Optimize Your Conference Poster's Impact

Engineers routinely optimize process designs; poster designs need optimization too. Use these techniques and strategies to create a poster that captures and holds the viewer's attention.

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◀ Suneetha Burla (right) from SAFER Systems, Camarillo, CA, discusses the poster, "Guidelines for Sensor Siting at Industrial Facilities," March 23, 2010, at the AIChE Spring Meeting in San Antonio, TX. Photo by Roberta Barnes.

Can your poster attract and hold an audience in four seconds? That's what poster presentations at AIChE conferences need to do.

Many conference attendees value poster sessions because they can control how their time is spent and can select personally valuable information quickly. Most are looking for cutting-edge ideas and research results, but they may also look for prospective faculty members, new hires for industry, and collaborators for new projects. Surprisingly, most engineers appear to decide in less than five seconds whether to stop and read a poster or to walk on. You must help audiences quickly recognize the value of your project.

An intensive analysis of 154 posters presented at an AIChE Annual Meeting found that only 20% of the posters had an optimal design. The most common problems were:

- titles did not communicate the project's purpose and significance
- the organization of the poster's sections did not reflect the project's message
- headings did not summarize points about the project
- poor legibility resulted from too much text, small point sizes, and poor use of color.

In contrast, the best posters helped visitors: decide quickly whether to stay and read the poster; comprehend the author's argument; gauge the professional value of the work; and enjoy the interpersonal and intercultural appeal of the display. A poster that ranks high on all of these criteria has optimal value for all possible audiences. The following guidelines can help you create a design that maximizes the poster's effectiveness.

Communicate the project's purpose and significance quickly

As viewers approach a poster, the size and legibility of its title — as well as its words' meanings — influence the audience's first decision about whether to view the poster in detail. Some title treatments fail because the background and the title are in equally bright, competing colors (such as bright red on bright blue). If "wordart" has been used to stretch, shade, or contort the title, the extra second it takes to read the title uses up one of those four precious decision-making seconds.

Several design techniques can help draw the viewer's attention to the title:

- the size of the type
- a clearly defined area that showcases the title
- a contrasting color for the type that sets it off from the rest of the poster and links it to the major headings.

Make your title answer the viewer's questions. Many titles announce only the topic, such as "Oxidation of Lactose," when the viewer really wants to know the project type (research, design, modeling, and so on) and the

project's significance (new application, improved process, economic benefits, etc.).

The grammatical structure also contributes to the ease with which a viewer grasps a poster's argument. For example, "Treatment of Waste Streams Containing Copper (II) Ions and Organic Compounds Using Polyethyleneimine (PEI)" has highly specific words. However, the participle "using," which signals a means or method to produce an effect, doesn't occur until the eleventh word in a twelve-word title. If the syntax had been altered to "Using Polyethyleneimine (PEI) to Improve Treatment of Waste Streams ...," the cause-effect message about changes to the process would have been perceived from the outset, and the significance implicit in "improve" would have been conveyed also. Signaling the kind of improvement (economic, efficiency, and so on) would have been even better.

As often as possible, rephrase titles to indicate the project type and its significance as well as the topic, and be as specific as possible.

Arrange sections to create an obvious visual argument

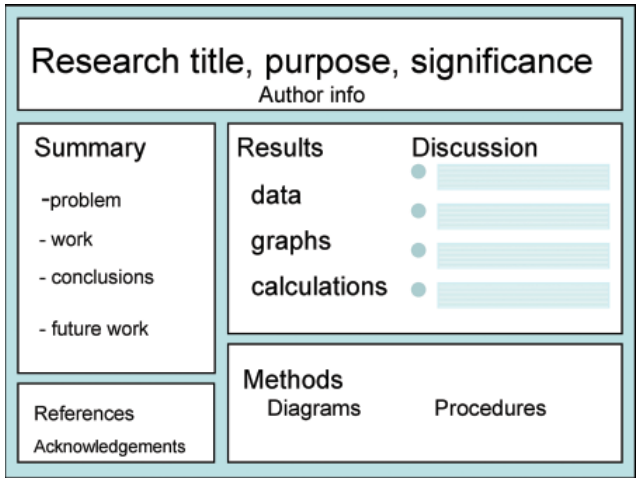
Almost before reading the title, the viewer has also detected the macro organization of the poster and that organization's intrinsic meaning — *i.e.*, its visual argument. Thanks to a mental capacity called subitizing *(1)*, it takes only a fraction of a second for human brains to determine how many items or how many areas are contained in a display.

