

## **CHI 2003 Tutorial**

### **Card-Based User and Task Modeling for Agile Usage-Centered Design**

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## Instructor Biographies

**Larry Constantine**, Adjunct Professor, Information Technology, University of Technology, Sydney (Australia) and Director of Research and Development, Constantine & Lockwood, Ltd., is a pioneer in software engineering who is recognized for original contributions forming the foundations of modern design and development practice. His current interests focus on enhancing software usability through model-driven and usage-centered design methods. In a career spanning four decades, he has had over 150 papers published plus 16 books, including the 1999 Jolt Award winner, *Software for Use* (Addison-Wesley). An award-winning designer (Performance-Centered Design Competition 2001) as well as a respected teacher, he has taught in 17 countries around the world.

**Lucy Lockwood**, President, Constantine & Lockwood, Ltd., is an internationally respected consultant and trainer who draws on nearly 20 years experience in programming and project management. Her practice centers on software usability and technical teamwork, and she has contributed many of the core concepts and techniques in usage-centered design. A top-rated speaker, she has taught around the world and has keynoted major conferences. She is author of more than a dozen published papers and co-author of the award-winning book, *Software for Use* (Addison-Wesley, 1999).

# Overview

User and task modeling are essential parts of the toolkit of most usability and design professionals and core components of nearly all systematic design approaches. User and task models help professionals to capture, explore, analyze, elaborate, and validate their understanding of users and the tasks they need to perform.

While thorough ethnographic inquiry, deep and refined analysis, and complete and detailed modeling are regarded as the ideal in HCI work, in practice, many professionals do not have luxury of leisurely investigation and exploration. Under current conditions of ever-shortening design and delivery lifecycles, many traditional techniques are proving too costly or cumbersome. Rather than omitting systematic analysis and modeling altogether, professionals need simplified techniques that quickly provide concise, focused, and trustworthy guidance. This need is especially acute for rapid deployment of software and Web-based applications and services developed with the emerging "agile" methods.

User and task models take many different forms and can be constructed in a variety of media. This tutorial focuses on approaches that exploit the inherent flexibility and conceptual power of ordinary index cards supplemented with other low-tech media. These extremely fast and simple card-based modeling techniques form the core of agile usage-centered design, a proven design approach to complement the increasingly popular agile methods, such as eXtreme Programming (XP), that have demonstrated their ability to speed development and delivery of software and Web-based products. In agile usage-centered design, the focus is on minimalist models that provide maximum payoff for improved designs.

A variety of techniques will be explained and applied, including card storming, role and task inventories, abstract dialogs, role-support analysis, and cooperation clustering of task cases. In addition to the core models of user roles and task cases, closely related modeling approaches will be addressed, including personas, user profiles, scenarios, user and customer stories.

## Covered Topics

- **Usage-centered and user-centered design**
- Overview of a model-driven design process
- Relationships among role, task, and content models
- Model-driven derivation of visual and interaction designs
- Iterative agile processes and design-release cycles:  
XP, agile modeling, and others

- Usage-centered, model-based exploration
- **Beyond paper prototypes: traditional and novel low-tech tools**
- Managing chaos with holding bins
- Card-based modeling: cognitive and pragmatic advantages
- Basic techniques:  
card-storming, affinity clustering, prioritizing, coordination clustering and other specialized categorizations
- **Users, actors, user roles, personas, and user profiles**
- Concise and efficient modeling based on relationships
- Generating a user role inventory
- Ranking user roles by commonality and priority
- Refining user role models through affinity clustering and role elaboration
- Role-support analysis
- **Tasks, use cases, scenarios, and stories**
- Writing abstract dialogs
- Elaborating task models:  
workflow, preconditions, extensions, inclusions, rules and constraints
- Ranking techniques for card-based task models
- Combining and comparing alternative rankings
- Affinity clustering and task model refinement
- **Bridging the gap from task models to design**
- Cooperation clustering of tasks into interaction contexts
- Card-based models as drivers of design, planning, and scheduling
- Content inventories and abstract prototypes
- Deriving visual and interaction designs from card-based models

# Card-Based Modeling for Usage-Centered Design

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## Agile Development

Pressure to deliver more for less in less time generated revolution in software development methods.

