IX Studies: A Tool for Performing and Analysing Complex Interaction Experience Studies

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Introduction & Motivation

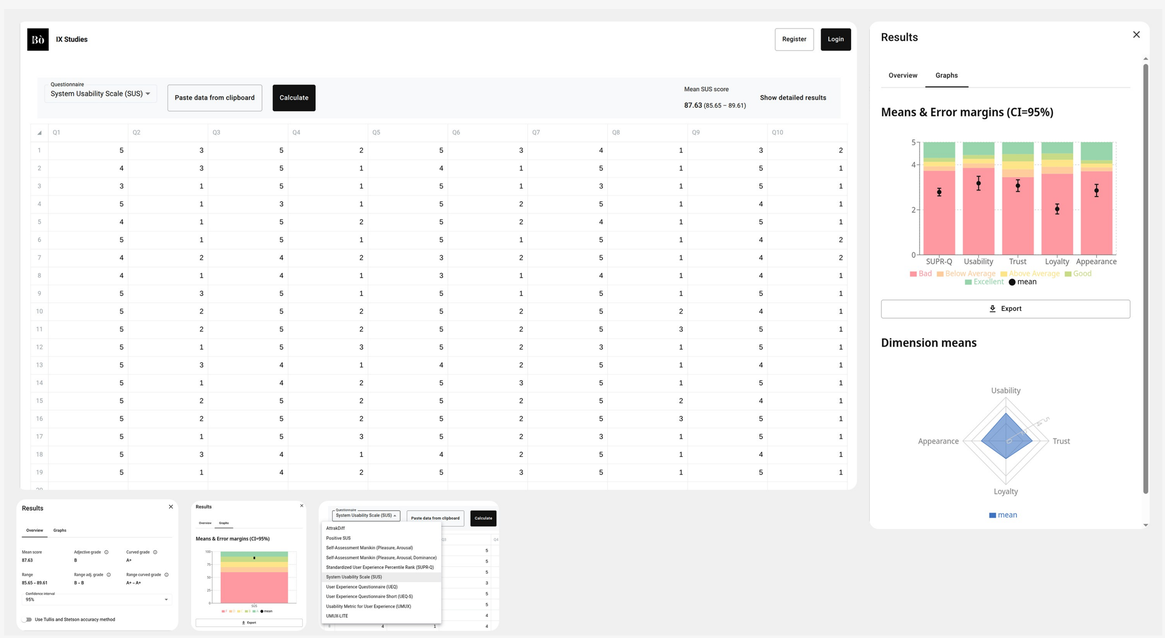
- Context: Questionnaires are the standard subjective UX measurement method [4].
- Challenges:
  - Generic tools (e.g., Google Forms, LimeSurvey) lack automation for specific tasks common in the HCI community, such as pick & use standardized questionnaires, complex order randomization options (tasks, questions, questionnaires, survey parts), pictorial scales (8% of HCI questionnaires usage [4])
  - Manual scoring leads to reported errors in several publications [1,2].
- Solution: IX Studies (https://interaction-experience.com/) combines tailored HCI survey creation with automated, error-free score analysis.

Methodology

We built IX Studies as a web platform that is currently split into two modules.

