Chapter 3: ANALYZE YOUR NEEDS AND THOSE OF THE USERS

What Is Needs Analysis?

A needs analysis is an investigation. When you conduct a needs analysis, you collect the evidence you need to answer two big and equally important questions about your Web site:

1. What do you and the other people in your organization (the stakeholders), want from the people who will use your Web site?
2. What will the users of your Web site want and need from it?

The answers to these questions define the major purpose of your site, and a clearly defined purpose will help you decide what the content of your site should be. A clearly defined purpose will also guide you as you make decisions during the design process.

Why Conduct a Needs Analysis?

Without concrete evidence gathered from users and stakeholders, you may complete the design of a site only to find that no one is happy with it because their wants and needs were different than your assumptions. Your site may satisfy the users and not the stakeholders, or the stakeholders and not the users – or it may not satisfy anyone at all. And struggling through the design process without being sure what your organization and your users expect is simply no fun.

It's easy to assume that users will want the same things from your site that you do, and that they will want to do what you want them to do. You have their best interests in mind – no one wants to make a boring, unhelpful, or inconvenient Web site. Unfortunately, since you are not your user, you can't be sure that your idea of what the users want and need is the same as theirs. Even if you think you already know what your users want and need, you have to investigate your target population by getting their input.

It's also easy to assume that you and the other people in your organization (the stakeholders) know what you want from the users – and that you agree on what you want. Unfortunately, you can't be sure that all the stakeholders want the same things you do, or that every stakeholder has given much detailed thought to how the site will enhance the relationship between your organization and the people it serves. The only way to find out is to ask.
What Should Already Be Done Before the Needs Analysis?

Your Team Should Be Together

It's really hard, though not impossible, to develop a Web site all by yourself. Some people have done this, but their sites are either small or they are spending every waking moment working on them. More likely than not, you'll want to have a team. It's usually more fun that way, and likely to be more effective since some team members will have special talents and skills -- such as interviewing users, analyzing data, designing Web pages, coding HTML files for pages, and creating good-looking and functional graphics.

Your Resources Should Be Identified and Accessible

By this time you've convinced your boss or colleagues that building a Web site is worth the effort. Soon after the needs analysis and early prototyping are done you'll need computer equipment and software, people with a few special skills, and space on a Web server for your site. For now you need time and a place where your team can meet to share the information they'll be collecting, and you need access to the people who can answer the questions your team is getting ready to ask.

How Is a Needs Analysis Conducted?

Agree on the Goals for the Web Site

You know you want people to visit your Web site, but what do you expect them to read, look at, or do when they get there? Your goals should be specific, which means that you should be able to say about your users:

- who they are,
- what they will be doing (actions), and
- under what conditions they will be performing these actions.

In addition to describing your goals from the users' point of view, describe for each goal the outcome or benefit you expect for the users and the stakeholders. Don't spend too long debating each item at this point – you'll find out very soon whether your expectations are realistic or not.

Identify Your Audience

Since the statement of your goals depends on describing who will be using the site, you must identify your audience. This step usually happens in parallel with the last one, but it can be tricky so we'll discuss it in some detail.
Deciding who the users are for your site can be challenging when the World Wide Web is so—well, world wide. It can be especially challenging when a group of people, all of whom have different opinions and interests, are designing a site together. Your team should list all the people who might use the site if the goals you are developing were actually being met.

Give this list some detail beyond simply listing job titles or one-word characterizations of audience members. How old are they? What is their educational level? How much do they know or not know about your organization already? Will they use your site because they want to or have to, or will they need to be coaxed? Later on you'll use this information to identify the people who will help you test your site.

Identify the Primary, Secondary, and Incidental Users Within Your Audience

The list of potential users you create for your organization's Web site will probably be so long that you'll wonder how you'll have time to interview all these "representative" users, let alone how you'll find them. The next step is to categorize the list based on some key characteristics, so that you can work with several user profiles instead of many individual descriptions.

Primary, Secondary and Incidental Users

Sort this initial list into primary users, secondary users and incidental users. Primary users are the ones without whom your site doesn't have a purpose. If these people never show up, all your work will have been in vain. Secondary users are the "important but not critical" users; you may be successful if some, but not all, of them show up, or you may be successful even if no one in a particular category shows up. Even so, you want these people to visit the site, so you place them in the secondary category. Incidental users are the ones it would be nice to have, but who won't affect the success of the site if they don't show up at all.

It sounds easy to make this classification once you're finished, but determining the difference between a primary and secondary user is not always easy. Encourage your team to remember that:

- the primary users are the ones for whom the site must work,
- the secondary users are the ones for whom you make some compromises as long as the compromises do not impinge too much on the primary users, and
- the incidental users shouldn't bother you too much one way or the other.

Identify the Stakeholders

A 'stakeholder' is anyone who has a vested interest in how the Web site is designed, how it performs, and how it is maintained once it exists. Stakeholders can include:

- administrators,
- clients,
- managers,
designers,
technical specialists,
consultants (for the Web site),
information providers (anyone who will be responsible for contributing content to the site), and
users who might visit the Web site.

Less visible stakeholders can include:

- maintenance personnel,
- members of the organization at large (who are affected by the image that the site projects), and
- people and organizations who are contacted as a result of the site's existence (responses to e-mail or forms, those who are "found" because their information appears in the site).

All users are stakeholders, but not all stakeholders are users. Some stakeholders may not visit the site until after you've given your presentation to unveil it, and even then they may not become regular visitors. If such stakeholders are not part of your primary audience you may not need to worry that they aren't visiting the site frequently, but you do need to know what their goals are for the site and you do need to inform them about the site's development as you proceed.

Find out What the Users and the Stakeholders Need, and How They Are Meeting Those Needs Now

Start your investigation with the primary users of your proposed site, and with the information providers – the people who will be expected to contribute content to the site when it is up and running. Find out how users get their information now, what kinds of information they have trouble getting, and what they like about the way they get information. Find out from the information providers what they are being asked for now and how they supply the information.

Expect some confusion

You may find it difficult at first to convince your organization, or even your team, that you really want to talk to these people, or that there will be any benefit in it – after all, you're probably on the design team because someone presumes that you know what should be in this Web site.

