Developing a Model for Assessing Team and Program Performance in Large-Scale Agile Development

Maximilian Doepp, Dec. 07th, 2018

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

Agenda

1. Introduction

- Motivation
- Problem Statement
- Research Methodology
- Research Approach

2. Case Study Partner

- EGP
- Company Structure
- Team Setup and Distribution
- Team Structure

3. Status

- Agile and Multiteam Systems
- Current Status
- MTS Models
- Roadmap

© sebis

Motivation - Large-Scale Agile Development

1

Agile has replaced the waterfall model in software development

Google Trend: **10 times** more people search for Agile compared to traditional project management methods [1]

2

More and more big projects and companies adapt Large-Scale Agile development

29% of the companies that participated in the VersionOne Agile Report started scaling with Scaled Agile Framework (SAFe) [2]

3

Agile development relays on self organizing teams with inter- and inter-team communication

Sources:
[1] Google Trends: 06.12.2018
[2] VersionOne 12th Annual State of Agile Report

© sebis

Problem of Large-Scale Agile Development

- Many frameworks (e.g. Scaled Agile Framework (SAFe), Large Scaled Scrum (LeSS), Disciplined Agile Delivery (DAD)) try to define methods, activities, principles and artefacts to optimize and define the processes

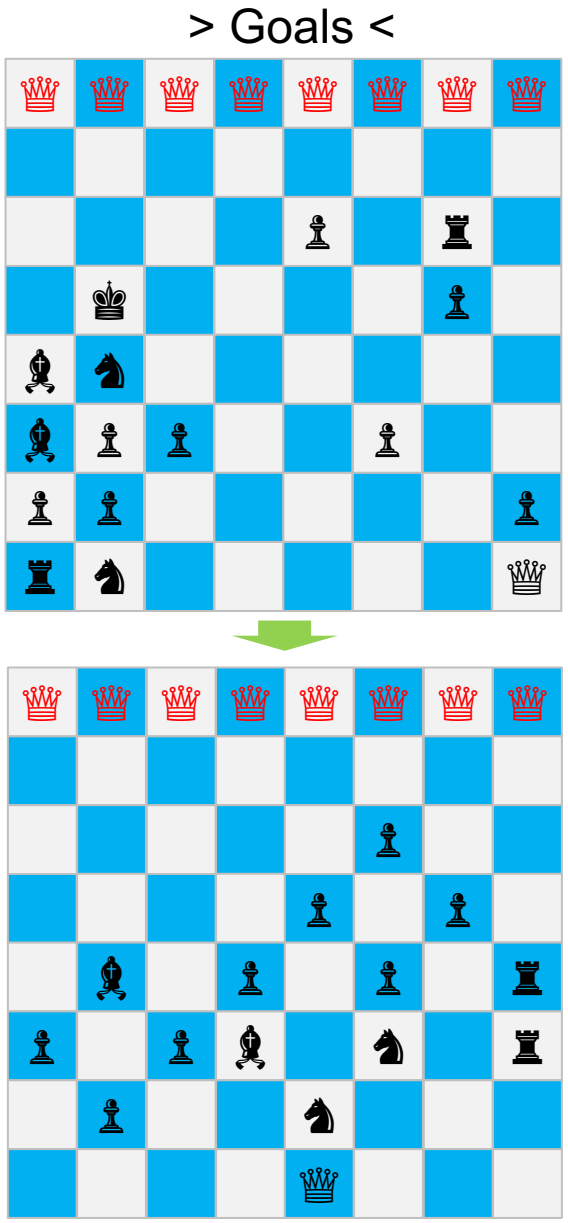
→ In the end the teams are responsible for the result and the frameworks can only define rules

- Example calculation
  - 1 Developer will cost 100.000 €/year (Salary, Office, …)
  - 80 Developers are needed (
  - + (1 PO + 1 SM) per Team + Architects/… = +20 Person
  - = 100 Persons * 100k€ = 10 Mio.€/year
  - ⇢ Optimizing the Team performance by **1%** → **100k€/year**

- It's hard for companies to find experienced developers

→ So they had to optimize the existing teams!

