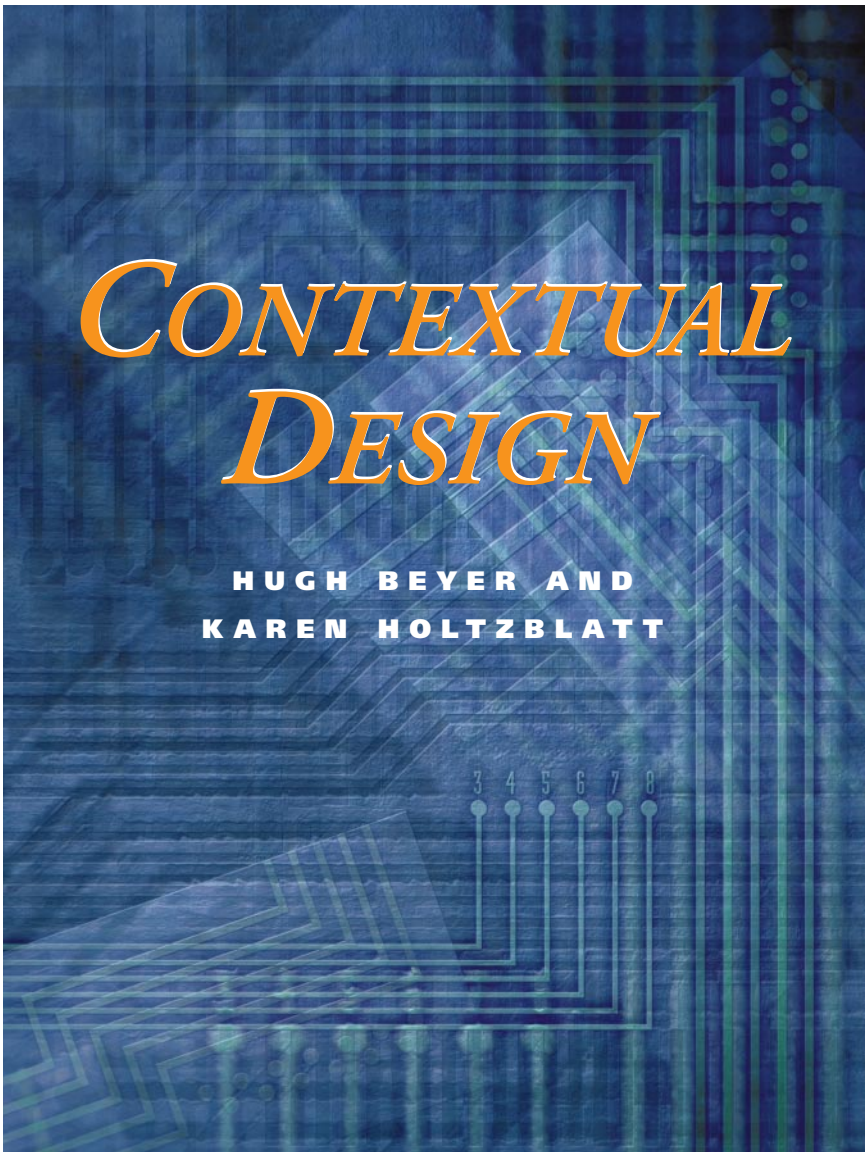

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Contextual Design is a state-of-the-art approach to designing products directly from a designer's understanding of how the customer works. Great product ideas come from the marriage of a designer's detailed understanding of a customer's need and his or her in-depth understanding of the possibilities introduced by technology. The best product designs result when the product's designers are involved in collecting and interpreting customer data and appreciate what real people need. Contextual Design gives designers the tools to do just that.

Contextual Design starts by recognizing that any system embodies a way of working. A system's function and structure force users to accept particular strategies, language, and work flow. Successful systems offer a way of working that customers want to adopt. Contextual Design is a method that helps a cross-functional team come to agreement on what their customers need and how to design a system for them.

According to the Contextual Design approach, data gathered from customers is the base criterion for deciding which needs to address, what the system should do, and how it should be structured. The process guides the design team in understanding and redesigning customers' work, using those decisions to help define computer systems to support them. By explicitly defining the work and the system, Contextual Design unifies design, marketing, delivery, and support in a coherent response to the customer. It gives a team activities focused on the customers and their work, rather than leaving team members to argue over personal opinion, anecdotes, or unverifiable claims about "what customers would like."

