CHAPTER 26: ORAL DESIGN PRESENTATIONS

Chapter outline

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Good engineers need to be good speakers. They need to identify and explain problems, propose solutions, persuade others to take a particular action, and give reasons for their decisions. Researchers who surveyed over one hundred engineers with an average of fifteen years of experience found that "for the individual interested in career advancement, the ability to give a formal presentation is essential" (Darling & Dannels, 2003, p. 13). This chapter explains how to plan an effective presentation, including how to make good Power-Point slides, and then deliver the presentation persuasively and professionally.

26.1 PREPARING THE PRESENTATION

26.1.1 Analyzing purpose and audience

As in planning any type of communication, you should begin by considering what you want to accomplish (your purpose), who you are communicating with, and what that implies for your content and tone. The primary purpose of your spring quarter final presentation is to explain your design and persuade your client that it is an excellent solution to the problem. In that final presentation, your audience will comprise four different groups:

1. your client—and possibly others from your client's organization—who wants to know how your design solves the problem

2. your instructors, who will evaluate your presentation for clarity, persuasiveness, and professionalism

3. your classmates, who want to see your final design

4. visitors, such as clients of other groups, who know nothing about your project and would like to hear a clear, interesting presentation

To present your design clearly and persuasively to this diverse audience, your team will need to work together to deliver a solid group performance.

In EDC you will have 30 minutes for your final presentation, the typical length of many business and professional presentations. In the first part—no more than 20 minutes—you will describe your design and its benefits. In the remaining time, you will answer questions from the audience.

26.1.2 Organizing the presentation

Final presentations generally follow this order: (1) introduction, (2) agenda, (3) explanation of problem, (4) overview of solution, (5) features, (6) summary, (7) recommendations, (8) conclusion, and (9) Q & A. Sometimes the problem is explained in the introduction and thus precedes the agenda. If the content of your presentation does not lend itself to this outline, talk to your instructors about alternative ways of organizing it. This same advice applies to all the examples in this chapter. **Do not use the sample slides and other examples as templates**. Instead, adapt them to your content, audience, and purpose.

1. Introduction. People typically use one to three slides for their introduction. While your title slide is on the screen, you will introduce your team, project, and client (and other guests). Plan to thank your client for coming. The title slide should include the date and the names of the project, client, team members, and organization (Northwestern University, Engineering Design and Communication). If you want to use a logo for Northwestern, go to the Northwestern University Relations/Publications website to download an authorized version (see References). Finally, if the project was funded by an outside grant, indicate that at the bottom of the title slide.

   Instead of following your title slide with your agenda, you may decide to introduce your topic by using a detail that will grab your audience's attention. For instance, a team designing a toy grocery store checkout counter to teach children about nutrition might begin with a slide that presents the startling facts about the rise in childhood obesity. While that slide is showing, they might say something like this:

   Example 26.1: Capture listeners' interest in the introduction

> There is a silent epidemic occurring in the United States today. It is childhood obesity. In 1964, 10% of children were obese; in 1994, 20%; today, 26%; and some predict, in short time, obesity will rise to 50% unless some changes are made.
>
> One partial solution to this crisis is education. The Dolores Kohl Education Foundation is spearheading a drive to educate 4-8 year old children about nutrition. They have asked us to participate in their program by designing an interactive toy grocery story checkout counter that helps children to learn how to recognize nutritious foods.

To accompany this introduction, they might use a slide that presents these startling facts about the rise in childhood obesity. This slide would precede an agenda slide.

2. <u>Agenda</u>. Following this introductory story, state the purpose of your presentation and the major topics it will cover. If you decide to do this on an agenda slide, avoid clichéd, generic items such as "problem," "design overview," "features," "summary," and "next steps," which are boring and not very informative. Instead, use phrases that are specific to your project. For instance, instead of a bullet point reading "Problem" on the agenda slide, the bullet might read, "Why teach young children about nutrition?" Instead of "Design overview," the agenda item might read, "A child-sized grocery checkout counter to teach nutrition basics."

   If you list the key points in your presentation, organize the list hierarchically (like an outline) so that the audience can see which are the major sections of your presentation and which are subsections. For example, instead of listing User Testing and Performance Testing as two major, equal sections, you could present Testing Results as a major section and then make User Testing and Performance Testing subheadings.

