Communicating the Priority of Problems Discovered During a Product Evaluation

Heather L. McQuaid, David Bishop
MAYA Design, Inc.
USA
mcquaid@maya.com

Although usability practioners are experts at finding usability problems with products, in many cases, they aren't the ones who actually make the recommended improvements—that responsibility usually falls to the product development team. Consequently, it's important that practioners' recommendations are communicated to the product team in a way that addresses both the product team's concerns (cost, schedule, and resource constraints) and the users' concerns (efficiency, effectiveness, and satisfaction). As part of our expert analysis method, we've developed guidelines for prioritizing problems that account for both sets of concerns. Our five-step method integrates user research, heuristic evaluation, affinity diagramming, cost-benefit charts, and recommendations into a report that produces a clear and immediately executable plan of attack for the product team.

BACKGROUND

Our company is an interdisciplinary design consultancy and technology research lab that helps companies develop products that are functional, aesthetic and easy to use. We use a team-based approach to design (Ballay, 1994), creating teams that include at least one member from each of our core disciplines, or groups: Human Sciences (Human Factors and Cognitive Psychology), Engineering (Software, Electrical, and Mechanical), and Design (Visual and Industrial). As part of our design process, we often evaluate existing products.

One cost-effective method we use to evaluate products is an expert analysis. In an expert analysis, a team of experts (usability specialists) evaluates a product looking for negative and positive interactions. We've found, in the past 10 years of conducting these analyses, that our five-step method can be applied or adapted to virtually any product, including consumer electronics, office machines, and software and web-based applications.

OUR METHOD

Our method integrates user research, heuristic evaluation, affinity diagramming, cost-benefit charts, and recommendations into a report that produces a clear and immediately executable plan of attack for the product team.

Our method consists of five steps (McQuaid & Bishop, 2001):

1. Gather domain knowledge.
2. Evaluate the product (usually a heuristic evaluation).
3. Categorize the issues.
4. Prioritize the categories according to how important it is to fix them (from the users' perspective) and how difficult it is to fix them (from the developers' perspective).
5. Write the report, including recommendations for solving the problems.

On the surface, there is nothing particularly groundbreaking about our method—we've simply combined well-known techniques into a sequence of repeatable steps. There are, however, several notable differences between our method and other methods. Some differences, such as how we integrate and implement the knowledge gained from the research phase (step 1) into the evaluation (step 2) are rather subtle. What distinguishes our method most is step 4—prioritize the problems, which we discuss in more depth later in the paper.

Step 1: Gather Domain Knowledge

We document the business goals, analyze competitors' products, and observe and interview users using techniques such as contextual inquiry (Beyer & Holtzblatt, 1998) and task analysis (Hackos & Redish, 1998; Lewis & Rieman, 1993), then organize the information using techniques such as task flows, personas (Cooper, 1999), and scenarios. This step

has the greatest variability in duration. If we have only limited access to customers and domain knowledge, it may take us a few hours. In contrast, if we're able to conduct more in-depth customer research, we may spend a few weeks.

Step 2: Evaluate the Product

For most products, we conduct a heuristic evaluation (Nielsen, 1994)—a technique that allows usability specialists to use a list of heuristics, or guidelines, to evaluate products at virtually any point in the design process. However, any number of techniques could be used in this step, including usability testing, interviews, walkthroughs, and surveys.

When conducting an evaluation, we assemble a team of evaluators that includes not only members of the Human Sciences Group, but also at least one member from our Engineering and Design Groups. We've found that including members from other disciplines enhances the quality of the evaluation as each person approaches the product with a different perspective and finds problems related to his or her core discipline. Moreover, if the people who evaluated the product are also the ones who will recommend improvements, participating in the evaluation gives them first-hand experience with the product and allows them to begin formulating solutions to the problems.

For most products, we spend between four and eight hours per person conducting the heuristic evaluations. If we're conducting usability tests, it may take us several days or a few weeks, depending on the nature of the evaluation.

Step 3: Categorize the Problems

Because the number of problems identified during the evaluation can be rather large (typically between 100 and 200), we use affinity diagramming to group the problems into manageable categories. Affinity diagramming is a technique that allows people to organize a large number of issues into categories based on each issue's affinity with, or similarity to, other issues. This technique enables us to see patterns in the problems—which problems tend to group together and which seem unrelated. These patterns, in turn, give us a more integrated view of the problem space. Instead of focusing narrowly on each individual problem, we can expand our focus and get a high-level view of all the problem areas. In general we spend about half a day creating an affinity diagram.

