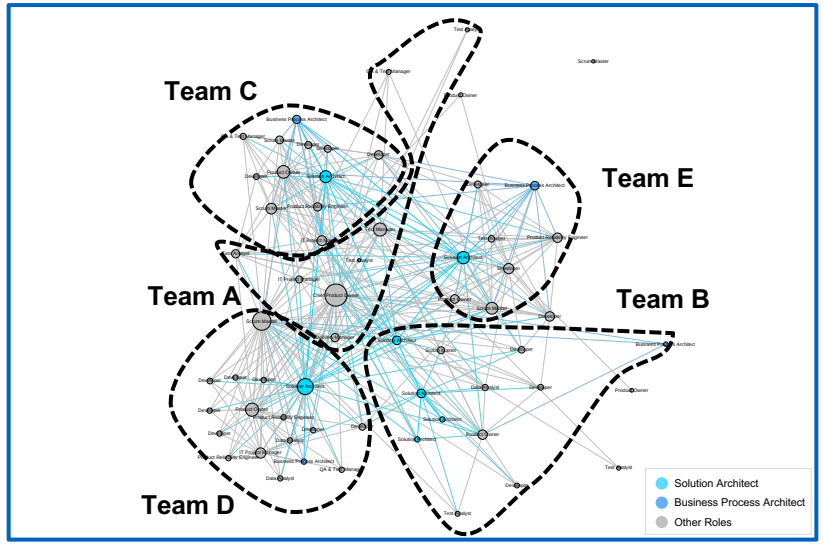

Figure 4: Architecture sharing – min. Daily Stand-Up

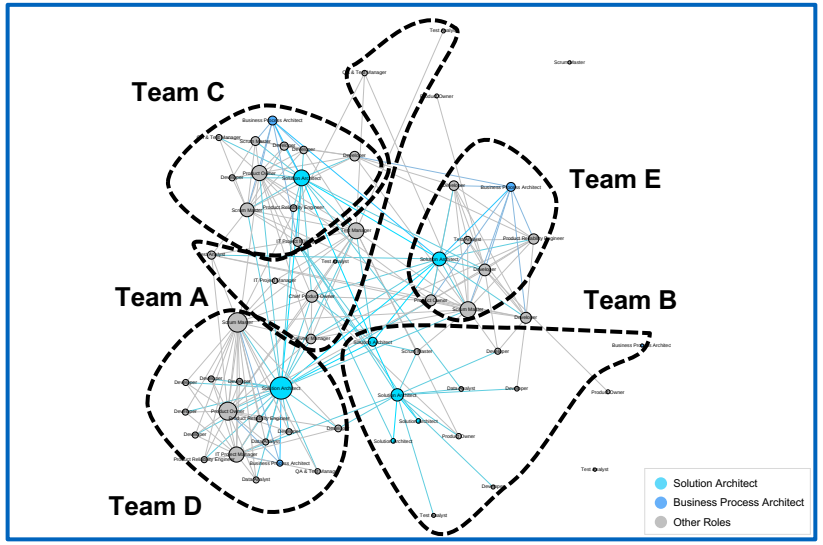

Figure 5: Architecture sharing – Constant

Social Network Analysis – Intra-Team Communication (Architecture sharing with focus on architects)

