Protocol for a Review of Scaling Agile Frameworks

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Mohammad Abdur Razzak[1], John Noll [2], Ita Richardson[3], Clodagh Nic Canna[1] and Sarah Beecham[3]

[1]Ocuco Limited, Dublin, Ireland
email: razzak.abdur@ocuco.com
[2]University of Hertfordshire, UK
[3]Lero, University of Limerick, Limerick, Ireland

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1 Introduction

Many software development organizations look for support in three process areas: firstly, how to implement agile methods; secondly, how to implement agile methods within a global environment; and finally, how to ensure this can be achieved while continuing to grow. A number of frameworks have been proposed for scaling agile methods across the enterprise, of these, most of the frameworks are reported in the grey literature (non-peer reviewed venues) for example, VersionOne [1]. To provide a more complete view of this landscape, we conducted a mapping study to identify scaling agile frameworks reported in the academic literature. This document presents the protocol we used to conduct our review of the associated literature on Scaling Agile Frameworks, following guidelines presented in [2]. We start with articulating our research question, and then continue to show our step by step approach to selecting and comparing the various frameworks.

2 Research Question

What scaling agile process models or frameworks are used in practice?

3 Search String

("scaling agile") AND (framework OR method* OR model* OR mechanism OR principle* OR practice*)*

4 Electronic Bibliographic Databases

Searches were conducted in the following databases:

- IEEE Digital Library (IEEEXplore)
- ACM Digital Library
- Science Direct (Elsevier)
- Scopus

5 Inclusion and Exclusion Criteria

5.1 Inclusion

- Publication year: 1992-2019
- Language: English
- Full text available and accessible
- Peer reviewed work
- Experience reports
- Answers our research question
- Empirical studies and theoretical studies will be included if they meet the quality criteria.

5.2 Exclusion

- Exclude that not relate to the process of software development
- Exclude duplicated studies (where authors report similar results in two or more publications – e.g. a journal paper that is an extension of a conference paper). Exclude the least detailed paper, or if unclear exclude the paper that is published in the more notable venue.
- Exclude sources which did not discuss the concept of software development
- books, presentations, blogs

6 Review Process

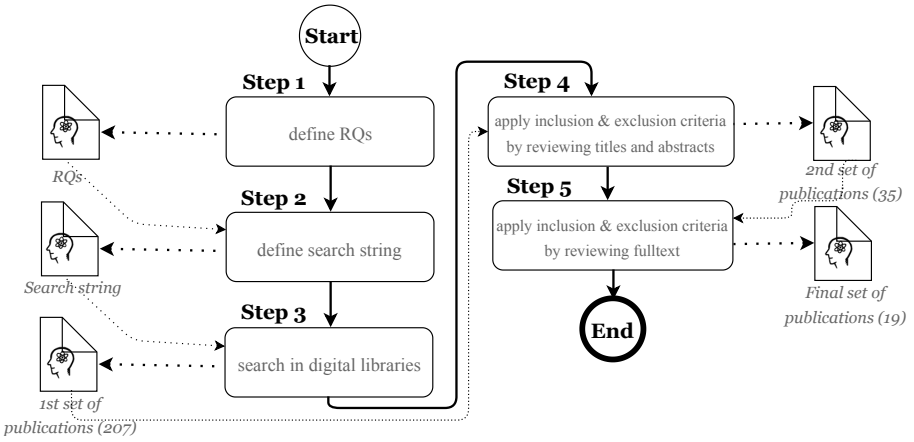

Fig. 1. Search Process

7 Final Set of peer-reviewed papers

1. Uludağ, Ö., Kleehaus, M., Xu, X., & Matthes, F. (2017, October). Investigating the role of architects in scaling agile frameworks. In Enterprise Distributed Object Computing Conference (EDOC), 2017 IEEE 21st International (pp. 123-132). IEEE.
2. Ebert, C., & Paasivaara, M. (2017). Scaling agile. IEEE Software, 34(6), 98-103.
3. Putta, A. (2018, May). Scaling agile software development to large and globally distributed large-scale organizations. In Proceedings of the 13th Conference on Global Software Engineering (pp. 141-144). ACM.