Examples of categories. Some examples of the kinds of categories that could be generated include:

1. Facilitate Users' Tasks
2. Support Users' Mental Model
3. Convey Strong Sense of Place
4. Lay Out Information Logically
5. Provide Clear Cues and Instructions
6. Correct Errors
7. Provide Feedback
8. Provide Consistent Controls
9. Ensure Visual Design/Branding Are Appropriate
10. Provide Clear Language

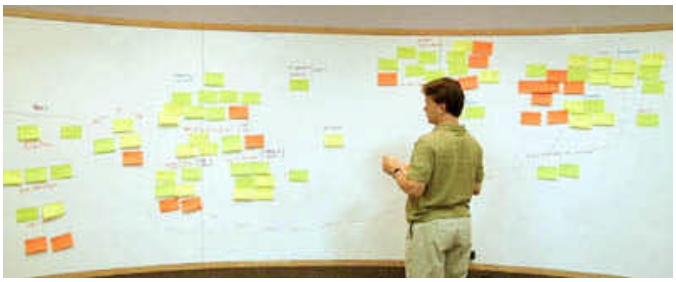

Figure 1: An evaluator examines an affinity diagram

Step 4: Prioritize the Categories

Once the problems are grouped into categories, we're ready to prioritize them. There are four primary ways in which our prioritization scheme differs from other schemes:

- We consider two dimensions when prioritizing problems: importance-to-fix (from the users' perspective) and difficulty-to-fix (from the designers' and developers' perspectives).
- We attempt to take into account the needs of all the primary stakeholders, including business, marketing, and sales (Fadden & McQuaid, 2003; Karat, 1994).
- We prioritize groups, or categories of problems, not individual problems.
- We construct a diagram, called a cost-benefit chart, that communicates the design tradeoffs to the stakeholders—the people who decide what gets fixed or built, and what doesn't.

Importance. To prioritize usability categories according to importance (how important it is from the users' perspective to fix the problems), we consider such issues as the degree to which problems:

- Interfere with users' ability to accomplish critical tasks
- Interfere with their ability to learn (form a mental model

of) the system
- Contribute to their feelings of frustration
- Contribute to a negative perception of the product

Categories that are rated as more important are placed higher on the importance list (see the example category list on the previous page).

Difficulty. To prioritize usability categories according to difficulty (how difficult it is from the product team's perspective to fix the problems), we consider such issues as the degree to which:
- The problems are pervasive
- The product team has resources to fix the problems
- More research is needed
- Major structuring is needed

Another factor that influences the difficulty in getting problems fixed is the degree to which the key stakeholders are committed to making improvements. Consequently, if we've identified the key stakeholder groups (such as corporate, marketing, and sales) and have some insight into their needs, we may also prioritize usability categories according to the degree to which the:
- Key corporate stakeholders are interested in fixing them
- Key marketing stakeholders are interested in fixing them
- Key sales stakeholders are interested in fixing them

Cost-Benefit chart. Once we've ranked the categories according to importance and difficulty, we can place them on a Cost-Benefit Chart (see Figure 2). The x-axis (horizontal) represents Importance (or benefit)—how important it is to fix the categories from the users' perspective, that is, how much benefit users will experience if the problems are fixed. It is meant to be viewed as a continuum from lesser importance (!) to greater importance (!!).

The y-axis (vertical) represents Difficulty (or cost)—how much time, effort, and cost the client must expend to fix the problem. Likewise, it is meant to be viewed as a continuum from lesser difficulty ($) to greater difficulty ($$).

By mapping both Importance and Difficulty, the Cost-Benefit Chart essentially depicts the Return on Investment (ROI) associated with addressing each category of issues. To further emphasize the ROI principle, we have divided the chart into four cells, or quadrants, which we've labeled:
- High-value—contains very important issues that require less effort to fix (greatest ROI)
- Strategic—contains very important issues that require more effort to fix
- Targeted—contains less important issues that require less effort to fix
- Luxuries—contains less important issues that require more effort to fix (lowest ROI)

