EXPLORING REQUIREMENTS: QUALITY BEFORE DESIGN

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6 CONTEXT-FREE QUESTIONS

Now that there is a starting point and a working title, our next step in the project is invariably to ask some *context-free questions*. These are high-level questions that can be posed early in a project to obtain information about *global* properties of the design problem and potential solutions. Context-free questions are completely appropriate for any product to be designed, whether it's an automobile, airplane, ship, house, a jingle for a one-minute television commercial for chewing gum, a lifetime light bulb, or a trek in Nepal.

In terms of the decision tree, context-free questions help you decide which limb to climb, rather than which branch or twig. Because context-free questions are independent of the specific design task, they form a part of the designer's toolkit that can be used before getting involved in too many enticing details.

6.1 Context-Free Process Questions

Some context-free questions relate to the process of design, rather than the design product. Here are some typical context-free process questions, along with possible answers for the Elevator Information Device Project. To appreciate how these questions can always be asked, regardless of the product being developed, also try answering them for some current project of yours, like "Trekking in Nepal."

Q: *Who is the client for the Elevator Information Device?*
A: The client is the Special Products Division of HAL, the world's largest imaginary corporation.

Q: *What is a highly successful solution really worth to this client?*
A: A highly successful solution to the problem as stated would be worth $10 to $100 million in increased annual net profit for a period of five to ten years. The product should start earning revenue at this rate two years from now.

Q: (Ask this if the answer to the previous context-free question does not seem to justify the effort involved.) *What is the real reason for wanting to solve this problem?*

A: The Elevator Information Device Project is a pilot effort for a range of commercial (and possibly even home or personal) information transfer devices. If we can demonstrate success during development and early marketing phases, this project is expected to spawn an independent business unit with gross revenues in seven years of $2 billion per year.

Q: *Should we use a single design team, or more than one? Who should be on the team(s)?*

A: You may choose whatever team structure you desire, but include someone on the team who knows conventional elevator technology, and someone who understands building management.

Q: *How much time do we have for this project? What is the trade-off between time and value?*

A: We don't need the device before two years from now because we won't be ready to market it, but every year we delay after that will probably reduce our market share by half.

Q: *Where else can the solution to this design problem be obtained? Can we copy something that already exists?*

A: To our knowledge, nowhere. Although many solutions exist in the form of control and information display panels for elevators, the approach adopted here should exploit the latest in sensing, control, and information display and processing, so copying doesn't seem appropriate. We have no objection to your copying features that exist elsewhere, and you should be aware of what else has been done in the field, so you can surpass it.

6.2 Potential Impact of a Context-Free Question

Are context-free questions really worth such a fuss, and why do they need to be asked so early? Let's look at an extreme but real example of an answer to the second question, *"What is a highly successful solution really worth to this client?"*

At 3 A.M., a man in dirty jeans and cowboy boots showed up at the service bureau operation of a large computer manufacturer. Through the locked door, he asked if he could buy three hours' worth of computer time on their largest machine that night. The night-shift employees were about to turn him away when one of them said, "Well, it costs $800 an hour. Is it worth $2,400?"

"Absolutely," said the cowboy, who emphasized the urgency by pulling a large wad of $100 bills from his pocket and waving them at the employees on the other side of the glass door. They let him in, took his payment in cash, and let him run his job on the machine. It turned out that he owned a number of oil wells, and as a result of his computations, and especially the courteous treatment he received, he *bought* three of the giant machines, at a cost of some $10 million. If the employees had *assumed* the answer to the "What's it worth?" question based on his appearance, there would have been no sale (Figure 6-1).

Figure 6-1. A little manure on the boots may disturb city folks, but in requirements work, you learn not to mistake appearance for value.

6.3 Context-Free Product Questions

Some context-free questions relate to the design *product*, rather than the design process. Here are some typical context-free product questions, along with possible answers for our Elevator Information Device Project. Notice again how these questions can always be asked, regardless of the process or the particular product being developed.

Q: *What problems does this system solve?*
A: This system is to make riding an elevator enjoyable, safe, and informative. It is to enable riders to reach any desired destination in the building, and to assist riders in being prepared when they reach their destinations. It is to minimize all unlawful acts for which elevators are frequently used, including mugging, assault, robbery, and trespass, such as door-to-door magazine sales.

Q: *What problems could this system create?*

A: If we are not careful, the system could create an unusually heavy demand for elevator space by extra riders traveling for sheer pleasure, safety, and information. Also, when we provide critical information, we expose ourselves to possible litigation when the information is incorrect or misleading. Finally, the cost of producing elevators may grow as riders become ever more demanding of the quantity and quality of information.

Q: *What environment is this system likely to encounter?*

A: This system is to be installed in single-purpose buildings such as offices, apartments, and hotels, as well as multipurpose buildings, such as "total living" buildings that contain apartments, stores, offices, hospitals, and other services required for self-contained living. The system is to be installed in the usual passenger and freight elevators, and be operated by the same population that now operates such elevators.