→ What are the risks and influencing factors?



Sources:
StepStone Gehaltsreport 2018 (64.837 €) + additional costs (smartbusinessplan.de)

© sebis

Research Methodology

01 RQ	**Research Question 1** What limits do Scaling Agile Frameworks have?	> Structured Literature Review
02 RQ	**Research Question 2** What influence factors models are available that affect team and program performance?	> Structured Literature Review
03 RQ	**Research Question 3** Which influencing factors have a significant impact on team and program performance?	> Quantitative Survey + Case Study
04 RQ	**Research Question 4** Do the significant influencing factors also have relevance for performance in reality (case study)?	> Case Study

Sources: Vom Brocke, Jan, et al. "Reconstructing the giant: On the importance of rigour in documenting the literature search process." Ecis. Vol. 9. 2009.
R. Yin, Case Study Research: Design and Methods. Beverly Hills, CA: Thousand Oaks, Sage Publications, 2013.
P. Runeson and M. Höst, "Guidelines for conducting and reporting case study research in software engineering", Empir. Softw. Eng., vol. 14, no. 2, pp.131, 2008.

Research Approach

1. Identifying models based on a structured literature review
2. Selecting an appropriate model based on defined assessment criteria
3. Performing a quantitative questionnaire for assessing and validating the selected model in large-scale agile development
4. Calculating team and program performance based on KPIs
5. Comparing the outcome of the model with the “real” team and program performance

Agenda

1. Introduction

- Motivation
- Problem Statement
- Research Methodology
- Research Approach

2. Case Study Partner

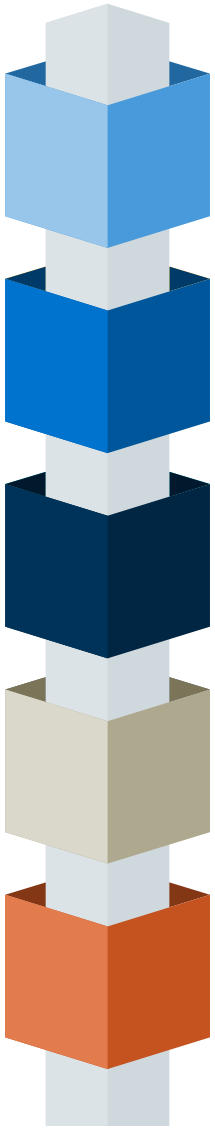
- EGP
- Company Structure
- Team Setup and Distribution
- Team Structure

3. Status

- Agile and Multiteam Systems
- Current Status
- MTS Models
- Roadmap

© sebis

EGP – History and background



01 **After the financial crises, German and EU regulations for banks have increased**

02 **The EGP was founded in 2016 to build a software that can create reports for the required regulatory laws and registrations**