When a team begins work, it has to decide how to approach the task of deciding what to build. Design methods define a coherent series of actions that lead a team, we hope, to a well-designed system. But every problem is different, and every team and organizational system are different; any design method must accommodate specific needs. Because Contextual Design deals with the front end of design, from finding out who your customers are to testing a specific solution for them, it offers a useful framework for tailoring a design pro-

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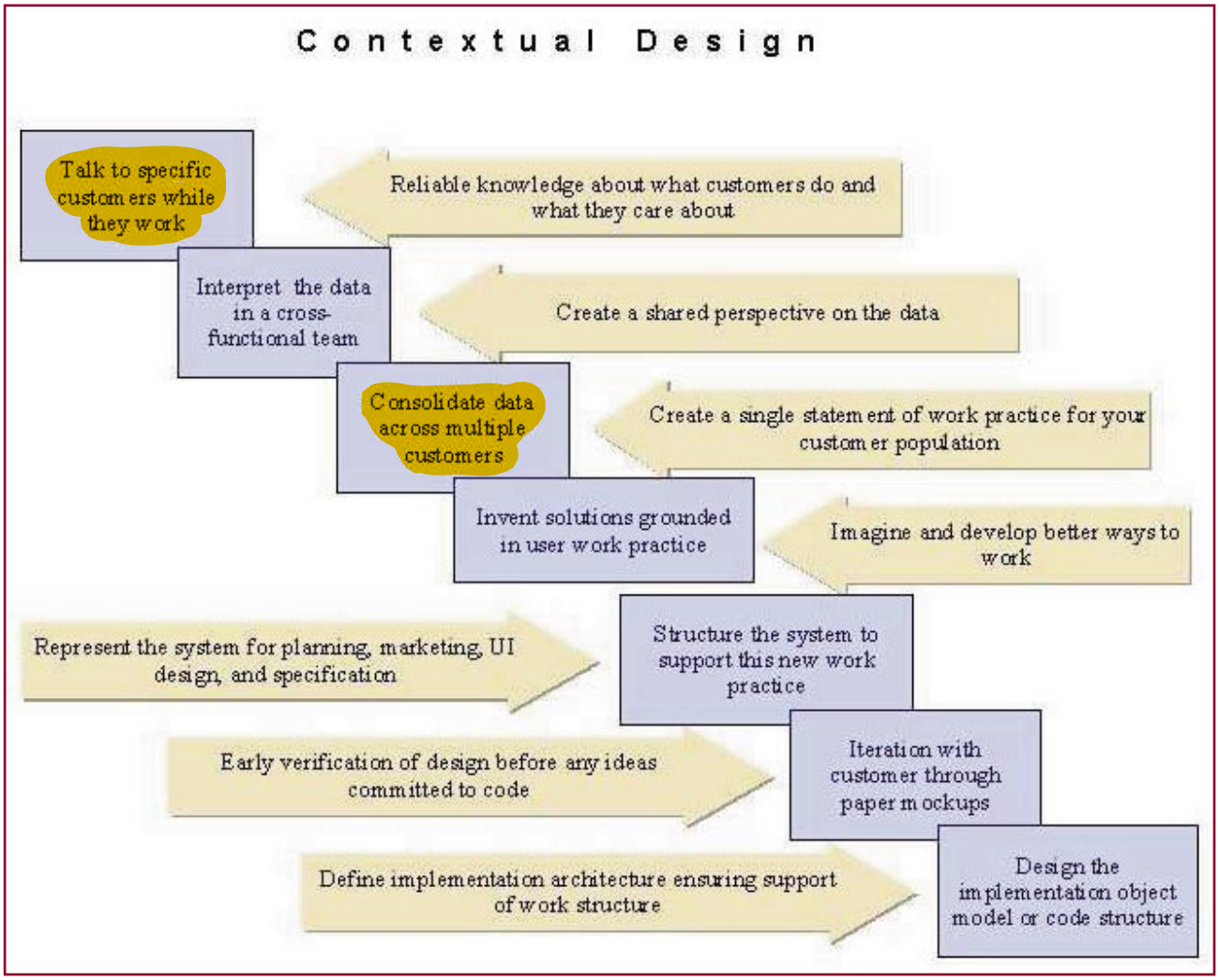


The Contextual Design process, showing the parts and where they fit.

cess. Individual steps can be shortened or omitted if they aren't applicable, or a step can be elaborated with additional techniques if it is important.

