

# **Designing Interactions**

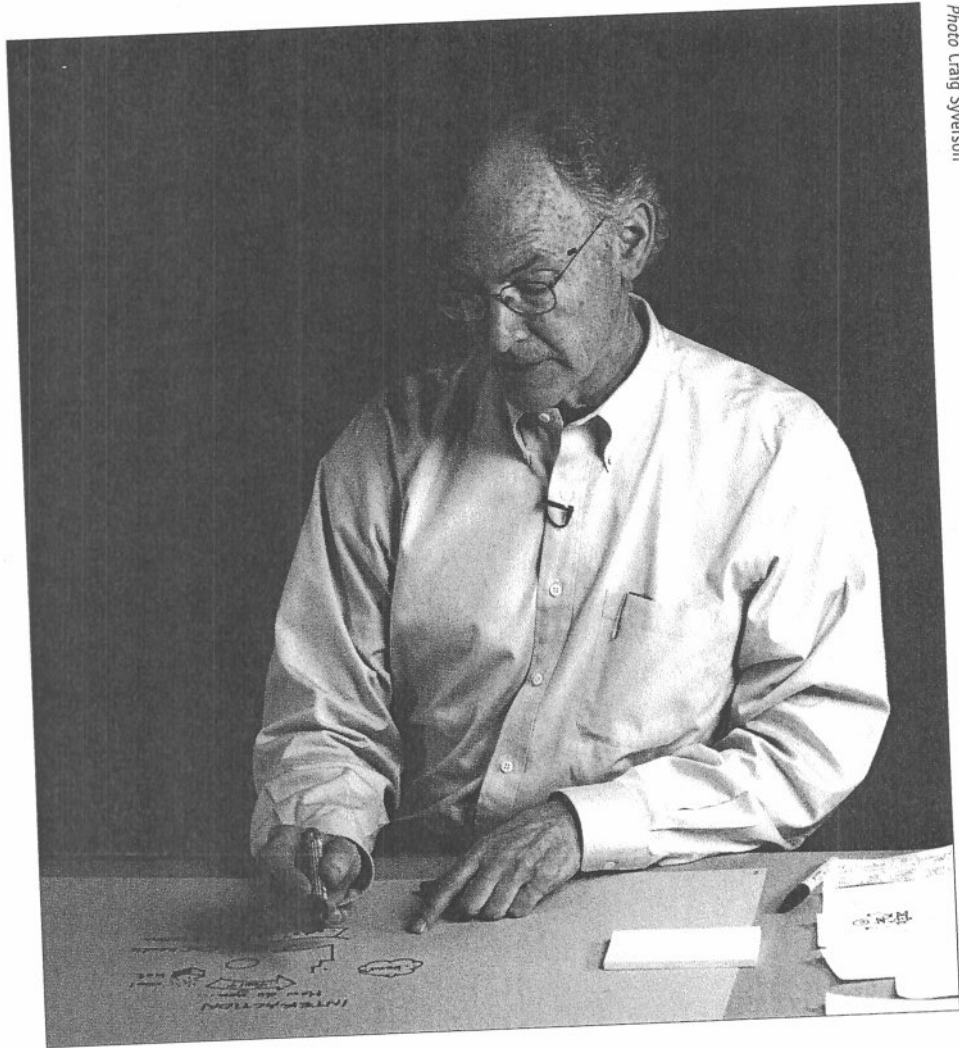
Bill Moggridge

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*Bill Verplank*

The MIT Press  
Cambridge, Massachusetts  
London, England

Photo Craig Syverson



Bill Verplank

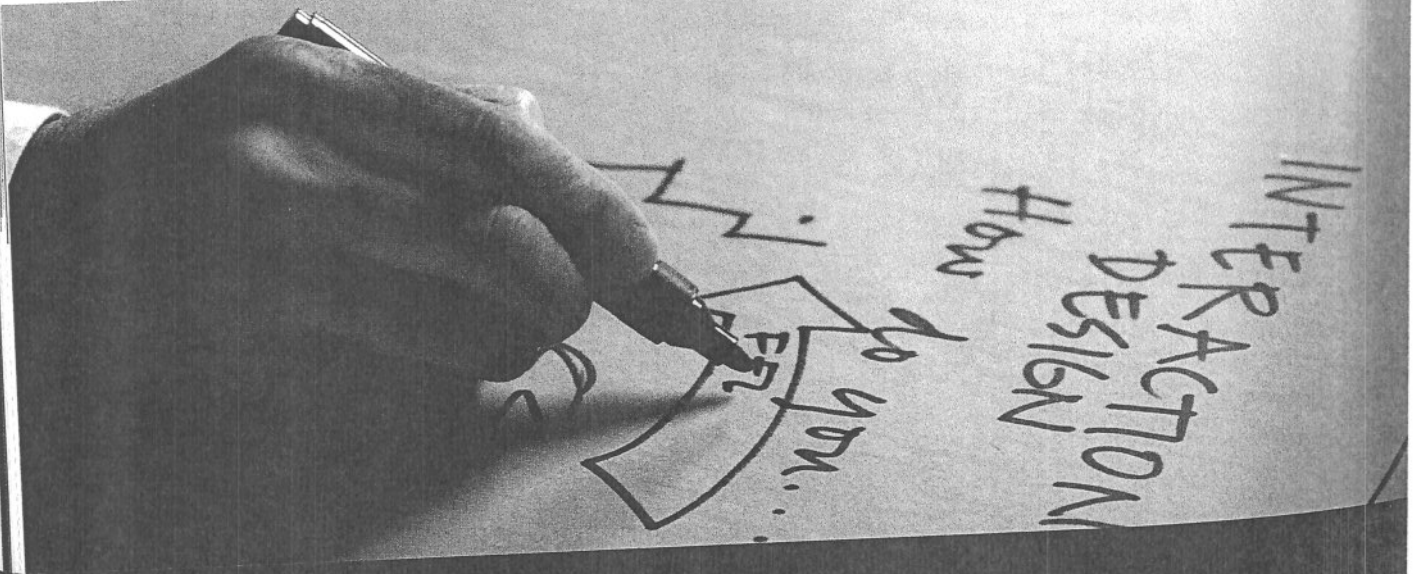
Bill Verplank has an amazing ability to draw at the same time as he talks. If you meet him and ask him a question about interaction design, you can sit at the nearest table or desk and be mesmerized by the fluency of his answer. His words are easy to understand, and as he talks he builds a beautiful diagram that reinforces what he is saying. You can take the drawing with you as a reminder and summary of his ideas about interaction design, which have evolved over many years. His PhD from MIT was in man-machine systems, applying information and control theory to measuring human operator workload in manual control tasks. At Xerox from 1978 to 1986 he participated in testing and refining the Xerox Star graphical user interface. From 1986 to 1992, he worked as a design consultant with the author to bring graphical user interfaces into the product design world. At Interval Research from 1992 to 2000 he directed Research & Design for Collaboration. He has helped to establish the Interaction Design Institute Ivrea and is now a visiting scholar in haptics in the Music Department at Stanford University. He summarizes interaction design by answering three questions about how you act, how you feel, and how you understand. He explains the context of the history and future of interaction design with paradigms that serve as patterns for the way people think about the subject. He describes the process of designing interactions with a concise diagram, and gives an example to illustrate it. He created the drawings that follow as he talked about his ideas during his interview.

## Bill Verplank

Bill says that the interaction designer has three questions to answer; they are all "How do you . . . ?" questions.

### INTERACTION

How do you...



## How Do You . . . ?

### 1. "How do you do?"

How do you affect the world? A human, a person that we are designing for, does something, and we provide affordances. We either present handles that they can continuously control, or we give them buttons for discrete control, pressing the button and giving up control to the machine. When you are designing the way people act, there is a choice between handles and buttons. You can grab hold of a handle and manipulate it, keeping control as you do it. Alternatively you can push a button, or click on one, delegating control to the machine.

