CHAPTER

13

RAPID ANALYSIS

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Analysis takes time and reflection. People must be lined up and their views sought. Ideas need to be sorted through. Data need to be collected, stored, retrieved, examined, and displayed. Calculating the formulas, writing the report, and presenting the findings takes time—and it should. All of this delays a decision maker's access to the final report. Often at the end of this grueling effort, analysis identifies the need for further inquiry, and therefore it creates more delays for decision makers. Something should be done to speed up analysis. Rushing through an analysis is not advocated here, but keep in mind that a late report is a wasted analysis. Timing matters. When reports are late, policymakers and managers may have to decide without the full benefit of the analysis, and many do.

This chapter focuses on how an analysis could be done more quickly without sacrificing its quality. Clearly, doing a thoughtful analysis takes time. There is no point to hurry and produce a suboptimal analysis. But there are ways to complete the analysis faster and yet maintain the quality of the work. An examination of what takes time in the analysis process suggests places where one can speed up the work without affecting the quality of the report. One could imagine analysis consisting of four distinct phases:

1. Preparation
   a. Arrange for contracts and mandate to start
   b. Coordinate kickoff meeting to clarify the purpose and scope of the analysis
   c. Find relevant experts and decision makers
   d. Design study instruments and survey forms
2. Data collection
   a. Collect observations
   b. Collect experts' opinions
   c. Store data
3. Analyze data
   a. Retrieve data
   b. Clean the data (classify data, check distribution and range of data, edit data)

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   c. Examine the accuracy of the data (check for errors in logic or in transfer of data)
   d. Examine whether experts are in consensus
   e. Calculate expected values or model scores
   f. Calculate the correspondence between the model and experts' judgments
4. Presentation
   a. Distribute draft report
   b. Prepare presentation
   c. Get input from audience before meeting
   d. Present results at meeting

If each of these phases can be speeded up even a little, then the whole analysis can be completed more quickly. This chapter addresses how this can be done.

Phase 1: Speed Up Analysis Through More Preparation

Thorough preparation can lead to significant time savings in conducting an analysis. This section lists specific recommendations regarding what should be done to be better prepared.

Step 1: Draft the Final Report at the Start

One of the simplest steps an analyst can take to reduce the time from the start of the project (signing the contract) to the end of the project is to do more thorough planning. In particular, it is helpful to draft the final report (the introduction, methods section, results section), with all related tables and appendices at the start of the project (Alemi et al. 1998). Obviously, the data will not be available to fill the report, but one could put in best guesses for the data. This exercise speeds up an analysis in several ways. First, it communicates precisely to decision makers what the final results will look like. Second, it reduces confusion and saves the time spent on clarifying the procedures of the analysis. Third, it clarifies to the analyst what data are needed and identifies the sources of these data. Finally, it clarifies what procedures should be followed to produce the tables and figures in the report. Obviously, the data and the final report will be different, but the exercise of putting the report together at the beginning of the project goes a long way in making sure that only relevant data are collected and that time is not wasted on diversions.

A good example of drafting the report before the data are available is the process of generating automatic content on the web. The text of the report is prepared ahead of the data collection, and portions of the report that depend on specific data are left as a variable to be read from a database. When the data are available, the final report is generated automatically.