Every part of Contextual Design exists for a reason, either to further the design process, maintain a shared purpose and direction in the team, or help the design team coordinate with the larger organization. To change a process means having to understand how each part of the process fits and what problems it solves. Following is a summary of Contextual Design, with a description of the purpose of the part, the problem it solves, and how to get it adopted by your organization. The parts are as follows: Contextual Inquiry: Talk to individual customers in their workplace while they work; Work Modeling: Draw models representing the work of the customers you talk to; Consolidation: Create a single statement of the work practice of your market or organization; Work Redesign: Invent and develop better ways to work; User Environment Design: Represent the entire system for product planning, marketing, UI design, and specification; Mockup and Test with Customers: Test and iterate the design with customers using rough paper mockups.

Contextual Inquiry

- Reveals the details and motivations implicit in people's work
- Makes the customer and their work needs real to the designers
- Introduces customer data as the basis for making decisions
- Creates a shared understanding of the data throughout the team

The first problem for designers is to understand the customers: their needs, their desires, their approach to the work. Often the work has become so habitual to the people who do it that they often have difficulty articulating exactly what they do and why they do it.

Contextual inquiry is an explicit step for understanding who the customers really are and how they work day to day. The design team conducts one-on-one field interviews with customers in their workplace to discover what matters in the work. A contextual interviewer observes users as they work and asks about the users' actions step by step to understand their motivations and strategy. Through discussion, the interviewer and user develop a shared interpretation of the work.

Team interpretation sessions bring together a cross-functional team to hear the whole story of an interview and glean the insights and learning relevant to their design problem. An interpretation session lets everyone on the team bring his or her unique perspective to the data, sharing design, marketing, and business implications. Through these discussions, the team captures issues, draws work models, and develops a shared view of the customer whose data is being interpreted and their needs.

Changing the organization

Clients repeatedly tell us that the most significant thing we do is put the designer in

"When I was coding I was behind a mirror... but when I sat together with the user in front of the system, I felt like I was looking *through* the mirror and becoming aware that there was a human being on the other side."
— Contextual Design user

front of the user. The experience of sitting with the customer, seeing what she struggles with daily, forces the designer to change his perspective and appreciate what the issues are and why they matter.

Don't limit contact with the users to "user interaction" specialists—or usability professionals, or human factors experts. Make sure all the designers of the system—developers, marketers, program managers, and even *customers* (if you're developing an internal system and have customers on the team)—have a chance to conduct or assist with some interviews. It's much easier if all stakeholders have a chance to see the issues for themselves than to try to make them all believe *you.*

The quick hit

If you apply only one technique from Contextual Design, contextual inquiry should be the one. Decide on your focus: Are you interested in fixing UI glitches? Finding the 10 top show-stoppers before shipping? Interview four to six users on the particular part of the system you care about. Run an interpretation session with the designers of that part—take notes of key findings, but don't bother with work models—and report the results.

Looking for opportunities for new products? Conduct interviews with 15 to 20 users across the market you hope to address. The insights from your interpretation sessions will give you a starting point—but you'll probably want to see a better picture of your whole market, so draw work models of the customers you interview.

Work Modeling

- Provides a language for talking about work that can be shared across teams
- Shows structure of work and makes data from interview coherent
- Grounds the team conversation in explicit representations

People's work is complex and full of detail. It's also intangible—there's no good way to write down or talk about work practice. Design teams seldom have the critical skill of seeing the structure of work done by others, looking past the surface detail to see the intents, strategies, and motivations that control how work is done.

Work models show the work of individuals and organizations in diagrams. Five different models provide five perspectives on how work is done: (1) the *flow model* shows communication and coordination, (2) the *cultural model* shows culture and policy, (3) the *sequence model* shows the detailed steps performed to accomplish a task, (4) the *physical model* shows the physical environment as it supports the work, and (5) the *artifact model* shows how artifacts are used and structured in doing the work.