4. Grewal, H., & Maurer, F. (2007, August). Scaling agile methodologies for developing a production accounting system for the oil & gas industry. In Agile Conference (AGILE), 2007 (pp. 309-315). IEEE.
5. Razzak, M. A., Richardson, I., Noll, J., Canna, C. N., & Beecham, S. (2018, May). Scaling agile across the global organization: an early stage industrial SAFe self-assessment. In 2018 IEEE/ACM 13th International Conference on Global Software Engineering (ICGSE) (pp. 116-125). IEEE.
6. Stojanov, I., Turetken, O., & Trienekens, J. J. (2015, August). A maturity model for scaling agile development. In Software Engineering and Advanced Applications (SEAA), 2015 41st Euromicro Conference on (pp. 446-453). IEEE.
7. Shameem, M., Kumar, C., Chandra, B., & Khan, A. A. (2017, December). Systematic Review of Success Factors for Scaling Agile Methods in Global Software Development Environment: A Client-Vendor Perspective. In Software Engineering Conference Workshops (APSECW), 2017 24th Asia-Pacific (pp. 17-24). IEEE.
8. Heikkila, V., Rautiainen, K., & Jansen, S. (2010, September). A revelatory case study on scaling agile release planning. In Software Engineering and Advanced Applications (SEAA), 2010 36th EUROMICRO Conference on (pp. 289-296). IEEE.
9. Paasivaara, M. (2017, May). Adopting SAFe to scale agile in a globally distributed organization. In Global Software Engineering (ICGSE), 2017 IEEE 12th International Conference on (pp. 36-40). IEEE.
10. Pries-Heje, J., & Krohn, M. M. (2017, May). The safe way to the agile organization. In Proceedings of the XP2017 Scientific Workshops (p. 18). ACM.
11. Lal, R., & Clear, T. (2018, May). Enhancing product and service capability through scaling agility in a global software vendor environment. In Proceedings of the 13th Conference on Global Software Engineering (pp. 59-68). ACM.
12. Giray, G., Tüzün, E., Tekinerdogan, B., & Macit, Y. (2016, May). Systematic approach for mapping software development methods to the essence framework. In Theory-Oriented Software Engineering (TOSE), IEEE/ACM International Workshop on (pp. 26-32). IEEE.
13. Kalenda, M., Hyna, P., & Rossi, B. (2018). Scaling agile in large organizations: Practices, challenges, and success factors. Journal of Software: Evolution and Process, 30(10), e1954.
14. Paasivaara, M., Behm, B., Lassenius, C., & Hallikainen, M. (2018). Large-scale agile transformation at Ericsson: a case study. Empirical Software Engineering, 1-47.
15. Horlach, B., Böhmann,T., Schirmer, I., & Drews, P. (2018) IT governance in scaling agile frameworks, URL:https://mkwi2018.leuphana.de/wp-content/uploads/MKWI_172.pdf (accessed 08/11/2020).
16. Uludağ, Ö., Hauder, M., Kleehaus, M., Schimpfle, C., & Matthes, F. (2018, May). Supporting Large-Scale Agile Development with Domain-Driven De-

sign. In International Conference on Agile Software Development (pp. 232-247). Springer, Cham.
17. Alqudah, M., & Razali, R. (2016). A review of scaling agile methods in large software development. International Journal on Advanced Science, Engineering and Information Technology, 6(6), 828-837.
18. Eckstein, J. (2016, May). Sociocracy: An Organization Model for Large-Scale Agile Development. In Proceedings of the Scientific Workshop Proceedings of XP2016 (p. 6). ACM.
19. Bick, S., Scheerer, A., & Spohrer, K. (2016, May). Inter-Team Coordination in Large Agile Software Development Settings: Five Ways of Practicing Agile at Scale. In Proceedings of the Scientific Workshop Proceedings of XP2016 (p. 4). ACM.