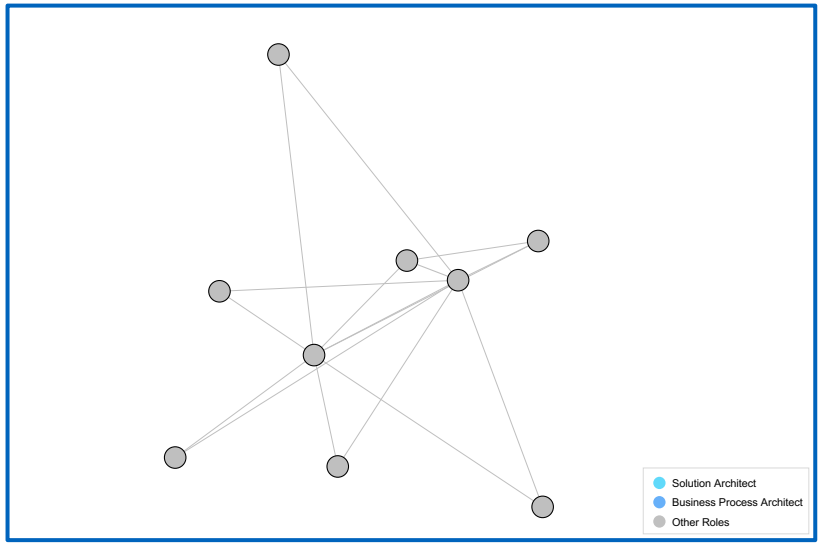

Figure 1: Architecture sharing – Team A

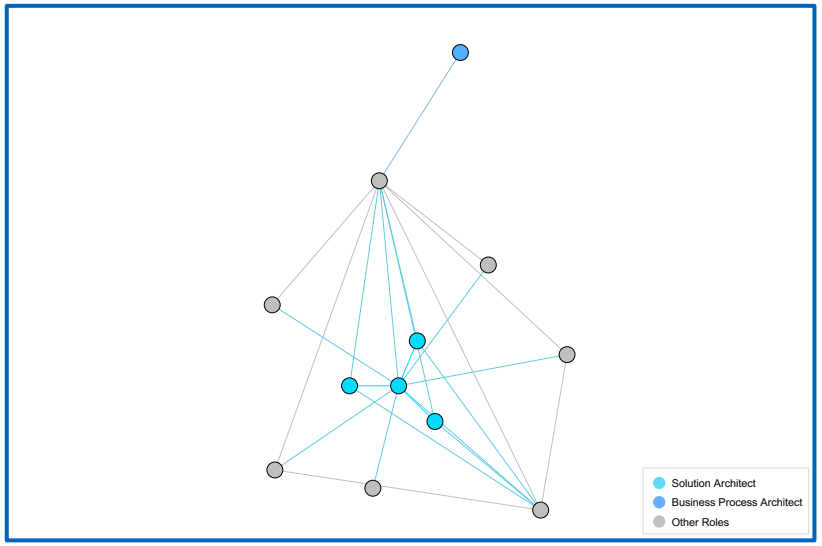

Figure 2: Architecture sharing – Team B

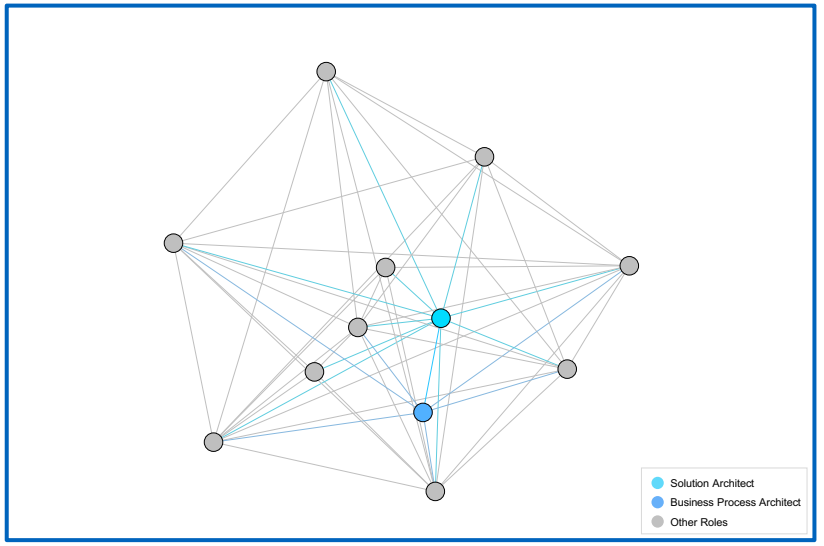

Figure 3: Architecture sharing – Team C

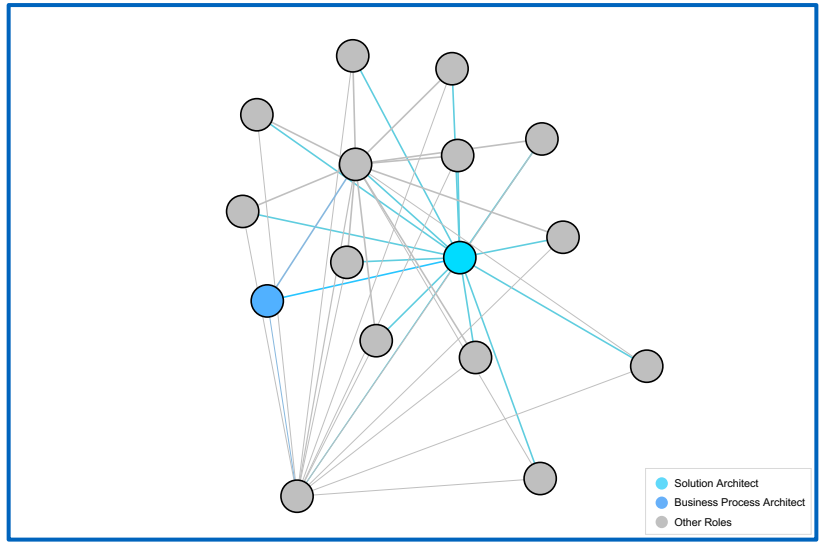

