



**AUT SOFTWARE ENGINEERING
RESEARCH LABORATORY**

AUT

Do Scaling Agile Frameworks Address Risk in Global Software Development? An Empirical Study



Assoc. Prof. Tony Clear
Tony.clear@aut.ac.nz

Mihi

- Hāere mai, Haere Mai, Haere Mai.
- Tēnā koutou katoa.
- Ko Tony Clear taku ingoa.
- Nō Pōneke ahau.
- Ko Maungakiekie taku maunga.
- Ko Waitematā taku moana.
- I te taha o taku matua, no Enniscorthy Ireland ahau.
- I te taha o aku whaea, no Cork Ireland ahau.
- Ko Tainui raua ko Ngapuhi nga iwi o nga mokopuna
- Tēnā koutou, Tēnā koutou, Tēnā tatou katoa.



Profile and Current Activities

1. Co-Director of Software Engineering Research lab at AUT <https://serl.aut.ac.nz/>
2. Global Software Engineering
 1. Scaled Agile
 2. Software Ecosystems – RSNZ Catalyst Leaders with Prof Daniela Damian
 3. GSE Education
 4. Global Collaboration
3. Computing Education
 1. Curriculum & Competencies [CC2020]
 2. Onboarding Software Professionals - SIGCSE Special Project [SERL]
 3. Editorial Roles [*ACM TOCE, ACM Inroads, Computer Science Education*], PC various conferences - CS Ed and SE
 4. Teaching BCIS Papers *Contemporary Issues in Software Engineering, Computing Technology In Society, R&D Project, B Eng(Hons)Industrial Project*, plus Masters & PHD Supervision

Do Scaling Agile Frameworks Address Global Software Development Risks? An Empirical Study

Sarah Beecham, Tony Clear, Ramesh Lal, John Noll
Journal of Systems and Software, Jan/Feb 2021

Journal First

Int'l Conference on Global Software Engineering (ICGSE) 2021

Presentation 19th May 2021

Tony Clear, Sarah Beecham, Ramesh Lal, John Noll



Overview

- Focus of the paper
- Phase one - Developing a GSD Risk Catalog
- Phase Two – Theoretical Mapping
- Phase Three – Empirical Assessment
- Conclusions

Paper Focus:

Scaling Agile Frameworks and GSD Risks

- A **three-phase** process (lit review/practice-risk mapping/empirical validation),
- Illustrated how **two scaling agile frameworks**
 - –**DAD** and **SAFe**–
- Largely address **63 software development risks**
- Identified in a ***GSD Risk Catalog***
- But stronger in **some areas** than others

Phase One – Developing a GSD Risk Catalog

First phase:

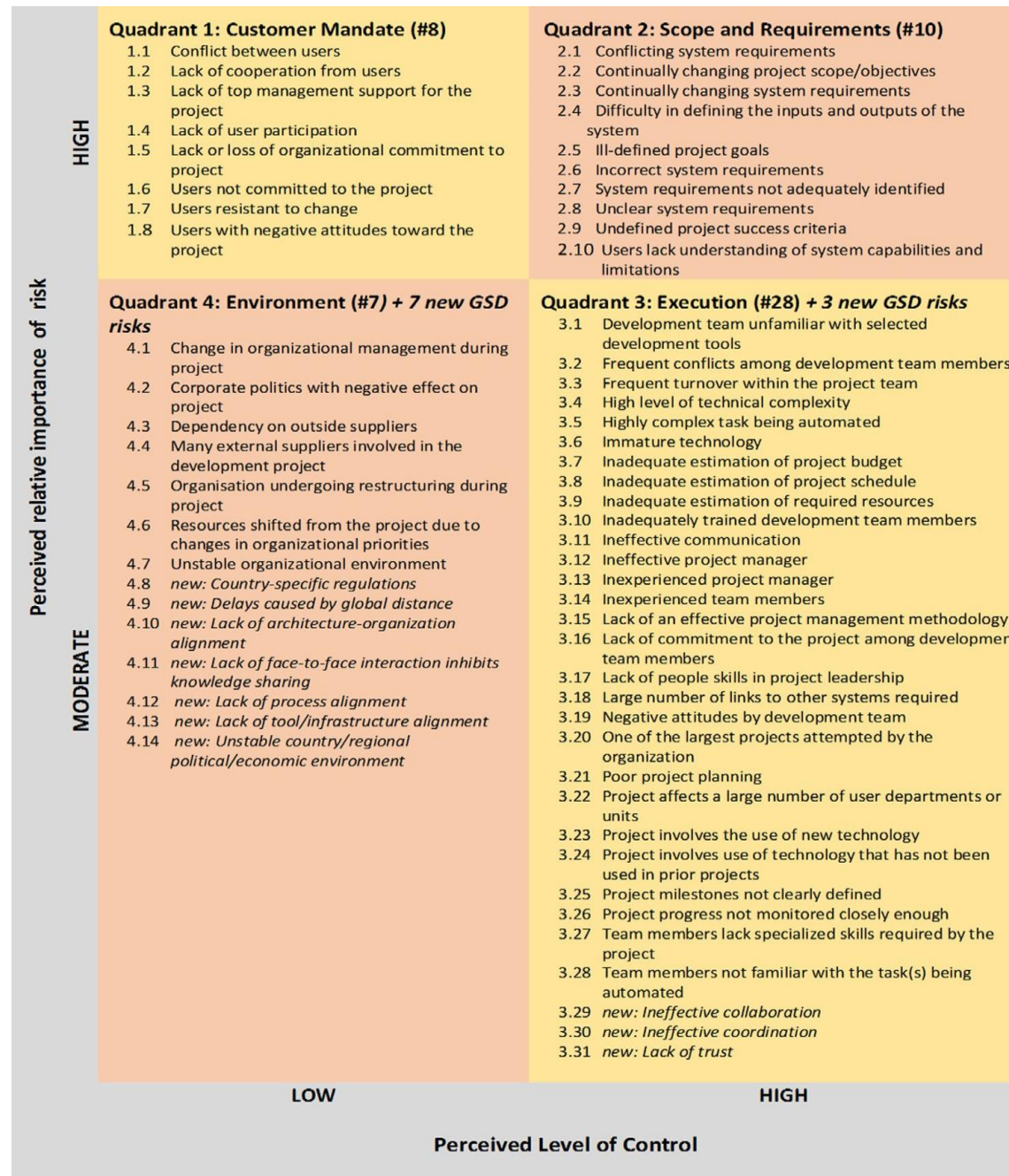
- Identifying **Global Software Development risks** faced by software development organizations,
- By examining the **literature on risks**
In both **conventional** and **GSD contexts**

Result:

- A **GSD Risk Catalog of 63 risks**,
- Divided into **four quadrants** following [Wallace and Keil \(2004\)](#):
 1. Customer Mandate,
 2. Scope and Requirements,
 3. Execution, and
 4. Environment

GSD Risk Catalog

Wallace, L., & Keil, M. (2004). Software project risks and their effect on outcomes. *Communications of the ACM*, 47(4), 68-73.



Verner, J. M., Brereton, O. P., Kitchenham, B. A., Turner, M., & Niazi, M. (2014). Risks and risk mitigation in global software development: A tertiary study. *Information and Software Technology*, 56(1), 54-78.

Fig. 2. GSD Risk Catalog derived from Wallace and Keil (2004) and Verner et al. (2014).