Step 2: Avoid Group Kickoff Meetings

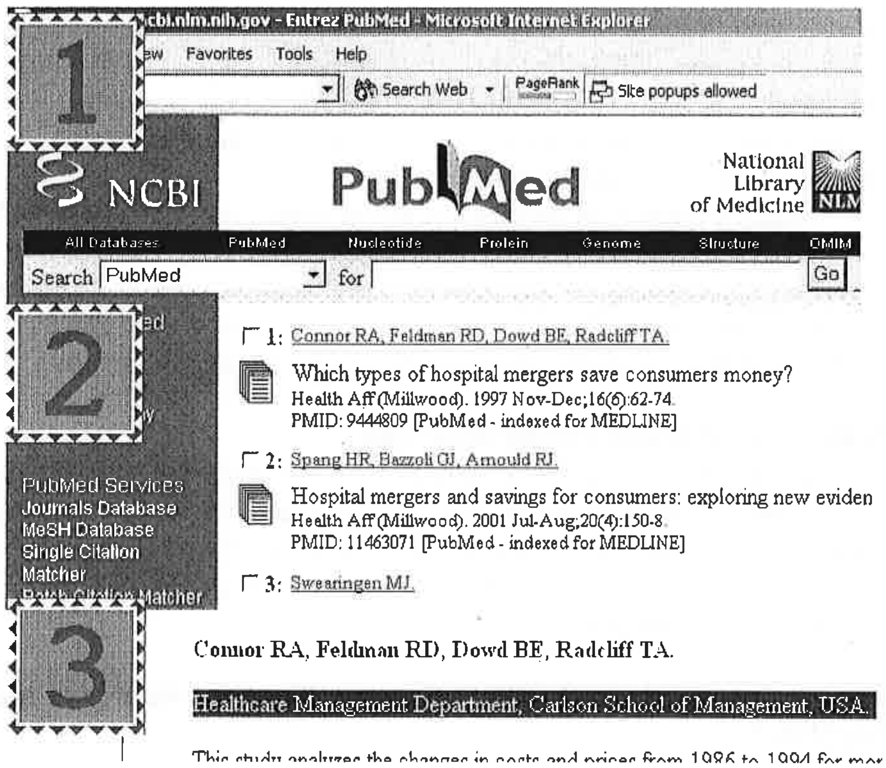
Another step that can speed up preparations is to meet individually with decision makers, even before the full kickoff meeting. Individual meetings are easier to arrange and require less coordination. Furthermore, as discussed in the Chapter 6, individual meetings facilitate larger face-to-face meetings later in the process.

Step 3: Get Access to the Right Experts Who Have Access to the Right Data

A third step is to search for external experts who understand the situation clearly and do not require additional time to orient themselves. On any topic, numerous experts are available. Finding the right expert is difficult but important in saving time and gaining access to resources that only the expert has access to. Automated methods of finding experts in a particular topic are widely available. One such tool is the Medline database (see http://www.nlm.nih.gov/medlineplus). One could search a topic in Medline and find authors who have published on the topic. Most articles include contact information for the author. In this fashion, one could quickly put together a list of experts in a topic—no matter how narrowly it is defined. For example, suppose the analyst needs to examine merger between two hospitals. First, the analyst accesses the PubMed search page (www.pubmed.gov). Here, a search for "hospital mergers" can be conducted. Next, PubMed will display the articles relevant to the search query. The analyst examines the results and notes the authors. Finally, PubMed will display the authors' affiliations and contact information after a search result is selected. These steps are shown in Figure 13.1.

In addition to searching the Medline databases, it may be useful to search CRISP, a database of National Institutes of Health funded projects (see http://crisp.cit.nih.gov). CRISP is useful in identifying researchers

FIGURE 13.1
Three Steps to Identifying Relevant Subject Matter Experts



who are currently collecting data. Many have likely thought through the issue being analyzed and may have preliminary data that could be useful. Finally, search Google's scholar database (see http://scholar.google.com) for names of people who might have special expertise or knowledge of the issue being modeled.

Once a preliminary list has been identified, the analyst contacts members of the list and asks them if they are aware of others who are doing research in this area, who might have access to specific databases, or who might be able to provide valid opinions on estimates needed in the analysis. The important advice is to use automated databases to widely search for one or two people who best fit the planned analysis. Choosing the right person can significantly improve your access to various pieces of information and, in the process, reduce the time it takes to complete the analysis.

Phase 2: Speed Up Data Collection

Often, the data needed for the analysis are not available and must be collected or deduced from data that are available. There are numerous steps in which the analyst can reduce the data collection time (Alemi et al. 1998). Following is a description of these steps.