Psychologists have demonstrated that the more items present, the harder it is for a viewer to detect how many there are, the longer it takes, and the poorer the viewer's accuracy. If multiple items are aligned in groups or patterns, however, additional cognitive capacities enable the viewer to make sense of the array more accurately *(1, 2)*. A coherent visual or graphic hierarchy, such as one with larger-to-smaller type and color coding, speeds the interpretive task.

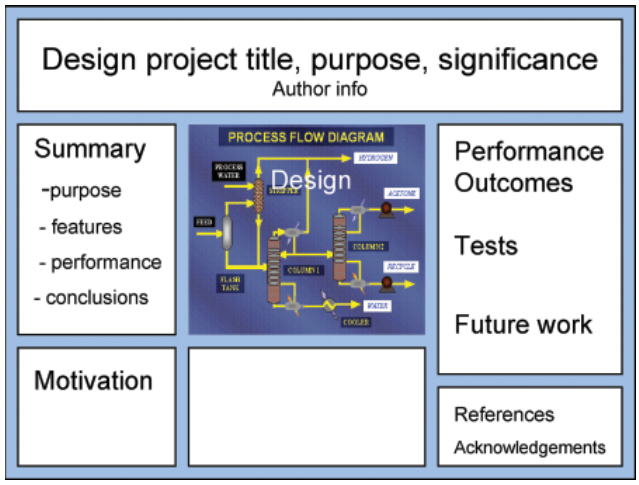
Whether the viewer recognizes the principal sections as a meaningful pattern depends on the macro organization of the areas. Blank space helps create patterns; it pushes smaller elements apart, forming distinct groups that can be seen as part of the macro organization. Additional cues, such as color regularities, lines, arrows, color bars behind headings, and graphic hierarchies of type, can reinforce this macro pattern.

Specific visual arguments and spatial arrangements are associated with the different genres of conference posters: research posters, design (or improved design) posters, new applications of known methods posters, candidate/career posters, problem analysis posters, and sales posters.

For example, research posters tend to include the introduction, methods, results, and discussion (IMRD) components common in scientific articles. Problems occur when research article headings are imposed on a different type



▲ **Figure 1.** In a research poster, the results are displayed above the method, because the results are usually of greater interest.



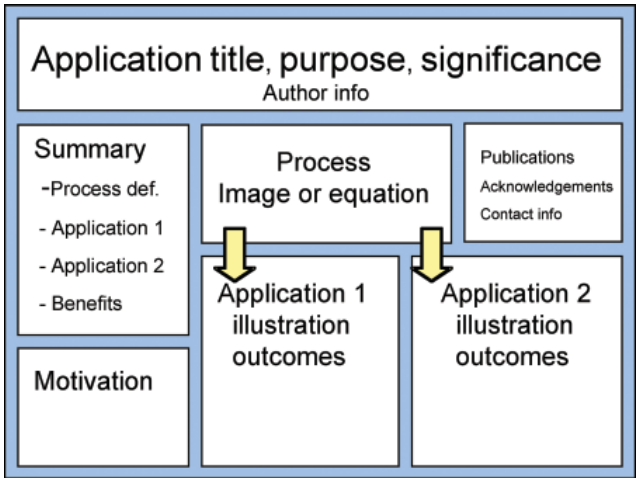
▲ **Figure 2.** Design posters usually highlight the flowsheet or an equipment diagram in the center of the poster. Performance data on purity, profitability, or efficiency will be critical.

of poster. Design posters present the problem/motivation, design, and confirmation of the design's appropriate performance. The design itself is usually featured prominently in a diagram, drawing, or photo. The confirmation section usually shows equations and calculations, along with graphs that demonstrate desired performance.