The Elevator Information Device is also expected to be used on the elevators during construction of new buildings. At this time, only construction workers with appropriate credentials will be allowed to use the elevators. These credentials will, of course, vary from floor to floor as the construction progresses.

As the elevators may be subject to improper use, loading conditions will be monitored at all times and unsafe loads will trigger special actions and warnings.

Q: *What kind of precision is required or desired in the product?*

A: To the extent that this is an information device, and not a control device, the precision requirement is not severe. If the system gives misinformation no more than once in a hundred times, that would be acceptable, as long as people could recover from the error. On the other hand, some functions of the system are directly involved in public safety, and these must meet much more demanding precision requirements, perhaps fewer than one error in ten thousand interactions.

6.4 Metaquestions

A third broad category of context-free questions is metaquestions, or questions about questions. Here are some typical metaquestions, along with possible answers from the Elevator Information Device Project.

Q: *Am I asking you too many questions?*

A: It's fine so far, but I do have other work, so I'll let you know if I have to stop.

Q: *Do my questions seem relevant?*

A: Most of them.

(If the answer had been negative, follow up with the metaquestions: *Which ones? Why?* These questions invariably reveal major misconceptions.)

Q: *Are you the right person to answer these questions? Are your answers official?*

A: Yes, I'm the one who knows the most about this, but I do have to get my boss to sign off on anything before it's official. *(Be careful here. Many people will be reluctant to answer this one accurately. Do you always like to admit that you're not an authority or that you're not in charge?)*

Q: *In order to be sure that we understand each other, I've found that it helps me to have things in writing so I can study them at leisure. May I write down your answers and give you a written copy to study and approve?*

A: Actually, I'd prefer to write them and send them to you for approval. Is that all right? *(Again, this can be a sensitive question for some people. It's not important who writes things down, but somebody should do it, and the other party should check it to ensure clear communication.)*

Q: (Use this if your communication has been only in writing so far.) *The written material has been helpful, but I find that I understand some things better if I can discuss them face to face. Can we get together at some point, so we can know each other better and can clarify some of these points?*

A: Sure. How about lunch tomorrow, then we'll spend the afternoon in my office.

Q: *Is there anyone else who can give me useful answers?*

A: Tomorrow after lunch, I'll introduce you to a couple of specialists from my organization who may be able to give more details than I can on some points.

Q: *Is there someplace I can go to see the environment in which this product will be used?*

A: Our office building is actually a good example. Why don't we start there tomorrow, when you're here?

Q: *Is there anything else I should be asking you?*

A: Well, there are a lot of details still to be covered, but I assume you'll get to them later. *(This is a question you can ask at the end of every interaction.)*

Q: *Is there anything you want to ask me?*

A: I'd like to hear a little more about your company, and about your personal background, so I'll know better what I can assume you know and don't know. There may be other things, too. I'll think about it and get back to you. *(This is another question you can ask at the end of every interaction.)*

Q: *May I return or call you with more questions later, in case I don't cover everything this time?* (Figure 6-2)

A: Sure. Here's my phone number. Just don't expect to find me on Monday mornings or Friday afternoons. *(This is a question you should definitely ask at the end of every interaction.)*
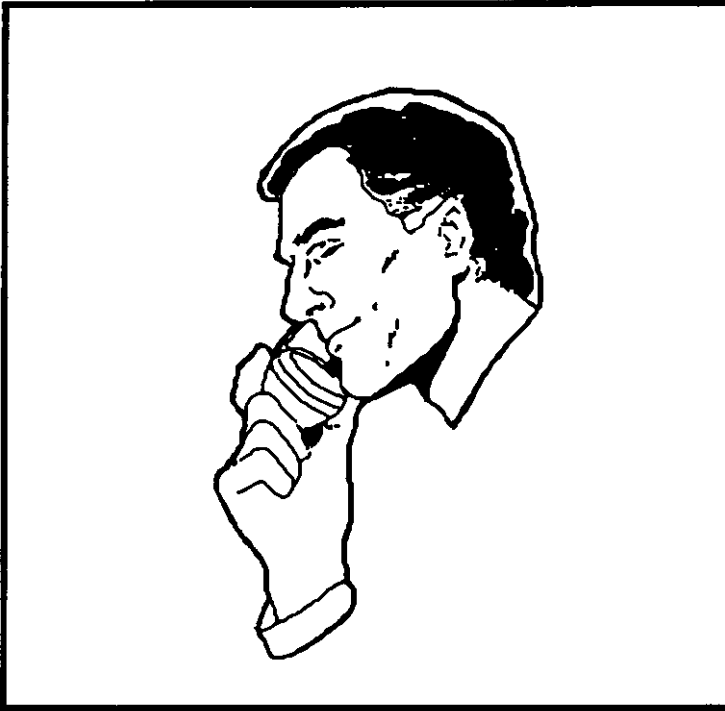
Figure 6-2. Perhaps the most important question is, "May I return or call you with more questions later, in case I don't cover everything this time?"

