

# Collaborative Sketching and Notation Creation with FlexiSketch Team

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**Abstract:** We used FlexiSketch Team, our flexible modeling tool, in an explorative study to better understand how novice and experienced engineers sketch and define ad-hoc notations collaboratively in early requirements elicitation and design sessions.

**Keywords:** Collaboration, sketching, tool, ad-hoc modeling, lightweight metamodeling.

## 1 Motivation and FlexiSketch Team

Requirements and software engineers commonly use paper and whiteboards in creative requirements elicitation and design meetings to create model sketches and communicate ideas [Ch07]. These tools allow engineers to use ad-hoc notations and to sketch at any level of detail, a flexibility that is usually not provided by formal software modeling tools. To re-use the sketches during the SE process, however, engineers can either take photographs and are left with non-editable files, or they have to manually transcribe sketches into formal models. The latter process can be time-intensive and error-prone: sketches are often ambiguous, and it can be difficult to interpret them correctly when information about the context in which they got created is missing [DH07].

To circumvent this problem, we have developed *FlexiSketch Team*<sup>3</sup>, a software tool for mobile devices and electronic whiteboards. Our tool provides flexible sketching mechanisms similar to whiteboards and paper, but also includes formalization capabilities that allow users to create and store free-form diagrams (consisting of nodes and edges) as semi-formal models instead of plain pictures. The user can manipulate elements drawn as if she were working with a classic drag and drop editor. Further, our tool uses a lightweight metamodeling-by-example approach: the user can assign types to the elements and add cardinality rules for links, thereby defining a custom diagramming notation on the fly [WSG13]. Typed elements appear in a sidebar and can be re-used via drag and drop. The tool also creates a lightweight metamodel according to the user definitions and by inferring missing cardinality information. The sketches and metamodels created are stored as XML files. Once respective parsers are written, the files can be exported and opened in other modeling and metamodeling tools. The team version of our tool allows multiple users to work simultaneously with multiple devices on the same model sketch. Thus, engineers can collaboratively draft custom modeling languages and formalize sketches on demand.

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<sup>3</sup> A prototype can be downloaded from [www.flexisketch.org](http://www.flexisketch.org)

## 2 Study on Collaborative (Meta-)Modeling

At the International Requirements Engineering Conference in 2015, we presented the results of an explorative study performed with three practitioner teams and three student teams [WSG15]. Each team consisted of three participants, except for one student team that had two participants. Each participant received a tablet with our tool installed. We connected the tablets to deploy a shared workspace (a shared sketch canvas and a palette with typed elements). The goal of the reported study was to see how novice and experienced engineers use our tool to sketch and define ad-hoc notations collaboratively in early requirements elicitation and design sessions. Results show that participants incrementally built notations by defining language constructs the first time they used them. Participants stated that being able to re-use defined constructs was a big motivation for assigning types to model elements. In all teams, every participant contributed actively to the creation of the modeling language by defining at least one element. The participants deemed our approach to be useful in longer sketching sessions and when sketches need to be re-used later on. An issue found in the student teams but not in the practitioner teams was that participants had problems to focus on both the interaction with the tool and team coordination, i.e., they sometimes neglected proper communication between team members. However, notation definitions impact the whole sketch canvas and therefore require good communication. Another issue was that it is not always easy to tell what other team members are doing because our tool currently contains no user awareness features.

## 3 Outlook

According to the study results, incorporating user awareness features into our tool is a topic for future work. In addition, we plan to expand on the types of diagrams supported by *FlexiSketch Team* by adding further concepts such as, e.g., the spatial relationship of elements. This would allow users to depict chronologies or to draw containment relationships. Other future work includes longitudinal studies with our tool in industry.

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