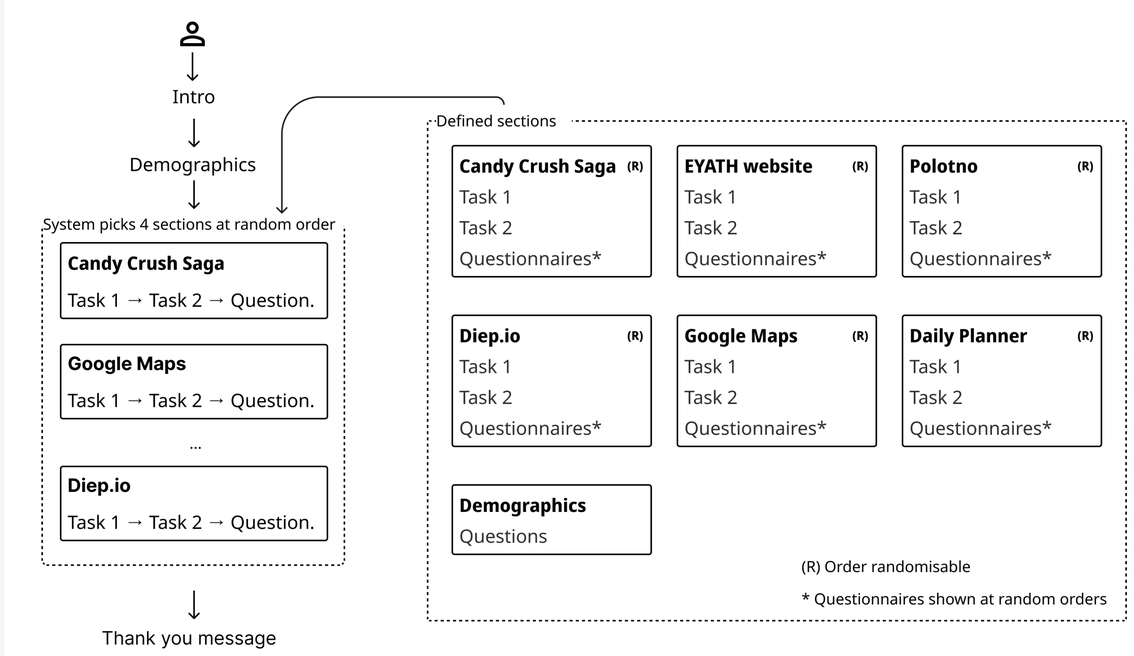
Module 1: Questionnaire Analysis & Calculator

- **Sheet-like Grid**: Input standardized HCI questionnaire responses easily.
- **Up-to-Date Scoring**: Calculates mean score(s) using the latest scoring definitions.
- **Confidence Intervals & Benchmarks**: Displays configurable CIs and available benchmark comparisons.
- **Exportable Visualizations**: Generates clear graphs of scores, CIs, and benchmarks ready for export.



Module 2: Survey Creation Tool

- **Section-Based Architecture**: Groups related study items together semantically to support complex HCI requirements.
- **Rich Page Content**: Supports standard form elements (enriched text, Likert scales, open/short text) alongside pre-built HCI questionnaires in multiple languages.
- **Flexible Logic & Randomization**: Randomize section order, display subsets of sections, or shuffle questions/questionnaires to eliminate priming and order effects.
- **Case Study**:
  - Conducted a study that investigated the interplay of UEQ-S, SUS, and SAM [3] across 6 products.
  - Each participant performed eight tasks and rated four systems (out of a possible six).
  - Order of appearance of systems & questionnaires randomised to nullify order-effects.



Results

Evaluation & User Testing

- Participants: Tested with **17 users** (female=12; mean age=20.94, SD=5.994).
- Real-World Task: Users designed, deployed, collected ~30 responses, using IX Studies over a one-month period and analyzed results.
- Evaluation Metrics: Assessed system usability and user experience using SUS, UEQ-S, and qualitative feedback.

