

## **Ambient Surfaces: Encouraging Communication Beyond Agile Practices in Co-located Scrum Teams**

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Agile software development (ASD) is commonly used in today’s software engineering industry. The agile methods Scrum and Extreme Programming (XP) are most notably adopted in companies. In both co-located and distributed ASD teams, communication (also referred to, e.g., “collaboration”, “interaction” and “knowledge sharing”) is highly relevant; software developers regularly attend meetings or informal discussions. Our research indicates that almost 40% of employees spend more than one-fifth of their time in informal communication. However, despite the acknowledged importance of communication in ASD, the existing empirical body of knowledge is very limited. Communication particularly beyond agile practices (e.g., daily meetings) in ASD teams has been studied inadequately so far. The literature additionally indicates that Scrum and XP practices are both not offering sufficient communication mechanisms for ASD teams. This research aims at shedding some light on communication processes in co-located ASD teams beyond agile practices.

To this end, the present research utilizes a custom ambient display solution (“Ambient Surfaces”) in a long-term single-case study. Ambient displays are known, e.g., to encourage communication. However, the literature lacks in providing examples that (a) utilize these systems as a lens to empirically investigate communication in a longitudinal research endeavor and (b) indicate useful day-to-day adoption scenarios. The research is carried out in a German ASD company. In February 2014, a first Ambient Surface was deployed in a common room, a second one followed in August 2015. There are currently up to 80 people (including management personnel, Scrum Masters, Product Owners and software developers) in the same building, where both Ambient Surfaces are located. In this large-scale ASD environment, multiple Scrum teams are working simultaneously on the company’s product for the pharma and biotech industry. Both Ambient Surfaces display information that is available in the company’s intranet; however, employees are often not aware of such information.

A Grounded Theory Method (GTM) is being conducted to guide the ongoing study process. GTM is suitable for this research, since there are no existing dominant theories regarding communication beyond agile practices in co-located ASD teams. Different data collection techniques (e.g., questionnaires, ob-

servations and Microsoft Kinect cameras) are being utilized. Furthermore, the research is informed by a preliminary literature review prior to the study and a thoroughly conducted systematic literature review as the research progresses.

There are three main contributions: Firstly, it will provide insights on communication processes beyond agile practices in co-located ASD teams. Secondly, the study will produce novel long-term empirical findings regarding the utilization of ambient displays in an industry setting emphasizing communication-related questions. Finally, only few GTM studies have been conducted in the software engineering discipline and particularly mixed-data GTM studies are rare to non-existing. This research will contribute a thoroughly conducted mixed-data GTM study.

The study's results would be valuable for both researchers and practitioners. Researchers would benefit from, e.g., the systematic literature review which summarizes recent research gaps regarding communication in co-located ASD teams. Practitioners would learn about, e.g., which information is relevant in different collaborative settings.

**Keywords:** Agile, Scrum, XP, Communication, Ambient Displays, Grounded Theory Method, Systematic Literature Review.