- Systematic but streamlined (“lightweight”) methods.
- Iterative, incremental evolution; short release cycles.
- Best known: eXtreme Programming, Crystal, SCRUM, Feature-Driven Development, Agile Modeling.\*
- Project management and project organization:
  - no overtime
  - cross-training, rotation, fungibility
  - paired programming
  - customer access
- Detect and eliminate defects early.
- Coordinate and collaborate with customers but not (usually) users.
- Deliver capability but not usability. \* See references.



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## Rapidity Revolution

- In effort to avoid “analysis paralysis,” thoughtful, thorough design is rejected. No BDUF!
- Users can be shortchanged in “customer-centric” focus on features, delivered value, customer satisfaction.

“GUI-intensive projects are problematical for XP (and probably for many approaches).” —Ron Jeffries

“It is not a ‘weak point’ [of the agile methods], it is an absence.” —Alistair Cockburn

- What can usability-oriented design professionals do under extreme programming pressure?
  - simplified architectural overview
  - minimalist modeling
  - concurrent, concentric design and development

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## Card-Based Modeling

- Usage-Centered and User-Centered Design
  - Beyond Paper Prototypes
  - Users, Actors, Roles, Personas, and Profiles
  - Tasks, Use Cases, Scenarios, and Stories
  - From Task Models to Design



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# Card-Based Modeling for Usage-Centered Design

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## Users or Usage

<p><b>User-Centered Design</b></p> <ul style="list-style-type: none"> <li>● Focus is on <b>users</b> - user satisfaction, user experience</li> <li>● Driven by user input</li> <li>● Substantial user involvement             <ul style="list-style-type: none"> <li>■ User studies</li> <li>■ User feedback</li> <li>■ User testing</li> </ul> </li> <li>● Design by prototyping</li> <li>● Variable, informal processes</li> <li>● Trial-and-error</li> </ul>	<p><b>Usage-Centered Design</b></p> <ul style="list-style-type: none"> <li>● Focus is on <b>usage</b> - task performance, task support</li> <li>● Driven by task models</li> <li>● Selective user involvement             <ul style="list-style-type: none"> <li>■ Exploratory modeling</li> <li>■ Model validation</li> <li>■ Usability inspections</li> </ul> </li> <li>● Design by modeling</li> <li>● Systematic process</li> <li>● Getting it right by design</li> </ul>
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 **Objective: simpler systems completely supporting efficient task performance and realization of user intentions. **Never**, "user friendly."**

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## Designing for Use

To design for use, you have to understand three things -

① Your users.



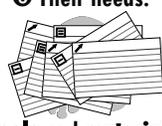
What **roles** do they play in relation to the system?

② Their work.



What **tasks** are they trying to accomplish in those roles?

③ Their needs.



What **tools and materials** are needed for the tasks?

Simple, abstract models can build and hold understanding.

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## Abstract Advantages

- Why abstract models?
  - Simplified forms quickly generated.
  - Defer details to focus on big picture, main issues.
  - Invite investigation and innovation.
  - Allow confident assertions in the absence of extensive research or real data...
- Which is the more common watch user?
  - middle-aged male runners or scuba divers?
  - time-zone-tripping-techno-nerds or casual-clock-checkers?

 **Abstraction can speed realization!**

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# Card-Based Modeling for Usage-Centered Design

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## Usage-Centered Modeling

- Begins with understanding of the **roles** users play in relation to the system being designed.
- Identifies **tasks** (task cases) needed to support user roles.
- Clusters tasks by use and meaning.
- Defines intentions and responsibilities for each task.
- Models **page contents** needed to support task clusters.
- Derives complete visual and interaction designs.

ROLES → TASKS → CONTENTS → DESIGN

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## What Makes it Fast

- Abstraction simplifies and tightens focus.
- Models shape and speed inquiry, quickly organize complex information.
- Designs derive from models not magic.
- Overview for planning and prioritizing easily drafted.
- Focuses on user intentions and genuine needs, not wants, wishes, and feature fantasies.