You may also find that the end users and information providers are surprised to have you asking them questions. They are not always used to being treated as experts, even as experts on themselves, and they may be worried about giving you the "wrong" information.

You can enhance the cooperation you get from your team and your organization by making sure everyone understands a few key points.

Knowing How Information Needs Are Met Without the Web Helps You Understand How to Meet Information Needs with the Web

The very first question you may be asked when you suggest a needs analysis is, "We're designing a new way to do things -- why
spend time investigating the old way?"  Keep in mind that you are not investigating the way people give and get information now in order to duplicate that system on the Web. You're investigating how people give and get information now so that you can:

- preserve or duplicate parts of the process that work well now
- identify what doesn't work so that you don't inadvertently reproduce problems
- figure out how your users view your part of the world so that your Web site will reflect their language and the structure of their knowledge — instead of yours
- assemble enough content to create a testable prototype of your site before asking all your potential information providers to build their own Web pages.

You Aren't Asking Users and Stakeholders to Design the Site

The team may wonder if they are simply going to ask people what the Web site should be, and they will rightly anticipate that the answers they get back will be contradictory — "What's the point of knowing that everyone wants something different?" they may ask. It's important for the team to understand that you will be asking users:

- What kind of information do you look for now?
- Where do you get that information?
- How do you get that information?

And you'll be asking information providers:

- Who comes to you for information now?
- What do they want to know?
- How do you disseminate that information?

You're not asking people to design the Web site — you're asking them about what they know best, themselves and their work, and they can't be "wrong" about that!

You Need to Talk to the People Who Provide Information, Not the Computer People

When you begin to make appointments to speak with information providers, you should explain carefully that you want to speak to people who accept and fulfill requests for information. As soon as people hear that you're designing a Web site, they're likely to assume that you want to speak to the person who handles their computing — and that's not usually the same person. Make every effort to ensure that you have arranged to speak to the right person or you and your interview subject may end up quite frustrated and confused.

Gather Information from Users, Information Providers, and Stakeholders

Decide How You Will Get Your Information

At this early stage, it is preferable to conduct interviews whenever you can so that you are starting with the people who will be affected by
your design. Your final decision will depend on what sources of information you have available and on how much time and effort you can spend conducting interviews.

Who Should Be Interviewed?
You don't need to interview a lot of people, but it is very important to interview people who are representative of the primary audience, the information providers, or the stakeholders for your site. Go back to the detailed description you made when you were first assembling your list of users and stakeholders. Look for the key characteristics that differentiate each group.

Common differentiating characteristics include:

- position in your organization and different perspectives they have as a result,
- familiarity with the general content your site is likely to contain,
- computing skills and/or Web skills, and
- anticipated goals for using your Web site.

You will want to interview people who exhibit each of these major differentiating characteristics. Estimate the general percentages of people who fit your various profiles, since this will help you as you decide how many people you will interview.

Start Small, Add to Your Sample Carefully, and Stop When You Aren't Getting Any New Information
When you conduct a needs analysis you are not trying to prove beyond the shadow of a doubt what should be in your Web site or how people will expect the site to be organized. You are just giving yourself and your design team some concrete information to work from as you design a prototype site. For this reason we recommend that you start with a small sample of interview subjects, no more than 8 to 10 individuals. If these individuals span the critical characteristics you have identified, start by interviewing them and then perform the "Should I stop now?" check in the next section. If 8 to 10 individuals turn out to be too few to span your critical characteristics, add to the sample while keeping the overall proportions of critical characteristics in balance. Of course, in some cases you will have the resources to interview every member of an important group, especially if the group is relatively small.

Should I Stop Now?
As you conduct the interviews, you'll be looking for patterns or trends in the information you're getting (read about patterns and trends in the next section, "Analyze and synthesize data"). When new samples do not seem to reveal any further patterns or trends and tend to reify what was observed in earlier samples, then you have reached "saturation." It's time to stop sampling and see where things stand in terms of user needs or wants.

But No One on My Team Is an Expert in Research ...
There are professionally trained specialists who can design and conduct a needs analysis, and if you have access to a person with these
skills you should definitely take advantage of that person's expertise. You should expect that an expert can conduct a more thorough and efficient needs analysis than a group of amateurs can, just as a professional meteorologist can usually predict the strength of an impending storm more accurately than an amateur weather-watcher can.

However, you should be confident that you can spot major trends in the interviews you will be conducting even if you have no special training. Even if you miss some of the fine points, it is still more worthwhile to determine the actual needs of your users, information providers and other stakeholders than it is to try and guess them based on no data at all.

Conducting Interviews: One-on-one.

The advantages of conducting individual interviews are that you can give your full attention to the person, and you can let them do most of the talking. The major disadvantage of individual interviews is that they take a fair amount of time.

Prepare a list of questions ahead of time, like the list used in the City Government and Wonderlab cases (at the end of this chapter). When you have the questions prepared you are free to take copious notes during the interview, and you should take as many notes as you possibly can. Many interview subjects also like to see your list before the interview so they can prepare the information you want without making you wait, or simply think carefully about their answers ahead of time.

Listen actively during the interview by reflecting back what you hear the person saying without adding interpretations of your own. They will correct you if you are missing the point, and when they do – write down what they say.

To the extent possible, you should observe and talk to users, information providers and stakeholders in their "natural habitat" when doing a needs analysis. There may be clues or indicators in the environment that help identify needs – everything from worn carpet, contents of display racks for handouts or brochures, locations of information providers in relation to the physical space of the organization, presence of job aids or "cheat sheets," well-worn directories or manuals, and so on. You just need to keep your eyes and ears open – and don't be afraid to ask basic, simple questions.

Conducting Interviews: Focus Groups.

Another useful way to do interviews is by assembling carefully selected groups from your users, information providers and other stakeholders. Again, you come with a prepared list of questions, listen actively and take lots of notes. The advantages of focus groups are that you may save cumulative time and the synergy of the group being interviewed might raise issues that might not emerge from individual interviews.

