

Research Goals for Evolving the ‘Form’ User Interface Metaphor towards more Interactivity

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Abstract. Forms have been static, document-like user interfaces (UIs) for centuries. This work proposes to evolve the ‘form’ UI metaphor towards more interactivity. Related work has proposed interactive form elements such as autocompleting or otherwise assistive input fields. But a unified concept and scientific reflection on the topic are missing. Methodologically, this work first provides a deeper understanding of forms as UI metaphor. It then presents relevant research goals for improved usability, including collaborative form filling, easier navigation in long forms, and combined input fields for comfortable data entry. Taken together, the contributions of this work are to provide a deeper understanding of forms, systematically highlight relevant research topics, and hopefully foster a scientific discussion in form design.

Keywords: Form Design, Web Forms, HCI, Usability, User Interaction

1 Introduction

Electronic forms are embedded in many of today's user interfaces (UIs), enabling users to engage in online communities, e-commerce, and productivity software [1]. These applications may involve multiple concurrent users, large amounts of (semi-)structured data, complex validation and business logic. In contrast to this complexity, the original concept behind forms is very simple: Pre-defined labels and placeholders prompt for information that conforms to the form's structure, diction and intent. As a result, forms do not always cope with the complex requirements of their embedding application, leading to usability problems [2].

Related work on form design includes established best practices documented in books [1, 3] and articles [4]. Research recognizes the need to make forms more dynamic and application-like; this applies to every aspect of form design as classified in [4]: (a) form content: e.g., assistive form elements [5], (b) form layout: combined form fields [6], (c) input types: free-text and multimodal data entry [7, 8], (d) error handling, e.g., with multimodal form filling [8], and (e) form submission: e.g., versioned submissions in co-operative form filling [9, 10].

But in addition, a deeper theoretical understanding and a unified concept for practical improvements are needed to adapt forms for use in complex applications. I hypothesize that form-filling can be improved in usability and user experience if forms more fully satisfy the entailments of the ‘form’ UI metaphor and put to use more of the interactive possibilities offered by digital media.

Real-World Example and Scenario. In a form-based, medical documentation software named “Wound Healing Analysis Tool” [11], users were observed shouting across rooms to find out who else was documenting at the same time ¹. The forms did not update in real-time and did not provide enough awareness about concurrent usage. Moreover, data entry was complicated because the length of most forms required a lot of scrolling. This scenario demonstrates the practical need for better, more interactive forms.

2 Forms as User Interface Metaphors

Understanding forms as UI metaphor provides a deeper understanding of how forms are used in software, helps comparing forms with other UI metaphors [12], and allows to identify relevant research goals, as shown in this work. Metaphors declare two different concepts or things to be identical in order to assert their similarity [13]. UI metaphors likewise assert similarity, which helps to explain the functionality of a UI. Derived from [13], the ‘form’ UI metaphor can be defined as: *The ‘form’ UI metaphor is a device for explaining the functionality of a UI by asserting its similarity to conventional (e.g., paper) forms.* Consequently electronic forms are a deliberate choice [12] for designing a UI in a way that metaphorically reminds of conventional (e.g., paper) forms. This perspective allows for a systematical identification of improvements in form design, see Fig. 1: Firstly, not all metaphorical entailments are fulfilled by electronic forms. E.g., in contrast to paper forms, electronic forms typically cannot be freely annotated. Secondly, the ‘form’ metaphor does not yet fully make use of the interactive possibilities offered by digital media. E.g., attention-reactive UIs can dynamically adapt to the user’s focus of attention [14], but forms are usually very static.

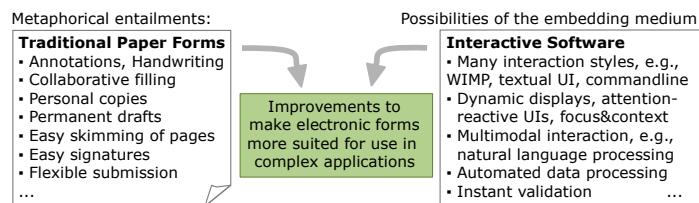


Fig. 1. To identify improvements in form design, this work considers unfulfilled entailments of the ‘form’ UI-metaphor and interactive possibilities offered by digital media.