### 2. "How do you feel?"

How do you get feedback? McLuhan made the distinction between what he called "fuzzy," or "cool," media, and "distinct," or "hot," media. Early TV was a cool medium, with its fuzzy images. Cool media draw you in. A book with careful printing or a gravestone with carved lettering is hot, or immutable—you cannot touch or change it. We design the way that the machine, or the system, gives feedback to the user, or the book looks to the user, or the sign communicates. That's where a lot of feelings come from; a lot of our emotions about the world come from the sensory qualities of those media that we present things with.

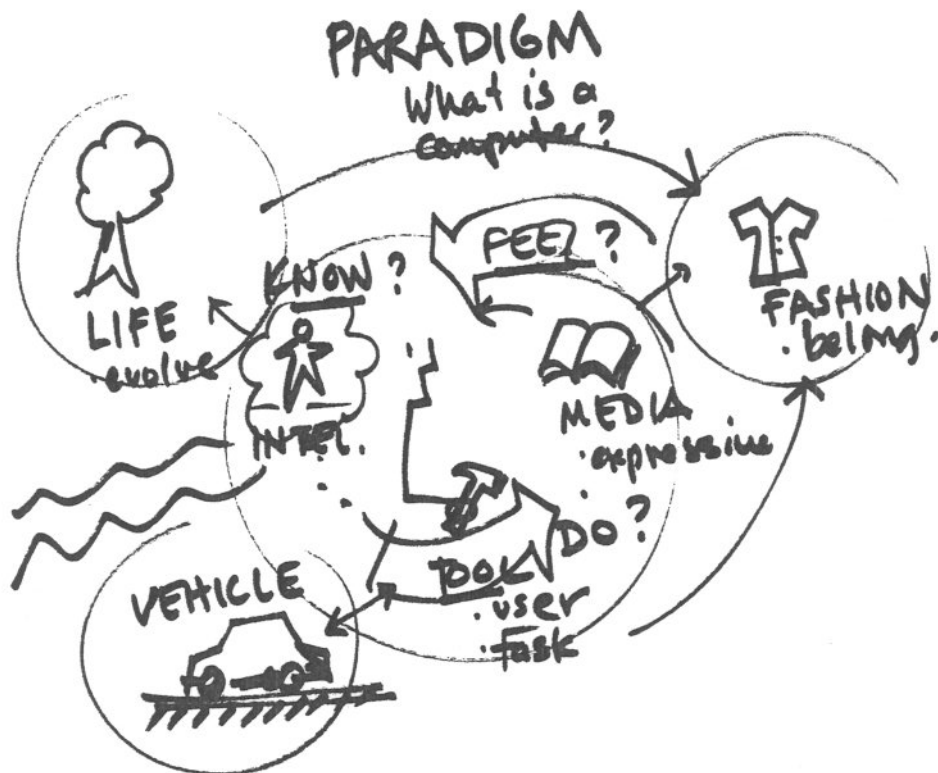
### 3. "How do you know?"

As we design products with computers in them, it is very difficult for a user to know exactly what they are going to do. A map gives the knowledge that you may need if you are designing complex systems. A path offers the kind of understanding that is more about skill and doing the right thing at the right moment. It is the responsibility of the designer to help people understand what is happening by showing them a map or a path. The map shows the user an overview of how everything works, and the path shows them what to do, what they need to know moment by moment.



# Interaction Design Paradigms

A PARADIGM is an example that serves as a pattern for the way people think about something. It is the set of questions that a particular community has decided are important. For interaction design there is often some confusion about what paradigm you are working with. The basic question is, What is a computer?



## Intelligence

In the early days, designers thought of computers as people and tried to develop them to become smart, intelligent, and autonomous. The word "smart" is one that we associate with this paradigm, expecting the machine or product to be smart and to know how to do things for the person who uses it.

## Tool

Doug Englebart, the inventor of the computer mouse, thought of the computer as a tool. Styles of interaction changed from dialogs, where we talk to a computer and a computer will talk back to us, to direct manipulation, where we grab the tool and use it directly. The ideas of efficiency and empowerment are related to this tool metaphor.

## Media

In the nineties, designers thought of computers as media, raising a new set of questions. How expressive is the medium? How compelling is the medium? Here we are not thinking so much about a user interacting with or manipulating the computer, but more about them looking at and browsing in the medium.