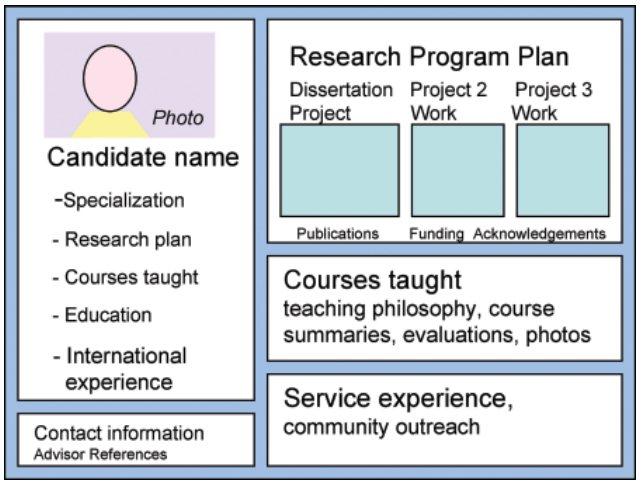
The presence of such expected components affects the first-glance perceptions of a specific poster. This helps the viewer determine whether the poster fits into a particular category of interest.

Look at the sample layouts in Figures 1–4. Their arrangement of areas signals typical patterns associated with project types. Notice the global cohesion suggested by the arrangement of big areas.

In the research poster (Figure 1), the results are shown



▲ **Figure 3.** In this application poster, arrows lead the viewer's eyes from the summary of the process to its applications.



▲ **Figure 4.** A candidate poster usually has a summary of qualifications in the left-hand column and organizes the rest of the space horizontally.

above the method. Since many methods are standard, the results are usually of greater interest than the method — unless the method itself is the new and significant element in the research.

The design poster in Figure 2 features the new process prominently in the center of the poster. The method of design may be insignificant; performance or justification, in terms of purity, profitability, or efficiency, will be critical.

The new applications poster in Figure 3 uses arrows to lead the viewer's eyes from the summary of the process (or method) to the applications.

In a candidate poster (Figure 4), a summary of qualifications usually appears in the left-hand column and the rest of the space is organized horizontally into the familiar three components valued in academic institutions: research, teaching, and service.

Signal a path for the viewer's eyes

A viewer's culturally learned pattern for reading usually contributes to his or her expectations. Westerners tend to expect information design to place a summary or abstract at the beginning of the exposition (after the title and author information), in the upper left corner or in another foregrounded, emphasized space. Non-Westerners are more familiar with an upper right to lower left pattern. Thus, the poster's design needs to signal a path that the viewer's eyes should follow. If the poster clearly indicates the path — with numbers, colored arrows, framing colors, and so on — it will direct the viewer's eyes whether the organization is from left to right or right to left.

Identical areas (such as PowerPoint slides) arranged in a grid should be grouped with lines or colored backgrounds to guide the reader's eyes. When the margins on all sides of the slides are the same, the viewer cannot necessarily tell whether to read across the row horizontally or down vertically. It is also hard to make the titles on PowerPoint slides large enough to read from several feet away or to signal groups of slides.

Paying extra attention to visual guidance is important, because the majority of poster session viewers at AIChE conferences are likely to expect a left-to-right pattern of organization. When the title area occurs on the right and the exposition area lacks reinforcing signals, viewers experience at least a temporary confusion about what path their eyes should follow.

Control color contrasts to emphasize the spatial argument

Color combinations strongly affect the perception of both macro organization and technical argument. A viewer quickly recognizes similar shapes and colors, and expects those similarities to be meaningful. Contrast helps the viewer know what parts of the argument are of equal weight as well as how they fit together in the macro pattern.

When colors compete because they are of equal intensity, it is harder to see the larger organization. The poster in Figure 5 on the next page attracts attention with red ovals and white rectangles on a blue background. The high-intensity contrast between the red ovals and the blue background draws a viewer's eye from one red oval to another without signaling an argument structure. The red headings are hard to read; the black text inside the red ovals is not easily legible against the bright red background (low contrast); and the high-level argument pattern is hard to decipher quickly. The dense table of information in the center of the poster also signals a long reading time. The friendly presenters had to rely on their smiles and relaxed stances to welcome viewers to an otherwise ambiguous poster.

