

Requirements, Models, and Prototypes for HCI Design

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ABSTRACT

Requirements, Models, Prototypes (RMP) is a structured process for HCI design for industrial software development teams. It consists of an organized collection of ten design deliverables, templates for each, and a set of practices. RMP is derived from the authors' ongoing experience and the HCI literature of research and practice. It was devised to aid experienced designers and to help beginners learn. The tutorial is intended for those already familiar with basic HCI design who desire a more systematic approach.

KEYWORDS

Design process, structured design, usability requirements model, prototype, formative evaluation., HCI design

OVERVIEW

Requirements, Models, and Prototypes (RMP) is a semi-formal, structured process for designing Human-Computer Interaction (HCI). It was devised to help HCI designers be more cost effective and to promote the fit of HCI design work into industrial software development processes. It is a statement of the current routine practice of the authors. The components of RMP are:

- A specific minimal set of HCI design deliverables (methods) and their known relationships for each of three groups, Requirements, Models, Prototypes (ten deliverables in all).
- Templates (tools) for each of these deliverables to promote repeatability, reliability, and efficiency as well as to help beginners.
- A set of five design practices that help designers work comfortably in contemporary software development environments.

The tutorial is appropriate for HCI designers familiar with the basics of the trade and ready for a more systematic or global approach, especially for work with a development team. It is intended that for each of the design deliverables, participants will learn to:

- Create and use it appropriately
- Convincingly explain it to a design team
- Use it to focus future learning

At the core of Requirements, Models, and Prototypes are the three groups of design deliverables, each detailed in a following section.

REQUIREMENTS

With RMP this covers *only* issues related to HCI and not general functional requirements. Minimally included are:

- User description including the standard demographic information and a set of "benchmark tasks" designed to precisely bracket the users skill level.
- Usability goals including the classic Nielsen five [11] plus three others that have proven useful.
- Scenarios that, taken as a group, describe the work that a system in design must support [2,14].

MODELS

Models in RMP bridge the gap between Requirements and Prototypes. They are the designers representation of the mental models that a user will form of the system and the work done with it. Two domains are distinguished and modeled:

- Work models describe the user's tasks as performed with the system [16]. Three models are included:
 - Extended Use Case [2,4,7]
 - Object/Concept Model [2,9]
 - State Model [14]
- User Interface Map [12] documents the "big picture" of the user interface, for establishing the graphic program [10], and for evaluating the between-screens quality of the design. The UI Map is best created in parallel with the paper and on-line prototypes.

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PROTOTYPES

Prototypes are used to make the UI concrete for design and for evaluation. RMP includes three:

- Paper prototypes are quickly built simulations that can be used concurrently with the UI Map to do graphic design and also to test conceptual aspects of the design with users. RMP offers an effective technique.
- On-Line prototypes are created in a software tool for designing and evaluating UI look and feel. RMP offers suggestions and templates for layout grids [1,10].
- A storyboard visually shows a specific sequence of actions with our imagined system and are used to *explain* rather than to design [8].

TEMPLATES

Templates are formats that allow the designer to focus on finding and analyzing information rather than figuring out what information to acquire. They provide either blanks to fill in, specific qualitative or quantitative judgments to make, or specific components to include in a particular RMP deliverable. They are based on the idea that most of design work is repeated time after time, and that the most effective designers modify their own previous designs rather than starting from scratch. A practical way to capture and share the fruits of experience is in design templates [3]. RMP supplies at least a rudimentary template, for each of the ten design deliverables.

DESIGN PRACTICES

To help designers organize the creation and evaluation of design deliverables, RMP offers a set of five design practices that the authors have found effective in industrial practice:

- Creation of usability at *design time*, rather than after implementation and testing. This implies rigorously evaluating early design deliverables and also creating deliverables concurrently rather than iteratively.
- A focus on design deliverables rather than activities so that there are clearly defined work products that must be completed. For economy, only activities required to complete deliverables are done. Any activities that contribute to a deliverable are acceptable.
- Team responsibility for decisions; no designs "thrown over the wall." A single designated individual (DRI) is responsible for each deliverable, while the team is responsible for careful review and connection with other deliverables.
- Concurrent creation of design deliverables. All are created, evaluated, revised, and elaborated in parallel, much like chapters in a single technical book are drafted, reviewed, and rewritten. Whenever time runs

out, a complete design document at some level of detail exists.

- Formative evaluation rather than summative. All the deliverables are evaluated, not just prototypes, and not by only a single method. All are evaluated in rough draft form so that there is time for revision. Timeliness is more important than precision of evaluation.

These practices reflect the authors' experience and reading of current theory and best practice in software engineering, HCI design, and consulting [3,4,5,6,7,13,15]

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