   An agenda does not need to be a list. Some of the most effective agendas are diagrams, such as flow charts. PowerPoint is a visual media, so you should consider exploiting its capability to present information visually.

3. <u>Explanation of problem</u>. Explain the problem concisely. The following slide uses a photo and concisely worded text to summarize why athletes need a device to stretch their hamstring muscles unassisted (Chikando, Hamzah, Heng & Kryger, 2004):
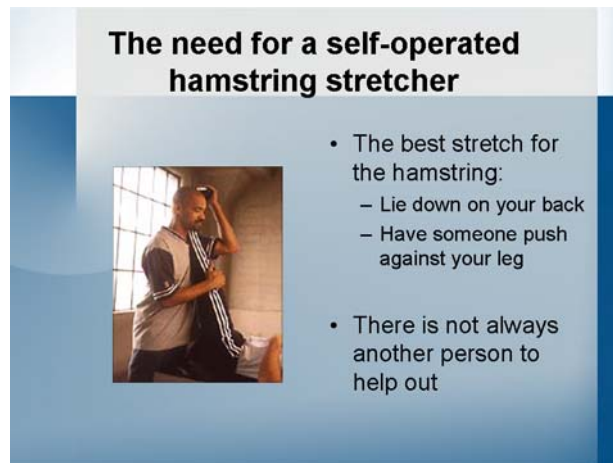
Figure 26.1: Summarize the design problem

The specific heading is more effective than a simple label like "Problem" or "Challenge," because it immediately gives the audience important information. The team further explained the problem with slides detailing the mission and requirements. In some cases, you might need only to explain the mission statement because it includes the main requirements. If you have several user groups, you might also include a slide that lists them.

Figure 26.2: State the mission

Figure 26.3: User needs

4. <u>Overview of solution</u>. Give your audience the "big picture" of your solution, but don't describe it in detail at this point. You might show your final prototype, or a slide containing a photo or drawing, and comment on the main features. Here's a slide giving an overview of the hamstring stretcher:

Figure 26.4: Present an overview of the design

5. <u>Features</u>. Explain all the features of your design and how they satisfy the major requirements. The following slide uses a photo and bullet points to highlight the benefits of one feature of the hamstring stretcher. (The team also used the prototype itself to demonstrate features.)
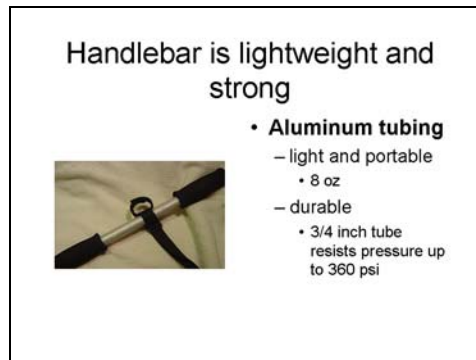
Figure 26.5: Highlight features and their benefits

Support your claims of the features' benefits with evidence from user testing, reasoning, and the opinions of authoritative sources. The hamstring stretcher team used the following slide to demonstrate that users preferred their shoe strap system to two other systems they had tested. This slide is especially effective because it starts with a heading that conveys important information and it uses a good mix of figure and text.
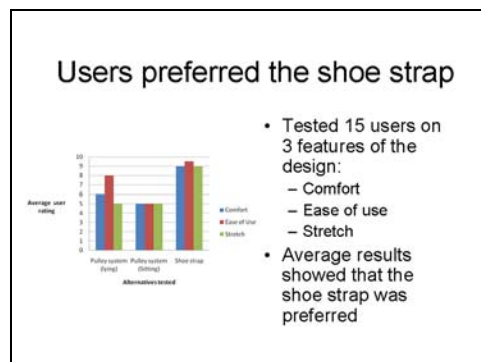

Figure 26.6: Support design features with evidence

6. <u>Summary</u>. Use one or more slides that highlight the relationship between features and benefits to summarize how your design satisfies the major requirements. You also might demonstrate the operation of your prototype's key features.

7. <u>Recommendations</u>. Recommend steps to refine, further test, and implement the design. These steps should parallel those explained in the corresponding section of your final report, but you should avoid overemphasizing what others, such as future teams, need to do (see Chapter 23 on "Limitations"). Of course, if there are no major steps to recommend, you needn't say anything here.