03 **The employees are sourced by the companies‘ owners**

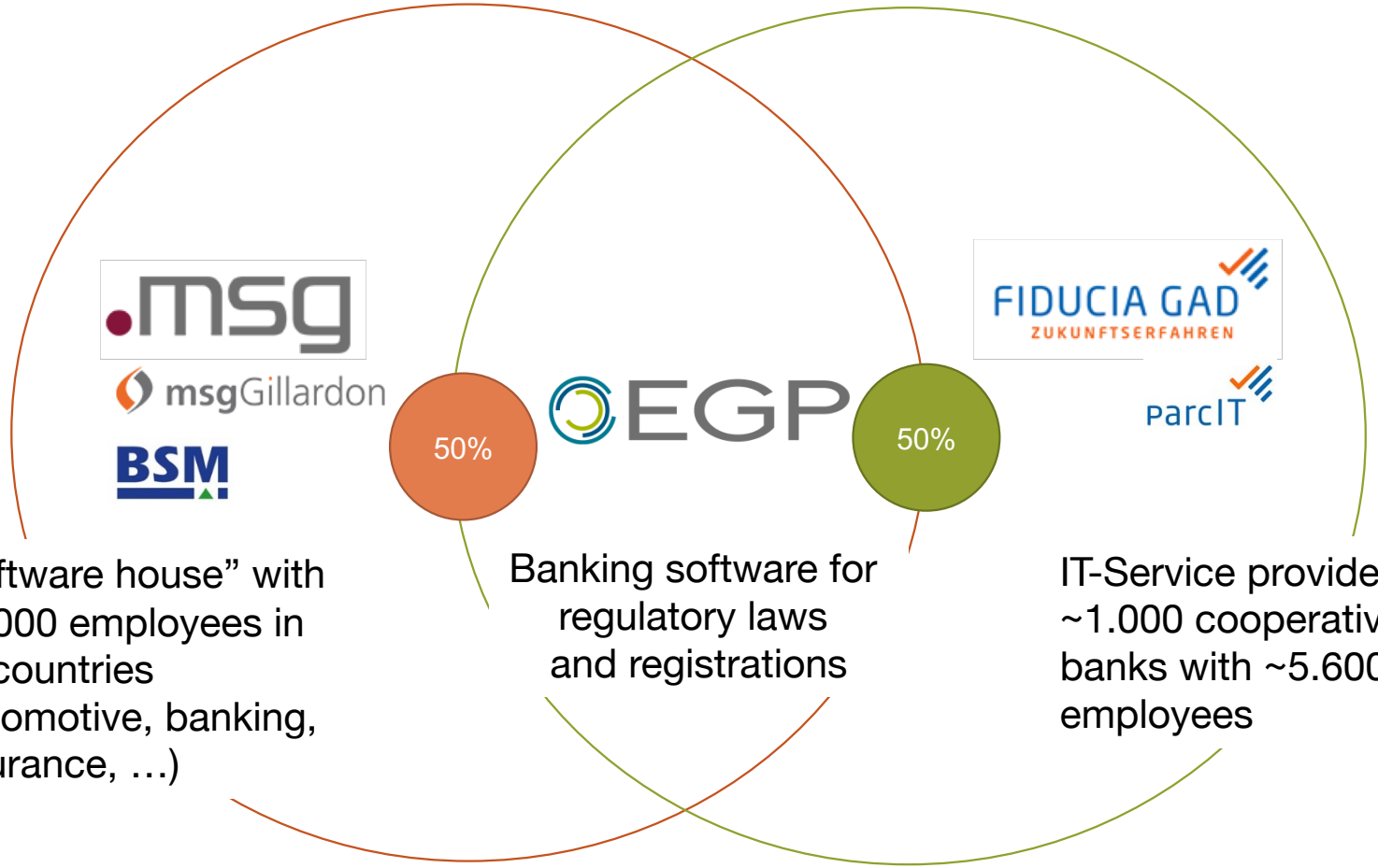
04 **Between 2016 and 2018, the first version of the software was developed based on a requirement document and waterfall model. They failed with this approach.**

05 **Due to the bad result, the management and stakeholders decided to change to Agile development (SAFe Essential)**

1st PI-Planning in September 2018 for 2 days in Munich

© sebis

EGP – Company Structure



"software house" with ~7.000 employees in 24 countries (automotive, banking, insurance, …)