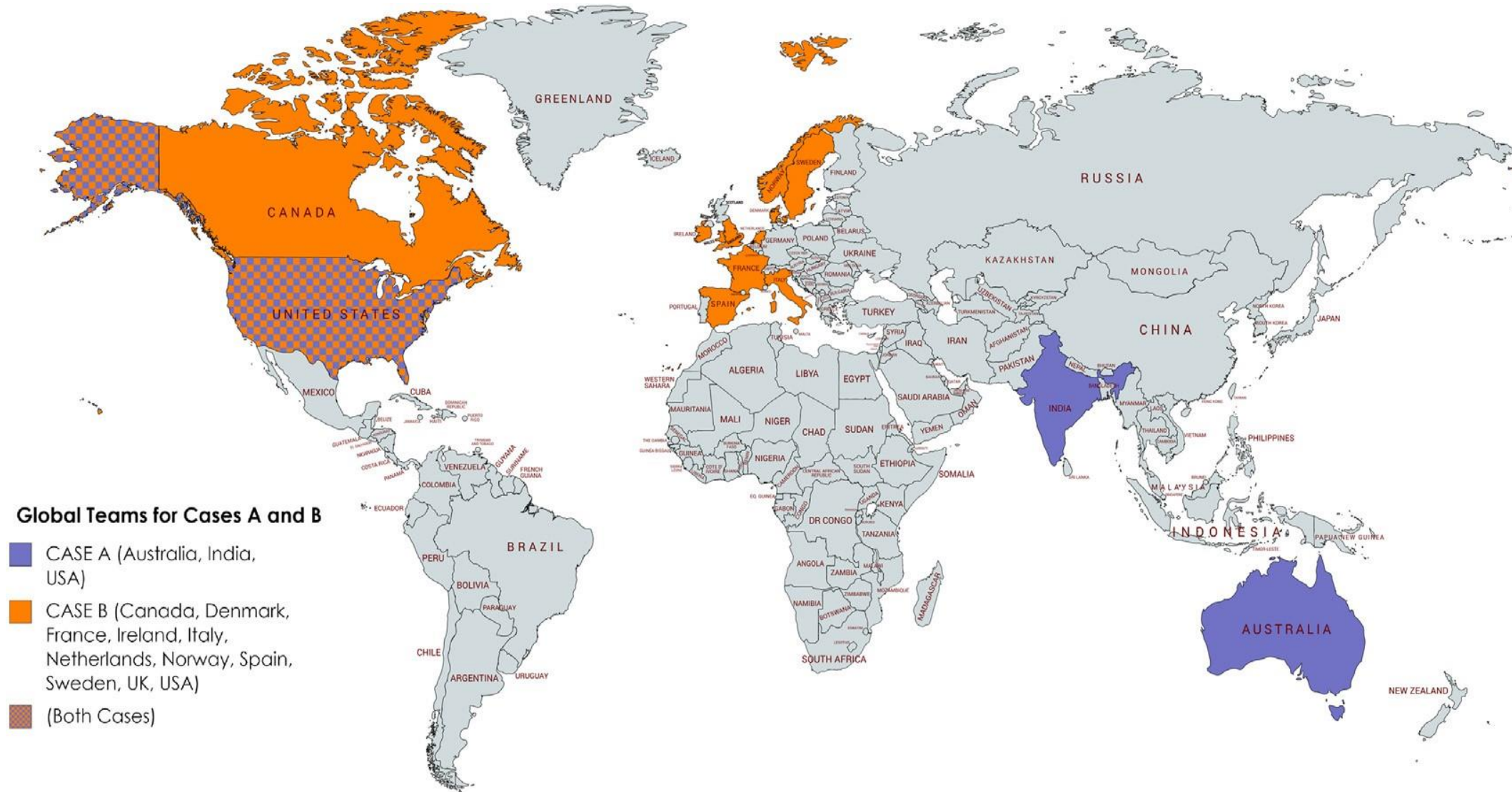
Phase Two - Theoretical Mapping

- Identified potential **risk mitigation** and **elimination practices** in the **two scaling agile frameworks (DAD and SAFe)**.
- We **compared** these extracted **practices** (from **DAD** and **SAFe**) to risks in the ***GSD Risk Catalog*** (developed in Phase one)
- **mapped practices to risks** indicates **how scaling agile practices *might* eliminate or mitigate** those risks

Phase Three – Empirical Assessment

- Assessed the strength of the scaling agile frameworks to mitigate or eliminate risk,
Avoiding criticism that we “speculated that the strategy would have helped observed problems” (Verner et al., 2014),
- Performed an **empirical assessment** of the **theoretical mappings** from Phase 2.
- To determine:
 - **frequency** with which **practices** in each framework **performed** in two companies,
 - and the **risks encountered** by those companies.

