EnCoBase

Virtual laboratory for evaluating engineering collaboration methods and tools

Student

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Introduction: International engineering collaboration in global, cross-disciplinary teams during product conception and design confronts obstacles, including trust, cultural integration, and tool limitations. While PLM systems address some, they fall short in co-creation support. Engineers rely on disparate tools, risking data fragmentation and insecurity. Current research to observe and measure engineering collaboration hinges on single-tool case studies, lacking comparative assessment. Additionally, undocumented experiments hinder reproducibility. Absent are standardized tests for statistically sound data collection.

The EnCoBase project addresses these gaps, aiming to enhance collaboration and generate reliable measurements thereof. Sub-questions include identifying core collaboration elements, quantifying success metrics, effective methods, and enabling IT tools for collaborative product data creation. Objectives include developing a virtual laboratory with measurement systems, user onboarding, modular tools, experiments, and analytics. The virtual laboratory will be used for observing collaboration and testing hypotheses, thereby improving the quality of collaboration. This report focuses on building the IT infrastructure of the virtual laboratory.

Approach: This report describes an EnCoBase sub-project focusing on the IT infrastructure of the virtual laboratory. The project roadmap spans literature review, virtual laboratory design, and experiment executions. During the project phase, two other EnCoBase sub-projects were running, dealing with engineering collaboration methods and measurements. Collaboration with the other students on experiment execution and measurement was pivotal.

Conclusion: As a result of this sub-project, an application for managing experiments and their execution was created. The application populates a MariaDB database with the experiment master data and serves as a basis for addressing external applications for use in experiments.

IT architecture of the virtual laboratory
Own presentment

Datamodel of the database used for experiment administration
Own presentment
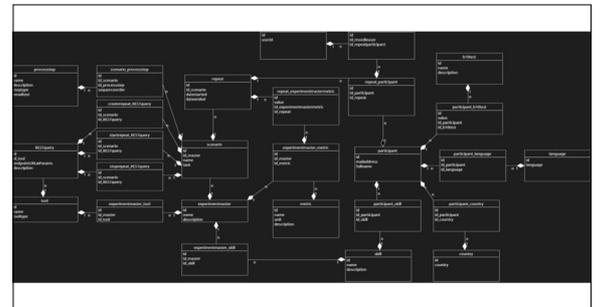
User interface for performing experiments with the virtual laboratory
Own presentment

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Subject Area
Mechanical Engineering, Electrical Engineering, Business Engineering, Software and Systems

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