Banking software for regulatory laws and registrations

IT-Service provider of ~1.000 cooperative banks with ~5.600 employees

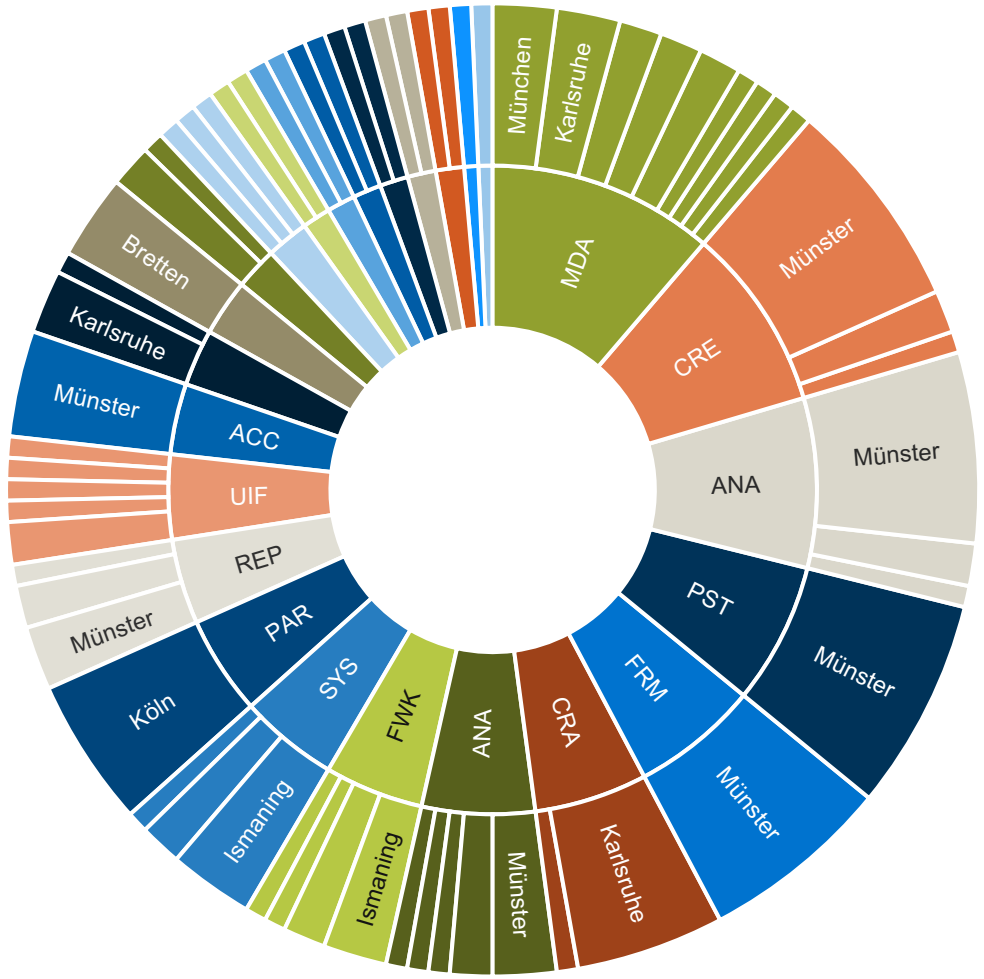
Company	# Team members
msg systems ag	10
msgGillardon AG	44
msg systems Romania	3
BSM	5
	SUM **62**
Fiducia & GAD IT	70
parcIT	10
	SUM **80**

Sources:
egp.finance, msg.group, fiduciagad.de (16.11. 2018)
EGP Team Setup (Sep. 2018)