Conduct focus group interviews with care, however, since they do carry some risk. Dynamics within the group may prevent issues from arising as, for example, when individuals are mixed into an interview group with their immediate supervisors and are therefore reluctant to discuss certain topics. Dominating individuals in a group may also prevent all those being interviewed from participating equally. If you decide to save time by conducting focus group interviews, be sure to
plan the makeup of each group carefully and take time during the interview to ask for the opinions of those who aren't participating very much.

**Analyze and Synthesize Your Data**

Now that you have conducted interviews and made observations, you need to try to make sense of all it — look for patterns, themes, commonalities, problems, and issues. We have found it useful to get acquainted with the details of our data by conducting hands-on activities with the data as a team.

**Get to Know Your Data**

The process of analysis relies partly on using a reasonable system for representing the information you have collected, and partly on the somewhat intuitive processes that go to work when you become very familiar with that information. For these reasons you need to set aside enough space and time to conduct your analysis effectively.

**Use a Format That Allows You to See a Lot of the Data at One Time.**

Find a room with big white boards or walls that will take pins or tape. Failing these, a room with one or more big tables can work. You'll need to have several people working together, and you should spread you information out so that you can see as much of it as possible all together. This is because human beings have a limited ability to hold many bits of information in mind at one time, and therefore a poor ability to make connections between bits they can see and bits they can’t. If you assemble your data in a notebook, some of the parts that might have important connections to others will appear on different pages and you’ll miss the connection between them.

Don’t consolidate any items at this point. It may seem pointless to make out six little cards that say the same thing when you could create just one little card and add a “6” to it, but you will need the visual cue of multiple cards to let you see the relative frequency of that item. If you are listing items, you can use tick marks to accomplish the same kind of visual cuing. Don’t begin to create charts and so on though, because if you do you are liable to try and impose categories on the data before you have really looked at what you have.

**Use a Format That Allows You to Move Items Around Easily**

In order to see patterns in your information you will probably have to move the individual items around. If you log them individually onto small cards, or use a white board that is easy to erase, you will be able to get items close to each other so that you can create provisional categories or propose sequences of items and then change your mind quickly if you see another option.

**Don’t Use a Computer Without Considering the Possible Limitations of Doing So.**

Computers offer some advantages for analyzing your data once you have it:
Many people type faster (and more legibly) than they write by hand.
If you have the right program, you can move items around easily.
You can project a computer screen so many people can see what’s happening.

Computers have their drawbacks, however, and we don’t recommend using one for this phase of the process unless you have a specialized facility that lets you overcome those drawbacks. The problems with computers include:

- Computer screens do not allow you to show as much information at one time as white boards and walls usually do.
- There aren’t many programs that allow you to move items around as quickly and easily as you can do by hand.
- Computer displays have a tendency to look ‘official’ or ‘finished,’ which can lead your group to the erroneous impression that analysis is complete before the job is really done.
- Most of the time only one person runs the computer while everyone else watches and tells that person what to do. The problems with this are:
  - Only one person has hands “on” the data and gets to know it very well.
  - Some of those engaged in the process may find their ideas overlooked as everyone vies to direct the person at the controls.

You can use a computer to enter many items of information quickly, then print them out and cut them up into pieces. You might also decide to enter the items into a simple database format so that you might be able to sort them quickly using various terms that might show up in groups of items. If you have the resources, you might also investigate specialized software used by social researchers to help them make connections in large bodies of observational data. Either of these last two suggestions still carry the drawbacks listed before, and are most useful as extensions of your basic process at this point.

**Identify Trends in the Data**

*Really Look at What’s There.*

Once you have assembled your people and your information in one place, take some time to let all the people look through all the information. You might structure this part of the analysis by asking individual data collectors to give the others an introduction to what they have found (as long as they don’t go too far toward summarizing as they do so). Another method is to have a scribe stand at a board or a flip chart and record items of data as they are reported by those attending. This process can be fairly informal, so that anyone who has a similar item to one just offered can speak up and add it to the record. When you create your combined record this way, everyone involved has a chance to become familiar with the entire body of information. Alternatively, you can collect items from individuals, reproduce them,
and ask your group to review them before the meeting – but remember that everyone may not do so, and you will have lost the benefit of sharing publicly even though you may seem to have saved time.

Look for Items That Are Similar.
Are there groups or repetitions in your data? If there are, they are likely to jump out at you. When you find these obvious similarities, go ahead and record them. You may revise them on later reflection, but they are likely to be valid and you will appreciate having them when the task gets more difficult later on! For example, an analysis team creating a web site for a community-based parks program might see that 5 out of 6 interviews conducted by your analysis team identified people’s desire for your web site to provide a calendar of events. When such a need has been stated explicitly and repeatedly, they can feel confident in paying attention to it. They may have expected this result and may even think it is too simplistic to record, but they should go ahead and do so – these data validate their prior assumption!

Once the obvious similarities have been spotted, you will want to study the data for less obvious ones. It can be helpful at this point to refocus at a higher level then the individual items and identify those items as instances of some more general concept. For example, the team working on an intranet design for a medium-sized high-tech company may notice the following:

- One survey respondent reports his habit of calling the computing center to find out if certain company labs are open or not.
- One respondent describes her responsibility for sending out flyers through internal mail to announce new technical facilities across the organization.
- Several respondents list “scheduled down time for company servers” under “Information important to my job and currently hard to find.”

Although the items are not identical, and perhaps not similar enough to jump out as a group, the team can view each of them as an instance in which someone is getting or giving “update information regarding the current state of our technical facilities.” The statement seems to describe an important category of items, so the team may adopt it and look for more items that fit into it.

Look for Items That May Be Linked.
When you have collected your data from multiple sources, make a pass through all the items looking for connections. Did people who gave you one answer in common also tend to give you another one in common? Is that answer different for another category of people? For example, are the people who look for courses to take at a university also interested in getting registered for those courses? Do they also report wanting to know their academic standing, or wanting to be able to consult an advisor? The team noticing such links should create a group out of the items, even though the information and activities represented by them are scattered in different offices across that particular university.
Look for Items That Are Missing.

This is hard to do. You have to spend some time with your information so that you know it pretty well. Then ask yourself if anything you expected to find out did not turn up. Look at the items you have identified and ask for each one – what about the opposite? Sometimes the answer is just silly, but sometimes this exercise helps you discover categories of information or interaction that do not appear in your analysis. Why do you want to know about them if they are not there? The most obvious answer is that you do not want to spend time developing an aspect of your site that people do not want!