Figure 4: Architecture sharing – Team D

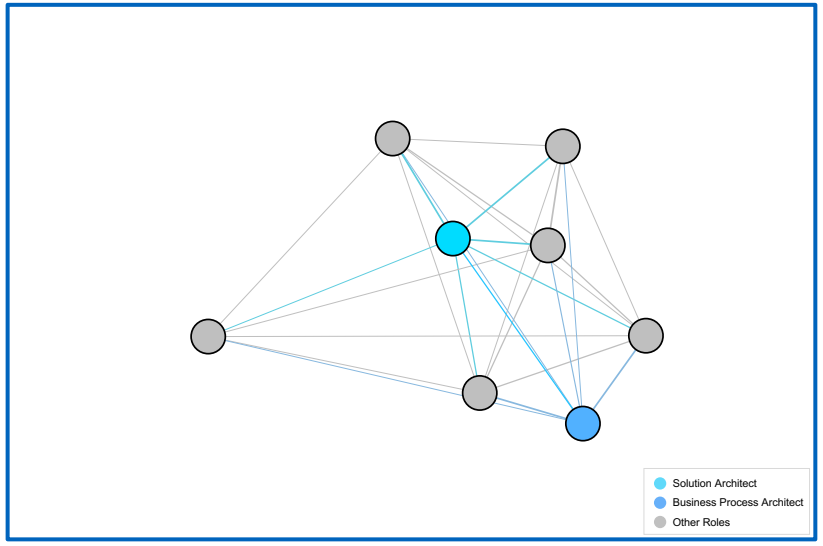

Figure 5: Architecture sharing – Team E

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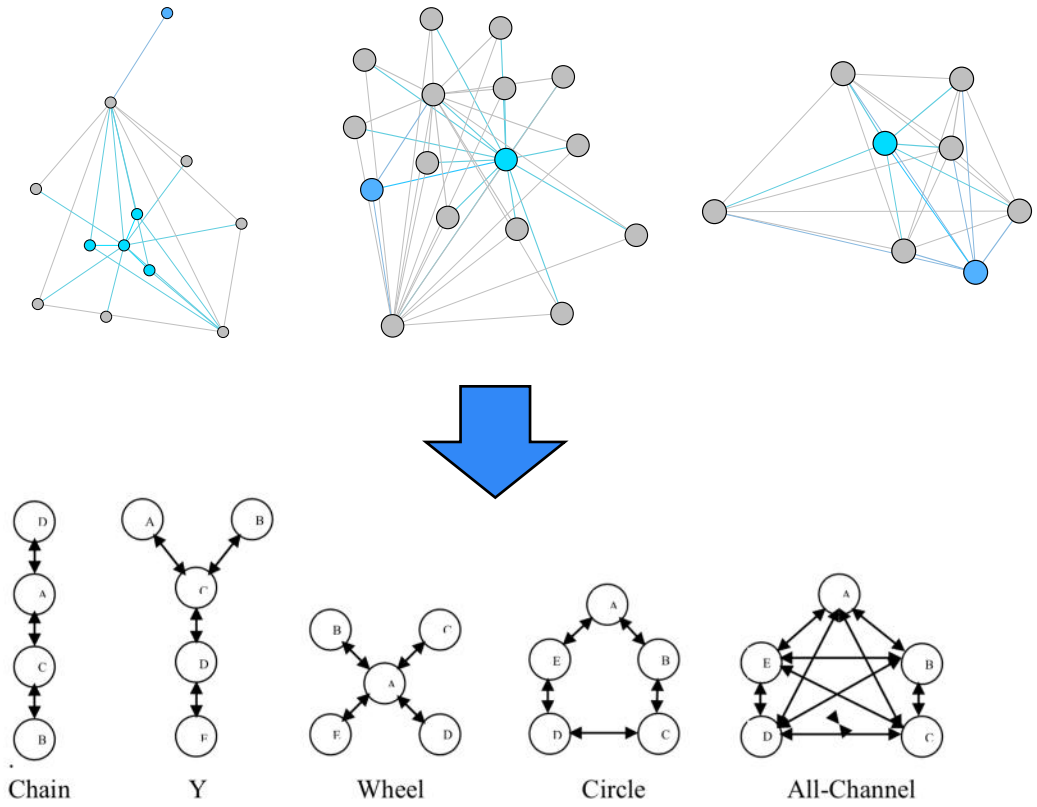
Social Network Analysis – Summary