© sebis

EGP – Team Setup and Distribution

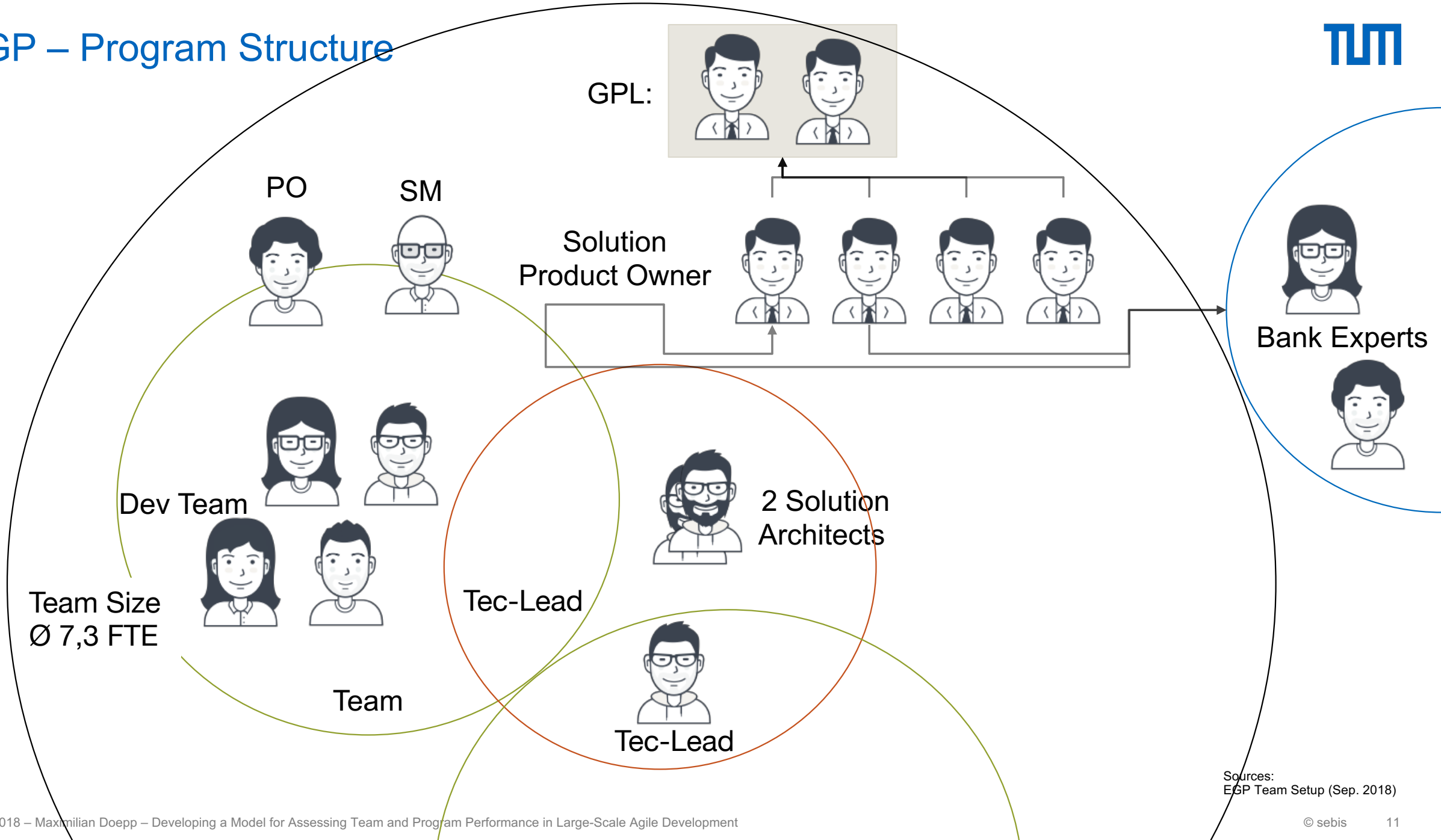
Team name	Team members	Team co-location factor	Company distributing (1-x)
Program Management	2	50%	50%
Release Train Engineer	2	50%	50%
Solution Product Owner	4	25%	38%
Solution Architect	2	50%	50%
	Sum: 10		
Balancing of accounts	5	100%	100%
Accounting	10	100%	82%
Business Logic	8	78%	50%
Credit Reproting	**13**	62%	48%
EU Reporting	2	50%	50%
Finance Reporting	2	50%	50%
Data structure	**16**	13%	35%
Method	8	41%	47%
Other Reportings	2	50%	50%
Static Reporting	9	21%	36%
Formular management	9	100%	100%
Internationalisation	7	100%	100%
Reporting-Framework	6	39%	33%
Framework	7	31%	31%
System	7	43%	55%
UI-Framework	6	22%	50%
Test	3	56%	56%
Maintenance Version 1	12	60%	39%
	Sum: 132		



Sources:
EGP Team Setup (Sep. 2018)