Agile usage-centered design -

- Model-driven iterative cycles.
- Sharply focused minimalist models - only what is most basic and really important.
- Simplified card-based modeling techniques.
- Holding bins keep order in rapidly evolving process.

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## Scheme and Architecture

For rapid iterative or XP-style design and development -

- Not BDUF, but draft of overall UI design in advance to know where everything is and how it fits together.
- Navigation architecture - how UI is organized into interaction contexts, collections, or groups; how these are presented to users; how users navigate among these.
- Visual and interaction scheme - "abstract style guide," common layout templates, basic visual elements, etc.
- Consider IDE for automation apps PLC programming.

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# Card-Based Modeling for Usage-Centered Design

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## Card-Based Modeling

- Usage-Centered and User-Centered Design
- Beyond Paper Prototypes
- Users, Actors, Roles, Personas, and Profiles
- Tasks, Use Cases, Scenarios, and Stories
- From Task Models to Design



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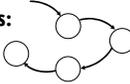
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## Task Modeling Views

Work as sequential steps:

- flowcharts
- work flow models
- data flow diagrams (Preferred by programmer-types.)

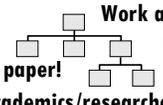


DETAILED, CONCRETE  
Like writing code!

Work as hierarchy of tasks:

- functional decomposition
- work breakdown
- goal hierarchy

CONCEPTUAL, CATEGORICAL  
Like writing a paper!  
(Favorite of academics/researchers.)



Work as narrative:

- scenarios
- storyboards



RICH, REALISTIC  
Like writing a script!  
(In with artsy folks.)

Sequential, hierarchical, & narrative views can be combined.

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## Task Cases

- **Task case:**\* a use case (one case of use) in essential form, that is, abstract, simplified, and technology and implementation independent.
- A single, discrete intention that is complete, well-defined, and meaningful to a user, in some role. Not a complete job, story, or scenario.
- For example: reviewing product annual sales, entering special symbol into document, or checking liability insurance claim status
- But not “unsuitably vague”: coordinating events, processing claims, or using information kiosk
- Named with a continuing action (“ing-word”) and a fully qualified object. \* also called “essential use case”



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# Card-Based Modeling for Usage-Centered Design

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## Why Task Cases

- **Task cases** model the “what” and “why” of use rather than the “how.”
- **Task cases**
  - are simplified and abstract.
  - are closer to the essence of work.
  - encourage innovative solutions.
  - represent user intentions rather than actions.
  - are fine grained.
  - are readily reorganized and re-used.
- **But, rich, realistic scenarios that tell a plausible story can seem more familiar and more fun.**



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## Use Case Unified-Style

**Withdraw Money\***  
The use case begins when the *client inserts* an ATM card. The system reads and validates the information on the card.

1. **System** prompts for PIN. The *client enters* PIN. The system validates the PIN.
2. **System** asks which operation the client wishes to perform. Client *selects* “Cash withdrawal.”
3. **System** requests amounts [sic]. *Client enters* amount.
4. **System** requests type. *Client selects* account type (checking, savings, credit).
5. **The system** communicates with the ATM network to validate account ID, PIN, and availability of the amount requested.
6. **The system** asks the *client* whether he or she wants a receipt.  
This step is performed only if there is paper left to print the receipt.
7. **System** asks the *client* to withdraw the card. *Client withdraws* card.  
(This is a security measure to ensure that Clients do not leave their cards in the machine.)
8. **System** dispenses the requested amount of cash.
9. **System** prints receipt.
10. The use case ends.  
*user system internals user interface*

**7 user steps.  
(But no money!)**

1. Cluttered with noise words.
2. Mixes user and system issues.
3. Unnecessary assumptions about eventual user interface design.
4. Mixes internal/external requirements, design, and technology.
5. All about the system.