		Team A	Team B	Team C	Team D	Team E
Information Sharing	Overview (communication pattern)	decentralized; -	decentralized; almost all-channel	decentralized; all-channel	decentralized; almost all-channel	decentralized; all-channel
	Architects with other roles (communication pattern)	not applicable	decentralized; almost all-channel	decentralized; all-channel	decentralized; almost all-channel	decentralized; all-channel
	Architects with other roles (frequency)	not applicable	mostly daily basis	mostly daily basis	constant	mostly daily basis
	Among architects (communication pattern)	not applicable	centralized; wheel (Solution Architects)	not applicable	not applicable	not applicable
	Among architects (frequency)	not applicable	constant	constant	constant	constant
Architecture Sharing	Overview (communication pattern)	decentralized; -	decentralized; all-channel	decentralized; all-channel	decentralized; almost all-channel	decentralized; all-channel
	Architects with other roles (communication pattern)	not applicable	decentralized; all-channel	decentralized; all-channel	decentralized; almost all-channel	decentralized; all-channel
	Architects with other roles (frequency)	not applicable	mostly 2-3x pro Iteration basis (except Business Process Architect)	mostly daily basis	mostly daily basis	mostly daily basis
	Among architects (communication pattern)	not applicable	centralized; wheel (Solution Architects)	not applicable	not applicable	not applicable
	Among architects (frequency)	not applicable	constant (except Business Process Architect)	constant	constant	mostly daily basis

Fred C. Lunenburg (2011): Network Patterns and Analysis: Underused Sources to Improve Communication Effectiveness

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Discussion – Deviations of SAFe adaption at the Case Organisation

ROLE	LEVEL	EXISTING	NOT EXISTING
System Architect	Program	X	–
Product Management	Program	X	–
Release Train Engineer	Program	X	–
Business Owners	Program	X	–
Customer	Program	–	X
Dev Team	Team	X	–
Product Owner	Team	X	–
Scrum Master	Team	X	–

EVENT	LEVEL	EXISTING	NOT EXISTING
PI Planning	Program	X	–
System Demo	Program	X	–
Scrum of Scrums	Program	X	–
PO Synch	Program	X	–
Community of Practice	Program	–	X
Iteration Planning	Team	X	–
Iteration Execution	Team	X	–
Daily Stand-Up	Team	X	–
Iteration Review	Team	X	–
Iteration Retrospective	Team	X	–
Backlog Refinement	Team	X	–
Innovation and Planning Iteration	Team	X	–

ARTIFACT	LEVEL	EXISTING	NOT EXISTING
Features	Program	X	–
Enabler	Program	X	–
Program Backlog	Program	X	–
Program Kanban	Program	X	–
PI Objectives	Program	X	–
Architectural Runway	Program	X	–
Continous Delivery Pipeline	Program	–	X
Stories	Team	X	–
Enabler	Team	X	–
Iteration Goals	Team	X	–
Team Backlog	Team	X	–
Team PI Objectives	Team	X	–

Deviations of SAFe adaption:

- Compared to SAFe, additional roles are existing such as IT Project Manager, Test Analyst, Delivery Manager
- Solution Architects of case organisation correspondent with the definition of System Architects in SAFe
- Enablers are not differentiated from Features or Stories as prescribed by SAFe → Budgeting on a project basis
- Critical event Community of Practice (CoP) doesn‘t exist currently → Relaunch in the near feature