Pay Attention to the Questions That Come to Your Mind.

If anyone is going to ask stupid questions, now is the time. Are you wondering why some interviewees seem to call your primary service “research,” while others call it “consulting”? Say so. The group may need to focus on this issue and determine whether they should consider using both terms, going back for a few interviews to clarify the matter, or marking the issue as something to watch in their future usability studies.

Don’t Be Too Quick to Summarize the Data.

Some people are most comfortable with information when they have categorized it and achieved an overview of it. While you want to get to that point, and do so relatively efficiently, be careful that these members of your group do not gallop too quickly toward an overview. Even when the ideas make a lot of sense, or seem obvious, take time to question them from several perspectives before deciding that you have discovered the most salient patterns.

Be Sure to Summarize the Data Eventually.

Some people are reluctant to zero in on specific statements of patterns in the data, feeling that they need just a little more time or information to be sure that the statements are exactly right. It’s probably helpful to remember that the process outlined here does not yield exact results (only useful, helpful ones), and that practicality forces every group to end the analysis process – usually sooner than they really want to! When you realize that your group has spent a reasonable amount of time working and is no longer making any new discoveries, it’s probably time to attempt some summarization of your findings. You may need to ask the group to pause or take a short break, and then state explicitly that you will spend the next portion of your work time creating statements describing your findings.

Create Statements Describing your Findings

Apply Explicit Design Assumptions.

As you create the statements of your findings, do so in the context of explicit design assumptions. If you do not, you are likely to find yourselves spending time on statements that are not as relevant as they should be. What are your design assumptions? They are the logical outcome of your goals and the constraints you know about before you conduct your analysis. If your site is intended to function as a repository of document sets for a workforce distributed across several
countries, you might be working under explicit design assumptions like these:

- Our audience is familiar with the jargon and organizational structure specific to this company.
- Our audience is not all accustomed to looking up information in the same way.
- We must provide complete document sets even if we find out that people don’t need all of what’s there (because of a mandate from the main headquarters).
- Half our employees will not have upgraded computers until 8 months after the site is published.

Create Both Concrete Statements and Statements of Principle.

Your concrete statements should describe what will appear and not appear in your site, and what the organization of your site will be. Part of the statements may simply list the content to be included. Others may take the form of a map, or schematic that describes the underlying structure. Still other statements will outline the interactions that need to take place between your site and those who use it.

Your statements of principle will describe intangible characteristics your site must display and place some boundaries on the possibilities for design solutions. For example, you may decide based on your analysis that people want your public service site project a “welcoming attitude” to the public, or that your intranet’s primary structure must be consistent with the main organizational divisions of your company.

If your site is to serve and/or represent a very diverse organization, you may create a statement saying that design decisions will need to serve the individual populations as effectively as possible, provided they don’t disadvantage any individual population.

Such statements may sound generic to you – after all, who wouldn’t want to follow a principle like the one above? In different contexts, such a principle might not work. The development team working on a site for disseminating scientific research discoveries to the public may realize through analysis that some of their audience will know comparatively little about basic science while a smaller population will know quite a lot. They may state a finding of principle declaring that their design will support primarily the larger group of people who need definitions and simple explanations, even though this may cause some impatience in the more knowledgeable audience.

Create Some Statements That Describe What You Don’t Know.

Be sure to spend a little time listing items you don’t know. Maybe you left something out of your analysis, or you didn’t construct your analysis correctly to find out all of what you need. Maybe you didn’t know you needed certain information until you conducted this analysis. Maybe you don’t think you can really get the answer, but you want to preserve the question so that you can watch for potential problems later on. In any of these cases, it’s valuable for your future design effort to agree on what you don’t know because you can be clear about the points at which you are designing based on opinion rather than data!
Begin Needs Analysis Cases

WonderLab: Charles Graham
City Government: Jin Kim, Lyle Turner
Indiana Educators: Lisa Hansen
Distance Learning: Mona Masood

Overview

The WonderLab case is a good example of a differentiated needs analysis with several target audiences including K-12 students, teachers, parents, and potential donors.

The City Government case is a good example of conducting interviews of frontline information providers in a large organization in order to infer information needs of community citizens.

The Indiana Educators case is a good example of use of focus groups in purposefully selected representative schools.

The Distance Learning case is a good example of assessment and expert review of an existing Web site as part the needs analysis.
The WonderLab Case

Charles Graham
Indiana University

WonderLab is a non-profit organization with more than 500 volunteers dedicated to building a hands-on children's science museum to serve the families, schools and community groups of south-central Indiana. Hands-on activities are available to children both at the physical museum site, located in Bloomington, Indiana, as well as online through the WonderLab web site.

In January, 1998, a team of graduate students at Indiana University was asked to carry out a redesign of the WonderLab web site (http://www.wonderlab.org) in order to better meet the needs of its users. This case study outlines the steps of the project that took us from our initial starting point, through the needs analysis and up to the paper prototyping phase.

Getting Started – Identifying the Target Audience

We began the needs analysis of the WonderLab web site by trying to identify the primary audience for the site. We did this by asking the question, “Who will be using the site?” To help answer this question we (1) looked at the information currently on the site to try and determine who it was meant for and (2) we interviewed stakeholders, including WonderLab board members, staff, and volunteers.

From the web document analysis and stakeholder interviews we determined that the primary audience for the web site included K-12 students, parents, and teachers. We also identified a secondary audience which included stakeholders such as potential donors.

Preparing for the Needs Analysis Interviews

Once we had identified the target audience for the WonderLab web site, we put together a plan for our identifying their needs through the interviewing process. The steps we used in our plan were:

- Introductions and explanation of the purpose of the interview.
- Briefly show the users the current web-site and allow them to spend a few minutes exploring the site.
- Ask general open-ended questions about the site and their expectations for the site.