Changing the organization

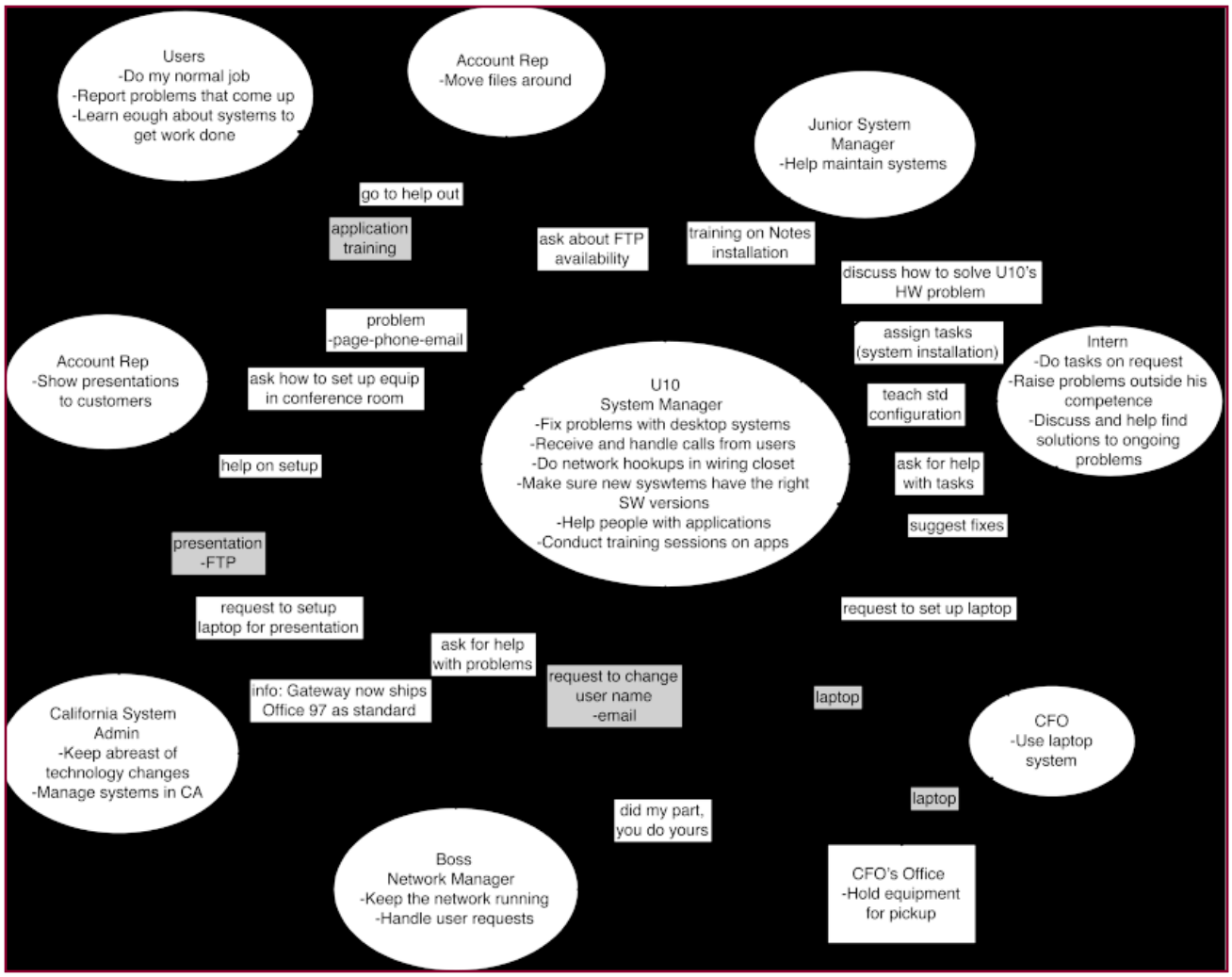
Work models are a convenient and compact way to represent a user's work. Being pictorial, they are easy to scan; they don't have to be *read,* like a scenario or trip summary. They'll help you communicate what you learned. If you've drawn work models during an interpretation session, you can use them to describe the customers' work to people who missed the session. Contextual Design teams depend on sharing work models to keep everyone informed on every interview. In the end, however, each team member has to design for the whole market—not just the customers *they* happened to visit.

Furthermore, work models help you take the next leap in understanding—from knowing the work of *individual* customers to understanding the fundamental structure of work for a whole *customer population.*

The quick hit

If you're focused on understanding a single task or designing a single piece of the system, start by drawing sequence and artifact models during the interpretation session. These models reveal how a task is structured and give immediate guidance on designing an interface to support the task.

If you're developing a new product, or looking for product opportunities, you want a deeper understanding of your market's overall work practice. Develop all the models—the flow, cultural, and physical models will be particularly important for seeing the big picture of how your customers' work fits together.



A flow model showing whom a user interacted with during the course of an interview.

Consolidation

- Provides a map of the customer population
- Makes sense of vast amounts of qualitative data quickly
- Identifies the needs of the customer
- Shows underlying structure of work across customers without losing variation
- Results in corporate data that can be reused by future projects

Systems are seldom designed for a single customer. But designing for a whole *customer population*—the market, department, or organization that will use the system—depends on seeing the common aspects of the work different people do.

Consolidation collects data from individual customer interviews so the team can see common patterns and structure without losing individual variation. The *affinity diagram* maps issues and insights across all customers into a wall-sized, hierarchical diagram to reveal the scope of the problem. *Consolidated work models* bring together each different type of work model separately to reveal common strategies and intents while retaining and organizing individual differences.