Step 4: Collect Only the Needed Data

No one sets out to collect data they do not need, but many do so anyway. When one compares the data used in reports and data collected, there is a great deal of difference between the two. Much data are collected but not reported. Some of this discrepancy is because one cannot anticipate the results of data collection. Occasionally, one collects data only to learn that the findings do not merit reporting. But sometimes one can anticipate what data will be relevant and reduce data collection by dropping irrelevant items. Some collect more demographics about their patients than they need to or will likely report. Others use standardized tools that collect data about various topics, most of which are not needed. Collecting more data than needed may waste time and resources. Unfortunately, the time and resources wasted are not directly experienced by the survey designer; he is often not the person who responds to the survey, collects the data, or even analyzes the data. Not surprisingly, survey designers are usually not sensitive to time pressures involved in collecting and analyzing data. But if one takes a larger perspective—the organization's perspective—the value of short surveys and quick data collections become more apparent. Short surveys will collect less data, have better response rates, and waste less of the organization's resources. In most surveys, the analyst needs to think through the various data needs carefully, making sure that the data collected will be reported and that the data missed are not needed. This chapter has already covered how preparing the final report ahead of time reduces the amount of data collected, as many pieces of data that do not make their way into the report are dropped from the data collection plans. In addition, the analyst may wish to go through each question to verify not that the response may be interesting but that the responses will be pivotal to the decision. If the findings are not directly related to a specific decision, then the analyst may want to drop the item from the data collection effort.

Step 5: Reduce the Data Collected by Sampling

One way to reduce the data collection burden is to reduce the number of patients surveyed through sampling. A representative sample allows the analyst to infer the population characteristics from the average of the sample. Typically, the larger the number of people surveyed, the longer the time for the completion of the analysis. Sometimes, months can be cut out of data collection by reducing the sample of people surveyed. Some decision makers are not familiar with sampling procedures and therefore miss the advantage of these techniques in reducing the data collection burden. They may insist on surveying all patients about their satisfaction when only a sample will do. An analyst should work with decision makers to highlight the importance of sampling and how it will reflect the population characteristics. Decision makers who are uncomfortable with sampling should be reminded that if a sensitivity analysis shows that the additional data could reverse the conclusions of the analysis, more data will be collected.

Sampling can be made more effective in at least two ways. One way is to start with a small group of people and, if unexpected results are obtained, expand the sample to a larger group of people. First, a small sample is drawn. If it leads to clear unequivocal conclusions, then no more data are collected. If the results are ambiguous, then a larger sample is drawn. Thus, for example, one may agree to sample 20 representative patients about their satisfaction with the new process. If less than 5 percent are dissatisfied, then no more samples are drawn. If more than 5 percent of the respondents are dissatisfied, then a larger sample of 50 patients is drawn. This method of two-stage sampling[1] reduces the number of patients that need to be contacted and thus reduces the time it takes to collect the information (see Posch, Bauer, and Brannath 2003; Schafer and Muller 2004).

Another method of reducing the data collection burden is to shift from sampling the event to measuring the time to the event. If an analyst needs to collect information about a phenomenon that is rare, she needs to collect large samples of data to measure the frequency of the event. For example, if the analyst needs to estimate the probability of wrong-site surgery, many patients need to be reviewed before a sufficient number of wrong-site surgeries are identified to accurately measure this probability. An alternative is to calculate the probability of the event from the time between reoccurrences of the event. For example, one can radically reduce the number of patients examined by looking at the time between two wrong-site surgeries. Details of how the time between events can be used to estimate probability of the event are provided in Chapter 9. Here, it is sufficient to point out that this approach radically reduces the data collection burden (Benneyan 2001a; 2001b).