We generated a list of general questions that we could ask individuals from our target audience that would help us to better understand their needs. With these questions we first tried to understand the context in which the web site might be used. In order to do this we probed with questions like the ones shown in Table 1. Then we generated some questions to try and understand the motivation or purpose a user might have in accessing the site. In order to do this we probed with questions like the ones shown in Table 2.
When and where would you be most likely to use the Wonderlab web site? (location)

Knowing when and where the site would most likely be used would help us to better understand how it might be used. For example, the needs of the site might be different for a teacher who plans to use the site in a computer lab with his/her class than for a teacher who plans to show it in front of the class or use it as a resource in preparing a lesson.

Additionally, if using at a public site, they may not have the ability to install plugins. So in this situation, if the site requires plugins that are not installed, a portion of the site is no longer available to the user.

What kind of computer and internet connection, and browser will you be using to access the site? (hardware, software)

This is a big issue in determining the needs of the site because:

- Some software is platform specific – such as the Cocoa programming language for kids – used in programming competitions on the site.
- Some web design solutions (such as javascript) are rendered differently on competing browsers.
- Monitor resolutions make a difference about what users can see.
- The speed of the internet connection, can help illuminate tradeoffs can help to determine the kind of graphics used on the site.

<table>
<thead>
<tr>
<th>Questions about purpose for using the web site</th>
<th>How it applies to Needs</th>
</tr>
</thead>
<tbody>
<tr>
<td>What purposes are you most likely to use the web site for?</td>
<td>This would help to determine current needs of the existing site.</td>
</tr>
<tr>
<td>What would you like to be able to use the web site for?</td>
<td>This would help to determine possible needs that are not being met by the current site.</td>
</tr>
<tr>
<td>What would make the web site more useful to you?</td>
<td>These could help to determine needs that the users have that are not being addressed by the current site.</td>
</tr>
</tbody>
</table>

Table 1: Context related needs analysis questions

Conducting the Needs Analysis Interviews

After preparing a plan and questions to use in the needs analysis interviews, we tried to locate and set up interviews with members from each group in the target audience. When setting up student and teacher interviews we tried to get some representation from elementary, middle, and high school levels so that we were sure to understand the needs of different age groups. Table 3 shows the number of interviews that we were able to set up for our target audience.

<table>
<thead>
<tr>
<th>Target Audience Category</th>
<th>Number of Interviews</th>
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<tbody>
<tr>
<td>Elementary School Students</td>
<td>3</td>
</tr>
<tr>
<td>Middle School Students</td>
<td>3</td>
</tr>
<tr>
<td>High School Students</td>
<td>3</td>
</tr>
<tr>
<td>Elementary School Teachers</td>
<td>5</td>
</tr>
<tr>
<td>Middle School Teachers</td>
<td>1</td>
</tr>
<tr>
<td>High School Teachers</td>
<td>0</td>
</tr>
<tr>
<td>Parents</td>
<td>3</td>
</tr>
<tr>
<td>Stakeholders</td>
<td>10</td>
</tr>
</tbody>
</table>

Table 3: Number of Needs Analysis Interviews Conducted for Target Audience
Debriefing and Synthesizing Findings

After completing the interviewing process for all of the individuals above, our team got together in a debriefing session in which we discussed the interviews and looked for trends and patterns in our notes from the interviews. From that meeting we were able to identify five broad needs (outlined in Table 4) that we could focus on incorporating into the paper prototype of the web site re-design.

<table>
<thead>
<tr>
<th>Needs</th>
<th>Explanation/Elaboration</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. More interactivity and content</td>
<td>The users, especially the youth, wanted to have more interactivity on the web site. They liked activities such as the “mad libs” and detective scenarios available. A few showed us the types of sites that they normally visit ones with fun things to do, view, and print.</td>
</tr>
<tr>
<td>2. Needs to reach a diverse audience</td>
<td>The site needs to reach a diverse audience in both age and purpose for going to the site. The major groups that will probably use the site are: teachers, parents, potential donors, and K-12 students.</td>
</tr>
<tr>
<td>3. Must have clear terminology and navigation</td>
<td>Clear terminology and navigation is definitely a need that we discovered. Many people were confused about the overall organization of the site and what was actually available to do on the site.</td>
</tr>
<tr>
<td>4. Must include explanation of Wonderlab web site vs. museum</td>
<td>One of the big confusions we found in the needs analysis was how the web site and WonderLab were related. Those going may not have clearly understood that the site is both an informational site for WonderLab as well as a site for web-based exhibits.</td>
</tr>
<tr>
<td>5. Needs to include more information about the museum.</td>
<td>Users expect to be able to find critical information about the WonderLab site in Bloomington. Much of this information just does not exist on the site and the information that does exist on the site is not easy to find.</td>
</tr>
</tbody>
</table>

Table 4: Results of the Needs Analysis Interviews

Charles Graham is currently a doctoral student in Instructional Systems Technology, teaches classes at Ivy Tech College, and is a graduate assistant in the Office of Instructional Consulting in the School of Education at Indiana University.
Introduction

Purpose
Michael Chui, Chief Information Officer and Kristin Logsdon, Communication Officer of the City of Bloomington (City of Bloomington), contracted our team at Indiana University to design and develop a new web site template for the City of Bloomington Government. The team performed this task from January through April of 1999.

The City of Bloomington's goal for its web site was to provide information to its citizens and people in the surrounding areas in an efficient and effective manner. It was decided that the web site’s structure would be based on actual questions asked by the public to city employees.

Context
The Bloomington City Government provides support services through twenty-two departments for the citizens who live, work, and attend school within the city limits of Bloomington, Indiana.

The City Government can use several formats to address the needs of people who live and work in the Bloomington city area. As city services and issues continue to grow and change, a well-developed Web site is one support that could provide 24-hour access to important city information.

Prior Needs Analysis
A previous needs analysis was completed by another team for this web site from September through November in 1998. That team's analysis included responses from nearly 70 interviews conducted with city employees and residents. The analysis revealed the following major findings:

**Web site**
- Citizen use: Currently, few citizens use the site.
- Information: Much of the information is out-of-date.
- Employees: There are very few city employees with web development skills.