## Life

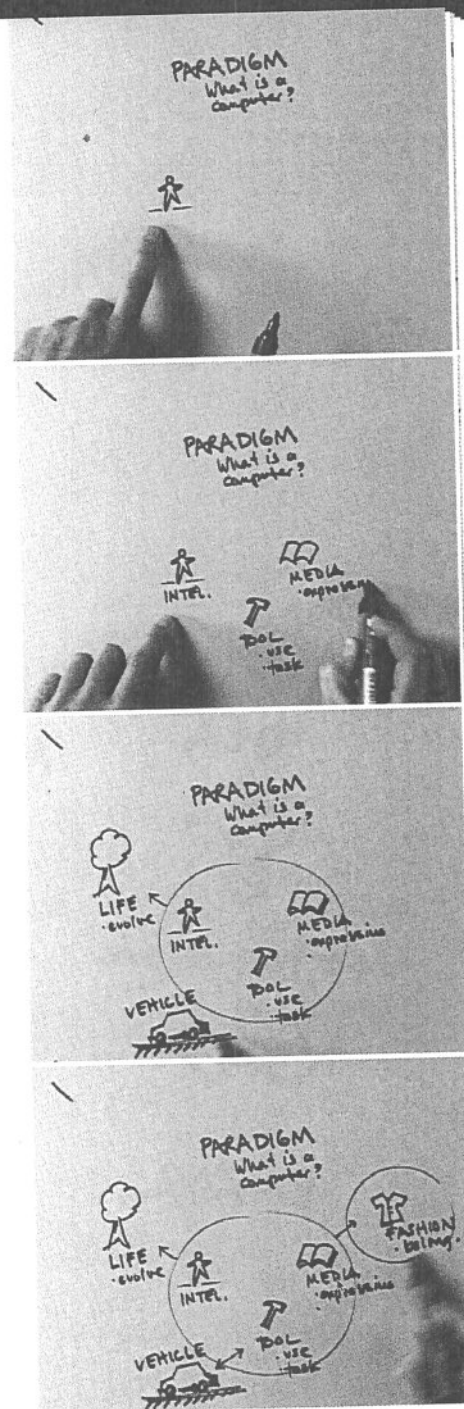
Starting in the mid nineties, people have been talking about computer viruses or computer evolution; they are thinking of artificial life. When the program has been written, it is capable of evolving over time—getting better and adapting. The programmer is in a way giving up responsibility, saying that the program is on its own.

## Vehicle

Another metaphor is the computer as vehicle, and we have to agree on the rules of the road. There has to be some kind of infrastructure that underlies all computer systems. People spend their careers determining the standards that will define the infrastructures, and hence the limitations and opportunities for design.

## Fashion

The media metaphor plays out to computers as fashion. A lot of products are fashion products. People want to be seen with the right computer on. They want to belong to the right in-crowd. Aesthetics can dominate in this world of fashion, as people move from one fashion to another, from one style of interaction to another style.



# Interaction Design Process

BILL VERPLANK SUGGESTS a four-step process. First, the designers are motivated by an error or inspired by an idea and decide what the ideal goal for the design should be. Next they find a metaphor that connects the motivation to the end goal and develop scenarios to help them create meaning. Then they work out step-by-step what the tasks are and find a conceptual model that ties them all together and clarifies the modes. Finally they decide what kind of display is needed, what the control are, and how to arrange them.





### 1. Motivation—errors or ideas

Design ought to start from understanding the problems that people are having, and also from ideals. A lot of people are motivated by problems that they see, breakdowns of one sort or another, errors that they observe. Another place that design starts is with ideas. These are the brilliant concepts, the ideals that we have for making the world wonderful.

### 2. Meaning—metaphors and scenarios

If you can tell a good story about something, or spin a good metaphor, it makes sense to people. This is where the meaning of the design comes from. A clear metaphor is the strange idea that connects two things; for example the cloud and the bolt of lightning, saying—Ah hah! This isn't a computer, it's a desktop! Along with the metaphor, we also need a variety of scenarios, to understand the context of Who is using it, Where are they, and What are they trying to accomplish?