8 Scaling Agile Frameworks reported in different paper

Table 1. List of Scaling Frameworks.

Paper ID	Framework(s) in paper
1	Crystal Family, DSDM, SoS, Enterprise Scrum, ASSF, LeSS, SAFe, DA, Spotify, Mega Framework, EADAGP, RAGE, Continuous Agile Framework, Scrum at Scale, Enterprise Transition Framwork, ScALed Agile Lean Development, eXponential Simple Continuous Autonomous Learning Ecosystem, Lean Enterprise Agile Framework, Nexus, FAST Agile
2	SoS, SAFe, LeSS, DAD, Lean Scalable Agility for Engineering (LeanSAFE)
3	SAFe, LeSS, DAD
4	SoS and eXtream Programming
5	SoS, LeSS, SAFe, DAD, Spotify, Nexus, Scrum at Scale
6	SAFe
7	SAFe, LeSS, DAD
8	SAFe
9	SAFe, LeSS, DAD
10	SoS, SAFe
11	DAD
12	Nexus
13	SoS, SAFe, LeSS, DAD, LeanSAFE, RAGE
14	SAFe, LeSS, DAD
15	DA, EA, EUP, laCoCa model, RAGE, SAFe, Scrum at Scale, Xscale, Crystal Family, DSDM, ES, FAST Agile, Goal Driven agile, LeSS, Nexus, Prince 2 Agile, SoS, Scrum Pattern Language for programs, Spotify, Matrix of Services, SCARE, SLIM
16	SAFe, LeSS, DAD
17	DAD, SAFe, LeSS, LeSS HUGE, Spotify, Nexus, RAGE
18	SoS, LeSS, SAFe, Nexus, LeSS HUGE
19	SAFe, LeSS, DAD

Table 2. Citation Frequency.

Paper ID	Framework Name	Paper ID	Total
1	Scaled Agile Framework (SAFe)	1,2,3,5,6,7,8,9,10,13,14,15,16,17,18,19	16
2	Large-Scale Scrum (LeSS)	1,2,3,5,7,9,13,14,15,16,17,18,19	13
3	Disciplined Agile Delivery (DAD)	1,2,3,5,7,9,11,13,14,15,16,17,19	13
4	Scrum of Scrums (SoS)	1,4,5,13,15,18	6
5	Nexus	1,5,12,15,17,18	6
6	Spotify	1,5,15,17	4
7	Recipes for Agile Governance in the Enterprise (RAGE)	1,13,15,17	4
8	Scrum at Scale	1,5,15	3
9	Crystal Family	1, 15	2
10	Dynamic Systems Development Method (DSDM)	1, 15	2
11	Enterprise Scrum	1, 15	2
12	AST Agile	1, 15	2
13	Lean SAFE	2, 13	2
14	LeSS HUGE	7, 18	2
15	Agile Software Solution Framework (ASSF)	1	1
16	Mega Framework	1	1
17	Enterprise Agile Delivery and Agile Governance Practice	1	1
18	Continuous Agile Framework	1	1
19	Enterprise Transition Framework	1	1
20	ScALeD Agile Lean Development	1	1
21	eXponential Simple Continuous Autonomous Learning Ecosystem	1	1
22	Lean Enterprise Agile Framework	1	1
23	XP	4	1
24	Enterprise Agile	15	1
25	Enterprise Unified Process (EUP)	15	1
26	laCoCa Model	15	1
27	XScale	15	1
28	Goal Driven Agile	15	1
29	PRINCE 2 Agile	15	1
30	Scrum Pattern Language of Programs (PloP)	15	1
31	Sustainable Cultural Agile Release in the Enterprise (SCARE)	15	1
32	Matrix of Services	15	1
33	Scrum Lean in Motion (SLIM)	15	1

References

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2. Petersen, K., Feldt, R., Mujtaba, S., Mattsson, M.: Systematic mapping studies in software engineering. In: 12th International Conference on Evaluation and Assessment in Software Engineering (EASE) 12. pp. 1–10 (2008)