\* Kruchten, 1999

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## Task Cases—Basic Form

- Defined by a structured narrative in language of the users and the application domain.
- An abstract dialog described in two columns:\*

USER INTENTIONS	SYSTEM RESPONSIBILITIES
getting cash from my ATM account	
2. identify myself	1. request identification
5. choose	3. verify identification
7. take the cash	4. offer choices
	6. give cash

*external requirements* (pointing to left column), *internal requirements* (pointing to right column), *user interface* (pointing to bottom of right column).

**Simplify and generalize!**

- Concise, simplified, abstraction encourages innovation.
- Can be elaborated into precise, comprehensive model.
- Easy for users/clients to understand, confirm, amplify; no notation to learn.

\* Rebecca Wirfs-Brock

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# Card-Based Modeling for Usage-Centered Design

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### An ATM Scenario

Wanda Cashnow is out shopping and realizes she is short on cash. She spots a BankIT ATM. She inserts her card and enters her PIN when asked. Offered the choice of 4 set amounts, she selects \$300. The ATM reports "Transaction Denied" and returns the card. She starts over but chooses "Other Amount," then enters 150 and is told "Multiples of \$20 only." She enters 160, then presses OK when asked if she wants a receipt. When money and receipt are dispensed, she notes a low balance. She presses OK when asked if she wants another transaction, then selects "Balance Transfer." Changing her mind, she keeps pressing "Cancel" until the system beeps and asks if she is done. She presses OK and walks away. A repeated tritone from the ATM draws her attention, and she sees "Please take card!" on the screen. She grabs the card and sighs in relief.



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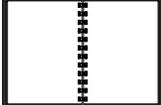
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### Scenarios: the Good and the Bad

- ✓ Plausible extended vignette comprising multiple task elements.
- ✓ Easily constructed from simple observation or minimal analysis.
- ✓ Rich and realistic, appealing to designers and users.
- ✓ Effective for usability inspections, usability testing, communication with users and clients.
- ✗ Coarse grained model muddles distinct tasks.
- ✗ Rarely feasible to model entire task domain.
- ✗ Superfluous details distract from essentials.
- ✗ Exceptional, uncommon, or unimportant actions can assume undue prominence in story line.
- ✗ Concreteness does not facilitate innovative thinking.



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### User Stories

- XP (and some other agile methods) employ "user stories" to identify and define features and functions as input to planning process.
- User stories are concrete, quasi-realistic scenarios, plausible accounts of use of the proposed system.
- Concise, testable, free of implementation specifics.
- They are called user stories, but they are written by the customer (or person in "customer role").
  - Clients and customers are not the same as users.
  - Users actually use the system.
  - Users outnumber customers.
  - If you meet the real user needs, you meet the customer needs.

*Once upon a dark and stormy night...*


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CONTEXT:

CHARACTERISTICS:

CRITERIA:



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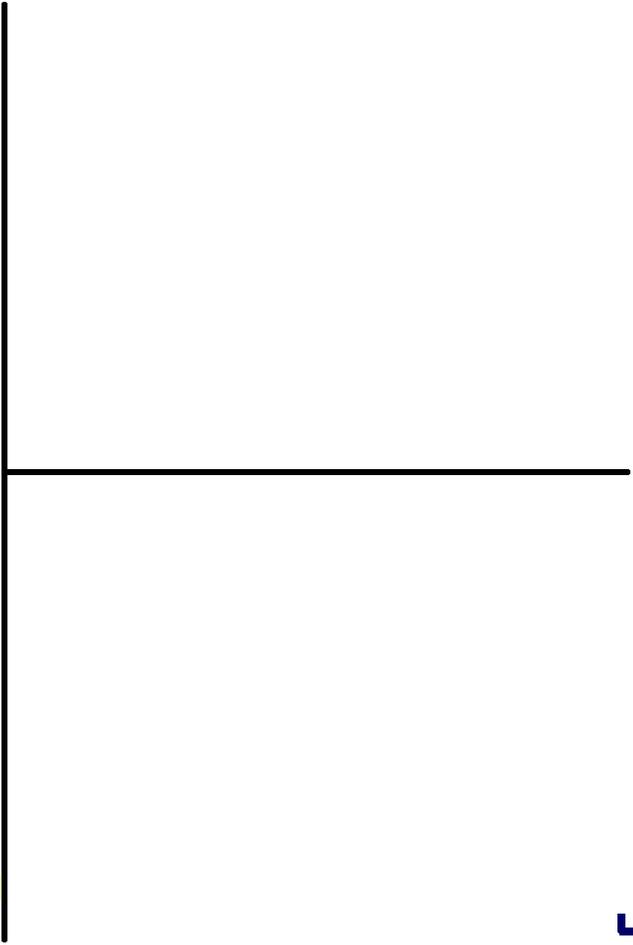
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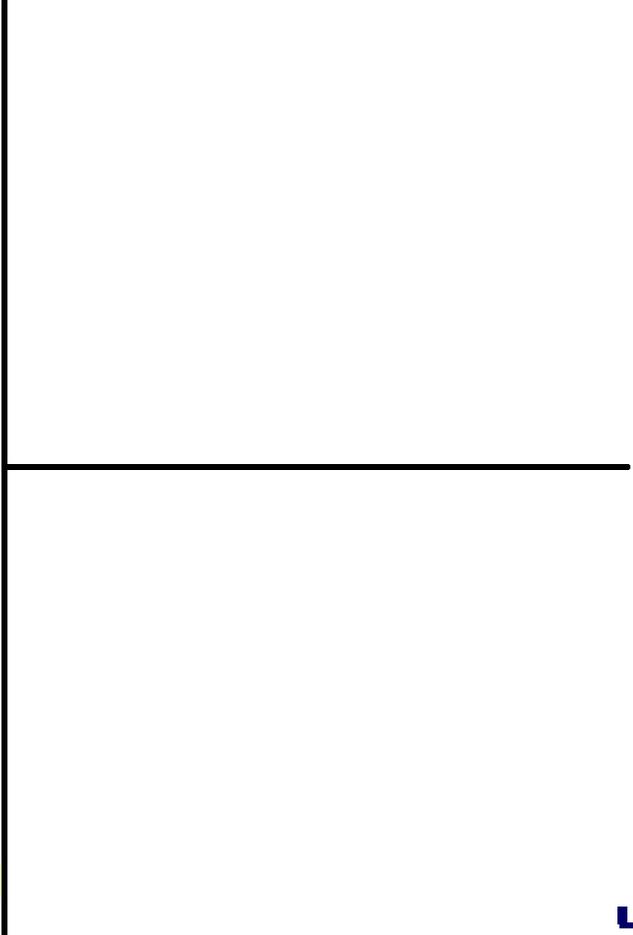
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## Experience Report

# Cutting Corners: Shortcuts in Model-Driven Web Design

Larry Constantine

Director of Research & Development  
Constantine & Lockwood, Ltd.

**Abstract:** *Model-driven design under the pressure of Web-time development and impossible deadlines may require taking shortcuts, especially in which design models are developed and how. This reprint of a column describes the approach to usage-centered design taken in one crunch-mode project for a Web-deployed classroom information system. Continual access to domain experts and speed modeling with index cards are among the techniques that helped.*

**Keywords:** crunch mode, Web time, agile methods, lightweight methods, usage-centered design, Web applications, model-driven design, just-in-time requirements, card-based modeling

Readers of this column do not have to be reminded of the benefits of working systematically. I have long been known as an advocate of systematic, model-driven design and development and have many times argued, in this Forum and elsewhere, that the greater the time pressure in software development, the greater is the need for thoughtful and thorough modeling. Such advice is, of course, far easier to give than to follow.

I recently completed with Lucy Lockwood one of those crunch-mode projects that tests the mettle of all involved. We were asked to design the user interface for a complex new web-based classroom application, defined by ambitious but profoundly vague requirements and being developed on a sanity-free delivery schedule that left no time for analysis, design, thinking, or sleep.