2 Global Cases and Locations



Created with mapchart.net

Fig. 5. Case locations.

Phase Three – Empirical Assessment (Cont'd)

- Examined **observation** and **interview notes** and **transcripts, self-assessment survey** results,
- In multiple case study of two **global software companies**
- To understand
 - Extent to which DAD and SAFe practices (from theoretical mapping) were implemented in the company
 - Evidence of any of the risks (in the mapping or GSD Risk Catalogue) occurring in either company

If **practice is implemented** in a company and



risk NOT seen = theory supported

risk seen = theory unsupported

Phase Three – Broad Conclusion

Adds to **limited** empirical **evidence** of **efficacy** of **scaling agile frameworks**.

suggesting **claims**

*Scaling Agile Frameworks address **risk** and are driven by **value***

have some validity!

Conclusions From Paper

Of the **four quadrants** in the **GSD Risk Catalog**

1. **Customer Mandate risks** quadrant appears to be **better addressed through the SAFe framework than DAD**
2. **Scope and Requirements risks** are **addressed well by both methods**
3. **Execution risks** are **better mitigated by DAD than SAFe**
4. **Environment risks** are **less well addressed by either approach**

Suggests **Environment set of risks** are **less amenable to being addressed by a process framework.**

GSD Risks – not fully addressed by Scaling Agile Practices?

17 (out of 63) risks observed in both cases, eight are GSD risks specific:

1. Ineffective collaboration,
2. Ineffective coordination,
3. Lack of trust,
4. Country-specific regulations,
5. Delays caused by global distance,
6. Lack of architecture-organization alignment,
7. Lack of face-to-face interaction inhibits knowledge sharing,
8. Lack of process alignment.

Implications for all remote and home working?

Further Conclusions From Paper

Creating the **GSD Risk Catalog**

- Found many **Global Software Development risks, not identified** in the Wallace and Keil inventory
- **Ten new risks** GSD risks added to inventory
- Eight of these ten **GSD risks observed** (as shown on previous slide) in both companies, except:
 - Lack of tool/infrastructure alignment and
 - Unstable country/regional political/economic environment

These **new risks** appear to be **endemic** and suggest
a risk tariff in GSD

Final Takeaway

The **result** of a three phased methodology created a
scaling agile risk theoretical mapping applied
in a multiple case study

showing how **two** scaling agile frameworks

Disciplined Agile Delivery and the **Scaled Agile Framework**
can potentially **eliminate** or **mitigate** the majority of
'software project' risks

- many **global software development** risks still pervade.

Scaling Agile Frameworks do not support every GSD risk.

- GSD Risk Catalog
 - Process of dev't elaborated in Supplementary Technical Report pp. 5 - 7
 - Beecham, S., Clear, T., Lal, R., & Noll, J. (2020). *Companion to manuscript: Do Scaling Agile Frameworks Address Risk in Global Software Development? An Empirical Study* https://www.lero.ie/sites/default/files/Beecham_2020_TR003.pdf
- Practices by Framework
 - *The result of these three phases is a **scaling agile risk theoretical mapping** that shows how two scaling agile frameworks– Disciplined Agile Delivery and the Scaled Agile Framework– can potentially eliminate or mitigate software project risks in global software development. [p. 21 also process elaborated on p.23 of TR]*
 - Beecham, S., Clear, T., Lal, R., & Noll, J. (2021). Do Scaling Agile Frameworks Address Risk in Global Software Development? An Empirical Study. *Journal of Systems and Software*, 171(110823). <https://doi.org/https://doi.org/10.1016/j.jss.2020.110823>
 - Table 11 of paper – DAD p.22
 - Table 12 of paper – SAFE p. 25



Utility and Impact?