Step 6: Replace Data Collection with Observations of Others

When an analyst collects data, he is observing the frequency of a target event. In the absence of conflicts of interest, there are no reasons to expect that the analyst is a better observer of the event than others who are familiar with the process. In fact, one would expect that an expert familiar with the process or an employee engaged in the process may know more about what to observe, when to pay attention, and how to define the target event than an analyst, who is typically new to the process. For this reason, whenever possible, it is preferable for the analyst to rely on the observations of others as opposed to setting up her own data collection. Numerical data obtained from experts' or employees' observations of a process are often referred to as *subjective data*. When the analyst observes the same process and calculates the same data, it is referred to as *objective data*. These two labels are unfortunate because they imply that one is more accurate than the other. Note that subjective data do not refer to the likes and dislikes of a person, which are idiosyncratic and unreliable. Subjective data rely on the observations of others. Thus, a nurse's claim that patients' satisfaction has improved is based on the nurse's observation of the frequency of the patients' complaints, not on his likes and dislikes. Both subjective and objective data are suspect. Subjective opinions are distrusted when the estimator has a vested interest, the event estimated is not observed frequently by the estimator, the question asked is different from typical questions faced by the estimator, the estimator has limited expertise in the area, only one person's judgment (not a group's judgment) is sought, tools typically available (calculator and various reports) are not made available to the estimator, and estimators are not trained in the estimation process. Objective estimates are distrusted when the target event is poorly defined, the target event changes in nature over a long data-collection period, data-collection procedures are not kept consistent over time, frequent data-entry errors occur, and important nuances and exceptions are not accounted for. But if subjective opinions can be measured accurately, then subjective data can be as accurate as objective data (McManus et al. 2002; Marcin et al. 1999) and can radically reduce the data collection burden. Of course, the analyst does not need to choose between the two and can use both methods simultaneously. An example of how subjective and objective data can be combined to save time is presented later in this chapter.

Step 7: Validate Subjective Indexes on Objective Data

If experts specify the parameters of a model (e.g., the utility or probabilities in a multi-attribute value model), then there is no need to put aside data for parameter estimation; thus, the need for data is drastically reduced. For example, severity indexes can be constructed from subjective opinions and tested against objective data. When doing so, less data are needed. An objectively constructed index needs data equal to ten times the number of variables in the index. For an index with 20 variables, 200 data points are needed. In contrast, if the index is developed based on experts' opinion, then the aggregate severity score is one variable. Testing the accuracy of this single variable against objective data requires very little data: 10 to 30 cases.

Step 8: Plan Ahead for Rapid Data Collection

Data collection can be completed more quickly if various preliminary steps for data collection are taken before it is clear what data should be collected. The analyst approaches employees close to the process and alerts them that the team plans to ask them a few questions. They are told that the exact nature of the questions is not clear; but the procedures used to send the questions to them and collect the questions are explained and perhaps even practiced. Employees' consent to respond is collected, and the importance of timely response is emphasized. When the need for data becomes clear, the analyst broadcasts the questions to all who have given consent, usually through a telephone message or an e-mail, and collects the response within a few hours. For example, suppose you want to know about changes in substance abuse rates within the United States. Emergency department staff of a sample of hospitals are approached and asked to participate in the study when a specific question is e-mailed to them. Consent is obtained, and a practice run is made once every six months. Then, when the policymakers have a specific question, the network is used to obtain the response. For example, if policymakers want to know if heroin is replacing cocaine as the drug of choice, the analyst would e-mail participating emergency department staff to count the number of people who have used heroin or cocaine. Within days, the responses are collected and the analysis is provided. Of course, much time and effort goes into maintaining networks of informants and consents, but the result is spectacular: data made available when the policymaker needs it.

Step 9: Let Technology Collect the Data

Computers can now automatically call patients, find them in the community, ask them questions, analyze the responses, and fax the results to the analyst. In one study, Alemi, Stephens, and Butts (1992) asked a secretary and a computer to contact "hard to reach" persons and ask them a few questions. On average, the secretary was able to do the task in 41 hours, while the computer accomplished the same task in nine hours. Technology can help overcome the difficulty of finding people.