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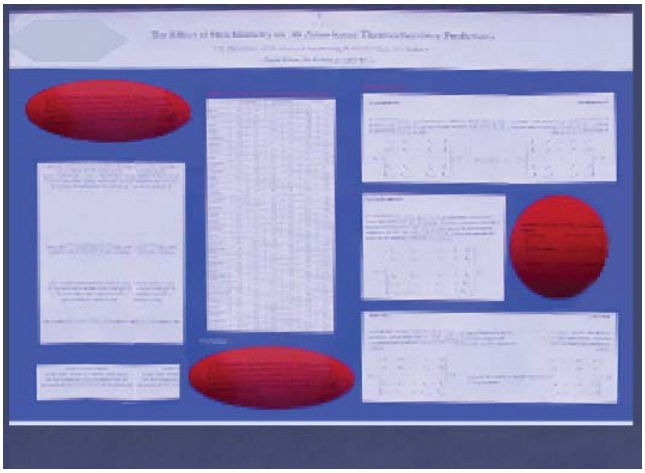
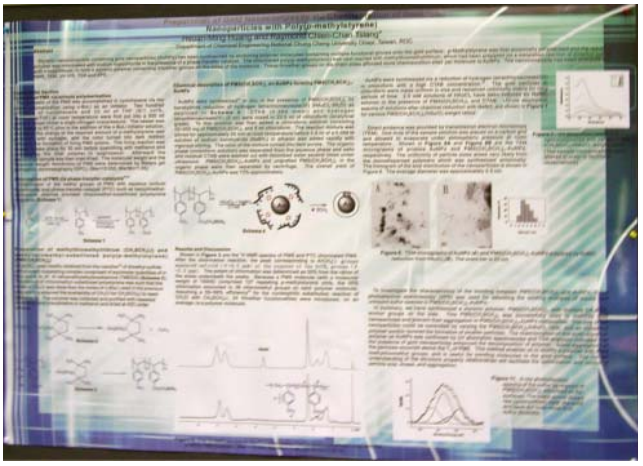


▲ **Figure 5.** In this poster, the equally intense blue background and red areas compete for attention, making it hard to decide where to look first.



▲ **Figure 6.** PowerPoint templates do not always translate well to poster size. Even with accessible graphs and diagrams, the background color pattern and small, heavy text discourage potential readers.

Deliver your message with high-specificity major headings

A viewer attempts to grasp the meaning of a poster's sections with a glimpse at the major headings. If the poster uses the IMRD structure, the viewer can guess the type of information, but not the specific semantic content of the section or how it relates to the title. The reader will need to turn to the abstract or summary, if the poster has one, to get the point. If time is short, he or she will likely move on.

Explicit headings help viewers perceive the project's value. However, a heading of "Summary" or "Abstract" is indeed important for visual efficiency, because initially the viewer is trying to comprehend the overall visual argument, and "Summary" shows the reader where to look for the highest-priority information related to the read/not read decision. "Method" and "Results" add little to a reader's comprehension of the presenter's argument, and they are not key to the read/not read decision. Descriptive, explicit headings increase comprehension more efficiently.

Summarize your message legibly

An abstract or summary helps viewers who are trying to determine how valuable a poster will be for their own interests. Comprehensibility matters to them, and the summary contributes to the efficiency of their decision-making. The summary should contain a brief statement of the research challenge, the project's activities, and outcomes.

The poster summary or abstract should be in especially large, legible type, and can be broken into paragraphs or bullets. It is *not* the same as a journal article abstract.

Presenters who display this key element in small type and in a single, unbroken stream of text (as in a technical journal article) do so in opposition to viewers' needs and their own interests. Older engineers, who are often in decision-making positions, may have trouble reading abstracts displayed in small point sizes.

Enhance legibility for easy reading

A text-heavy design, especially one that lacks blank space around text areas, deters readers. If other design choices also reduce reading efficiency, such as an intrusive background image or low-contrast color combinations for the background and text (*e.g.*, light yellow type on a pastel blue background), many people will choose to walk on.

The poster in Figure 6 illustrates the problems of intrusive background, too much text, and a small-point-size title. The highly visible, large figures in this poster did not compensate for the burden of excess text and low legibility.

The background pattern in Figure 6 appears to be from a PowerPoint template. Although suitable for projecting a bullet-point list that is large relative to the background, these templates are sometimes problematic when used for a poster because of the latter's large format and much smaller type (in relation to the overall area). Such problems arise when an author views the elements of a poster only on a small computer screen.

Set your computer display to 100% and step back about five feet to see the effect of text choices. Scroll to other parts of the poster, such as figures, and step away again to judge their legibility. The details you consider essential will be irrelevant if the viewer concludes that reading your poster will be too much trouble.

A background image can add visual drama. However, one that interferes with legibility increases reading time. For example, the background of the poster in Figure 7 overwhelms the legibility of the white (or reversed) type that falls on the yellow portions of the image.