8. <u>Conclusion</u>. End on a positive note by briefly emphasizing the benefits of the design for users and by thanking your client.

9. <u>Q & A</u>. If no hands go up immediately, wait a minute or two for audience members to formulate questions. If there are no questions, politely thank everyone for listening.

26.1.3 Making the presentation persuasive

To persuade your client that your design solves the problem, you will need to present evidence and reasoning to support your claims As mentioned in #5 above, this evidence may come from the authority of experts, the results of testing, or your own analysis.

The following slide illustrates the use of **expert authority**. A team working on a project for the BridgeClimb Tour of Sydney, Australia—which sponsors a climb of the Sydney Harbour Bridge—had to solve the problem of noisy climbing equipment that bothered area residents (Hertog, Nelson, Ng & Parikh, 2004). To offer persuasive evidence that the equipment creates a bothersome noise, and to identify the type of noise, the team drew on expert authority— a consulting firm in Australia. They summarized this authoritative research in this slide:
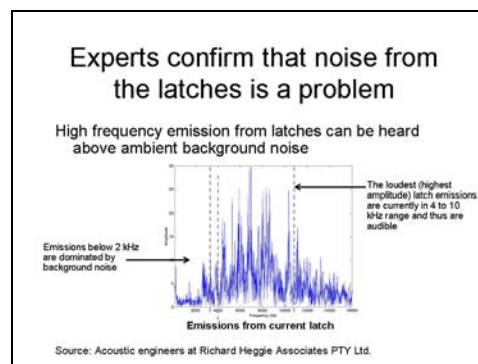

Figure 26.7: Use expert authority to support claims

The next slide illustrates the use of **evidence from testing**. The BridgeClimb team built a prototype and tested it in a chamber designed to measure noise emissions. The slide compares the noise emissions with and without their prototype.
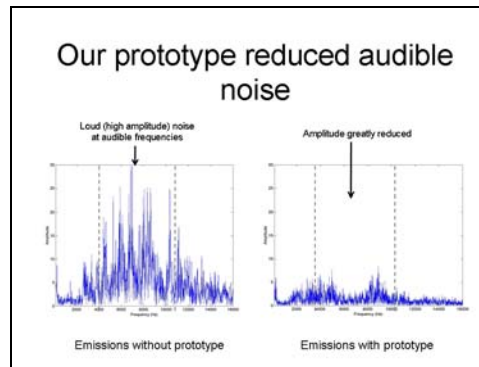
Figure 26.8: Use test results to support the design

The following slide illustrates the use of **sound reasoning** to support a design decision (Tsuruta, Wong & Wuisan, 2004). A team designing a new library for an elementary school wanted to support its decision to use rooms 201 and 202 for the library rather than rooms 202 and 203. They reasoned that using rooms 201 and 202 allows for more efficient planning and use of space due to the rooms' symmetry and the location of pillars and doorways.

Figure 26.9: Use reasoning to support the design

You can also present evidence orally. For example, to support a claim about your design, you might orally summarize the statements of an expert you interviewed.

Here is additional advice about being persuasive:

1. <u>Be precise in your oral statements</u>. Turn vague statements into precise, convincing versions, like the ones below:

Example 26.2: Turn vague statements into precise ones

Vague	Precise
We interviewed experts.	We interviewed two professors in Northwestern University's Department of Industrial Engineering.
We tested the mockup with users.	We tested the mockup with five wheelchair users, all within our target age range of 21 to 55.
The ramp will be safe.	The ramp will keep wheelchairs from slipping in rain or snow and will bear loads of up to 800 pounds.
The cost will be fairly inexpensive.	We estimate that the materials and building costs for the ramp will not exceed $750, as this slide shows.

2. <u>Use "talking headlines" instead of topics</u>. Talking headlines take advantage of the prominent headline section of a slide to make a point rather than just announce a topic. These headlines can be complete sentences or simply phrases. Figure 26.6 illustrates a sentence used as a talking headline, and figure 26.9 uses a phrase that "talks" as it communicates a whole idea.

3. <u>Avoid sounding defensive</u> when your client, instructors, or classmates appear to challenge an aspect of your design during the question and answer session. If your client asks, "Won't that feature pose a safety hazard?", don't say, "We looked at that and don't see how that can cause any safety problems." Instead, ask the client what specific safety hazards he sees, and then explain point by point how you have designed the feature to minimize those hazards. If you think the client has a valid point you haven't considered, recommend that future designers on the project address the issue.