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Discussion – Key Findings

- Both information and architecture sharing take place decentrally
- Solution Architects are centrally located in all teams and play a vital role in architecture sharing
- All non-architectural roles, such as SMs, POs, RTE, especially CPO are involved in architecture sharing
- Solution Architects are dedicated to individual teams (internal architect) and play dual role in their teams
  - Guiding their team with the help of architecture models
  - Constantly supporting their team to meet architectural goals and requirements
- Almost all Solution Architects share architecture-related information with their team members on a daily basis

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Discussion – Limitations

- **Construct validity**
  - Multiple persons with different roles were interviewed
  - All interviews and observations were coded and reviewed by a second researcher
  - All analyses of the case study were reviewed by a key informant of the case organization
- **Internal validity**
  - Not applicable, as the thesis was neither explanatory nor causal
- **External validity**
  - Case study provides empirical insights that allow an understanding for architectural practices
- **Reliability**
  - Case study protocol was used, which defines the detailed procedures for data collection and analysis
  - Case study database was created, which includes all case study notes and documents, such as audio recordings, transcribed interviews, workshop protocols, and field notes of observations

Yin (2008): Case Study Research: Design and Methods (Applied Social Research Methods)
Runeson and Höst (2009): Guidelines for conducting and reporting case study research in software engineering

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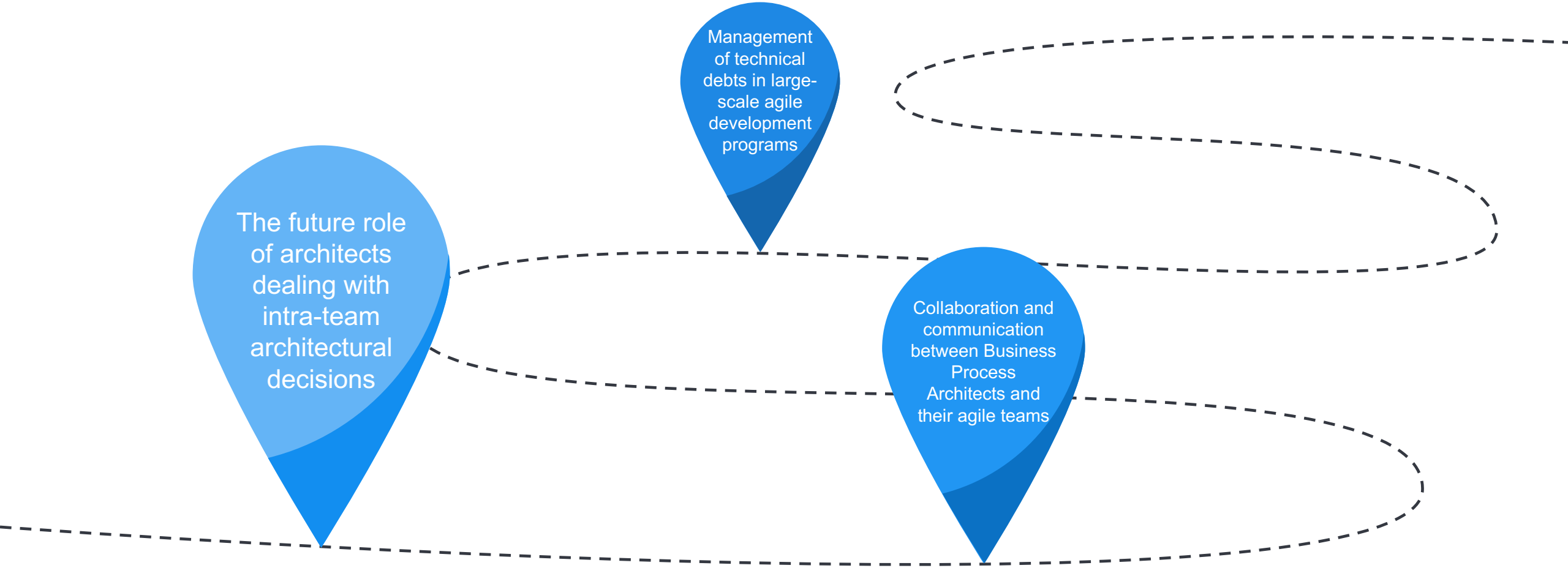
Management of technical debts in large-scale agile development programs
The future role of architects dealing with intra-team architectural decisions
Collaboration and communication between Business Process Architects and their agile teams

Thank you for your attention!

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