Seduced by the challenge and the opportunities to break new ground in supporting classroom teaching, we plunged in, determined to deliver a world-class design but fully realizing that there was not enough time to do the kind of thoughtful and comprehensive design models on which we have built our reputations. Had we known the full scope of the project and the void of the analysis before we signed on, we might

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Original of a column in The Management Forum, *Software Development*, February 2000. Reprinted in L. Constantine, ed., *Beyond Chaos: The Expert Edge in Managing Software Development* (Addison-Wesley, Boston, 2001). The author may be contacted at Constantine & Lockwood, Ltd., 58 Kathleen Circle, Rowley, MA 01969; tel: 1 (978) 948 5012; fax: 1 (978) 948 5036; email: [larry@foruse.com](mailto:larry@foruse.com) | [www.foruse.com](http://www.foruse.com) © 1999, L. L. Constantine

not have done it, but then we would have missed out on a lot of fun and would not have learned some new lessons in corner cutting.

We have long argued that projects of differing size and developed on various time scales require different development processes. One-size-fits-all, “unified” methods are likely to fail on one end of the spectrum or the other. Large-scale projects may require elaborate models, meticulous record keeping, repeated validation and auditing, and careful tracing of information, while smaller, accelerated projects may need streamlined, low-overhead approaches. Web-based projects, in particular, may require stripped-down, speeded-up methods to keep pace with the demands of the rapidly evolving Internet world. [See Dave Thomas, “Web-Time Development,” this column, October 1998.]

Everyone who has worked on one of those exciting, sleep-depriving, mission-impossible projects has felt the need to cut corners, but how far do you go? When does paring down on process leave only a bare-boned skeleton inadequate to support the needs of the project?

As the late Robert Heinlein so aptly expressed it in the classic novel, *The Moon is Harsh Mistress*, there ain't no such thing as a free lunch. Taking a shortcut always exacts a cost. Shortcutting a proven process means omitting or short-changing some productive activities, and the piper will be paid, if not now, then later.

The trick is to pick the tune and the price to pay the piper. Some shortcuts save time, while others can lead into swamplands, where backtracking can be far more costly than sticking to the straight and narrow of proper analysis and design.

## **Model Still**

Despite pressure to deliver designs, we decided at the outset not to abandon completely the modeling we knew would help us deliver a better product. Instead, we would simplify both the models and the modeling.

Most modern software engineering, and certainly nearly all disciplined development, is model-driven to some degree. In our work as user interface designers, we use three simple models to help us understand the needs of users and fit the design to those needs. We model user roles, user tasks, and user interface contents. Associated with each of these models is a map: a role map captures the relationships among user roles, a use case map represents relationships among supported tasks, and a content navigation map represents how all the pieces of the user interface fit together. You may use more or fewer models in your work, but the odds are you use some kind of models.

## **Required Requirements**

As the user roles for this application appeared to be neither many nor highly varied, we radically shortened the front-end modeling by constructing only a somewhat vague and admittedly inaccurate model of user roles. We were engaging in a sort of studied sloppiness, for which we knew there would be a cost, but we had little alternative. We gathered just enough information to get a good feel for the users and their ways of

working, then moved on to other matters. We never constructed a complete map of all the user roles and how they fit together.

In retrospect, this was an expensive compromise but worth the price. The heart of the matter is understanding the tasks of the users. A good user role model is a bridge to good task models and can speed up the identification of use cases in the task model, but under such tight time constraints, we concluded the payoff was not quite worth the price. Had we filled in all the blanks and crossed every tee in the role model, we might have had fewer false starts and moments of panic, but we would still not have a design.

Our advice would be to look at what models in your process serve primarily as bridges to other models rather than driving design directly. Consider cutting corners there and saving your resources for more critical steps.

## **Just in Case**

Use cases are ubiquitous in software development today, and one particular form—essential use cases—plays a pivotal role in our work. Essential use cases represent the minimal core of capability that the user interface must provide to users, thus they not only capture basic functional requirements but also help structure the user interface around the core tasks.

Those of you familiar with use cases know there are two pieces to the use case puzzle. You have to be able to list all the use cases, and you need to describe the nature of the interaction each use case represents. In other words, to understand fully the nature of the supported tasks, you need a use case map identifying all the use cases and their interrelationships, and you need an interaction narrative defining each use case. Or, in UML-speak, you need a use case diagram for the application and a flow of events for each use case.