6.5 Advantages of Context-Free Questions

From examples of context-free questions, we can see how the answers have greatly increased our understanding of the Elevator Information Device Project, with only a small investment of effort. A great inherent advantage of context-free questions is that they can be prepared in advance, before much is known about the project. In addition, they help get over the awkwardness of starting a new project and new relationships.

Later on in the process, context-free questions focus attention on global issues concerning the product, as well as on issues in the design process itself. The answers to the metaquestions, in particular, help keep everyone on track in developing requirements. Metaquestions raise the kinds of issues that are most likely to be resolved implicitly, and thus ambiguously. In product areas with ancient histories, such as printing, home building, and highway construction, many metaquestions are answered by tradition. Unless we address these issues explicitly, we're likely to hear at the end of a project, "Oh, we thought you *knew* that. We always do it that way." (Figure 6-3)

Figure 6-3. Context-free questions will help you avoid hearing this: "Oh, we thought you knew that. We always do it that way."

6.6 Helpful Hints and Variations

- Here is a list of context-free process questions that we have found widely useful:
  Who is the client?
  What is a highly successful solution really worth to this client?
  What is the real reason for wanting to solve this problem?
  Should we use a single design team, or more than one?
  Who should be on the team(s)?
  How much time do we have for this project?
  What is your trade-off between time and value?
  Where else can the solution to this design problem be obtained?
  Can we copy something that already exists?

- Here is a list of useful context-free product questions:
  What problems does this product solve?
  What problems could this product create?
  What environment is this product likely to encounter?
  What kind of precision is required or desired in the product?

- The following metaquestions have been used with great success:
  Am I asking you too many questions?
  Do my questions seem relevant?
  Are you the right person to answer these questions?
  Are your answers official?

In order to be sure that we understand each other, I've found that it helps me to have things in writing where I can study them at leisure. May I write down your answers and give you a written copy to study and approve?

- Use this if your communication has been only in writing so far:
The written material has been helpful, but I find that I understand some things better if I can discuss them face to face. Can we get together at some point, so we can know each other better and can clarify some of these points?
Is there anyone else who can give me useful answers?
Is there someplace I can go to see the environment in which this product will be used?

- The following metaquestions should be asked at the end of every interaction:
Is there anything else I should be asking you?
Is there anything you would like to ask me?
May I return or call you with more questions later, in case I don't cover everything this time?

- Context-free questions can tease out essential information about the most subtle assumptions. You may easily miss important information that comes in the form of nonverbal reactions such as hesitations, puzzled or delighted looks, amusement, anger, and changes in posture. Whenever possible, use two people to conduct the context-free questioning, one to ask and one to observe and note nonverbal reactions. The observer can ask metaquestions of the type:
I notice that you hesitated a long time before answering that question. Is there something else we should know?

- Context-free questions often reveal conflicting assumptions among various interested parties. Because you have prepared the questions in advance, you can more easily compare replies, and you should always do so. Then you can ask:
When I asked X about that, she said Y. Do you have any idea why she might have said Y?

- An easy way to compare replies is to interview two or more people at the same time. If they have differences in their assumptions, you may see a clear reaction. Then you can ask the following metaquestion:
I notice that you don't seem to agree with that reply. Would you tell us about that?

- When interviewing two or more people together, however, be on the alert for one person's answers inhibiting another's. Such inhibitions are going to haunt you as you proceed through the project, so you may want to take this early opportunity to ask:
Are you comfortable with the process right now?
Is there any reason you don't feel you can answer freely?

Of course, if they don't feel comfortable, they may also not feel comfortable *saying* they're not comfortable. If you sense that this situation may exist, try asking the previous questions in private, of each participant.

- All of this leads to another group of tough metaquestions that are critical, but that cannot always be asked directly:
  What can you tell me about the other people on this project?
  How do you feel about the other people working with us on this project?
  Is there anybody we need on this project whom we don't have?
  Is there anybody we have on this project whom we don't need?

  If a direct approach is not suitable, handle such questions not by asking them, but by looking for their answers buried in the answers to other questions. When someone mentions another person, make a note of the context and, possibly, ask,
  Can you tell me more about that person?

6.7 Summary

Why?
Context-free questions force you to look at the global issues in the design process, to put you on the right limb, rather than out on a limb. Since they are appropriate for any design project, they can be prepared in advance and used from one project to another.

When?
Context-free questions are used very early in the requirements process, before specific decisions get locked in.

How?
Follow this procedure:

1. Once an atmosphere of trust and rapport has been established, explain that you want to ask some very general and searching questions. Explain the importance of this type of question, and be sure you get agreement on the value of the process at this time.

2. Some people have trouble understanding why such general questions are useful. If necessary, go very slowly. Ask one question, explore the answers thoroughly, then explain how the information you obtained was useful to you.

Who?
Context-free questions are particularly useful with people who have broad knowledge of the present product or future requirements, knowledge that they may not realize they possess, or think is important.