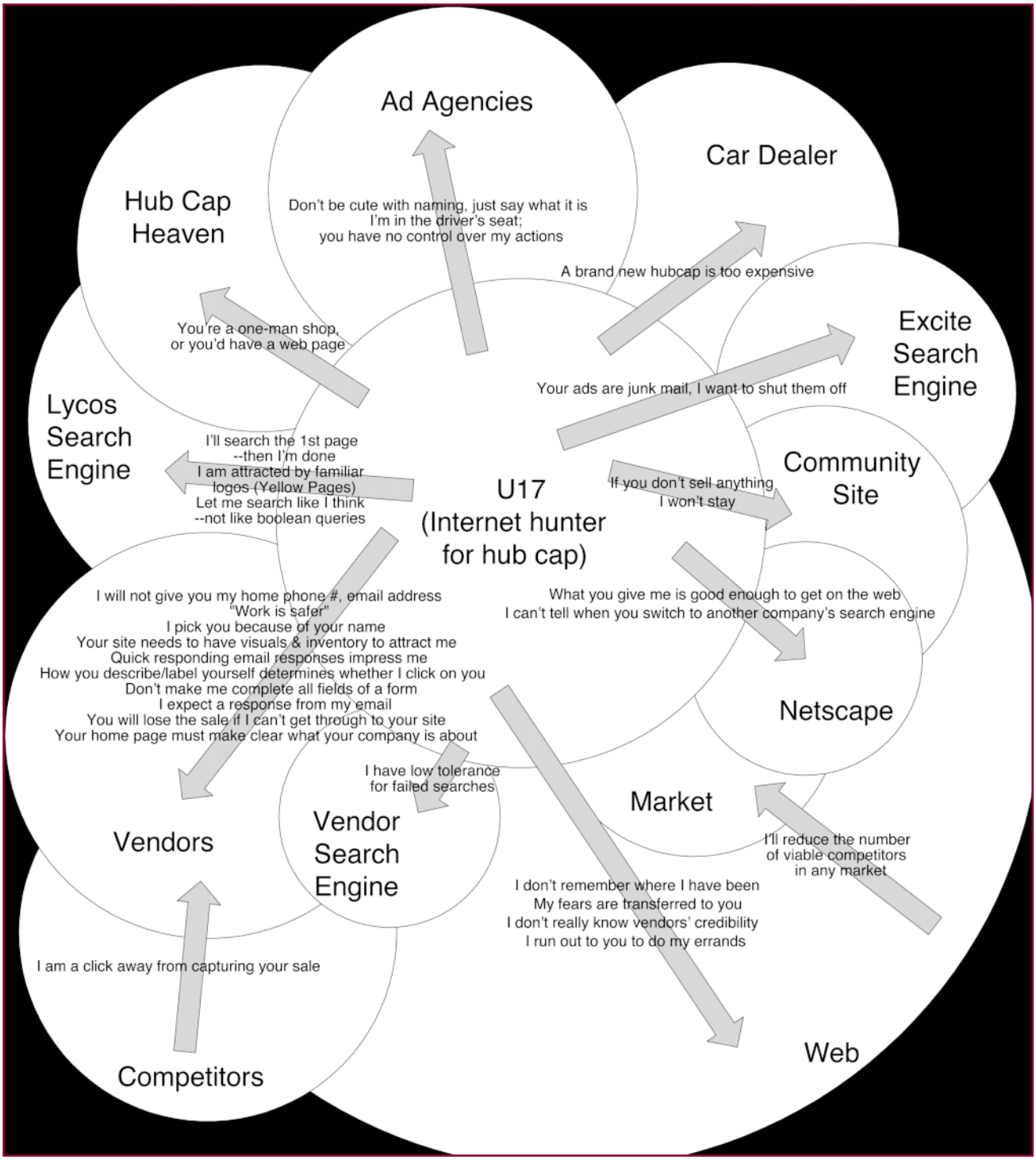
Together, the affinity diagram and consolidated work models produce a single picture of the customer population a design will address. They give the team a focus for the design conversation, showing how the work functions as a whole rather than breaking it up in lists. They show what matters in the work and guide the structuring of a coherent response, including system focus and features, business actions, and delivery mechanisms.

Changing the organization

An affinity diagram and set of consolidated models are a picture of your market, or of your internal customer population. They are a resource to be used and reused. People will come back to us years later to say that the data they collected are still guiding their design.