© sebis

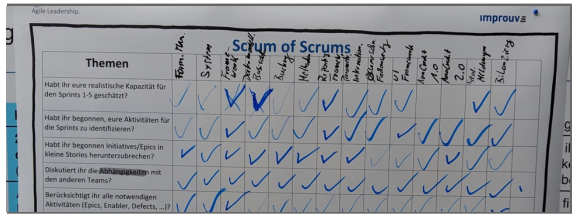
EGP – Program Structure

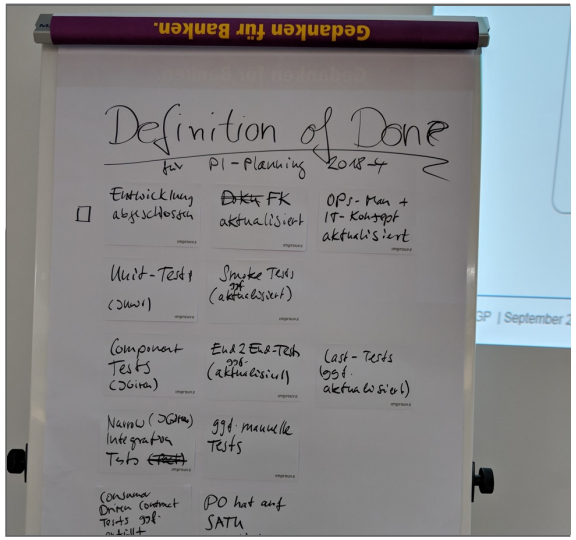


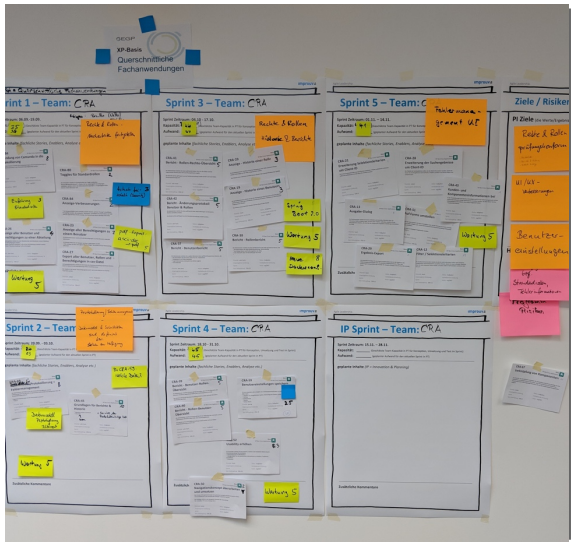
Sources:
EGP Team Setup (Sep. 2018)

© sebis

EPG – PI Planning 1







Dependency-Matrix colors: Yellow=Stories, Blue=Enabler, Red=Milestones

Sources: EGP PI 1 Planning (Sep. 2018)

Agenda

1. Introduction

- Motivation
- Problem Statement
- Research Methodology
- Research Approach

2. Case Study Partner

- EGP
- Company Structure
- Team Setup and Distribution
- Team Structure

3. Status

- Agile and Multiteam Systems (MTS)
- Current Status
- MTS Models
- Roadmap

© sebis

Influence Factors for Inter- and Intra-Team Performance

Intra-Team Influence Factors:

	acm	Google scholar	Web of Science	IEEExplore	Scopus	Emerald Insight
Structured literature review results:	49	171	41	148	392	20

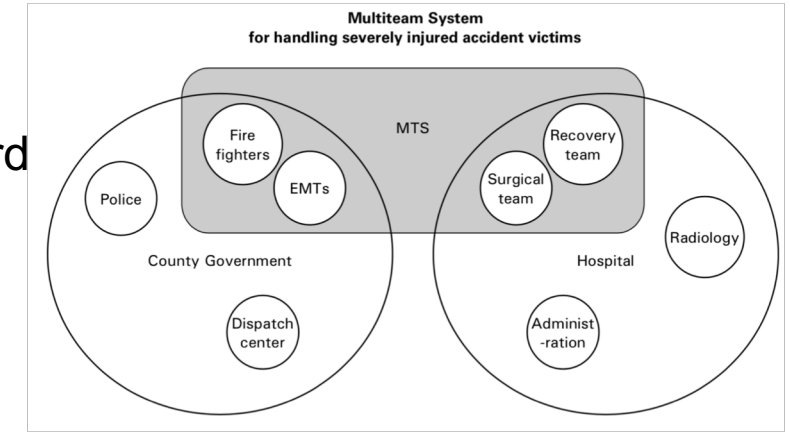
Examples:

