

**Second  
Edition**

# Project Decisions

## The Art and Science

LEV VIRINE | MICHAEL TRUMPER



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**THE ART AND SCIENCE**

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*Second Edition*

**Lev Virine**

**Michael Trumper**



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## Project Decisions

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# Preface

Project management is the art of making the right decisions. To be effective, a project manager must be conversant on the following questions:

- How do we make rational choices in project management?
- How can we improve our ability to make these choices?
- Which tools are available to help us during this process that will enable us to make better decisions?

In most cases, the answers to these questions are not trivial. In managing projects, we deal with multiple objectives, multiple risks and uncertainties, and multiple stakeholders. And the underlying framework of project management problems can be quite complex.

Fortunately, a set of practical methods and tools—called decision analysis—can help solve these problems. A unique aspect of decision analysis is that it involves two seemingly separate disciplines: (1) the psychology of judgment and decision-making and (2) mathematics and statistics. Psychologists try to understand the underlying mental processes we use when we make decisions. Mathematicians try to apply their knowledge and use the numbers involved in project management to assess and evaluate options. In this manner, both psychologists and mathematicians are looking to develop methodologies that will improve our ability to make good decisions despite the inherent limitations of our mental capabilities.

In recent years, decision analysis has become a practical tool in many disciplines. Companies routinely base their major investment strategies on the results of decision analysis and, in industries such as energy or pharmaceuticals, never proceed with major projects before performing a comprehensive, structured decision analysis. Decision analysis is used to analyze mergers and acquisitions, capital investments, reorganizations, and new product development. Governments apply decision analysis to policy development, attorneys use it to assess complex litigation that may have an uncertain outcome, and medical professionals use it to help them make correct diagnoses and prescribe the most effective treatments.

Coming to project management from a decision science background, we believe that project management is a primary candidate for the application of decision analysis. We have discovered, however, that most organizations use only a few components of the decision analysis process. In addition, many project managers are not familiar with the decision analysis approaches that are in wide use in other industries; if they happen to be aware of the processes, they do not believe that the processes are applicable to their own industry or organization. When we started to make presentations about the psychology of judgment and decision-making in project management, we found that it was an eye-opening experience for many project managers. At that point, we decided that the best way to get our message out to the widest audience would be to publish a book that provides a short, practical introduction to decision analysis.

Project management is all about processes. Decision analysis provides processes that will help project managers improve their ability to make good decisions. In Part 1 of this book, we outline the project decision analysis process. The subsequent four parts describe each phase of the process in detail, including a review of both its psychological aspects and various quantitative methods. We have tried to avoid complex mathematical discussions because we believe in the maxim “Knowledge of geography is unnecessary as long as there are taxi drivers.” In other words, complex mathematics and statistics are implemented in the myriad software applications you use as a project manager—you don’t need to know every last one of the details.

Instead, in this book we concentrate on the psychology of decision-making, which we think is terra incognita for many project managers. Decision-making is a fundamental skill of project management that can be improved by training. If project managers can avoid known mental traps and follow certain thinking processes, they can significantly improve the quality of their project decisions.

We hope this book will be useful, even perhaps entertaining, for everyone involved in the project management process: managers, members of project teams, and project sponsors. As part of this effort, we have tried to map our discussion of the decision analysis process to the project management process described in the *Project Management Institute’s A Guide to the Project Management Body of Knowledge (PMBOK® Guide)*.

This is the second edition of the book that was originally published in 2007. We have included references to new research in the areas of decision analysis and project management, have devised more examples, and have increased our focus on psychology of judgment and decision-making.

Finally, technical books are a lot like exercise machines. You can make a resolution to get in shape by losing weight and buying an exercise machine, which you then use religiously for a couple of weeks. When you see a few results—when you look down and your toes are visible for the first time in years—your interest flags, tedium sets in, and eventually the treadmill is collecting dust in

the basement. The same thing happens with most technical books. You use them for a few weeks and are able to make a few small improvements, but the reading is so tedious and boring that you would rather poke yourself in the eye than read the next chapter. We devoutly hope that this is not an issue with our book!

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Calgary, Alberta, Canada

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# Test Your Judgment

Here is a quiz to test your judgment as a project manager. This is *not* an IQ test, and it is definitely *not* some sort of psychological experiment to stress-test your brain. *This is a test of your intuition; you do not need to do any calculations.*

Consider this exercise an introduction to the book. We will discuss the problems from the test along with other issues throughout the book.

1. You are a project manager working on a movie called *Pirates of the Caribbean-24*. Your project is to produce and deliver a prop for the set: a treasure chest. You estimate that manufacturing the chest in China and filling it with gold will take between 10 days (you have 10% confidence in this estimate) and 40 days (90% confidence), using normal distribution. Delivery time should be the same in all cases. The film's director has requested that you come up with an estimate with 90% confidence for both manufacturing and shipping the treasure chest.

Which of the following is your estimate?

- A. ~80 days      B. ~50 days      C. ~63 days.
2. You are an artist drawing a wedding portrait of a royal couple: Prince Garry and Princess Eden. You have two strategies:
    - (1) Draw both of them at the same time. This strategy will take 20 days. However, if, at any time during the 20 days, Eden and Garry decide that they do not like the portrait, you have to start all over. The probability of their not liking your work is 60%.
    - (2) Draw Eden first and then Garry. This strategy will take 10 days for each of them. If at any time during these 10 days Eden or Garry decides that they do not like their portraits, you will need to restart your 10 days of work. The probability that either of them will not like your work is 30%.