Take advantage of your consolidations by

- Publicizing them. Invite developers, marketers, and other project teams addressing the same population to peruse them. Create events in which another group reads and discusses



A cultural model showing the culture and policy constraining how work is done.

the implications of the models for them. Invite upper management to review the key points from the models and discuss the implications for product and business direction.

- Teaching people how to use the models. Clean them up for easy reading. Introduce them to people, describing the models themselves, what they say about your customer population, and the design implications they suggest.
- Putting the models on your intranet. These days, a 4' x 6' diagram on a wall is invisible; a picture on your internal Web site will attract interest from all over the company. Organize the site with a description of the project and the data, and give people a means of browsing it.

The quick hit

If you're looking to simply identify the primary issues in a domain, you may be satisfied with listing key points and making an affinity diagram. The affinity diagram will collect similar issues and show where you have problems.

If you're focused on a single task or piece of your system, building and consolidating sequence and artifact models show how that task is structured. Use these models as a guide for your design—build storyboards or scenarios from them, or move straight to paper prototypes, and if you are planning an object-oriented implementation, to use cases.

Pull information from the consolidated models to talk to other teams and management about what you discovered. Get the key points of a slide presentation from the affinity diagram or from issues you identified in a consolidated model. Identify and communicate the "three key strategies" or the "four central roles" for your product.

A Contextual Design team is truly immersed in customer data.

Work Redesign

- Focuses the team on improving work, not delivering technology
- Ensures that systems, business alliances, and services fit into the customers' overall work practice
- Collects and integrates ideas from the whole team

Any successful system improves its users' work practice. A design team's challenge is to invent and structure a system that will improve customers' work in ways they care about.

Work redesign brings the designers together to discuss the consolidated data and how technology can improve the work. This focuses the conversation on how technology helps people get their jobs done, rather than on what could be done with technology without considering the impact on people's real lives.

The redesigned work practice is portrayed in a *vision*, a story of how customers will do their work in the new world we invent. A vision includes the system, its delivery, and support structures to make the new work practice successful. The team develops the details of the vision in *storyboards*, "freeze-frame" sketches showing scenarios of how people will work with the new system.

Changing the organization

The vision itself is a high-level statement of what you intend your project to accomplish in its impact on the customer. The vision is a summary orienting a manager, developer, or new team member to your project. It will keep you focused on what matters to the customer, by showing your impact on their work. It's hard to argue with your vice president when he or she has fallen in love with some design solution—but if you have concrete customer data backing you up, you stand a better chance.

Different parts of the vision will be important to different groups. Even before you've started working on the details, marketing can develop market messages and business plans from the vision. Development can start investigating the underlying technology the vision depends on. Delivery and support have a heads-up on what will be expected of them. After the vision is formed, the different functions will start to pursue their separate issues in parallel.

Storyboards show how your proposed system will actually be *used*. Designers spin stories of use all the time—"first the user will do this, then they'll go here, then..." Storyboards show the conversation and make it concrete, giving your team an external artifact to represent the design conversation. It's a technique you can use anytime you're trying to sort out the details of a design.

The quick hit

Use visions to quickly come together on a shared direction. They distill your ideas and help you see how they can fit together. Once you have a vision, you can quickly order which parts to roll out first and who will have to do what to make it happen.

Storyboards act like scenarios, but also like high-level use cases, showing what happens when people interact with the system. Use them to think through the principal situations your system will have to support. Let them be the context for your initial UI design, and check the results against your consolidated sequences. When you make use cases, use your storyboards as a guide, and you'll be better tied to your customer.

User Environment Design

- Maintains coherence of the system from the user's point of view
- Captures the structure, function, and flow of the system
- Focuses the design team on what the system does, not the user interface or implementation
- Allows for planning and keeps team members focused on the whole system, not just their part

The new system must have the appropriate function and structure to support a natural flow of work through the system. Just as architects draw floor plans to see the structure and flow of a house, designers need to see the "floor plan" of their new system—hidden behind user interface drawings, implemented by an object model, and

responding to the customer work. This floor plan is typically not made explicit in the design process.

The *User Environment Design* (UED) shows the floor plan of the new system. It shows each part of the system, how it supports the user's work, exactly what function is available in that part, and how the user gets to and from other parts of the system—without tying this structure to any particular user interface.

Using an explicit User Environment Design, a team can make sure the structure is right for the user, plan how to introduce new features in a series of releases, and manage the work of the project across engineering teams. Using a diagram that focuses on keeping the system coherent for the user counterbalances the other forces that would sacrifice coherence for ease of implementation or delivery.