4. <u>Don't apologize for lack of time on the project</u>: Every engineer feels the pressure of the final deadline and wishes there were more time. Instead, take a positive approach: "We have verified the feasibility of audio output in our design by interviewing Professor Unsworth of the electrical engineering department at Carnegie-Mellon. To implement the feature, we recommend the following work."

26.1.4 Preparing effective slides

Most EDC teams use PowerPoint slides because they're a valuable tool in visual communication. As shown in the examples above, good slides help you explain your design, summarize research results, highlight benefits, and present evidence. They help audiences visualize your message, stay on track, and remember key points. Poor slides, however, distract the audience from your

message. Therefore, our key advice is: **Don't just *write* slides and slide presentations. *Design* them with your audience in mind.**

Below are guidelines for developing good slide presentations.

Guidelines for organizing slides

1. <u>Number of slides</u>. Avoid using more than one slide per minute unless some of your slides are simply pictures that all support the same point. Your slides should **support**, and not be the subject of, your oral presentation.

2. <u>Logical organization</u>. Divide your material into logical categories and use headlines for clarity. The following series of six slides illustrates logical organization (Cibor, Leung, Santana & Wastell, 2002). They focus on the second product in a two-product solution to the problem of disorganized desk space. The slides start by saying this is the second of the two products, go on to give the team's rationale for the design, and finally focus on the design's four key features. The headlines in the last four slides include the number of the feature.
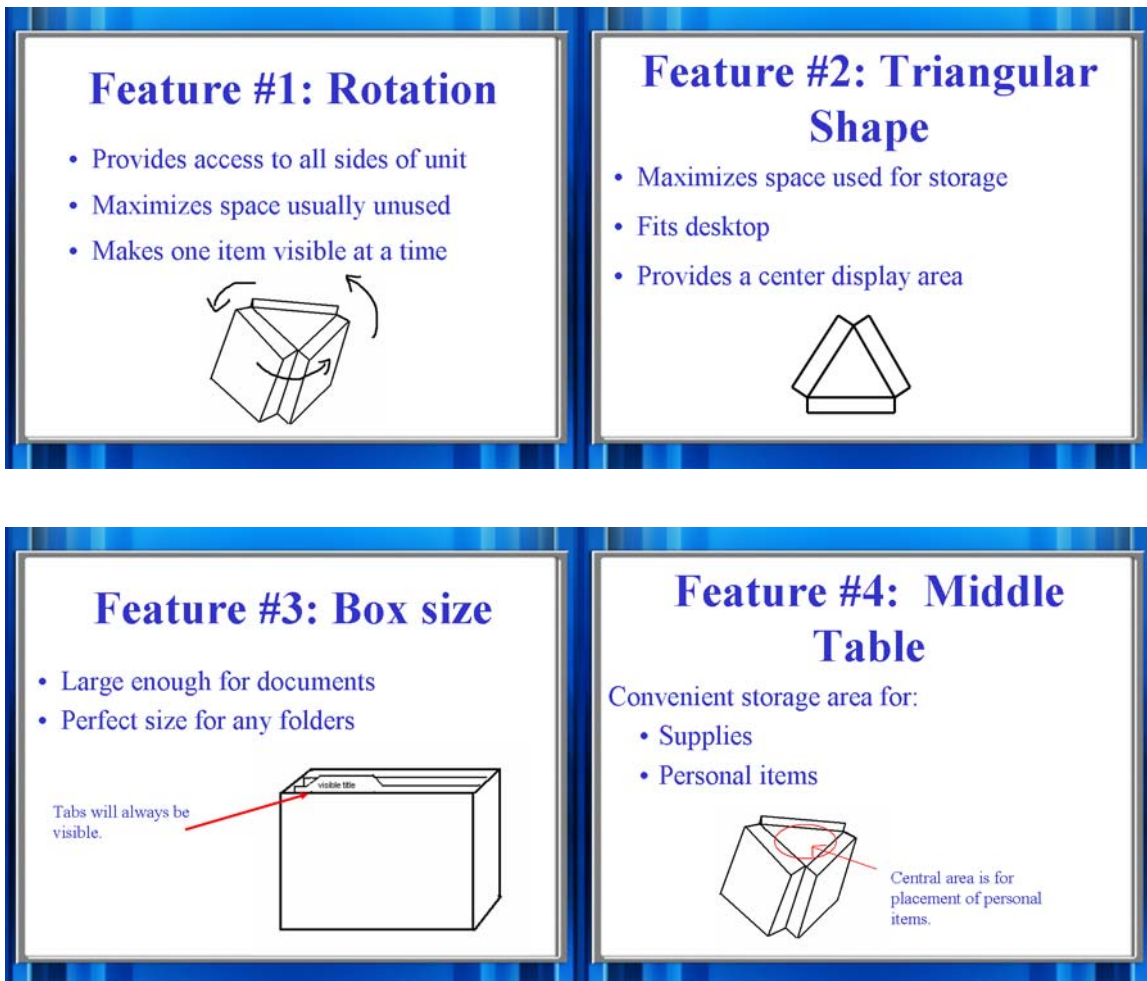
Figure 26.10: Use headlines to signal the
presentation's organization