Since most conference attendees have a limited amount

of time available for visiting the poster hall, anything that increases visual efficiency is valuable. In Figure 7, aesthetic appeal and novelty are powerful attractive forces, but the difficult-to-read title and text reduce the poster's accessibility and make it largely unsuccessful.

Slim down "fat text"

Avoid long sentences. Use the active voice, with what is doing the action in the subject position if it is not clearly indicated in the heading. Then look for parallel or equivalent elements that can be made into a bullet list.

For example, consider the following fat text, which goes on for 25 words: "The ideal anesthetic should quickly make the patient unconscious but allow a quick return to consciousness, have few side effects, and be safe to handle." This can be pared down to a heading and 10 words:

Ideal anesthetic

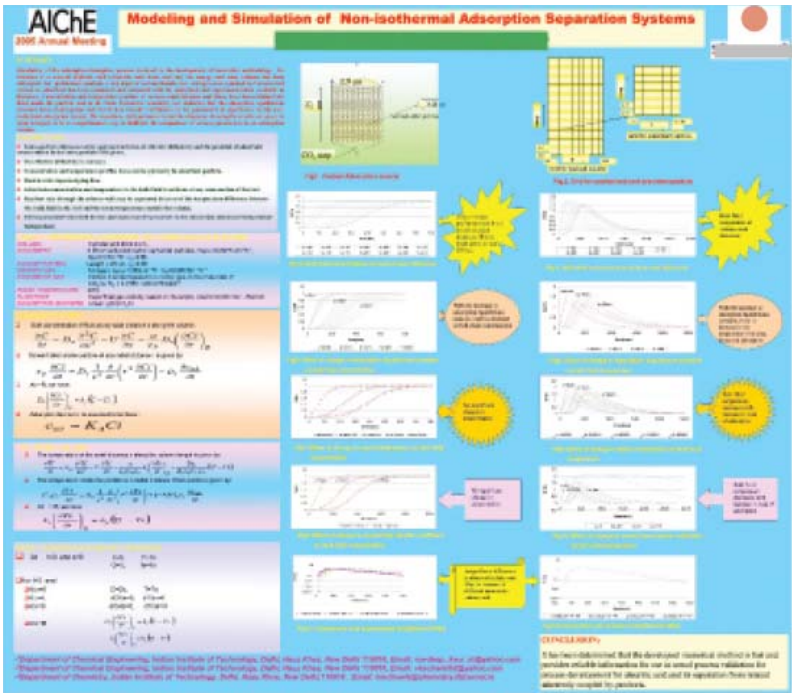
- quick sedation
- quick recovery
- few side effects
- safe to handle

Legibility depends on both point size and the contrast between the text and the background. When the text and background color are similar in intensity (equally bright or equally pastel), readers have a hard time distinguishing the text. In Figure 8, the bright yellow headings and the hot pink type of the abstract are not clearly visible against the bright blue background and are difficult to read. Although the colors are visually appealing, they should be combined with high-contrast type, as they are in the callouts beside the graphs. Notice how much more legible the callouts appear than the headings above the graphs.

The colors in Figure 8 appeared in several posters authored by engineers from South Asian institutions or companies. They were frequently combined, as in this example, with national colors, such as the bright coral, lime green, and tan in the title areas. Many East Asian engineers seem to prefer red backgrounds, a culturally positive, even celebratory, color, combined with yellow-gold type and green accents. When the type is a serif font, the variable shaft width of the numbers and letters makes the equations and figures difficult to read, especially when the type is small. Yellow-gold type on a bright aqua background has the same effect.

Authors do not need to adopt Western patterns of organization, but all presenters must

▲ **Figure 7.** The yellow portions of this background image make reading the small white text a challenge. Coupled with section heading text that is too small and a layout with an unclear macro organization, the dramatic background leaves the visual argument even more difficult to follow.



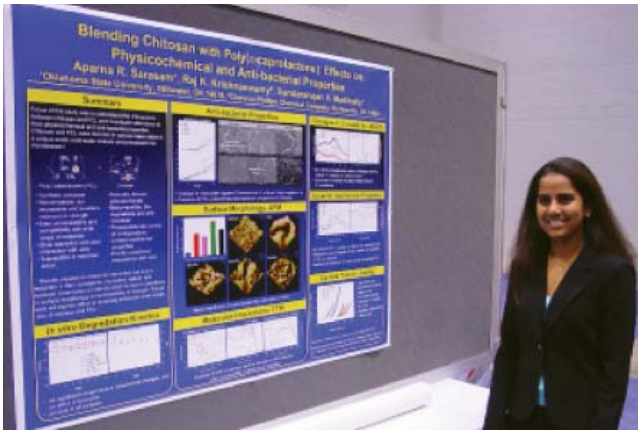
▶ **Figure 8.** Equal color intensity and low contrast contribute to poor legibility.

pay attention to legibility when choosing colors and directing viewers to the macro organization of information. With appropriate cues, such as numbers, arrows, and colored areas, designers can guide the viewer's attention.