Changing the organization

Don't limit the User Environment Design to creating *new* systems. If you have usability problems with an existing system, creating a *reverse UED* for it can quickly reveal many structural problems. Use the reverse UED as a focus for follow-on contextual inquiries. If you're extending an existing system, the same sort of diagram will show you what you're starting with. It will help you keep the system coherent while extending it and will be an ally against feature creep.

The User Environment Design is also a good way to analyze competitive systems. It strips away the detail of a UI so that you can compare systems at a structural level. How well does your system compare in function? More important, does your competitor match the customers' work better than you do?

The quick hit

Use informal User Environment Designs to reveal the structure in current and proposed systems. Use it to help make sense of the huge spec sitting on your desk. Then show the result to the designers so they can see the structure of their proposal. Sketch small, informal User Environment Designs during design meetings to visualize your design discussions and keep avoid getting in the details of a UI. Address structural problems at this level and you'll have less to do when you get to the UI.

Mockup and Test with Customers

- Finds and fixes errors in the new design before any commitment to code
- Makes users a design partner in developing the new system
- Shortens arguments in the team through a quick way to resolve disagreements
- Keeps the team from arguing over user interface detail before the basic structure is right

Testing is an important part of any systems development. It's generally accepted that the sooner problems are found, the less it costs to fix them. So, it's important to test and iterate a design early, before anyone becomes invested in the design and before anyone spends time writing code. The simpler a testing process you have, the more you can do multiple iterations to work out the detailed design with your users.

Paper prototyping develops rough mockups of the system using Post-it® notes to represent windows, dialog boxes, buttons, and menus. The design team tests these prototypes with users in their workplace, replaying real work events in the proposed system. When the user discovers problems, they and the designers redesign the prototype together to fit their needs.

Rough paper prototypes of the system design test the structure of a User Environment Design and initial user interface ideas before anything is committed to code. If you've built a User Environment Design from customer data, your base structure should be good and you'll quickly be able to focus on the UI. Otherwise, you'll spend longer working out the base structure on paper.

Paper prototypes support continuous iteration of the new system, keeping it faithful to the users' needs. Refining the design with users gives designers a customer-centered way to resolve disagreements and work out the next layer of requirements. The team uses several paper prototype sessions to improve the system and drive detailed user interface design.

Changing the organization

Paper prototypes are always popular and always successful. They're quick to build and easy to run. You'll sometimes run into nervousness in your company—someone will be afraid they look like a kindergarten project, not like the product of a responsible organization—but these fears dissolve after the first few interviews. Customers love paper prototypes, because they give customers an opportunity to understand a new design and contribute to it.

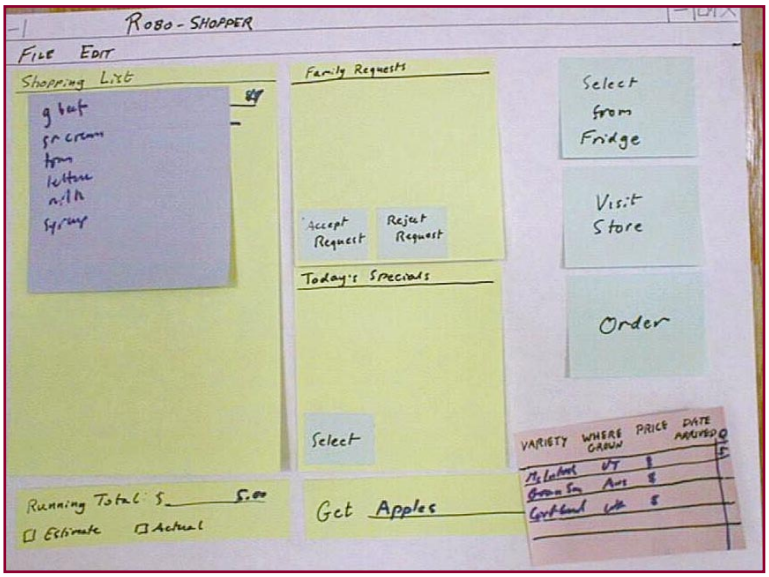
The quick hit

You can create a paper prototype at any time. Customer data-gathering, storyboarding, and User Environment Design save you time because they improve your first prototype. But if even you didn't do that work, mock up and test your design ideas anyway. If you're stuck arguing over design alternatives, mock them up and test them with users. You can prepare a decent mockup, run the interview, and interpret the results in 48 hours—surely more effective than rerunning the argument every week until you ship.