Guidelines for making slides visually appealing

1. <u>Design template</u>. Pick a design template (background) that enhances the material you are presenting; avoid using a busy template that will distract readers from your graphics and text. PowerPoint offers an array of templates that convey different moods. You can find additional templates on the Web, and even design your own template. Whichever option you choose, make sure the text stands out clearly from the background. For this reason, avoid slides with color gradations that are likely to interfere with your font color. Also, make sure the background is appropriate for your design—don't use a template with a "law" theme for a product for a nursery school. Finally, don't use a background that is too "cute" for a business audience.

2. <u>Font style</u>. Choose fonts on your computer that are easy to read, such as Arial and Times New Roman. You can use two different fonts—one for

headlines and one for body text—as long as one is a serif font (like Times) and the other is sans serif (like Arial).

3. <u>Font size</u>. Use a font size that is large enough to be read easily:

   - Headlines should be 28 points or larger.

   - Bullet-point fonts should range from the size of your headline down to 18 points (for third-level bullet points).

   - Use fonts no smaller than 18 points, except for material in the slide footer.

   - Use font sizes consistently in your slides.

   - Be aware that fonts used in the text for figures and tables tend to be too small to read. Either reformat the text or eliminate it.

Guidelines on slide text

1. <u>Keep slide text to a minimum</u>. Use key words or brief phrases to highlight points you plan to explain. Remember that a bullet point shouldn't exceed two lines.

   Here's how one team restructured its mission statement slide to make it easier to read (Cameron, Collins, Rauwerdink & Woodward, 2003).

   Example 26.3: Wordy mission statement

   Mission Statement

   - To design a clip to facilitate the process of attaching a bike light to a bicycle and to design a battery containment system to prevent the battery from falling out

   Example 26.4: Concise mission statement

   Mission

   <u>Design</u>:

   - a better mechanism to attach a light to a bicycle
   - a secure battery compartment for the light

   Here's how another team whittled down the verbiage on its list of user needs:

   Example 26.5: Wordy list of user needs

   - Design a prominent place for brochures and other informational material to be kept for students to pick up
   - Divide the office from the area that students wait in
   - Create enough places for students to sit
   - Have one window for pick-up and one for drop-off

- Have an overall pleasant and professional-looking environment
- Create an environment that is comfortable to work in

Example 26.6: Concise list of user needs

Provide the user with:

- Prominent spot for informational material
- Waiting room divided from office
- Ample seating
- Separate windows for pick-up and drop-off
- Pleasant, comfortable, professional environment

2. <u>Use the same grammatical form for all bullet points</u>. Phrase bullet points in a grammatically parallel style, i.e., sentences, verb phrases, or noun phrases.

Example 26.7: Slide with non-parallel list

Requirements

- Must be durable
- Safety
- Ease of use
- Be easy to maintain

Example 26.8: Revised slide with parallel list

Requirements

- Durable
- Safe
- Easy to use
- Easy to maintain

3. <u>Use effective "builds" to emphasize key points</u>. On a "build" slide, the slide starts with the first bullet point, and others appear as you mention them. Avoid "fly-ins"—bullet points that fly into the slide from above, below, or the sides—because they distract from the content. If you are presenting from a figure, your build might include circles or arrows that highlight key areas of the figure as you discuss them. Or you might begin with an overview picture of the whole design and then follow with a series of slides in which each presents a close-up of a key feature.