- Challenges and success factors for large-scale agile transformations: A systematic literature review (Kim Dikert, Maria Paasivaara , Casper Lassenius)
- Identifying and Structuring Challenges in Large-Scale Agile Development based on a Structured Literature Review (Ömer Uludag, Martin Kleehaus, Christoph Caprano, Florian Matthes)
- A survey study on critical success factors in agile software projects (Dragan Stankovic, Vesna Nikolic, Miodrag Djordjevic, Dac-Buu Cao)

Inter-Team Model:

Multiteam Systems (Mathieu, Marks, Zaccaro, 2001)

- Multiteam systems (MTS) are two or more **teams** that interface directly and **interdependently** in response to environmental contingencies toward the accomplishment of **collective goals**
- MTS theory is currently mainly used for emergency situations and in the military environment



Source: Mathieu, Marks, Zaccaro (2001): Multiteam Systems

Current State - Multiteam Systems (Mathieu, Marks, & Zaccaro, 2001)

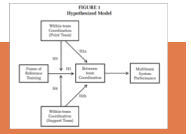
- Two research approach based on and MTS has been found so far:
  - Inter-team Coordination in Large-Scale Agile Development: A Case Study of Three Enabling Mechanisms (Finn Olav Bjørnson, Julia Wijnmaalen, Christoph Johann Stettina, Torgeir Dingsøyr, 2018)
  - Coordination in Large-Scale Agile Software Development: A Multiteam Systems Perspective (Alexander Scheerer, Tobias Hildenbrand, Thomas Kude, 2014)

- Does agile / large scale agile development match with MTS?
  - Compare characteristics
  - Compare MTS vs. organization vs. task force vs. ad hoc groups
  - Goals and goal hierarchy and priority
  - Roles and leadership

- Find an existing MTS model that can be used in the context of large-scale agile development

© sebis

MTS Model – Evaluation

	MANAGING COORDINATION IN MULTITEAM SYSTEMS: INTEGRATING MICRO AND MACRO PERSPECTIVES	EXTENDING REPRESENTATIONAL GAPS THEORY TO ENHANCE PERFORMANCE IN MULTITEAM SYSTEMS 	The Continued Evolution of Team Research: A Theoretical Model of Performance in Multiteam Systems	The Science of Multiteam Systems: A Review and Future Research Agenda
Year	2016	2015	2005	2015
Main topic	horizontal and vertical coordination	Performance support to non-support (pointer) teams	Communication and leadership	Intra- and Inter-team attributes and connections
Qualitative or quantitative	Quantitative	Quantitative	Qualitative	Qualitative
Cited by	13	27	3	35
Software / Agile	No	No	No	No
Study type	Case study	Lab	Literature review	Literature review
Matches	No, coordination is in all teams the same	Partly; comparison of teams with many enablers to other teams	Yes	Yes

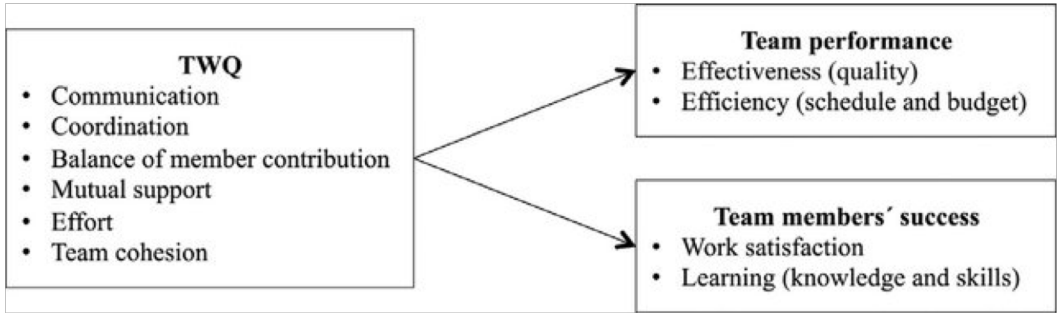
© sebis

Team- and Program-Performance Measurement

Research Approach 5: Comparing the outcome of the MTS model with the “real” team and program performance

How can success and performance be measured:

- Teamwork Quality and the Success of Innovative Projects: A Theoretical Concept and Empirical Evidence (Martin Högl and Hans Georg Gemünden (2001))