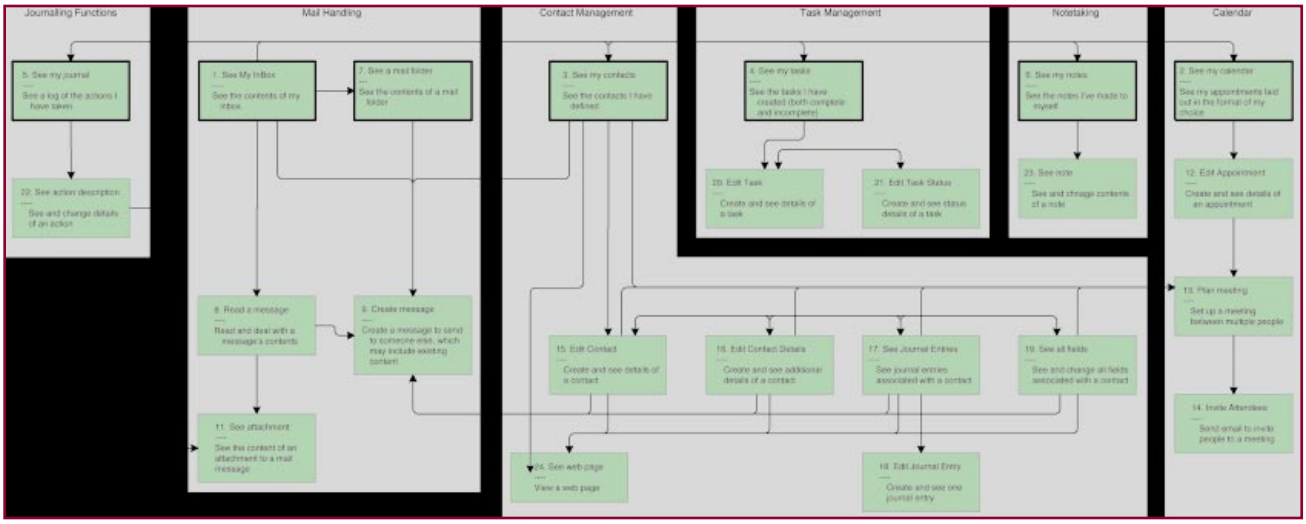
Then, when you've got the team in the habit of going to the customer to *test* their ideas, you can ease them into continuing the customer visits as they decide what to build in the next version.

After the primary Contextual Design process, a team moves into implementation. Many designs are too complex to deliver in a single release and need to be divided into a series of releases, each addressing a coherent task or role. You can use an ordering process based on the vision and the User Environment Design to decide what subset of the design will give them the most impact for the least effort. And when a team will be using an object-oriented implementation, you can create use cases and object models from the User Environment Design and storyboards.

Contextual Design works because it helps a team think about the design issues while handling the interpersonal problems that get in the way. Using concrete, customer-centered



A paper prototype for a shop-at-home system. The hand-drawn look encourages redesign during the interview.



A reverse User Environment Design for Microsoft Outlook 97 showing the underlying structure of the product.

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techniques leads to a team's shared, concrete understanding of the customers' work and the system's response. These techniques give a design team the chance to design a coherent system that works for customers and can be delivered by the organization.

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You've got a project, you want to get customer data for it, but you don't know where to start or how much of Contextual Design to use? Here are some quick guidelines.

FAST FEEDBACK **You're in field test. Your manager wants to know, "What are the 10 most important problems to fix before we ship?" Or you have a product in the field. You are asked, "What are the key usability problems in this part of the interface?"**	**Perform contextual inquiries with four to eight users at a minimum of four field test sites. Conduct interpretation sessions, capturing notes but no models. Create an affinity diagram to view the issues and write a report.**
Next Version **You're working on the next version of your product. You know you want to support a certain task better, or extend it to support a new task.**	**Interview 8 to 12 users playing two or three roles in all at four to six sites. Take notes during your interpretation sessions, as well as sequence, artifact, and physical models. Consolidate the sequence models to see the structure of the task. If they are interesting, consolidate the artifact models to see strategies and intents. Create a low-level vision and storyboard, showing details of the users' interaction with the system. Design the UI and test it with paper prototypes.**
New Product **You're designing a new product for a market.**	**Follow the whole process, including the affinity diagram and all models. If you lack the time, skip building a User Environment Design and go straight to UI design and paper prototypes.**
New Market **You're defining a product strategy for a market you've never addressed.**	**Follow the whole process using a vision. Conduct 15 to 20 interviews, covering as many different roles as you can—go for breadth, not depth, of understanding. End with a vision defining various products you *might* deliver. Analyze the vision to decide which products to pursue, and conduct another round of in-depth interviews to design them.**