Guidelines on slide graphics

The following slides show how to use graphics to make key points:

1. <u>Highlight the design problem</u>. The slide below uses graphics and minimal text to show how the cap for a bicycle headlight can easily come off and get lost (Cameron et al, 2003).
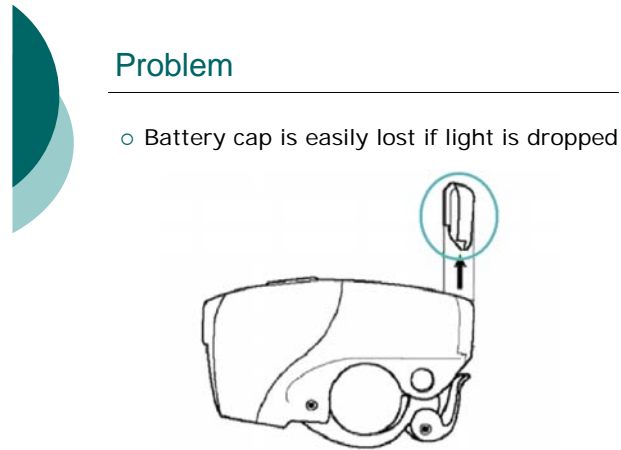

Figure 26.11: Use graphics to highlight the design problem

2. <u>Highlight the features of your design</u>. The slide below shows how a safety zone improves the way parents drop off and pick up children from the school parking lot. Note the use of arrows to connect the text to the relevant part of the graphic (Bosak, Davidson, Mitra & Ratz, 2001).
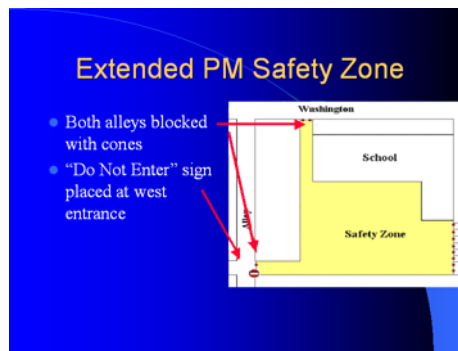

Figure 26.12: Use graphics to highlight design features

3. <u>Emphasize the benefits of the features you present</u>. The following slide complements the graphic with bullet points and a heading that emphasize the benefits of the safety zone (Bosak et al., 2001).
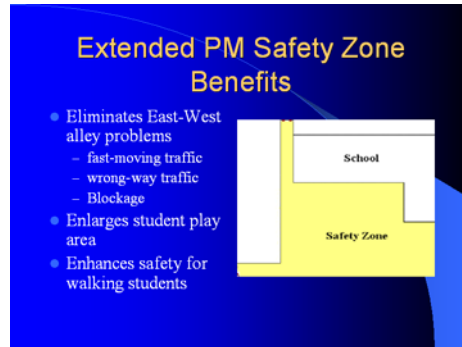

Figure 26.13: Use graphics to emphasize benefits

4. <u>Illustrate the structure of the design</u>. The slide below uses clear, simple graphics and minimal text to show the placement of the two products designed to reduce the client's desk clutter (Cibor et al, 2002).
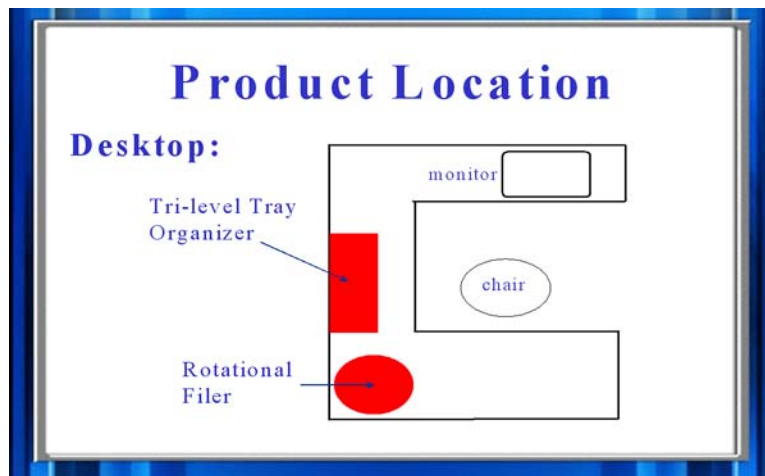

Figure 26.14: Use graphics to show design structure

After preparing a draft of your slides, review them as a team. Make sure each slide coordinates headline, text, and graphics, and that the slide package makes sense to your audience. Slides should have a clear flow and tell a persuasive "story."