When technology is used to collect information from people, there is one added benefit: People are more likely to tell the truth to a machine than to a person. In surveys of drug use, homosexuality, and suicide risks, patients were more likely to report their activities to a machine than to a clinician, even though they were aware that the clinician would subsequently review the computer summary (Newman et al. 2002; Williams et al. 2000; Kissinger et al. 1999; Griest et al. 1973). Another advantage of collecting data through computer interviews is that data are immediately available, and no time needs to be spent on putting the data into the computer after collection. A number of reviews of the effectiveness of various technologies for data collection are available (see Shapiro et al. 2004; Newman et al. 2002).

Phase 3: Speed Up Data Analysis

When data are available, several steps can be taken to make the analysis go faster.

Step 10: Clean the Data and Generate Reports Automatically

To speed up analysis, the analyst puts together procedures for cleaning the data even before the data are available. At the simplest level, the analyst prepares reports of the distribution and the range of each variable. Such reports can then be examined to see if there are unusual entries. A computer program can then be prepared to run various tests on the data to make sure the responses are within range (e.g., no one with negative age) and responses do not conflict with each other (e.g., no pregnant men). The computer can examine the patterns of missing information and their reasons (i.e., not applicable, data not available, data applicable but not provided). This is typically done by calculating the mean of data items entered in previous cases and testing if the current data item is more than three standard deviations away from the mean. To ensure integrity and accuracy of data, the computer can select a random number of cases for reentry. The point is that procedures for cleaning the data can be automated early in the process so that the analyst can rapidly proceed as soon as data are available.

Another alternative that has been made possible because of the growth of web services is to allow reports to be generated from data automatically. First, the analyst drafts the report with all of the variables in the report linked to a database. Then, the analyst prepares a data collection procedure which populates the database. Third, the computer cleans the data and generates the report. This process is used in a web site, maintained by Alemi and Newhauser (2006), that tracks personal improvement. Clients who complete their personal improvement report their success and failure on the web. The data are collated by the computer, which cleans and stores the data in a web database. A report is automatically generated from the data on the web so that current and future clients can see the success rate of clients engaged in the personal improvement effort. The report is available instantaneously after the data are collected.

Step 11: Analyze Emerging Patterns Before all Data Are Available

Many readers are familiar with exit polling to predict results of elections. The same procedures can be used to anticipate data findings before a complete data set is available. One very useful tool is to predict the probability of an event from the time it takes for the event to reoccur. In this fashion, early estimates of the data can be made from just two reoccurrences of the event. If the event is rare, it takes a long time for it to reoccur. If not, it will reoccur in a short interval. By examining the interval between the event, the probability of the event can be estimated.

Step 12: Use Software to Analyze Data

One way to conduct a sensitivity analysis quickly is to use software designed to conduct decision analyses. Many of the existing software programs automatically conduct single- and two-variable sensitivity analyses. Reviews[2] of software for decision analysis are available online (Hazen 2002).

Phase 4: Speed Up Presentation

An analysis is not done until the sponsor examines the results. To speed up the presentation, several steps can be taken.

Step 13: Set Up Presentation Meeting Months in Advance

Many decision makers are busy. To arrange for their time, make an appointment many months in advance. If a presentation date is set, it will create pressure to produce the findings on time. In addition, if the project falls behind schedule, then additional resources can be brought to the task to accomplish the project on time and present it as planned. A useful tool is to calculate backwards from the presentation date and see which tasks are critical for the presentation and which tasks have slack and are not critical. Software, such as Microsoft's project management software, can help identify the critical paths so that the project can finish on time.

When a date is set for presentation, the decision maker is more aware of the report and may delay deciding on the decision until the report becomes available. Waiting is always made easier if it is clear when the wait will be over. Consider if you were asked to wait to board a flight but were not told how long the wait will be—five minutes or several days. Many find it easier to wait when they know what to expect.