**Information Needs**
- Electronic Commerce: This need is futuristic, and its use and impact is not determinable at this point.
- Non-Web site Information: Citizens generally feel the city currently does a good job of providing information.
Goals & Target Audience

Goals

After reviewing the prior needs analysis, our team met with CIO Michael Chui, CO Kristin Logsdon of the Bloomington City Government, and Dr. Ted Frick of Indiana University and determined the goals and procedures for developing the web site and defined the anticipated audience/users of the web site.

Web Site Goals: To Provide
- A user-centered source of information
- A timely source of information
- An accurate source about Bloomington City services that citizens could use

Web-Site Development Team's goals:
- Integrate the results of prior and current needs analysis
- Develop an intuitive and easily accessible site structure
- Establish guidelines for enlarging and maintaining the site.

Audience

The list of the expected and potential audience for the City of Bloomington Government web site include:

Primary: frequent users
- Bloomington City residents: Citizens with residency of more than one year and needing information about city government
- Bloomington City employees
- Monroe County residents who live near the City of Bloomington
- Students of Indiana University, Bloomington campus: IU students who use City facilities, live off-campus, work, or otherwise need City specific information

Secondary: occasional users
- Parents of students of IU
- People who plan to visit the City of Bloomington
- Monroe County residents who do not live in the City of Bloomington
- Potential Bloomington city residents
- Potential students of Indiana University, Bloomington campus

Incidental: sporadic users
- Web surfers who are curious about the Bloomington City site.

Stakeholders

We identified the stakeholders of the Web site as anyone who has a vested interest in how the Web site is designed, how it performs, and how it is maintained once it exists. The stakeholders of this web site also include those interested in this site's development, maintenance, and performance.

Primary stakeholders: Development and Maintenance Focus
- John Fernandez, Mayor, City of Bloomington
- Information and Technology services Department, particularly:
  - Michael Chui, Chief Information Officer
  - Kristin Logsdon, Communication Officer
- City of Bloomington Government employees interviewed in the analysis process.
Technical specialists and consultants who will update and maintain the web site

Secondary stakeholders: Performance Focus
- Bloomington city residents
- Bloomington city employees not interviewed in the analysis process
- Monroe County residents who live near the City of Bloomington
- Students of Indiana University, Bloomington Campus

Interviews

The web-site redesign process was a cooperative effort with City government employees. Interviews were arranged with city employees who had direct contact with the public to determine:

- Questions the public asked city employees
- Answers to those questions
- The original sources for those answers.

Interviews with Front-line Employees

Prior needs analysis revealed the current status and use of the City of Bloomington Government web site and other resource centers. However, to restructure and build a new user centered web site template, we had to know what information the public actually wanted to know and where they expected to find it. For this information we conducted nineteen interviews with employees who represented the majority of the City's twenty-two departments and services and acted as "gatekeepers" or department points-of-contact for the public. An example of one department we did not interview was Fleet (vehicle maintenance and management).

Interview Questions
We developed the five following questions to use in our interviews with department gatekeepers.

1. What questions do citizens ask when they call a specific department?
2. How frequently do they ask these questions?
3. What are the answers to these questions?
4. Who asks the questions (citizens, visitors, students, or business professionals)?
5. How are they asked (letter, telephone, or walk-in [in person])?
6. When are they asked (seasonal, summer, fall, etc.)?

Interview Purpose

The interviews were used to gather a list of specific questions the public ask when they call or visit various City departments. Often similar questions were asked in more than one department or one particular question was predominant over others. It was, therefore, important to know what were the most frequently asked questions in each department.

Interview Process

Michael Chui and Kristin Logdson sent a letter to introduce our team and our purpose for meeting with the department contact people. This letter and a copy of the questions was sent out before the interviews were scheduled by Kristin.

Interviews with each representative were scheduled at 30-minute intervals in a central location in City Hall on Wednesday and Friday afternoons over a period of three weeks. Two interviews were conducted at the employees work site when schedules conflicted. Employees interviewed were the points-of-contact between their office and the public. We were particularly interested in how people worded the questions they asked. At
least two people did the interviews: one leading the interview, elaborating or following-up the five basic
questions for detail when possible, while the other would take notes.

Transcripts
We created a transcript of each interview's question and resulting responses. The transcript information was
then transferred to index cards. For each question, a new card was created that listed the department the citizen
called, the question's answer, the question's frequency, how it was asked, and when it was asked. There were
approximately 200 index cards in total when the interview process was complete.

Analyzing Interview Results
We used the following process to analyze the information:

- All 200 cards were shuffled.
- Questions were read aloud. (and the answer if elaboration was needed)
- Related questions were placed together (using group consensus).
- Category titles were developed from the stacks of related questions.

The cards were grouped and sorted under major categories of related topics. Once all cards were grouped
and sorted, these categories were used as the top-level starting points in the first paper prototype of our web site
redesign.

- **What's happening?** Calendars, events, meetings, appointments
- **Services used often:** Family service, animal shelter, employment, parks & recreation
- **Departments:** Animal control, fire, mayor, city council, parks, utilities...
- **People, places, & city records:** Employee directory, where is ____, special groups, records, legislation, minutes and plans
- **Living in Bloomington:** Facts about Bloomington, housing, animals, trash / recycling, fire safety, police protection
- **Assistance--citizen and family resources:** Financial support, child and adult care, emergency home repair, housing aid ... 
- **Permits & applications:** Permits, licenses, others, parking permits
- **Payments, fees & fines:** Utilities, facility reservation, fines, parking tickets
- **City jobs & employee information:** Employee benefits, employment opportunities in city government...
- **I have a problem/question:** Bloomington City information, complaints and problems, frequently asked questions

End of City Government Case

Jin Kim is currently a doctoral student in Instructional Systems Technology in the School of Education at
Indiana University. Lyle Turner is a ??? at Wisdom Tools, Inc. Other persons who worked on this project team
included Susan Clayton-Randolf, DingDing Chen and Liu Yang.
Project Overview and the Needs Analysis

In 1996, a Strategic Directions Initiative from Indiana University addressed the issue of Indiana teachers having access to the Internet. The creation of a web site specifically for Indiana teachers seemed a reasonable first step, but a needs analysis would be conducted first, to determine the accuracy of this assumption, and to direct the efforts of web developers. This needs analysis would ensure that the resulting site would reflect the actual needs of the end users, namely, teachers in Indiana. Therefore, teachers in Indiana were contacted and asked what they wanted or needed regarding computers and the Internet.