Note on including supplemental slides and using handouts: You may find it useful to make supplemental slides that include graphics you can refer to during the question and answer session. For instance, you may include backup slides with data tables, graphs, photos or drawings of the design, etc. These slides are not meant to be part of your formal presentation but to serve as visual aids during the Q & A. Similarly, if you have material that is too dense

to be readable on a slide, such as a table with many testing results, you can use a handout to supplement a slide.

26.2 DELIVERING THE PRESENTATION

A successful presentation involves more than just designing good slides. You also need to speak clearly and professionally and to demonstrate your prototype effectively. Here is advice for doing that.

26.2.1 Effective delivery

A successful presentation requires that you:

- Speak clearly. Talk to "the back of the room." If you imagine yourself talking to people at the back of the room, you will automatically project your voice sufficiently so that even audience members who are hard of hearing or who are coping with background noise from the adjacent room will hear you.

- Maintain eye contact with your audience. To make sure you don't neglect a section of the audience, deliberately look at individuals who are sitting in various parts of the room as you speak.

- Don't read aloud from notes. Your audience expects you to be the expert on your design and to be able to speak without written notes.

- Don't read slides aloud. Instead, look at each slide briefly to refresh your memory, and then turn and talk directly to your audience. You should have more to say than what's written on the slide. The extra information you present will give your presentation depth.

- Avoid digressions. Stick to the content and organization your team worked hard to develop for the presentation.

- Stand so that everyone in the audience has an unobstructed view of you and your slides. Don't stand between the projector and the slide (to avoid casting a shadow on the slide).

- Use precise language. Avoid vague wording like "our mockup is not exactly to scale, but it's pretty close," and "we're fairly confident our design will stand up to the wear and tear of everyday use." Instead, say, "Our mockup is built to nine-tenths scale," and "We are confident our design will stand up to the wear and tear of everyday use. Our written proposal details the rigorous testing we subjected our prototype to establish its durability."

- Avoid filler expressions like "uhm" and "right." It's okay to be silent for a moment while you're thinking.

- Repeat each question posed to you and answer it in a straightforward way. Repeating the question ensures that everyone hears it and that

you've understood it. If you don't know the answer, be honest and say you will research it.

26.2.2 Using the prototype to communicate your design

Your prototype is **not**, in most cases, identical with your design; it illustrates key features and functions of the design. It's important, therefore, to avoid confusing your audience on this point. That means that you must be clear about the features of your prototype that do and do not correspond with your final design concept. For instance, if your prototype is made of wood, but you are recommending that the final product be manufactured out of aluminum, you need to say that.

Despite this word of caution, however, your prototype is probably your most powerful tool in illustrating the design and persuading the client that you have solved the problem. Therefore, carefully integrate the display and demonstration of your prototype into the presentation using the following guidelines:

- Decide when to show your prototype in the presentation. Briefly demonstrate your prototype near the start if you believe doing so will dramatically convey your solution and predispose your client to accept it. Later, you can present the prototype in more detail. However, you may decide that your client will more readily understand and accept your solution if you present the problem and research first, followed by slides that show close-ups of features, culminating in your demonstration of the prototype.

- Display the prototype prominently. Place it on a table in viewing range of the audience. If it's small, have one team member hold it up while another explains its features. If it's large, place it on the floor, surrounded by the audience's chairs. Make sure you turn up the room lights if you have dimmed them for the slide presentation.

- Use slides to supplement the demonstration of your prototype. If some features of your prototype are small or hidden, use enlarged slides to show these features.

- Clearly explain the prototype's functionality. Prototypes in EDC tend to have some fully functional features, some that are partly functional, and some that do not yet function at all. In addition, the prototype's dimensions may differ from those in your recommended design. Therefore, you should explain the level of functionality and the ways in which the prototype differs from your recommended design. Otherwise your client might be confused, assume the prototype **is** the final design, and wonder why it doesn't work the way you say it does.