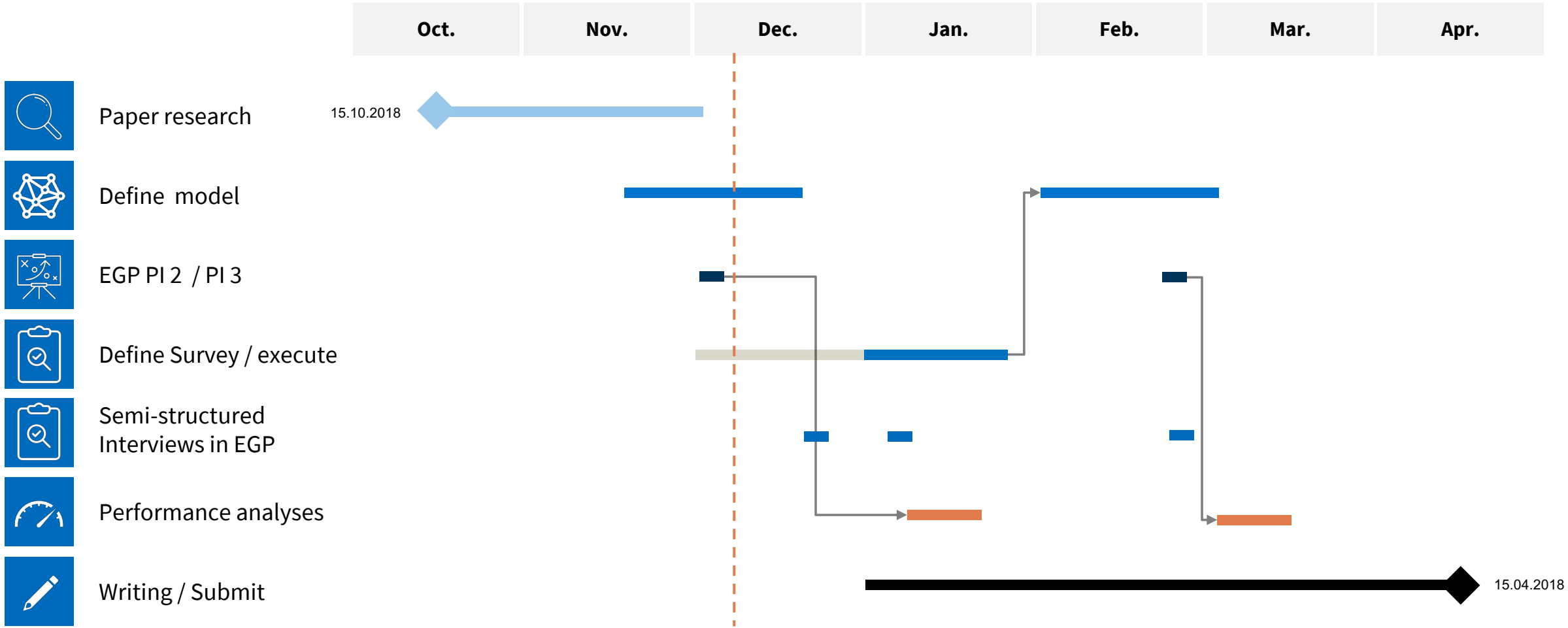
Next Steps to measure the performance:

- Define KPIs to measure the TWQ
  - Based on Agile and SAFe metrics
  - Survey results
- Compare the results from PI 1 and 2 to the theoretical performance based on the influence factors and the MTS model

Source: Martin Högl, Hans Georg Gemünden (2001):Teamwork Quality and the Success of Innovative Projects: A Theoretical Concept and Empirical Evidence

© sebis

Roadmap of this Master‘s Thesis



B.Sc.

Maximilian Doepp

Technische Universität München
Faculty of Informatics
Chair of Software Engineering for Business Information Systems

Boltzmannstraße 3
85748 Garching bei München

Tel +49.89.289. 17132
Fax +49.89.289.17136

matthes@in.tum.de
wwwmatthes.in.tum.de