I participated on a team of about 15 graduate students who conducted a series of focus group interviews. The focus group process was selected as an appropriate first step because it allowed us to meet and speak personally with our target audience, not only providing us with unequivocal information, but also giving ourselves and the project credibility in the education community. Also, we were able to gather significant data relatively quickly, and were also able to modify the process as subsequent interviews occurred. This iterative process helped to hone the questions asked and issues raised. This was important because a survey was distributed statewide, based on information from the focus groups.

Selecting Schools to Visit

Knowing that this was a volunteer effort, and that we had limited expenses for travel, we looked for a convenient stratified sample of 15 to 20 schools. Using Indiana's Department of Education statistics and demographic data, and a map of the state, we began looking for schools that would represent a cross-section of Indiana, and that were a reasonable driving distance from our location in Bloomington.

Several key variables were addressed in our sample. First, all grade levels needed to be represented primary, middle, and high schools. Second, an equal portion of schools from rural, suburban, small town, and urban areas were included, since the Indiana population is widely varied in its geographic location. Third, we looked for schools that served high, middle, and low socio-economic groups, knowing that schools in wealthier neighborhoods would have significantly different technology issues than those in low SES areas. Overall, we tried to include as many school districts as possible. We also reviewed data such as per pupil expenditures, school size, and score reports from State-mandated assessments, although we did not include this when selecting schools to visit.

Once schools had been identified, we contacted each to ask permission to conduct interviews. Sixteen schools initially agreed from the 20 identified as meeting our sampling needs. Scheduling and communication problems eventually reduced this number to 13. Each focus group was scheduled and a project team assigned. Prior to the actual interviews, each team participated in a mock interview, in order to ensure that all teams were asking the same questions with appropriate responses to various "personality types" that could potentially be encountered in a typical work environment.
The Interviews

The contact person at each school (usually a principal or assistant principal) was asked to select focus group participants, usually six to eight faculty and staff members, although we requested that any technology teachers, media coordinators, and school librarians be invited to participate. Most of our contacts were happy to help, but other focus groups were hastily assembled moments before the session was to begin, or conflicted with another school-related activity or meeting. However, 86 education professionals were interviewed, representing a wide range of grades and subject areas. In addition, their computer skills were widely varied, enabling us to hear from a spectrum of technology users.

Focus groups were designed to last from 30 to 45 minutes. Typically, from four to six teachers attended the meetings, and the principal agreed to a separate interview. We felt that the presence of the principal might have prevented some teachers from speaking freely, so we made every effort to create an open forum by interviewing the principal separately.

Using a non-recorded, semi-structured interview process, we asked several open-ended questions. Attempting to capture as many direct quotes as possible, project teams took copious notes as the teachers and principals responded to the following questions.

- When you hear the words "the World Wide Web" or "the Internet," what do they mean to you?
- Are you connected to the Internet/Web? How? (via modem, direct connection...)
- What are you or your colleagues doing with the Web?
- What do you see that the Web can offer you as a teacher (counselor, principal, librarian or media specialist, technology coordinator)?
- What are the issues and barriers to implementation of the Web in your school? Have you overcome any of these? How?
- [For the principal only] How are technology projects/computer activities funded?
- [For the principal only] Are you in touch with the regional service center in your area? How do they help you with computer/technology issues?

These questions provided us with a variety of data that we would not have considered had we not done the interviews. For instance, several focus groups revealed that their Internet access was restricted to only the actual
school day; several ISP's were cutting access after school hours. Other groups said that the state-funded technology center in their area made little effort to assist them in training and staff development in the area of technology. Also, we learned of many different technology initiatives in schools, several of which were funded by grants and contained exciting new ideas for technology integration.

**Record Keeping and Data Analysis**

Data, in the form of project team member reports from field notes (37 reports total), were analyzed by a smaller analysis team. The team looked for patterns of information that either crossed over the boundaries of grade level, geographic location, and SES, or were specific to those subsets. The themes that emerged were:

- School Context around Web Use
- Frustration Using the Web
- Enthusiasm about Professional Uses
- Making Sense of the Web's Information
- Censorship
- Issues about Connectivity
- Need for Training

One interesting general finding of this process was the large number of schools which fell into our "low connectivity" range in terms of computers available. Of the 13 schools, eight were considered "low connectivity," meaning there were two or fewer computers connected to the Internet. This finding helped to corroborate an overall sense of frustration on the part of the teachers; they had ideas about what was possible using technology, but did not feel they had the support to do try it.

For further information, see the complete report on the Web at:

http://www.indiana.edu/~iweb/focusgr.html

**Conclusion**

Based on emerging trends from these reports, a survey was developed which was distributed to several hundred teachers statewide. The focus group process provided invaluable data to inform our survey, and the subsequent development of the web site. If we had not conducted the focus groups, we would have missed several key elements that at the time were of critical importance to teachers. As a result, the web site was designed to include information that addressed the themes that emerged from the focus groups, and that were later confirmed by the survey.

Lisa Hanson is currently an assistant professor at the University of Northern Iowa.
Overview

In the fall of 1996, four Instructional Systems Technology graduate students undertook a project with a client from the School of Continuing Studies (SCS) at Indiana University. The SCS had a working website but no usability tests were conducted before then. Our team was placed in a unique position since the initial needs analysis was already done. Boling and Frick (1997) recommend that testing be done early in the process of designing since any problems or structural changes are relatively easier to make then. Our client's two main purposes for creating the Distance Learning (DL) website are marketing reasons and providing information regarding the DL program to both prospective and current students.

In considering our client's objectives, our team conducted a usability test that included: the assessment study, the expert review, and the exploratory test. The target audiences for the website were people in the DL program, future candidates of the program, administrators, and faculty members. However, for our project, we only focused on the aspect of servicing students and future candidates of the DL program. The assessment study helped us observe participant behavior and preferences while the expert review gave us current best practices or guidelines in designing the website. After the assessment study was conducted, we designed the first prototype. Finally, we made slight modifications to the redesigned website for the final product using results from the exploratory tests.