Using video to demonstrate a prototype: As an alternative to doing a live demonstration, some teams have made a video of the prototype in use and

shown that at the presentation. The advantages of making a video are that you can show the prototype being used in its intended location and that you avoid the possibility of embarrassing malfunctions during the presentation. The disadvantage is that your video might not work (see the next section on managing technology). If you plan to use a video, be prepared to discuss the prototype without the video in case something goes wrong.

26.2.3 Managing presentation technology

The technology you use to deliver your presentation should complement your message, not overwhelm it. Be prepared for problems, and prevent them by following these guidelines:

- To increase the likelihood that your presentation file will be compatible with the classroom computer, (1) <u>use standard fonts</u> that will be available on the classroom computer for presentations. Avoid unusual fonts you may have downloaded to your computer. (2) <u>Avoid cutting and pasting pictures into your presentation</u>. Instead, save picture files to your computer and use the "insert" function to insert them into your presentation.

- <u>Use high-contrast colors and fonts</u> for your presentation, and make sure they look good. Pastels or light shades that look good on your monitor are likely to look washed out when projected. Test them at your rehearsal.

- <u>Test your slide presentation</u> on the equipment you will be using. Anticipate hardware and software problems, and work with local tech support to solve them. If you have problems with computers in the design studio, consult the EDC staff.

- <u>Test all multimedia in advance</u>. Not all video, audio, animation, and modeling applications that worked on your computer will work on the computer you'll be using at the presentation. To avoid this problem, copy large files to the computer's local hard disk instead of running them from a CD or networked drive. Test all demonstrations in advance to prevent delays or catastrophes during the presentation.

- <u>Have backup copies of all files on hand</u>. If you can download files over the network, great. But be prepared for problems: You don't want to have to sprint back to your dorm room because of a network outage or bad disk.

- <u>Set the room lights at an appropriate level</u>. The audience should be able to see you, the screen, the prototype, and handouts. Practice setting the lights so you can adjust them quickly and unobtrusively during the presentation.

26.2.4 Presenting in a professional way

All members of your team are expected to take a visible, active role in the final presentation and to present themselves professionally. Making a professional group presentation requires more than effective delivery by each individual. Here is some advice for presenting professionally as a team:

- <u>Dress professionally</u>: a jacket and tie, or a tie and dress shirt for men; a nice outfit for women. All members of a team should be dressed at a similar level of formality.

- <u>Introduce group members at</u> the start of the presentation and list their names on your title slide.

- <u>Introduce and thank your client</u>.

- <u>Assign each team member a role</u>. Each team member should deliver part of the presentation. During the question and answer period, have all team members answer questions to emphasize that the design is a team effort. Decide beforehand who will answers questions on various topics.

- <u>Make smooth "handoffs" from person to person</u> during the presentation. For example: "That summarizes the problem and requirements. Now Jamal will explain how our design addresses those requirements."

- <u>Stand and pay attention throughout the presentation</u>, even when you're not speaking. Chatting, slouching, or looking off into space while your teammates are speaking is not professional!

- <u>Give your client the prototype</u>, a bound color copy of your <u>proposal</u>, and a disk with your PowerPoint <u>presentation</u>.

26.2.5 Rehearsing the presentation

Rehearsing as a group makes a tremendous difference in the quality of your final presentation because it helps each person become more confident and relaxed. It also provides an opportunity to make changes to your content, organization, and delivery. As soon as you speak your ideas out loud, you are likely to gain new insights about what to say and even what to emphasize about your design. Moreover, practicing out loud will help you perfect your timing.

As you rehearse, ask yourselves the following questions:

- <u>Content</u>. Is the main message getting through? Are we providing enough or too much detail?

- <u>Organization</u>. Does the order of points make sense? Are there points that need to be explained sooner?

- Delivery. Can each person be heard and understood? Is the prototype demonstration effective? Are the slides helpful? Do the visuals connect to what the speaker is saying? How can each person improve his or her part of the presentation?

- Technology. Are we handling the equipment unobtrusively? Have we resolved all potential hardware or software conflicts? If something goes wrong, do we have a backup plan?

Time yourselves to ensure that the presentation is no more than 30 minutes, with the last 10 devoted to questions and answers. Rehearse at least twice, once in front of your class and instructors, and, if possible, video your practice presentation so that you can review it later.

26.3 REFERENCES

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