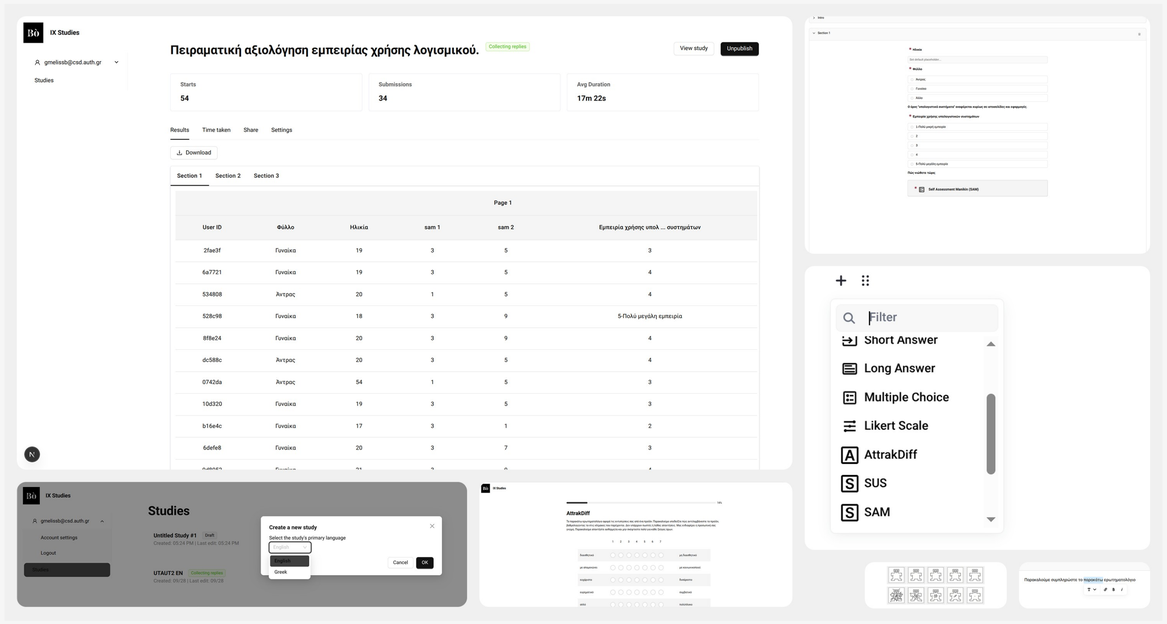
IX Studies Evaluation Results

- SUS: 69.59 (SD = 21.026)
- UEQ PQ: 0.84 (SD = 1.206)
- UEQ HQ: -0.10 (SD = 1.272)
- Overall Attractiveness: 0.37 (SD = 1.178)

Qualitative Feedback & Iteration

- Issue Identification: Qualitative analysis revealed 12 distinct usability issues and improvement opportunities.
- Targeted Fixes: Prioritized and resolved the most critical issues alongside internal feature enhancements.

IX Studies v2 is currently accessible at **https://interaction-experience.com/**.



IX Studies v2 currently supports the following features:

- **Analysis of the results** (means, CIs, and benchmarks, if available) and **graphs export** for: AttrakDiff, positive and original SUS, SAM (both PA and PAD versions), SUPR-Q, UEQ and UEQ-S, and UMUX and UMUX-LITE.
- **Creation of surveys** with multiple sections and **unlimited responses** in English and Greek.
- **Insertion of predefined** standardised **questionnaires**.
- Configurable **randomisation of section and questionnaire/question order**.
- **Random assignment of a subset of sections** per participant.
- **Tracking of time spent** per section and page.
- Download of results in XLXS format.

Future Direction

To increase the utility of the tool, we plan to continue evolving IX Studies to arrive to an eventual **version 3** in which the following features will be incorporated:

- **More complex statistical analysis analysis**: Parametric and non-parametric statistical tests (t-test, chi^2, U test, etc.), factor analysis, and structural equation modeling.
- **Automatic import of studies' results** to the calculator **for analysis**, without having to download the data.
- **Support for a wider range of** predefined standardised **questionnaires**.
- **Implementation of complex form features** (e.g. conditional logic, editing of predefined questionnaires).
- **End-to-end encryption** of survey data.
- **Collaboration in study creation** —sharing the editing of a study between the members of the research team.
- **Creation of studies in more languages** (e.g. French, Spanish, German, etc.).

The tool consists of a generally light-weight stack that is currently hosted in a shared hosting space located in the Netherlands. An important future plan is to **find a more permanent dedicated hosting space** while continuing keeping all data strictly in EU located servers.

Bibliography

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[4] Mortazavi, E., Doyon-Poulin, P., Imbeau, D., Taraghi, M., & Robert, J. M. (2024). Exploring the landscape of UX subjective evaluation tools and UX dimensions: A Systematic Literature Review (2010–2021). Interacting with Computers, 36(4), 255-278.

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