Assessment Study

During the assessment study, our team used the "specific task" method. The questions or tasks developed were based on the content for the existing website, the categories listed on the first level of the homepage, and frequently asked questions directed to our clients. Using the usability guideline that was recommended by Frick et al (1995), we had to be acquainted with the website our clients had previously designed. Rubin's Handbook of Usability Testing (1994) was most helpful to us in developing a more grounded procedure for conducting the usability tests. A pilot test was initiated first before we reformulated the usability tasks.

Tasks

Thirty tasks were developed based on the existing content of the Distance Learning website. The tasks were divided into three sets such that each participant in the usability test has to complete 10 short tasks that lasted for 30 minutes. One task is presented at a time and the same script was presented to each participant by the test monitor.

Subjects

Fifteen voluntary subjects who had not used the DL website were chosen from IU, IUPUI (Indianapolis), or in the Bloomington area. They were either enrolled in the Distance Learning program or were prospective candidates for the SCS Distance Learning programs.
Environment
The environment for both Bloomington and Indianapolis subjects was a room with a computer connected to the university's network. All subjects were treated equally and were reminded that we were only testing the design of the website and not them.

Data Gathering
One monitor who is also a recorder and one other recorder were present at each test. Each participant was encouraged to think out loud while the recorder notes down the response on a prepared form.

Data Analysis and Findings
After conducting the assessment study, our team analyzed the findings of each task. We listed all the tasks followed by the findings that our team observed during the study. Then, a statement with suggestions and recommendations were listed so that our client will have a clear idea what changes were possible in the website. Finally, we grouped the tasks according to the categories that the tasks were designed initially and discovered major trends from the observations, interviews, and findings.

Expert Review
The expert review or design guidelines were compiled from various resources:

- Indiana University: Basics of Web Design: [http://www.indiana.edu/~iuinfo/guides/basics.html](http://www.indiana.edu/~iuinfo/guides/basics.html)

From these resources, our team developed a table that helped us compare the DL website. Figure 1 shows a part of the guideline comparison table that we used to evaluate the SCS Distance Learning website. Major principles that were commonly found across all the guideline resources were listed in the table. Then, we compared the principles with the existing website and noted what was present, partly present, or missing.

**Guideline & SCS Page Comparison: Information & Content**

<table>
<thead>
<tr>
<th>Principles</th>
<th>+</th>
<th>~</th>
<th>-</th>
<th>Reasons or Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>A link should indicate or provide hint where it links to</td>
<td></td>
<td></td>
<td>x</td>
<td>In most of the pages, there is no indication of what the links will lead to.</td>
</tr>
<tr>
<td>Do not bury information (get to the info in less than 3 clicks)</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Limit homepage content to ten items, with seven the optimal number</td>
<td></td>
<td>x</td>
<td></td>
<td>Most of the parts use less than 10 items. Independent Studies and Gen. Studies the lists are longer.</td>
</tr>
</tbody>
</table>

Figure 1

First Prototype
Ease-of-use is the primary factor that influences ones decision to buy or use any devices or software (Myers, 1994). Consequently, our top priority of the redesign agenda was to make the website easier for users to navigate for information. Our clients' capability to modify and maintain the website was also considered. In turn, we consulted with our client's in-house designer regarding their knowledge base and resources. Another change that we had taken into thought is the design structure so that navigation problems would be minimized.
The mock-up design of the DL website was not only based on the assessment study but the expert review guidelines. Sample pages of each level were mocked up and a set of template with major design changes was delivered to our client along with other documentation and analysis.

**Exploratory Test**

The main purpose of the exploratory test was to evaluate the interaction design as the product being developed. The exploratory test was based on the naturalistic paradigm that assumes that reality does not exist for everyone to see and experience in the same way (Bhola, 1990). Hence, to measure the qualitative and phenomenological variable of our redesign, our team used naturalistic evaluations. The participants in this exploratory test were videotaped and questioned besides being observed. The goal is to ensure the trustworthiness of the product judgment with minimal designers biases in the testing itself. In contrast to the assessment test, the task was designed in an open-ended manner. During the testing, our aim was to extract as much information as possible from every participant who uses any part of the interface (Hix & Hartson, 1993).

In a way, the exploratory test was an opportunity to reconfirm that the redesigned website was clearer and easier to use than the previous one.

In the exploratory test, we used only three participants, also due to time constraints and other reasons. According to Hix & Hartson (1993), the optimum number of participant for formative evaluation is 3-5 people. Also, Nielsen (1994, p. 224) displayed in a table that three or more candidates should be sufficient in cases whereby the "thinking aloud" and "observation" method during formative evaluation and follow-up studies are used. Lewis (1994) also discusses when the probability of finding errors are high the sample size is smaller. We left the number of subjects open at first, but decided that if after three subjects there were no additional errors discovered, we would stop. In normal circumstances, it would be better to have a larger number of subjects. Instead, due to low level of error detection, I would commend that the choice of three subjects as justified. I would however point out that since the three subjects did not find a lot of problems with the redesigned website, one could not assume that other users would not either. The three subjects were students who were interested in taking future courses offered by SCS Distance Learning program or are already enrolled in the program itself.

**Second Prototype**

From the feedback we got during the usability testing, we confirmed that the redesigned website was clearer and easier to use than the old one. We found that most of the redesigned parts were appropriate. However, there were some shortcomings in our redesigned website from our observation and users' comments. Overall, there were only minor graphical changes made rather than navigational, structural, or layout issues.

**Problems That May Occur**

Throughout the project, our team was constantly in touch with our client. However, a clear understanding has to be clarified at the beginning of the project. In our experience, we had difficulty in making sure that the DL website was the same when we began testing it. This was because, whenever we reported some findings to our clients, they were thoroughly excited and immediately made changes to their website; thus, incurring problems for the design team. Another issue that surfaced was the difficulty in keeping track with our subjects. Recruiting subjects can be a difficult task especially when setting the time for the usability test.

**References**


After Needs Analysis: What's Next?

Once your needs analysis is complete, you are ready to:

- build a paper prototype
- identify specific tasks you will use to test the prototype
- identify audience members who will help test the prototype, and
- test the prototype.