Step 14: Present to Each Decision Maker Privately Before the Meeting

Even though a joint meeting is coming up, it is important to present to each decision maker separately and get their input so that the analysis can be revised in time for the meeting. As discussed in Chapter 6, research shows that obtaining a decision maker's input individually before the group meeting is important in having a successful meeting.

An Example of Rapid Analysis

One of the most complicated concepts regarding speeding up decision analysis is the process of relying on subjective opinions to speed up data collection. To illustrate this point, consider an example of how Gustafson, Cats-Baril, and Alemi (1992) combined experts' opinions with objective data to analyze a fast-moving policy decision. Gustafson was asked to predict the effect of national health insurance (NHI) programs on five low-income populations. The implementation of NHI would have profound effects on people who currently rely on federal programs administered by the Bureau of Community Health Services (BCHS) in the Department of Health and Human Services. These groups include migrant farm workers, Native Americans, mothers and children needing preventive or special care, residents of medically underserved areas, people desiring family-planning services, and those lacking adequate health insurance coverage. The unique circumstances of migrant workers and Native Americans necessitated the creation of special services responsive to their needs. If NHI results in termination of such assistance, the result could be a financial burden on current beneficiaries and a reduction in their access to care.

To accurately appraise changes that would occur under NHI, Gustafson had to find the utilization patterns of families served by the BCHS and the unit costs of services consumed. He also had to ascertain the eligibility requirements and cost-sharing provisions of the NHI proposal. Finally, he had to determine which currently used services would be included in the various NHI benefit packages. Primarily because of time constraints, he could not collect data and was confined to using the best available information.

Utilization patterns were created for individual family members (for each BCHS program) and stratified into appropriate age groups. Utilization patterns for individuals were then aggregated to achieve a family utilization description. The computer also determined the extent of coverage under different NHI schemes and compared this figure to present costs. Before directing the computer to simulate a sample of user families, Gustafson needed information on family characteristics, particularly about the population's socioeconomic and demographic status. These characteristics included such factors as the number and size of families, age and gender of family members, employment status, whether employment was longer than 400 hours per year per employer, size of employing firm, income levels, and Medicaid status. This information was primarily collected from U.S. census data on populations served by the BCHS.

The simulation also required frequency distributions of utilization rates for each of a set of health services (such as hospitalizations or prenatal visits) for each existing BCHS project. Separate distributions were created for different levels of age and income. In many cases these preliminary estimates were national averages for use of the particular service. In some cases, Gustafson decided that the best estimates of utilization came from regional sources, such as the Community Health Survey or the Mental Health Registry. The quality and reliability of these estimates were highly variable. Equally important, the available data reflected populations significantly different from BCHS users. Therefore, Gustafson brought together 80 experts to estimate the missing parameters. Some of these experts were project directors with experience caring for BCHS clients at organizations with reliable data systems; others were researchers who had studied utilization of BCHS programs.

Gustafson showed the panel of experts the utilization estimates from existing sources. Panelists were told the source of the data and were asked to revise the estimates in light of their experience. Each panel was then divided into groups of four and asked to discuss their estimates. Each group within each panel concentrated on a single user population. For example, at the community health center meeting, one table represented rural health centers, another represented small urban centers, and two others represented large urban health centers. Following their discussions, each panelist made final, independent estimates.

The revised utilization rates were aggregated into one set of estimates for each service. The aggregation across the experts was done by weighting the estimates according to the proportion of the total BCHS user population each estimate represented. For instance, the estimates of rural health center panelists received less weight than large urban health centers because fewer people participate in rural programs.