### 3. Modes—models and tasks

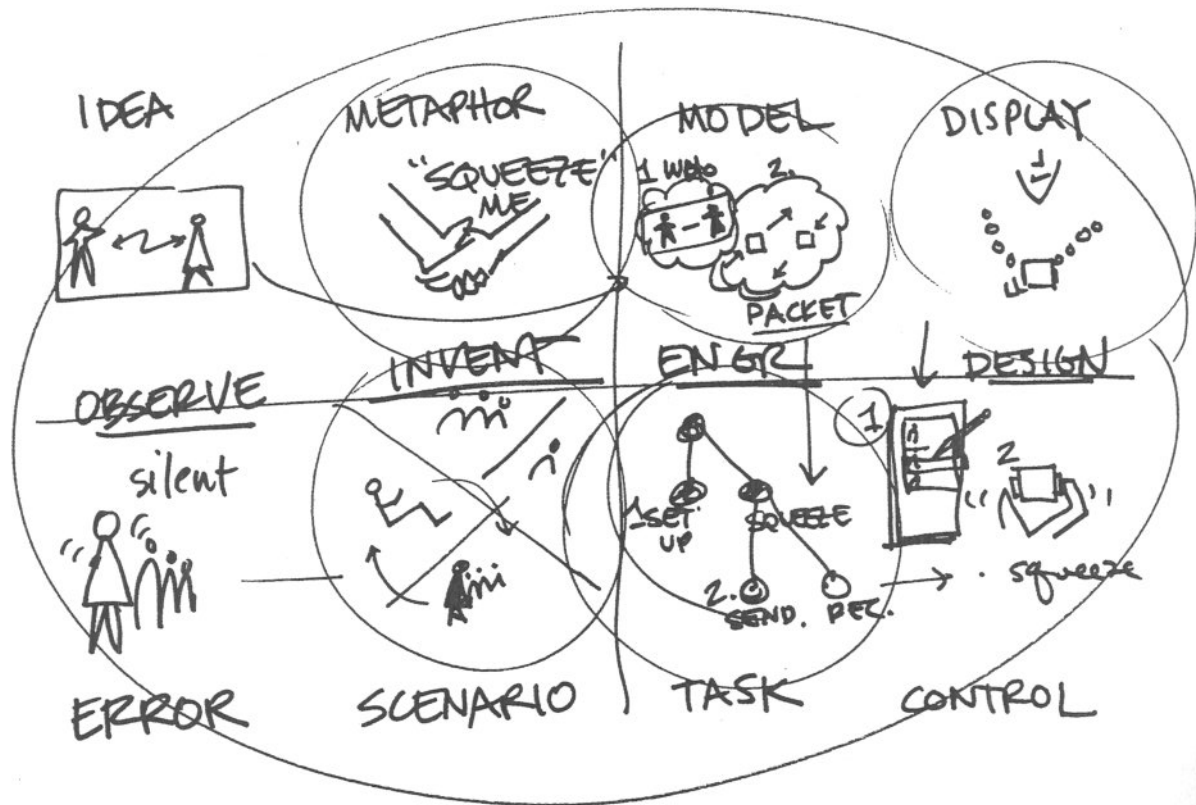
In order to create a conceptual model that users will understand, you have to have a clear picture of what they are thinking about. The mode that they are in depends on what the task is, and what they are trying to accomplish. How they can move from one mode or model to another, or from one environment to another, will then define the tasks. This is the conceptual cognitive science of understanding what the person doing the task needs to know

### 4. Mappings—displays and controls

Often, as an interaction designer, you design some kind of display and some controls. The display is the representation of things that you are manipulating. You need to be able to map the controls to the display. Those mappings can be really complicated with computers, as they can remap things in an instant, giving very strange powerful modes that can select everything or delete everything.

## Process Example, "A Haptic Pager"

BILL VERPLANK USES a story of the development of a tactile pager to illustrate the interaction design process. The example was created by one of the students at Stanford University, where Bill teaches. It shows the progress of the concept, going from error and idea to display and control, and how metaphor, model, scenario, and task are the core of that process.