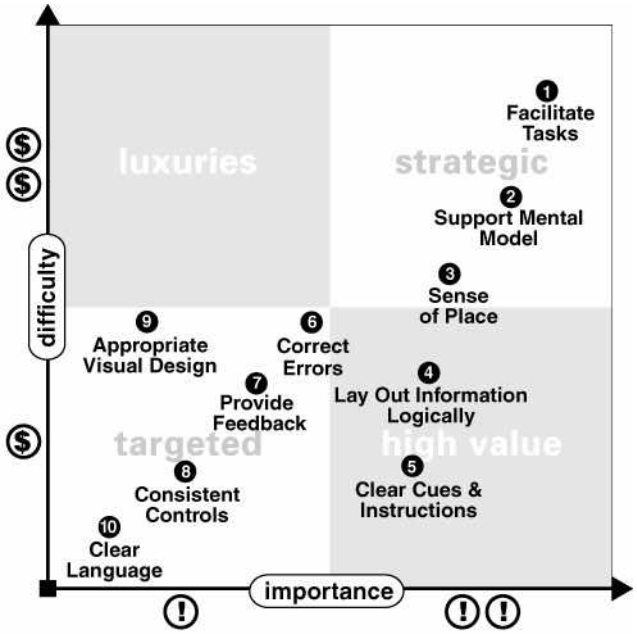

Figure 2: An example of cost-benefit chart

Because members of the product team cannot solve all the problems simultaneously, we advise them to use the Cost-Benefit Chart to plan the order in which they should attack the problems. We recommend that they start with categories in the high-value quadrant. These categories represent the "low hanging fruit"—important problems that can be fixed relatively easily. In other words, these are the problems that, if fixed, would have the greatest ROI.

Next, we recommend that the product team address the categories in the strategic and targeted quadrants. The problems in the strategic quadrant may require structured rethinking, or significant redesign of a product. For example, the problems in the "Facilitate Tasks" category may require more research on what users' tasks are and how those tasks could be streamlined. In contrast to strategic issues, targeted issues may have solutions that are easier to envision and implement. For example, if the problems in the "Clear Language" category relate to the use of jargon and unfamiliar

terminology, the unfamiliar terminology should be replaced with more common words or phrases. We recommend that clients address the categories in the luxuries category last, since they represent the lowest ROI.

It's important to note that the chart suggests only a plan of attack—the product development team may want to move issues up or down the Difficulty axis depending on their insider knowledge of budgetary or technical constraints. In general, we spend 1-2 hours prioritizing issues.

Similarity to other methods. Our technique of classifying problems by difficulty and importance shares some similarities with other methods, most notably Quality Functional Deployment (QFD) and its "Voice of Customer" and "Voice of Company" steps, which when combined with a number of other steps, result in a "House of Quality" (HOQ) matrix (Hauser & Clausing, 1988). However, unlike the detailed and rigorous QFD method, our method is meant to be an efficient and economical way to communicate design priorities to the product team. Some of the main criticisms of QFD are that it is time-consuming, tedious, and requires trained facilitators to lead many group sessions (Katz, 2001). In contrast, our method can usually be completed in about a week (including a formal report), depending on how much time we spend gathering domain knowledge.

Step 5: Write the Recommendations Report

After we've categorized and prioritized the problems, we generate recommendations for fixing them. To help the product team understand problems with specific interactions, we include pictures of the product with comments overlaid.

CONCLUSIONS

Without the influence of the user-advocates, the decision-makers may prioritize design changes based solely on the difficulty of implementing changes, with little regard for the users' needs. Because the prioritization techniques discussed in this paper take into account both the users' needs and the difficulty associated with fixing problems, it will help usability professionals communicate more effectively with decision-makers about usability problems and solutions.

REFERENCES

Ballay, J. (1994). Designing Workscape: An Interdisciplinary Experience, in Proceedings of CHI'94, Boston, MA, April, ACM Press, 10-15.

Beyer, H., and Holtzblatt, K. (1998). Contextual Design: Defining Customer-Centered Systems. Morgan Kaufmann Publishers, Inc., San Francisco CA.

Cooper, A. (1999). The Inmates are Running the Asylum. SAMS, a division of Macmillan Computer Publishing, Indianapolis IN.

Fadden, S., and McQuaid, H. M. (2003). Fixing What Matters: Accounting for Organizational Priorities When Communicating Usability Problems, in Proceedings of UPA 2003, Scottsdale, AZ.

Hackos, J. T., and Redish, J. C. (1998). User and Task Analysis for Interface Design. John Wiley & Sons, Inc.

Hauser, J. R., and Clausing, D. (1988). The House of Quality, Harvard Business Review, 32 (5), 63-73.

Karat, C. A Comparison of User Interface Evaluation Methods. In Nielsen, J., and Mack, R.L. (Eds.). (1994), Usability Inspection Methods. John Wiley & Sons, New York NY.

Katz, G. M. (2001). After QFD: Now What?, PDMA Visions Magazine.

Lewis, C., and Rieman, J. (1993, 1994). Task-centered User Interface Design: A Practical Introduction. Available at: http://hcibib.org/tcuid/

McQuaid, H. L., and Bishop, D. (2001). An Integrated Method for Evaluating Interfaces, in Proceedings of UPA 2001, Las Vegas, NV.

Nielsen, J. Heuristic evaluation. In Nielsen, J., and Mack, R.L. (Eds.). (1994), Usability Inspection Methods. John Wiley & Sons, New York NY

Rosenfeld, L., and Morville, P. (1998). Information Architecture for the World Wide Web. O'Reilly & Associates, Inc., Sebastopol CA