

Engineering Collaboration Basecamp

Methods and tools for globally distributed cross-disciplinary collaboration in Engineering

Student



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Problem: Global engineering collaboration poses significant challenges, including trust-building, stakeholder integration, intercultural dynamics, and IT performance/security. Although PLM systems address some aspects, they lack support for co-creation and often face resistance as collaboration platforms in cross-disciplinary projects, leading to fragmented communication via less secure channels. Consequently, there's a growing need for research to observe, quantify, and enhance Engineering Collaboration. However, existing scientific research relies on isolated case studies, focusing on individual tools, and suffers from a lack of generalizability and reproducibility. Absent are standardized methodologies for the collection of statistically reliable data.

Approach: In response to these pressing challenges, the EnCoBase project undertakes the task of creating a virtual laboratory explicitly designed for Engineering Collaboration experiments with the ulterior motive to improve collaboration and generate reliable measurements. Within the EnCoBase project, the "Methods and Tools" subproject is dedicated to the research of the fundamental elements of collaboration and methods which support Engineering Collaboration. This subproject involves a literature review, the execution of collaborative experiments, and the formulation of a standardized process specifically tailored for experiments which will be conducted in the virtual laboratory.

Result: The primary achievement of the "Methods and Tools" subproject is the development of a standardized process, rigorously tested through two illuminating "dry-run" experiments, conducted within the virtual laboratory environment. The standardized process establishes a robust framework for

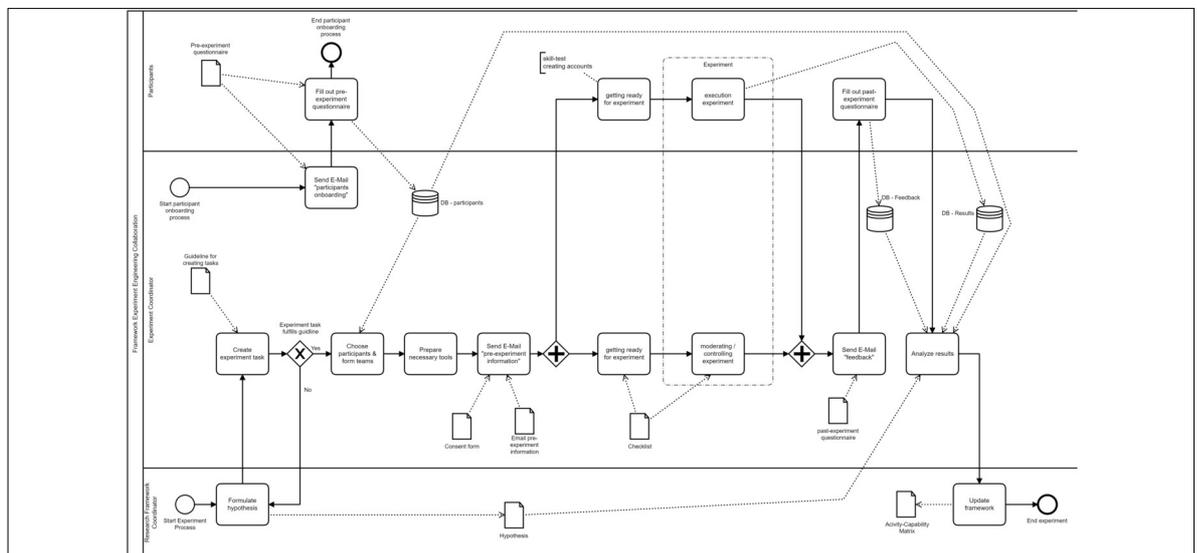
conducting engineering collaboration experiments, offering a foundation that assures replication and allows for meaningful comparisons. It serves as a cornerstone, ensuring the consistency and data quality essential for the empirical investigation. Another significant result is the preparation of a promising experiment that explores the efficiency of synchronous CAD sessions compared to traditional CAD systems.

Overview experiment "synchronous CAD compared to traditional CAD"

Own presentation

	Scenario A	Scenario B
Hypothesis:	Synchronous CAD is more efficient for negotiation of design solutions than asynchronous CAD.	
Task:	Participants are shown a specific product, which they have to re-design. In a CAD session a solution fulfilling all requirements should be designed as fast as possible	
Actors per scenario:	1x mechanical engineering student from Canada 1x mechanical engineering student from Switzerland	
Time limit:	2h	
Activities:	Agreement → Design Part A → Assembly	Agreement → Design Part A&B → Assembly
Tools:	- Onshape in asynchronous session - MS Teams for Agreement phase - E-Mail for communication	- Onshape in synchronous session - MS Teams
Measure:	Time to a solution that is accepted by both sides	Time to a solution that is accepted by both sides

Standardized process



Advisor
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Subject Area
Business Engineering