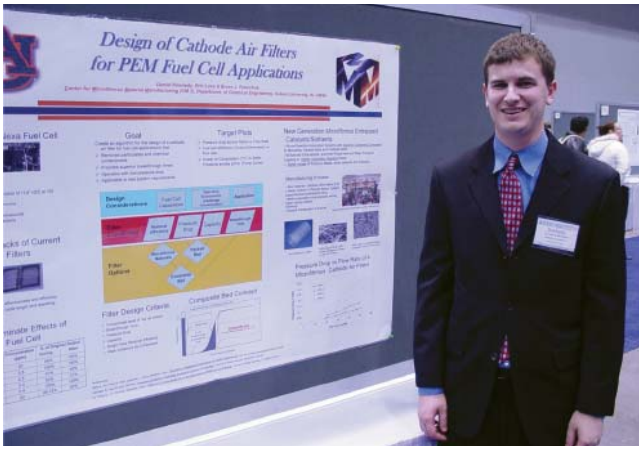
Reinforce ideas with design choices

The author of the poster in Figure 9 has clearly defined the poster's macro organization and used high-contrast color combinations to define major headings. Using the same gold color for the title and the background of major headings links the title and headings. The summary is large and in easy-to-read type. The poster could have been improved even more with changes to font size, especially in the graph labels.

The engineer in Figure 10 has signaled the macro-level organization of the poster by dividing the main area into three columns devoted to the current problem, the design process, and the design's applications and validation, making the arrangement reflect the title of his team's poster, "Design of Cathode Air Filters for PEM Fuel Cell Applications."



▲ **Figure 9.** Aparna Sarasam, from Oklahoma State Univ., presents her poster, "Blending Chitosan with Polycaprolactone: Effects on Physicochemical and Antibacterial Properties," at an AIChE meeting. The poster employs easy-to-read headings reinforced by effective color choices.



▲ **Figure 10.** Daniel Kennedy, of Auburn Univ., presents his poster, "Design of Cathode Air Filters from PEM Fuel Cell Applications." This is a good example of a macro-level arrangement consistent with the rhetorical argument and title.

Emphasize professional value

References, future work, and acknowledgement sections signal that you are a professional engaged in a stream of ongoing work that has been the subject of others' investigations. These sections show that you belong to a professional engineering community and that you are ethically bound to others, including those viewing your posters. Your professional status also rises when you acknowledge mentors or assistants, funding agencies, and corporate sponsors.

Provide detailed contact information. There is a chance that you may not be present when an important viewer strolls by your poster. By displaying your postal and e-mail addresses, you aid viewers in noticing you as well as your work. Some presenters also include the time and location of their conference talks, letting the posters advertise their sessions. Prospective employers and collaborators will be able to contact you later, which may be the beginning of a fruitful relationship. That is worth a few inches of poster space.

Final comments

By paying attention to organization and legibility, authors can maximize a poster's accessibility, comprehensibility, professional value, and appeal to create a high-quality presentation that can lead to professional recognition and advancement. It is important for practicing engineers and engineering students about to enter the chemical enginering profession to understand the aesthetic principles presented here. Armed with such knowledge, presenters can optimize their poster designs to take advantage of advances in communication technologies while achieving both their own and their organizations' goals. CEP

L. P. DRISKILL is a professor at Rice Univ. in Houston, TX. For ten years she directed Rice's Cain Project in Engineering and Professional Communication, which was highlighted in the 2004 *U.S. News and World Report Guide to Graduate Education in Engineering*. A survey of communication instruction at top-ranked U.S. and Canadian engineering schools described it as "one of the most innovative programs in the U.S." Driskill is the co-author of two communication textbooks and articles on international and intercultural communication, medical communication, visual argument, and communication theory as well as the AIChE poster study on which this article is based.

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