ESEML
Empirical Software Engineering Modeling Language

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MOTIVATION

Researches in Software Engineering proposes new practices to improve quality attributes.

A great part of these fail to present empirical evidence.
There are several types of empirical studies. Such as, surveys, case studies, secondary studies, action research and controlled experiments.
According to Sjoberg only 1.9% of articles has a controlled experiment and the quality is not very high.
CONTROLLED EXPERIMENTS

Wide range of skills is necessary to conduct experiments, often creating a barrier for adopting it.

Skills in terminology, statistics know-how, and expertise in experimental design.
GOAL

Facilitate the modeling process and the definition of an experimental plan

By mitigating social barriers between stakeholders

Such as statisticians, experiments designers, and domain experts
PROPOSAL

DSLs are efficient to model specific domains

+ Controlled experiments have their specific domain elements

= ESEML guides controlled experiments modeling in software engineering and reduces social barriers
ESEML

A **visual DSL** for modeling controlled experiments in software engineering

Automatically generates the experimental plan from an instantiation of a domain model
METHODOLOGY

Informal review of models, ontologies and formal representations for controlled experiments

Meta-model based on the review

Microsoft DSL Tools to create the DSL and its workbench
META-MODEL
LANGUAGE WORKBENCH

ELEMENTS PALLETE

EXPERIMENT MODEL
1. Introduction
This controlled experiment will be performed in order to characterize the use ESEM to define an experiment plan in software engineering.

2. Goal Definitions
The following sections present the objectives of this experimental study.

2.1. Main Goal
Considering the specification of experiment plan in software engineering, we wish to characterize the differences regarding to a specification that uses ESEM and one that uses a text processor (TI), in respect to the time and quality of the specification.

2.1.1. Questions
The time for specifying an experiment plan and its quality assumes more positive values using the ESEM?

2.2. Metrics
Time required to specify an experiment plan in units minutes.

Quality of the experiment plan specification, evaluated by a specialist in experimental software engineering and other expert in the field of the experiment. Each expert will give a score from 0 to 5 for the experiment plan specification according to their competence. Thus, the total of design quality will be the average of specialists in the experiment and the domain expert.

3. Planning
This section describes the experiment plan showing how it was designed. This allows the execution of other experiments using the same plan, which could confirm our results and derive new.

3.1. Hypothesis Definitions
Before presenting the hypotheses of this plan it is necessary to introduce some symbols, that will be used throughout the plan to denote the dependent variables.

ST: Time of experiment plan specification
QE: Quality specification of the experiment plan.

3.2. Null Hypotheses
H0: ST1 ≠ ST2
2.1. Main Goal
Considering the specification of experiment plans in software engineering, we wish to characterize the differences regarding to a specification that uses ESEML and one that uses a text processor (TP), in respect to the time and quality of the specification.

2.1.1. Questions
The time for specifying an experiment plan and its quality assume more positive values using the ESEML?

2.2. Metrics
Time required to specify an experiment plan in units minutes.
Quality of the experiment plan specification, evaluated by a specialist in experimental

4.1. Conclusion Validity
The conclusion validity regards the relationship between treatments and the dependent variables in order to establish a statistical relationship between them. To ensure the validity of this experiment results, its should be compared with a Student's t distribution, since this distribution is more appropriate in the absence of historical data and to check the statistical significance.

4.2. Internal Validity:
2 minutes demo
ESEML is part of a major initiative for defining a platform of empirical studies in software engineering.

ESEML guides the definition of the experimental plan 1st version.
FUTURE WORK

Automatically generation of artifacts to collect data and execute experiments

Systematic review to more accurate meta-model

Empirical evaluation of ESEML