### 1. Error and idea

Celine was annoyed by pagers and cell phones going off when she was waiting for the checkout at a supermarket—and embarrassed when her own went off. The problem that she wanted to solve was how to make a silent pager that she could feel without having to listen to it. Her ideal was that she and her friend could be linked, and whenever they wanted they could give each other a squeeze.

### 2. Metaphor and scenario

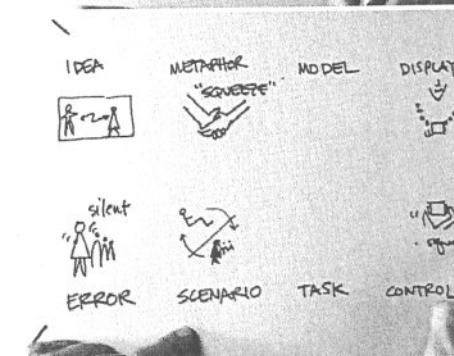
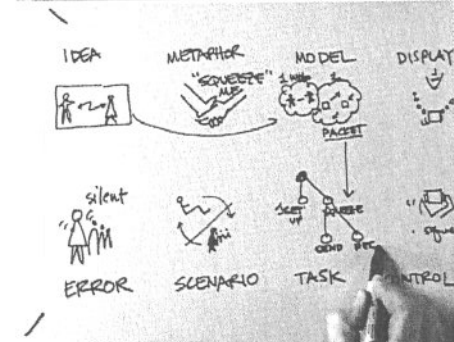
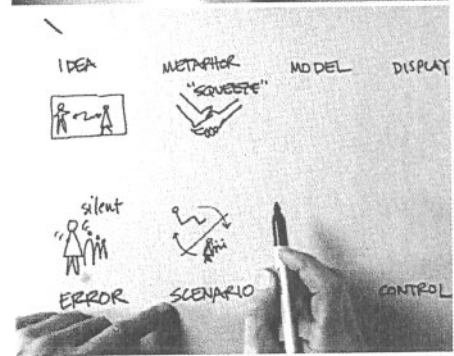
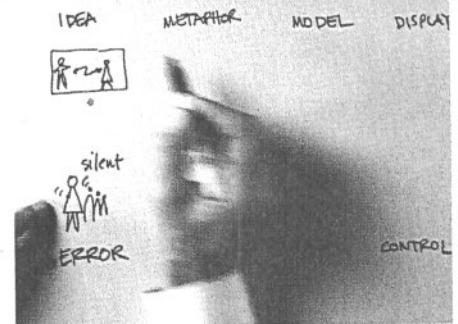
The metaphor is that she really wants something that is more like holding hands, so that she can hold hands at a distance and give a squeeze. She is thinking about a scenario that Fred is at home, and she is taking longer shopping than she had expected. She wants to be able to communicate without interrupting whatever he is doing.

### 3. Model and task

One conceptual model is that she is connected to him and no one else, so that when she squeezes, it is him that is going to feel it. Another is that when she sends off the squeeze, it is a packet, so she is not squeezing him at that moment. One task is to set up the connections, and another is to trigger the squeeze, both for sending and receiving.

### 4. Display and control

The idea for the display is that she could wear some kind of necklace that could vibrate, like the vibrating mode in pagers and cell phones, to let her know that someone is calling. The sending could be controlled by a squeeze. It turns out that Celine works for a company that makes a handheld computer operated by a stylus, so she uses this to set up the connection.



BILL VERPLANK HAS made connections among people of diverse backgrounds who are trying to understand how to design interactions. He shows his expertise in computer science, grasp of human factors issues, and ability to engage an audience—both with words and drawings—as he explains a concept. Bill helped to move the desktop toward the PC when he worked on the design of Xerox Star graphical user interface, and has helped designers in many different situations since then.

Cordell Ratzlaff,<sup>14</sup> whose interview follows, has been responsible for pushing the design of the operating systems for personal computers to the limits of progress to date. He has taken the desktop from close to the place that Bill Atkinson and Larry Tesler left it to Mac OS X, so far the most advanced graphical user interface there is.