Context: In large-scale systems engineering, a large number of requirements, models, and other artifacts is created, used, and maintained by many stakeholders. When adopting agile methods and trying to reduce unnecessary documentation, companies need to reevaluate how to manage both artifacts and traceability between them.

Objective: The goal of this research is to empirically study and support the continuous management of artifacts and traceability in large-scale agile systems engineering. To get an understanding of the context, we examine challenges with the management of artifacts and traceability. Moreover, we investigate what interrelations exist between the organizational, process, and cultural contexts and the management of artifacts and traceability. To support practitioners, we suggest guidelines and strategies to mitigate challenges.

Method: We conducted our research in close collaboration with industry by conducting empirical studies. To gain in-depth insights into the topic and its context, we relied on case studies as well as on an ethnographic study. We used a design-science approach to develop and evaluate applicable guidelines in several iterations.

Findings and Conclusions: We found that in large-scale agile systems engineering, the alignment of cross-functional teams is difficult. It is unclear what artifacts are needed and how they should be managed. Our findings suggest that there are two sets of artifacts: Boundary objects (used to communicate across team boundaries) and locally relevant artifacts (used within one team). These artifacts differ in importance and require different management processes. It is beneficial to manage boundary objects in communities of representatives from several teams, and ensure that traceability to locally relevant artifacts is established. We found that with adequate support, traceability can facilitate collaboration across team boundaries and bring new incentives to invest in trace link quality.

Future Work: In the future, we plan to tailor the provided guidelines to concrete contexts and put them into practice for specific boundary objects (e.g., in the area of systems architecture). We also plan to explore the use of artifacts and traceability for operations activities, e.g., continuous use, trust, and run-time monitoring.