This approach leads to relevant improvements because firstly – referring to unfulfilled metaphorical entailments – paper is still the preferred medium of many users [15]; and porting paper abilities into the software medium will benefit domains where paper forms have traditionally been used. Secondly – referring to unused possibilities of the embedding medium – electronic forms could employ more interactive techniques to improve efficiency and user experience.

¹ Unpublished field study at Krankenhaus Göttlicher Heiland, www.khgh.at, 2010

3 Research Goals and Methods

Relevant goals for form-filling interfaces that reflect the semiotics of historical (paper) forms and that more fully use the interactive possibilities of digital media are shown in Fig. 1. Methodologically, I propose to treat each goal using an iterative UI design process and subsequent empirical evaluation in the context of a specific domain, application and user group. The design process should include sketches, prototypes, and usability tests. The short length of this paper only permits a very brief overview on four particularly relevant goals:

Focus-and-Context Navigation. Long forms require a lot of scrolling, or else they are split into multiple pages or tabs. Both options lead to a loss of context for the user. This work proposes to apply the focus-and-context principle [16] and attention-reactive UIs [14] to form design: Only those parts of the form with the user’s focus shall be fully shown; the rest is shown in a compact and aggregated way, see Fig. 2ab. I will research navigation patterns in other application fields (e.g., master/detail view, drill-down) and evaluate different granularities (i.e., single fields or whole fieldsets may toggle between full and compact views).

Collaborative Form Filling. Support for co-operative form filling would benefit applications where multiple users work on shared artifacts, e.g., as demonstrated in co-operative web browsing [9] and in a customer support system [10]. I propose design and evaluation of a prototype for real-time collaborative form filling in the medical platform [11] described in the example scenario.

Combined Input Fields. Forms tend to be split into many small fields to simplify automated data processing, but this can lead to inefficient data entry. A related paper proposes to combine complex search fields into one smart field [6]. This can be generalized for arbitrary forms: Combined input fields match the users input to the underlying form schema, see Fig. 2c. A usability evaluation shall quantify the improvement in form filling performance. Biggest benefits are expected in scenarios with repetitive data entry in sparsely filled forms.

A unified concept. The proposed improvements can and should work together, creating a unified concept for form-based interactions. For this purpose, a JavaScript framework could provide modules to enhance web forms with dynamic behavior (e.g., real-time collaboration, focus-and-context navigation). The modules could be loaded individually as required for a specific application.

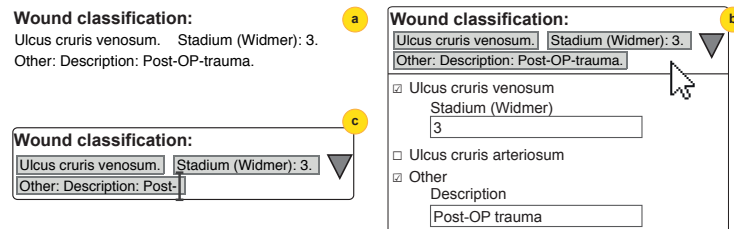


Fig. 2. Smart input fields: (a) Out-of-focus state, (b) Focussed state, with dropdown menu revealing the underlying structure, (c) Combined field with a textual editing UI

4 Discussion and Future Work

The contribution of this paper is to explain forms as UI metaphors, allowing to systematically identify relevant usability improvements, which are presented in this paper as goals for future research (Fig. 1). The author's future research can only cover select goals, starting with focus-and-context navigation in long forms, as described in this paper. Other researchers are encouraged to likewise discuss the future of interactive forms. These efforts shall lead to a unified concept that evolves the 'form' metaphor towards more interactivity and better usability.

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