ing this, great improvements will have been made. If we are all lucky, this section will be badly out of date. I hope so.

The Seven Stages of Action: Seven Fundamental Design Principles

The seven-stage model of the action cycle can be a valuable design tool, for it provides a basic checklist of questions to ask. In general, each stage of action requires its own special design strategies and, in turn, provides its own opportunity for disaster. Figure 2.7 summarizes the questions:

1. What do I want to accomplish?
2. What are the alternative action sequences?
3. What action can I do now?
4. How do I do it?
5. What happened?
6. What does it mean?
7. Is this okay? Have I accomplished my goal?

Anyone using a product should always be able to determine the answers to all seven questions. This puts the burden on the designer

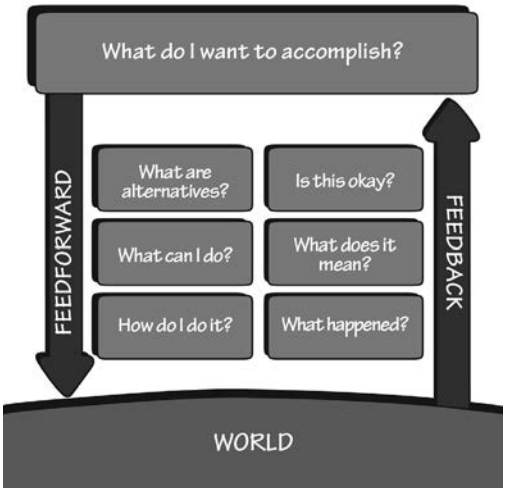

FIGURE 2.7. The Seven Stages of Action as Design Aids. Each of the seven stages indicates a place where the person using the system has a question. The seven questions pose seven design themes. How should the design convey the information required to answer the user's question? Through appropriate constraint and mappings, signifiers and conceptual models, feedback and visibility. The information that helps answer questions of execution (doing) is *feedforward*. The information that aids in understanding what has happened is *feedback*.

to ensure that at each stage, the product provides the information required to answer the question.

The information that helps answer questions of execution (doing) is *feedforward.* The information that aids in understanding what has happened is *feedback.* Everyone knows what feedback is. It helps you know what happened. But how do you know what you can do? That's the role of feedforward, a term borrowed from control theory.

Feedforward is accomplished through appropriate use of signifiers, constraints, and mappings. The conceptual model plays an important role. Feedback is accomplished through explicit information about the impact of the action. Once again, the conceptual model plays an important role.

Both feedback and feedforward need to be presented in a form that is readily interpreted by the people using the system. The presentation has to match how people view the goal they are trying to achieve and their expectations. Information must match human needs.

The insights from the seven stages of action lead us to seven fundamental principles of design:

1. **Discoverability.** It is possible to determine what actions are possible and the current state of the device.
2. **Feedback.** There is full and continuous information about the results of actions and the current state of the product or service. After an action has been executed, it is easy to determine the new state.
3. **Conceptual model.** The design projects all the information needed to create a good conceptual model of the system, leading to understanding and a feeling of control. The conceptual model enhances both discoverability and evaluation of results.
4. **Affordances.** The proper affordances exist to make the desired actions possible.
5. **Signifiers.** Effective use of signifiers ensures discoverability and that the feedback is well communicated and intelligible.
6. **Mappings.** The relationship between controls and their actions follows the principles of good mapping, enhanced as much as possible through spatial layout and temporal contiguity.

7. **Constraints.** Providing physical, logical, semantic, and cultural constraints guides actions and eases interpretation.

The next time you can't immediately figure out the shower control in a hotel room or have trouble using an unfamiliar television set or kitchen appliance, remember that the problem is in the design. Ask yourself where the problem lies. At which of the seven stages of action does it fail? Which design principles are deficient?

But it is easy to find fault: the key is to be able to do things better. Ask yourself how the difficulty came about. Realize that many different groups of people might have been involved, each of which might have had intelligent, sensible reasons for their actions. For example, a troublesome bathroom shower was designed by people who were unable to know how it would be installed, then the shower controls might have been selected by a building contractor to fit the home plans provided by yet another person. Finally, a plumber, who may not have had contact with any of the other people, did the installation. Where did the problems arise? It could have been at any one (or several) of these stages. The result may appear to be poor design, but it may actually arise from poor communication.

One of my self-imposed rules is, "Don't criticize unless you can do better." Try to understand how the faulty design might have occurred: try to determine how it could have been done otherwise. Thinking about the causes and possible fixes to bad design should make you better appreciate good design. So, the next time you come across a well-designed object, one that you can use smoothly and effortlessly on the first try, stop and examine it. Consider how well it masters the seven stages of action and the principles of design. Recognize that most of our interactions with products are actually interactions with a complex system: good design requires consideration of the entire system to ensure that the requirements, intentions, and desires at each stage are faithfully understood and respected at all the other stages.