To simulate current costs to BCHS user families under NHI, Gustafson used expert-estimated distributions, the observed demographics, and the various provisions of the NHI proposal to simulate what might

TABLE 13.1 Estimated Annual Costs for Community Health Centers

	Current BCHS Cost ($)	*Costs Under NHI ($)*
Total cost of care	1,222	1,222
Payments by BCHS	64	n/a
Payments by third parties (Medicaid, Medicare, private insurance)	470	8
Payments by NHI	n/a	685
Premiums paid by users	7	92
Deductibles, copayments	109	529
Total cost to users	116	621

happen. The simulation was run for a total of 500 families. A different set of families was, of course, generated for each BCHS program. Table 13.1 depicts one sample result.

The simulation was repeated under different NHI bills and proposals and for different BCHS populations. The key surprise finding was that NHI would raise barriers to access rather than remove them, at least for several segments of the poor. A sensitivity analysis was done to see how much the estimated variables had to change before the conclusions of the analysis would change.

The point of this example was to show how a rapid analysis could be done through a combination of objective data and subjective probability. Subjective estimates from respected experts can be effective surrogates for solid empirical data.

Concluding Remarks

Technology is changing the world. Computers are faster and more available than before. Technology has changed expectations of time for analysis. If it takes only a second to search the entire web, why should an analysis take months? As media-savvy decision makers take control of healthcare organizations, they bring with them an expectation of rapid but comprehensive analysis. They see that software can reduce the data analysis time. They see that computers can reduce the data collection time. Today, most word processing and slide presentation software programs come with templates for generating reports. So, naturally, they see that templates can reduce report preparation time. When managers see that an analysis can be done in a short time, they come to expect it.

Consider the manufacturing industry in the past century. When Ford implemented industrial engineering time-and-motion studies to reduce the time it took to create cars, the entire industry changed. The cost of car production dropped and new consumers came to market. The automobile, which was previously handcrafted, was suddenly mass produced. A time-and-motion study can do the same for decision analysis. Sure, it is a unique product, but the steps in completing a decision analysis are well known and can be speeded up. You have seen some of the ideas for speeding up an analysis in this chapter. If rapid analysis is possible, if the time drops from months to days, then decision analysis will be more readily available. Naturally, the market for analysis and evidence-based decision making may grow.

Many of the ideas presented here require an analyst to spend more time thinking through the analysis. In a way, the analyst's planning time is being traded against the organization's time for collecting data, or the decision maker's waiting time. Well-planned efforts take less time to execute, but they do take more time to plan. It may be naive to think that the analyst has the extra time to spend on planning. Because the person who plans the analysis, the person who executes it, and the person who receives it may be different, rapid analysis is a burden for one person and a nirvana for another. If organizations want to produce rapid analysis, they need to set the right incentives for all parties involved. They need to recognize that not all individuals involved have the same goal.

Summary

This chapter has shown 14 ways of speeding up analysis without affecting the quality of the work:

1. Draft the final report at the start
2. Avoid group kickoff meetings
3. Get access to the right experts who have access to the right data
4. Collect only the needed data
5. Reduce the data collected by sampling
6. Replace data collection with observations of others
7. Validate subjective indexes on objective data
8. Plan ahead for rapid data collection
9. Let technology collect the data
10. Clean the data and generate reports automatically
11. Analyze emerging patterns before all data are available
12. Use software to analyze data
13. Set up the presentation meeting months in advance
14. Present to each decision maker privately before the meeting

Some of these techniques may seem pedantic; could you, for example, save much time if you reduce the data collected by one case? Other techniques may be inappropriate in some settings; for example, why rely on subjective judgments when experts disagree on the issues? Whether these techniques work and when they are effective in speeding up analyses have not been demonstrated empirically. It is not clear, for example, how much time will be saved if all 14 rules were followed. The methods of speeding up analyses are in their infancy, and much work and investigation is needed to make sure that they are effective.

