

Speed, Data and Ecosystems: The Future of Software Engineering

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1 Speed, Data and Ecosystems

As Marc Andreessen wrote in his Wallstreet Journal OpEd [An18], software is eating the world. For industry after industry, investment in software R&D is increasing and the software in products, rather than the mechanics and hardware, defines the value. As a consequence, the software-intensive systems industry is under severe pressure to improve their capability to deliver on these software needs.

These developments have profound implications on software engineering. In this keynote, we analyze the future of software engineering [Bo16b]. As the future is shaped by the past and present, we first analyze the key trends in industry and society that we have identified, ranging from the transition from products to services to the constantly growing size of software in typical systems. Based on these trends, we identify three key factors, i.e. speed, data and ecosystems, that are central to software engineering going forward.

The research presented in this keynote has been conducted in the context of Software Center (www.software-center.se), a collaboration around software engineering research between ten companies, including Ericsson, Volvo Cars, Grundfos, Saab, Boeing and Siemens, and five Swedish universities. The paper is consequently based on significant amounts of industry experience.

Our research has concluded that there are three factors that companies need to establish as central to their work: increasing speed in R&D, more effective use of data from customers and products in the field as well as more strategic engagement with the ecosystem surrounding the company. Interestingly, for each of these factors, companies evolve in a predictable pattern that we have now seen occur at dozens of organizations that we have worked with. We have summarized this pattern in the Stairway to Heaven model [Bo16a] shown in figure 1. The model has three dimensions, speed, data and ecosystems, and shows the typical evolution that organizations follow for each of the dimensions. Each dimension follows five steps. For speed it moves from traditional development to experiment-based development. For data it moves from ad-hoc to evidence-based organizations. Finally, for ecosystems organizations transition from internally focused to strategic engagement of multiple ecosystems.

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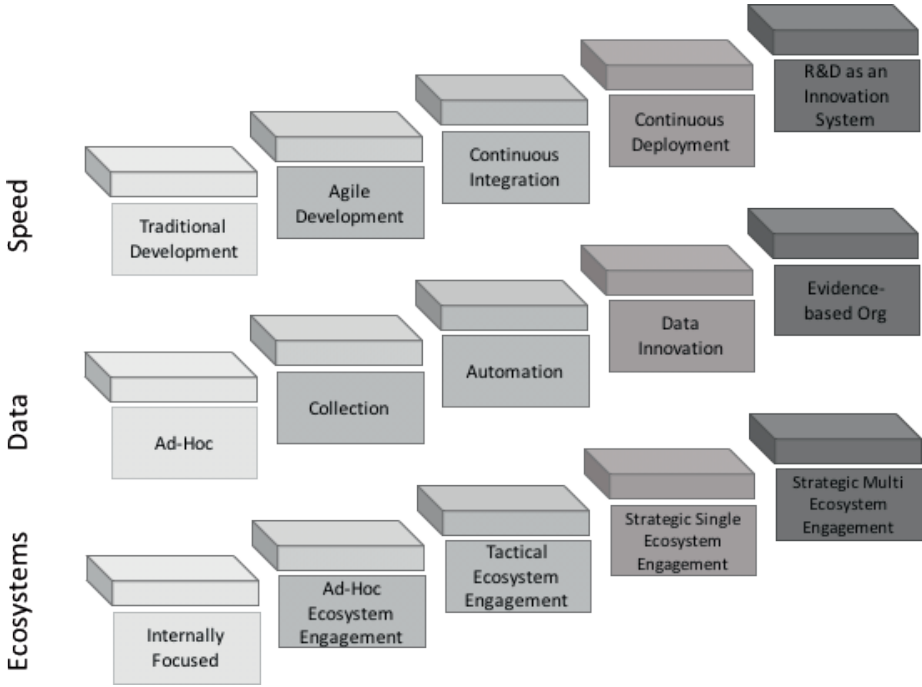


Fig. 1: The Stairway to Heaven: Speed, Data and Ecosystems

In the keynote, we will first discuss the societal and industrial trends that shape the software-intensive systems industry. Then we present the three dimensions of the Stairway to Heaven model and the research that we conduct in each of these areas. Finally, we discuss what the implications of the model are for research as well as software and systems engineering.

References

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