1) Sally plans her exhibit on black holes.

Sally Harris is a high school sophomore who has been researching black holes for the past three months. This is a topic that has fascinated her for years, and her biology teacher encouraged her to research it for the science fair this year, even though Sally won't be taking physics until next year. She has been in the science fair for the past three years, so she knows a lot about the kind of projects students select, how they organize their exhibits, and what the judges look for.

She is a bit worried about the space and materials provided to everyone—a standard 4x6 poster board, with a two-foot shelf underneath for supporting physical materials or models. This year she has explored some new methods—for example, an Authorware simulation that illustrates her theory of black hole formation. But she knows from past years that there are few electrical outlets in the gym, and she doesn't have a laptop to use in the exhibit anyway. She checks with the organizer, Rachel Berris, just in case, but Rachel confirms that the school district has no money for special resources such as laptops, and that she will be able to use only battery-powered equipment.

As she studies her simulation, Sally thinks of a way to turn the lack of computer support into a "feature": She will create a sequence of visualizations that can be flipped like a deck of cards to show the animation. In fact, as she works, she gets into it and decides to create several variations, so that visitors can guess which one matches her project data and conclusions. She will then chart people's guesses as a dynamic element in her exhibit. She knows from experience that this is just the sort of thing judges will notice and award points for. Now she just has to figure out how to fit everything into the space she will have.

2) Mr. King coaches Sally on her project.

Mr. King worked during his lunch hour so that he could save some time to come to the lab and work with Sally on her exhibit. He knows that Sally has already done a lot of work researching black holes, but he wants to make sure she comes up with an effective layout and that she covers all the standard project areas well. When she signed up, Sally told him she has done this several times, so he figures the session will go pretty smoothly.

When he gets to the lab, Sally is already there and has begun to collect stacks of materials on a lab table, which happens to be the same 4×6 size as the bulletin board she will have at the fair. John cannot tell what is in the piles, but a quick look suggests that they hold materials related to the standard sections, Introduction at the top left, and so on. Sally shows Mr. King some photos of galaxies she has downloaded from the Web; she is very

Figure 2.13 Problem scenarios illustrating how science fairs currently take place.

careful when handling these because they were printed in high resolution on expensive glossy paper.

Mr. King notes that Sally already has the standard sections well covered in her piles but thinks that she has too much content. Sally agrees and asks him to help her select the best pieces. He reminds her that both the judges and the visitors will be very influenced by first impressions as they walk up to the exhibit, so they first look for example materials that will look good from a distance. They use the table to lay these out, then choose supporting materials that provide the logical connections and explanations. Sally makes notes about figures and other documents that she still needs to create. She also talks to Mr. King about her idea for the interactive element, and he agrees that the judges will love it. But he's worried that the exhibit will get too complex and messy, and suggests a decorated hanging container for visitors' experiments and comments.

3) Alicia and Delia go to the science fair.

Alicia Sampson owns a hardware store. Her neighbor, Sally Harris, is participating in the science fair for the third year in a row, and Sally's mom has mentioned it several times. She wants to go to show support for Sally, but also wants to encourage her daughter Delia's interest in science. However, she also feels a little awkward about going—she knows the fair is in the high school gym, and she has not been inside the school since she was a student there. Five years ago she even signed a petition asking the school board to tighten budgets in high school science. But she saw a science fair poster at Krogers today, and wonders if her husband can take Bobby to his basketball game. He's free, so she and Delia go on their own.

When Alicia and Delia walk into the gym, Alicia smiles, sharing briefly with Delia some pleasant memories of high school basketball games. After quickly scanning the open area, Alicia is amazed at the variety in projects. Some have just a few diagrams, others have complex physical models. She and Delia head for a project that has attracted a big crowd, but then she spies Marge (a former bridge partner) across the gym, so she and Delia go over to join Marge instead.

Marge is at Sally Harris's exhibit on black holes, and Sally is showing her a flip-card animation of black hole formation. Alicia and Delia pause to listen, and Alicia is happy to see Delia try out the animation. As they move on, Alicia is surprised to realize how much she has learned about black holes, a topic she's heard mentioned many times, but never really thought much about. Delia seems interested too; she tracks down one of her own friends and brings her back to meet Sally. Remembering Sally's poise and verbal skills, Alicia decides to follow up with her about a summer vacancy at her hardware store. As Alicia and Delia leave, they are talking about how they might get involved in next year's fair.

(continued)

Figure 2.13 *(continued)*

4) Ralph judges the high school physics projects at the science fair.

For the last three years, Ralph—a retired civil engineer—has been a judge at the Blacksburg science fair, so he is not surprised to be asked again; he agrees because he knows that the organizer, Rachel Berris, counts on his experience on the judging team. In past years, he was occasionally able to get advance information about the exhibits, but this year could find out only the student names in advance. He is given the task of judging the high school physics projects; given prior years, he knows he will have to work quickly to get all five evaluated in the 90 minutes allotted. On the night of the fair, Ralph arrives promptly at 7 P.M., picks up his forms, and begins the process of studying the exhibits and interviewing the students. His previous experience helps him to assign ratings in the specified categories, but as usual he finds it difficult, especially when trying to compare across projects. At one point, he needs to evaluate two very nice projects in parallel, and finds himself running back and forth comparing details, annotating the scores with explanatory comments. Finally he is done; he signs the forms and submits them. Rachel and her assistant are already compiling a large stack of forms. Ralph is relieved to finish on time, and is eager to see how his evaluations will compare with those of the other judges.

5) Rachel organizes a presentation for the superintendent.

Rachel was proud of the science fair projects that were exhibited this year, so she is delighted when Superintendent Mark Carlisle tells her he wants to show highlights from the fair at next month's school board meeting. She hopes that if he can impress the school board with some of the best exhibits, he will be able to make a case for increasing the resources available for next year's fair. Carlisle wasn't able to attend the fair himself, so Rachel briefly describes some highlights. She is careful to tell him about the problems with Sally's exhibit, mainly that she was unable to demonstrate her black hole simulation because of lack of equipment and power sources.

Carlisle asks Rachel to collect sample materials for a 15-minute PowerPoint presentation. She spends a good part of the next week tracking down the winning authors and getting copies of their best poster elements. Some of the material is provided in digital form, but she has to use a scanner to digitize about half of it. After she has a good set of visuals, she browses them, looking for the most impressive and self-explanatory examples, adding a few notes here and there to help Carlisle summarize the source projects. When she is done, she emails the PowerPoint presentation to Carlisle. She also decides to sends him Sally's simulation file, just in case he has time to show it. Unfortunately, she later discovers that Carlisle's presentation backfires: The school board thought that the winning projects were of such high quality that there was no apparent need to increase resources for next year's event.