Review What You Know

1. Thorough planning speeds up report creation. What are the primary reasons why drafting the final report at the start speeds up the analysis?
2. Experts are naturally familiar with the subjects of their expertise. But how could you, as a person not familiar with the field, find the right expert? What is an automated method of finding experts in a particular topic?
3. Researchers often overestimate the need for data. When is a small sample adequate?
4. Subjective and objective data can be used for research. When can subjective opinions be a reliable source of data?
5. Explain how a 200-variable model could be validated with only 50 cases as opposed to ten times the number of variables in the model?
6. Why would automated data collection not only be faster but also more accurate than data gathered by individuals?
7. All statistical sources can have problems with missing data, noise, and outliers. What is the value of setting procedures for cleaning the data even before it is collected?
8. There are ways to anticipate data findings before a complete set of data is available. How can the early estimate of the probability of an event be assessed from two observations of the event?
9. In the example analysis for the BCHS, which data were subjective and not from primary sources?

Rapid-Analysis Exercises

In groups of three, conduct a time-and-motion study of how students complete the rapid-analysis exercises in your class. Analyze at least three

TABLE 13.2 Worksheet for Reporting Time Spent in Analysis

Task	Start Date	End Date	Total Work Hours
1. Preparation • Receive assignment and understand the work to be done • Coordinate kickoff meeting to clarify purpose and scope of the work • Find relevant experts and decision makers • Design study instruments and survey forms			
2. Data collection • Collect observations • Collect experts' opinions • Store data			
3. Analyze data • Retrieve data • Clean the data (classify data, check distribution and range of data, edit data) • Examine accuracy of data (check for errors in logic or in transfer of data) • Examine if experts were in consensus • Calculate expected values or model scores • Calculate the correspondence between the model and experts' judgments			
4. Presentation • Prepare report and distribute draft report • Prepare presentation • Get input from audience before meeting • Present results at meeting			

student projects to see the time various activities take and suggest how the work can be speeded up. Table 13.2 suggests a set of tasks, although you may want to focus on other tasks as well.

In your report, analyze the total time lapsed between the start and end of each task and the total time spent working on the task. Explain why there is a difference between lapsed time and time worked on the task. For each task, describe what can be done to reduce the difference between lapsed and worked time.

Describe the prerequisites of each task by showing what needs to be accomplished before the task is started. Use a table such as Table 13.3 in your report

TABLE 13.4 Worksheet for Describing Task Prerequisites

Task		*Cannot Start Until the Following Task Is Completed*
1.	Receive assignment and understand the work to be done	
2.	Coordinate kickoff meeting to clarify purpose and scope of the work	
3.	Find relevant experts and decision makers	
4.	Design study instruments and survey forms	
5.	Collect observations	
6.	Collect experts' opinions	
7.	Store data	
8.	Retrieve data	
9.	Clean the data (classify data, check distribution and range of data, edit data)	
10.	Examine accuracy of data (check for errors in logic or in transfer of data)	
11.	Examine if experts were in consensus	
12.	Calculate expected values or model scores	
13.	Calculate the correspondence between model and experts' judgments	
14.	Prepare report and distribute draft report	
15.	Prepare presentation	
16.	Get input from audience before meeting	
17.	Present results at meeting	

Review the task prerequisites to identify the critical path (these are tasks that, if delayed, would delay the completion of the project). Provide advice on how to start on critical tasks sooner and what to do to remove the dependency between the critical task and its prerequisites.

Then, review the 14 recommendations in this chapter and describe how they are the same or different from your recommendations.

Audio/Visual Chapter Aids

To help you understand the concepts of rapid analysis, visit this book's companion web site at ache.org/DecisionAnalysis, go to Chapter 13, and view the audio/visual chapter aids.

Notes

1. See Bauer, P., and W. Brannath. 2004. "The Advantages and Disadvantages of Adaptive Designs for Clinical Trials." *Drug Discovery Today* 9 (8): 351–7.
2. See the review of decision analysis software prepared by Dennis Buede for the Decision Analysis Society at http://faculty.fuqua.duke.edu/daweb/dasw.htm.

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