When it came to cutting corners in the use case modeling, we drew on our experience with larger, more disciplined projects. On one such effort, we joked that after the first hundred use cases, everyone on the team had become an expert at writing use case narratives. You reach the point where, once a use case is identified, you can almost instantly draft a rough outline of the narrative. Only for some of the more involved or exotic use cases will the interaction details not be immediately obvious to the experienced modeler.

This ability, being able to spot the occasional tough nut among the more numerous soft candies without having to bite into either, suggests one way of cutting corners in use case modeling. If your team has enough experience in use case modeling, then you may be able to skip writing the interaction narratives for many of the use cases. As you identify each use case, you make a quick but informed judgment about whether it represents an interesting or subtle problem in user-system interaction or just more of the same fairly obvious stuff.

You end up with a long list of use cases, plus narratives for some of the more interesting ones. In a pinch, this can pass for an understanding of the tasks to be supported by the system. In retrospect, this shortcut did not work quite as well as it sounds, because in the course of modeling the process narratives, you often discover

additional use cases. Thus, the shortcut can leave you with an incomplete list of use cases, which can mean missing functionality in the system.

Were we to start over, we probably would still hand-wave on many of the simpler narratives, but would push much harder on developing a complete map of all the use cases and interrelationships. Without this comprehensive map, critical functions may be discovered only late in the process, which can cost big-time in redesign. Duh.

## **Face It**

A more successful tradeoff was substituting face-time for modeling. We were lucky to be collaborating with a team of educators who combined extensive classroom experience with advanced knowledge of theory and technique. Continuous and ready access to users and domain experts can allow designers to plug holes quickly, clarify issues on the fly, and catch mistaken notions early. It is never a recommended practice to plunge into design with incomplete requirements, but inadequate requirements models are less costly if you can simply walk across the hall to check out a design idea or talk over the cubicle wall to resolve the meaning of an ambiguous term.

Both end-users and domain experts are needed. Users are application ground-dwellers, intimately familiar with the ground covered in their jobs but relatively ignorant of important issues outside that scope. Domain experts are the hovering hawks of applications: they know the landscape as a whole but may see less of the practical details.

Easy access to users and domain experts allows requirements modeling to overlap parts of design and development. We call it “just-in-time requirements.” Where and when you need the answer to a question, you get it. In one case, a ten-minute, ad hoc conversation in the hall was enough for Lucy to pin down the requirements for two incomplete screen designs.

This game can only be played with the designers, users, and domain experts on the same playing field. If you have to play telephone tag or wait for email or schedule a meeting and drive across town to a client site, you are doomed. In fact, Lucy recognized at the beginning that the only hope for success was to work on-site, full-time with the client.

## **Navigating**

Normally, we prefer to build an abstract prototype before we get into the final visual and interaction design. An abstract prototype has two parts: the content model, which represents how the contents of the user interface are collected for use by users, and the navigation map, which shows how all the collections are interconnected. In our experience, abstract prototyping leads to more robust, more innovative designs [see my article, “Abstract Prototyping,” this magazine, October 1998]. On this project, we chose to take the more common route and go directly from use cases into designing the layout and behavior of the user interface.

Skipping both the content model and the navigation map proved to be a mistake, and we later needed to go back to complete the navigation map before we could finish the design. The problem is that, without a navigation map showing all the screens, pages,

windows, and dialogs and how they are interconnected, you have no overview of how everything fits together. Without this picture of the architecture, you make too many mistakes in placing particular features. Once we completed the navigation map and validated it with our users and domain experts, the design process got back up to speed.

## Prototypes

We also learned some lessons about using prototypes. Prototypes have many uses. At their best, they can serve as a proof-of-concept for a challenging approach or as the foundation for a sound architecture. At their worst, they can end up being shipped out as a hacked and patched substitute for a real product. In crunch-mode projects, prototypes can be a costly diversion of resources.