- BCIS Current R&D Project
- Security Policy for a Globally Distributed SME [Various Asia/Pacific sites]
 - Paananen, H., Lapke, M., & Siponen, M. (2020). State of the art in information security policy development. *Computers & Security*, 88, 101608.
 - Beecham, S., Clear, T., Lal, R., & Noll, J. (2021). Do Scaling Agile Frameworks Address Risk in Global Software Development? An Empirical Study. *Journal of Systems and Software*, 171(110823).
<https://doi.org/https://doi.org/10.1016/j.jss.2020.110823>
- Startup Software Dev't Org
- Markets a Software Solution which helps MSPs (Managed Service Providers) to automate common processes associated with IT support and administration



Case context?

- **Culture of company**
- Freewheeling style
- Historical flow of contract staff
- Inconsistent and Individualistic practices
- Personal use of open-source tools
- Security risks to be analysed and addressed
- Move towards more team-based development
- Desire to grow and scale
- **How to develop and implement a security policy?**
- **Standardization, prioritizing, what to mandate vs. encourage?**

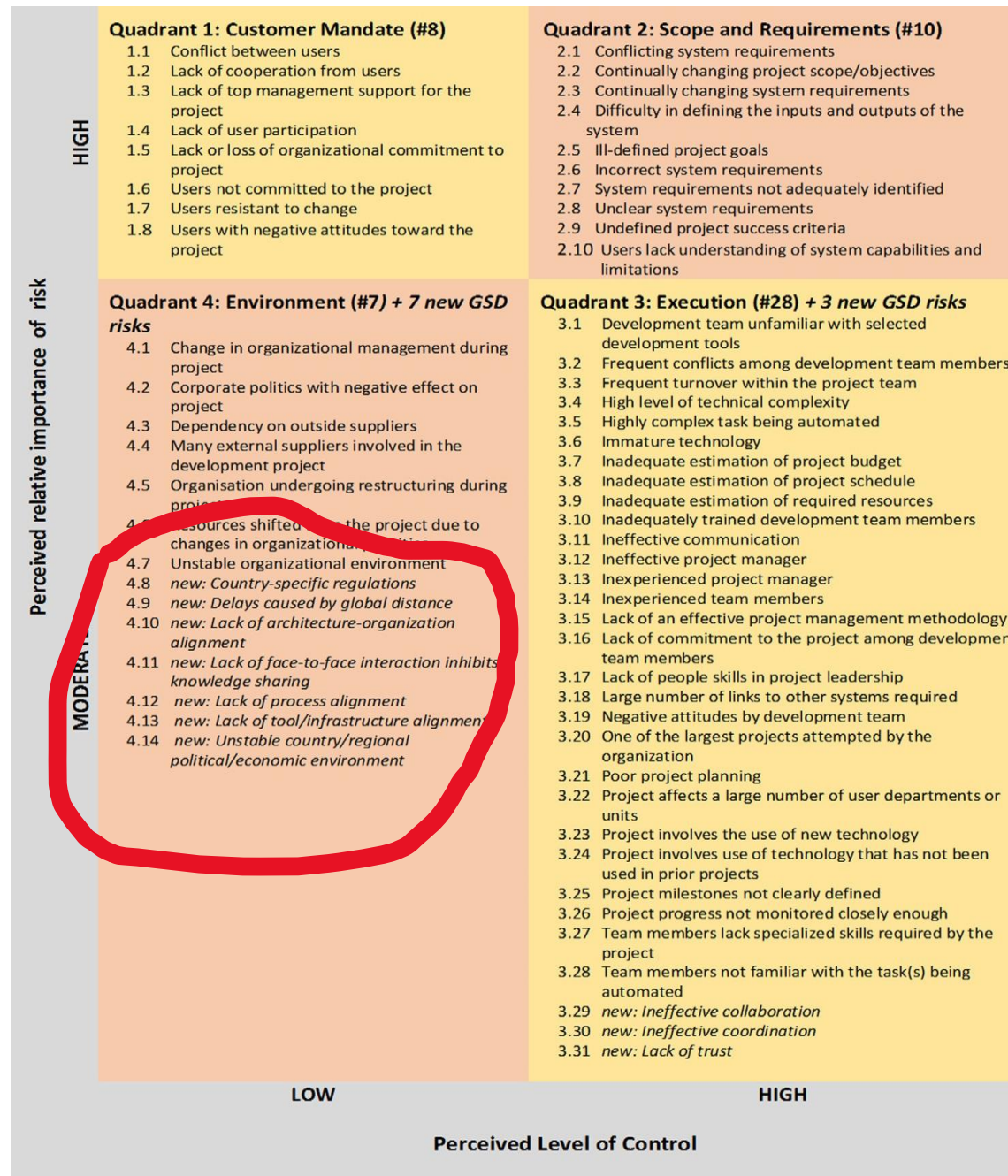


Framing the situation ?

- **How to develop and implement a security policy?**
- **Standardization, prioritizing, what to mandate vs. encourage?**
- **Possible contribution from our scaled agile risk model?**
- **Focus on risks to determine priorities?**
- **Focus on practices to identify areas of concentration and sequence of activities?**
- **Potential contribution to framing both the problem and solution**
- **Issues highlighted from *GSD Risk Catalog* below**

GSD Risk Catalog

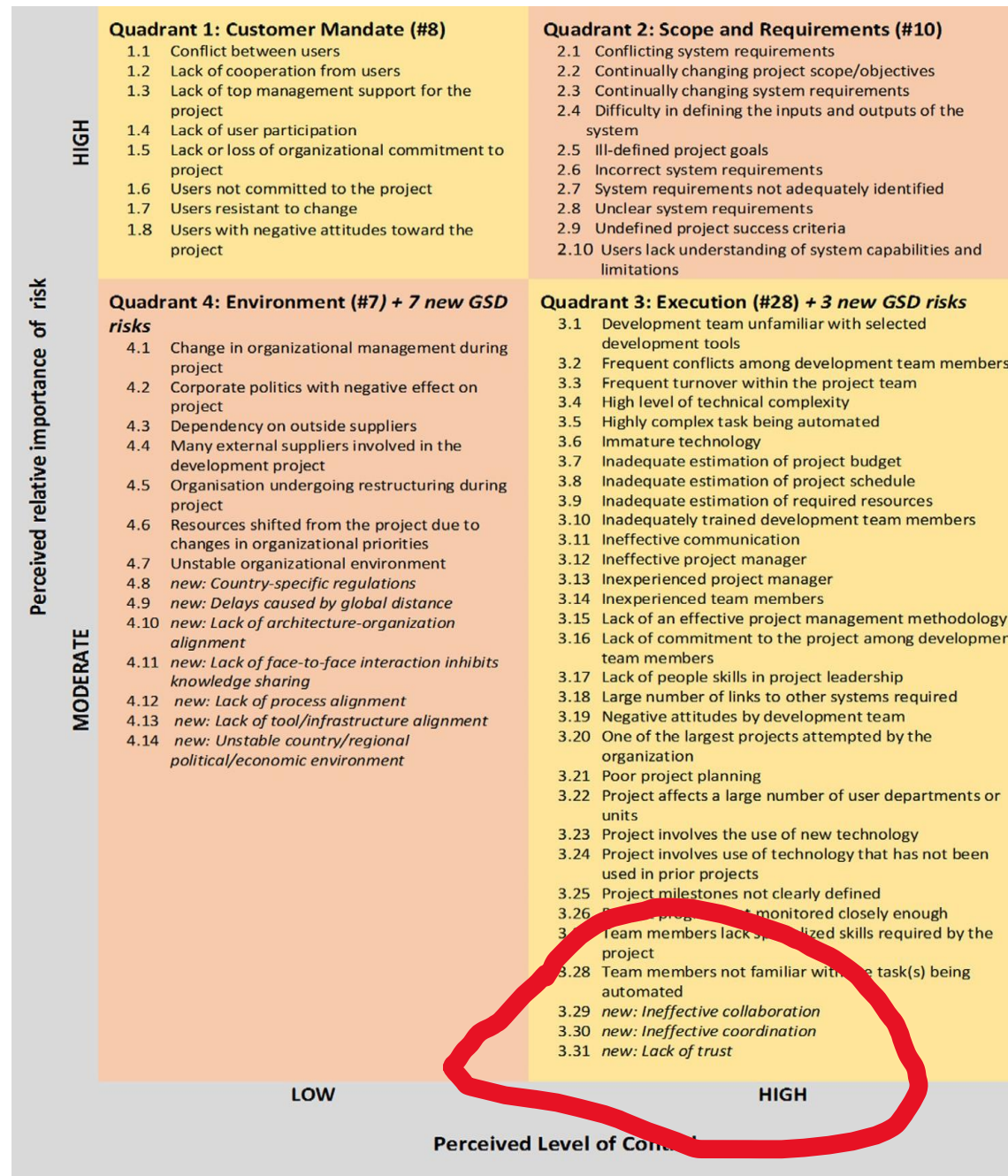
Wallace, L., & Keil, M. (2004). Software project risks and their effect on outcomes. *Communications of the ACM*, 47(4), 68-73.



