

Requirements Engineering Challenges in Large-Scale Agile System Development

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Despite wide critic, agile approaches have significantly contributed to the way software is developed [Me14] and success stories have led to their application at large scale [DPL16] and in system development [BE15; PMG12], an environment characterized by long lead times [BE15] and stable, sequential engineering practices [PMG12]. In this environment, new challenges arise, especially with respect to managing requirements [SKV10].

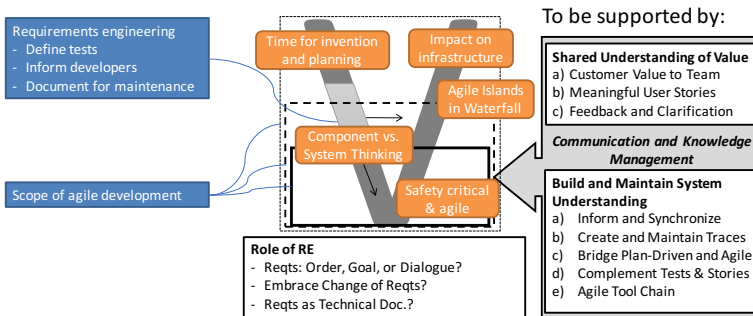


Fig. 1: Map of challenges with respect to scope of agile work in system development

We address the lack of empirical studies and report *RE related challenges of large-scale agile system development*. Through a multiple case study of four large-scale system development cases, based on 5 focus groups, 2 cross-company workshops and 20 semi-structured interviews, we present a catalogue of real-world RE challenges related to applying agile development in large-scale systems (Fig. 1). These challenges are effectively hindering a faster and more sustainable development of software. In order to yield their full benefits, agile practices and a holistic system requirements model must be better aligned (Tab. 1). Key challenges occur when there is an interaction, or a lack thereof, between system engineering domains and we believe that industry would benefit from new impulses from research in the area of Requirements Engineering for Large-Scale Agile System Development.

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Tab. 1: Conclusions of our research

1) Communication and knowledge management.	While related work implies that communication challenges are less prominent in agile RE [BWR11; In15], our challenges relate to communication and knowledge management. Both aspects are at the core of Agile and RE, indicating a need for research in these areas specifically for system development.
2) Two areas of requirements knowledge: User Value and System Understanding.	This is in line with traditional practices of user and system requirements, but not present in agile literature. Companies differ between doing RE in an agile way and doing RE to support agility. Our findings suggest that such support cannot be offered sufficiently by traditional, upfront RE, as indicated [He17; Me14].
3) The interplay of stakeholders from three domains: customer, development, and integration & testing.	Development embraces agility and dislikes traditional requirements and bulk updates, which requires better <i>synchronization between teams</i> and <i>establishing of an agile tool-chain</i> . Customer domain is concerned with breaking down customer-visible features in order to communicate <i>customer-value to team</i> , requiring support for <i>writing meaningful user stories</i> and for <i>bridging the gap between plan-driven and agile development</i> . Integration and testing domain is struggling to <i>create and maintain traces</i> and with the fact that <i>user stories and tests</i> are not sufficient to build and maintain sufficient system understanding.

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