One problem is that prototypes are made to be thrown away, whether in whole or in part. There are reasonable arguments for building software to throw away [see Phillips, “Throw-Away Software,” this column, October 1999], but you do not want to do so unintentionally, certainly not when there is barely time to build one system.

Prototypes can allow you to get something working quickly, but don't be seduced into thinking that building prototypes will save you time. When you are caught in a time crunch, prototypes can become a major time sink. If you know what you are doing, time spent building a prototype is far better spent building the real thing. If you do not know what you are doing, building a prototype is one of the more expensive ways to find out.

Unfortunately, prototypes often serve purposes beyond software engineering. Many companies, especially start-ups, want a prototype to show off to investors and potential customers. There are many problems with such demonstration prototypes. For one thing, the better they look, the more they risk raising expectations—from customers and from management. Cobble together a slick, working VB prototype, and people will wonder why it will take months to finish the project. You may be pressured to “just clean up” the prototype and turn it into a shipping product, or you may have to explain why the prototype won't work with real data or in a networked environment.

In any case, all the time you spend putting together a demo or building a prototype is time you are not building the real thing. True, some portions of well-designed, well-constructed prototypes may be recyclable into shipped versions, but any prototype built in crunch mode is probably far too messy and fragile for much to be incorporated into the end product.

In the worse scenario, which is all too common, you not only lose time creating the prototype, but then you are expected to baby-sit it, keeping it up-to-date and ready to show to the next group of visitors being shown around.

Even paper prototypes can carry hidden costs. We use drawing tools to mock up visual designs for review, inspection, and documentation purposes. Of course, they also make great illustrations for reports, and can be turned into slides for presentations to management and ... The list goes on. You can find yourself providing and maintaining PR materials instead of solving design problems.

## **Teaming**

Our crunch-mode project also reinforced for us the value of good teamwork. On the front-end, we had Chris Gentile and his brilliant team of educators. On the back-end, we had Larry O'Brien and his crack engineering team responsible for the programming. We were fortunate to be working with people who could quickly spot the flaws and holes in our designs or just as quickly implement a major change. When you are five hours from deadline and up to your eyeballs in interface alligators, nothing can substitute for a few good developers and one good development manager.



## Selected Resources

### Books

- Ambler, S. 2002 *Agile Modeling: Effective Practices for Extreme Programming and the Unified Process*. New York: Wiley.
- Beck, K. 2000. *Extreme Programming Explained*, Reading, MA: Addison-Wesley.
- Cockburn, A. 2001 *Writing Effective Use Cases*. Boston: Addison-Wesley.
- Cockburn, A. 2002 *Agile Software Development*. Boston: Addison-Wesley.
- Cooper, A. (1999) *The Inmates are Running the Asylum: Why High Tech Products Drive Us Crazy and How to Restore the Sanity*. Indianapolis, IN: SAMS.
- Constantine, L. L. (2002) *The Peopleware Papers: Notes on the Human Side of Software*. Upper Saddle River, NJ: Prentice Hall.
- Constantine, L. L. and Lockwood, L. A. D. L. 1999. *Software for Use: A Practical Guide to the Models and Methods of Usage-Centered Design*, Reading, MA: Addison-Wesley.
- Jeffries, R., Anderson, A. Hendrickson, C. 2001 *Extreme Programming Installed*. Boston: Addison-Wesley.

### Web Links

Agile Alliance

[www.agilealliance.org/](http://www.agilealliance.org/)

Agile Modeling

[www.agilemodeling.com/](http://www.agilemodeling.com/)

Crystal

[www.crystallmethodologies.org/](http://www.crystallmethodologies.org/)

Extreme Modeling

[www.extrememodeling.org/](http://www.extrememodeling.org/)

Extreme Programming:

[www.xprogramming.com/](http://www.xprogramming.com/)

[www.extremeprogramming.org/](http://www.extremeprogramming.org/)

<http://groups.yahoo.com/group/extremeprogramming/>.

Usage-Centered Design:

[www.foruse.com/](http://www.foruse.com/)

<http://groups.yahoo.com/group/usage-centered/>