Verner, J. M., Brereton, O. P., Kitchenham, B. A., Turner, M., & Niazi, M. (2014). Risks and risk mitigation in global software development: A tertiary study. *Information and Software Technology*, 56(1), 54-78.

GSD Risk Catalog

Wallace, L., & Keil, M. (2004). Software project risks and their effect on outcomes. *Communications of the ACM*, 47(4), 68-73.



Verner, J. M., Brereton, O. P., Kitchenham, B. A., Turner, M., & Niazi, M. (2014). Risks and risk mitigation in global software development: A tertiary study. *Information and Software Technology*, 56(1), 54-78.

Utility and Academic Impact?



- **Google Scholar Citations [19/05/2022 – 2021 paper]**

- 1) Evaluating the role of scrum methodology for **risk management** in information technology enterprises
- 2) **Adoption of Large-Scale Scrum** Practices through the Use of Management 3.0
- 3) **Agile transformation**, from classical-to agile project management in a multidisciplinary production environment, a case study
- 4) **Tools** Engineers Need to **Minimize Risk around CI/CD Pipelines** in the Cloud
- 5) Servitization **Program Management Process Based On Scaled Agility**: A Facilitating Framework
- 6) Analyzing **SAFe Practices with Respect to Quality Requirements**: Findings from a Qualitative Study
- 7) **Customer Controlled Managed Services Processes** for Productivity Gains without Breaking Contractual Obligations: An Exploratory Study
- 8) **Evaluating AGILE adoption** in software delivery organizations
- 9) **Analyzing SAFe Practices with Respect to Quality Requirements**: Findings from a Qualitative Study
- 10) Toward Unveiling How **SAFe Framework Supports Agile** in Global Software Development
- 11) An effective agile development process by a hybrid **intelligent effort estimation protocol**
- 12) Agile and generic work values of British vs Indian IT workers: a **culture-clash** case
- 13) Systematic Literature Review: **Causes of Rework** in GSD
- 14) Från kaffeautomaten till digitala mötesrum: Mjukvaruutvecklares upplevelser av att arbeta med agila utvecklingsmetoder under rådande pandemic *From the coffee machine to digital meeting rooms: Software developers' experiences of working with **agile development methods during the current pandemic***
- 15) **Modelo de evaluación de metodologías de desarrollo de software web** *Evaluation model of **web software development methodologies***



- Nga mihi
- And
- Questions?

