

Continuous Delivery at Scale: Challenges and Opportunities

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ABSTRACT

Continuous Delivery (CD) can bring huge benefits, but implementing CD is challenging. This is particularly true for implementing CD at an ultra-large-scale (across an R&D organization of tens of thousands of staff) for mission critical systems. In this talk, I will present the challenges in implementing CD in such a large scale and discuss the potential research opportunities.

CCS CONCEPTS

• **Software and its engineering** → **Software creation and management**

KEYWORDS

Continuous Delivery, Continuous Deployment, Continuous Software Engineering, DevOps, Agile Software Development

1 MOTIVATION

Continuous Delivery (CD) is a software engineering approach in which teams keep producing valuable software in short cycles and ensure that the software can be reliably released at any time [1].

CD can bring huge benefits, but implementing CD is challenging [1, 2]. Although challenges and solutions for CD adoption has been discussed in the literature [3, 4], little work is particularly focused on implementing CD at an ultra-large-scale that involves transforming tens of thousands of R&D staff's traditional way of working to the new CD way of working.

I'd like to share some particular challenges in this context and identify potential research opportunities that will attract talented researchers.

2 CONTEXT

Huawei is a Fortune 100 company headquartered in Shenzhen China. It delivers communication technologies for telecom carriers, enterprises and consumers. Its telecom network equipment, IT products and solutions, and smart devices are used

in 170 countries and regions. From July to September 2017, Huawei surpassed Apple and became the second largest smartphone manufacturer in the world after Samsung.

I am responsible for implementing CD across its "Product and Solutions" organization, which has tens of thousands of R&D staff and develops large mission critical systems that each can have as many as thousands of people working on it.

3 SUMMARY OF THE TALK

In this talk, I will present the major challenges I saw in such a context. In particular, I will discuss challenges in the following areas. These areas may seem not new, but the real differences lie in the manifestations in an ultra-large-scale context, which will be the main focus of the talk.

- Organizational challenges
- Process
- Tools
- Infrastructure
- Architecting for continuous delivery [5, 6]
- Continuous testing of non-functional requirements
- Test execution optimization
- Obtaining buy-in from a wide range of stakeholders
- Maintaining an application development team's momentum

I will also discuss several specific potential opportunities where I think researchers can help.

ACKNOWLEDGMENTS

I thank my colleagues for their help. The talk represents only my own views and doesn't necessarily reflect those of my employer.

REFERENCES

- [1] L. Chen, "Continuous Delivery: Huge Benefits, but Challenges Too," *Software, IEEE*, vol. 32, pp. 50-54, 2015.
- [2] L. Chen, "Continuous Delivery: Overcoming adoption challenges," *Journal of Systems and Software*, vol. 128, pp. 72-86, 2017.
- [3] E. Laukkanen, J. Itkonen, and C. Lassenius, "Problems, causes and solutions when adopting continuous delivery—A systematic literature review," *Information and Software Technology*, vol. 82, pp. 55-79, 2// 2017.
- [4] P. Rodriguez, A. Haghighatkah, L. E. Lwakatare, S. Teppola, T. Suomalainen, J. Eskeli, *et al.*, "Continuous deployment of software intensive products and services: A systematic mapping study," *Journal of Systems and Software*, vol. 123, pp. 263-291, 2017/01/01/ 2017.
- [5] L. Chen, "Towards Architecting for Continuous Delivery," in *Software Architecture (WICSA), 2015 12th Working IEEE/IFIP Conference on*, 2015, pp. 131-134.
- [6] L. Chen, "Microservices: Architecting for Continuous Delivery and DevOps," in *IEEE International Conference on Software Architecture*, Seattle, USA, 2018.

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RCoSE'18, May 29, 2018, Gothenburg, Sweden
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ACM ISBN 978-1-4503-5745-6/18/05.
<https://doi.org/10.1145/3194760.3194764>