Which strategy should you use to complete the portrait faster (on average, taking into account potential delays)?

- A. Both strategies will lead to the same duration.
  - B. Strategy B is 17% faster than strategy A.
  - C. Strategy B is 70% faster than strategy A.
3. Assume that you selected strategy 2 from the previous question. There could be two scenarios: (a) Eden's and Garry's art preferences are similar, so if Eden doesn't like the portrait, Garry probably won't like it either; or (b) Eden's and Garry's preferences are different. What is the project duration (on average, taking into account potential delays)?
- A. Situation A leads to a 50% faster completion of the portrait than situation B.
  - B. Situation B leads to a 50% faster completion than situation A.
  - C. Portrait completion times in situation A and B are about the same.
4. Billionaire Mike Zukkerfield decided to invest in a new software venture. He has three choices:
- A. A social network site for dogs and cats, so they can meet and enjoy themselves. Cost to develop is \$200 million, and the probability of success is 50%.
  - B. A computer game called "You Are Doomed" for current and prospective criminals. Cost to develop is \$400 million, and the probability of success is 25%.
  - C. A mobile app to determine less mosquito-infested spots for camping. Cost to develop is \$300 million, and the probability of success is 80%.
- In which venture should Mike Zukkerfield invest?
5. You are in Anchorage, Alaska, to film the new *National Lampoon's* "Vacation in Hawaii" movie starring Chevy Chase. If snow starts falling while filming a beach scene, you will have to restart 10 days of shooting. The chance of snowfall is 30%, and the official weather forecast says that there is an equal probability of snowfall for each of the 10 days. However, you think that it is most likely to snow close to the end of filming rather than at the beginning. Assuming that both forecasts are equally accurate, which situation will result in the longest time to complete filming, taking into account potential delays?
- A. Your forecast will lead to a 5% longer filming time than the official weather forecast.
  - B. The official forecast will lead to a 5% longer filming time than your forecast.
  - C. Filming will take about the same time regardless of the forecast.

6. You are involved in a project to promote rapper MC Uglyface. Despite spending \$1 million for ads, video clips, and marketing promotions, MC Uglyface is still at the bottom of the charts. Which option would you choose?
- A. One more \$50,000 ad campaign, because similar campaigns for other rappers were successful in 50% of the cases.
- B. One more \$100,000 ad campaign, because similar campaigns for other rappers were successful in 75% of the cases.
- C. Give up on MC Uglyface and start promoting the rapper BadPosture.
7. You meet a young actress who you believe can become an A-list actress and a celebrity in a few years, so you offer to be her future divorce lawyer. What is the chance that you will earn millions in attorney fees from her if there is a 10% chance that she will become a celebrity, a 100% chance that she will be married, a 100% chance that she will be divorced, and a 10% chance that she will choose you to be her divorce lawyer?
- A. 10%    B. 1%    C. 0.1%    D. 100%
8. You are a screenplay writer trying to figure out what type of screenplay will have the best chance of being produced. As part of this decision, you have reviewed historical data related to all the screenplays you know and have put them in the table below. Which type of screenplay will have highest probability of *not* being produced?

	Screenplay not produced	Screenplay produced
A. Action	20 times	4 times
B. Love stories	11 times	2 times
C. Children stories	15 times	3 times

9. Your project is to buy new clothes for the fall season. You read a number of fashion magazines and see that most experts agree that a mixture of bright and pale tones will be in style during the fall. A few magazines also stress the revival of a historical theme. In addition, some articles emphasize a trend to pink and blue colors. Which description do you think will be the most probable?
- A. Bright hues mixed with pale tones.
- B. Bright hues mixed with pale tones, combined with the purity of pink and blue colors.
- C. Bright hues mixed with pale tones, combined with the purity of pink and blue colors that bring a sense of energy and refinement to historical and classic themes.

10. You are a stunt double in a Western movie. Despite all your skills, you fall from your horse in 16% of all the shots. The occurrence of these falls appears to be completely random; it does not seem to have any correlation to how hard you try, which horse you use, the weather conditions, the filming locale, or anything else. In this movie, you have already fallen from your horse 7 times out of 35 shots. Are you going to be lucky the next time around? How many times do you estimate you will fall from the horse in the remaining 25 shots?
- A. 5 times      B. 2 times      C. 4 times

# Answers to Judgment Quiz

1. The correct answer is **C** (63 days). You cannot add together high estimates ( $40 \text{ days} + 40 \text{ days} = 80 \text{ days}$ ) to get the duration of the project with two activities associated with 90% confidence. It cannot be 50 days ( $2 \times (10 \text{ days} + 40 \text{ days}) \div 2$ ), which is the mean duration. The actual calculation can be performed using quantitative analysis tools based on Monte Carlo simulations. For more information, please read chapter 16, “What Is Project Risk? Monte Carlo Method.”
2. The correct answer is **B** (Strategy B is 17% faster than strategy A). A similar example is discussed in chapter 20, “Adaptive Project Management.” Splitting a risky project into smaller phases usually accelerates the project, but not as significantly as 70%. An actual calculation can be performed using Event chain methodology.
3. The correct answer is **C** (portrait completion times in situations A and B are about the same). The correlation between risk events plays a significant role only if probabilities are relatively high. In this case, the probability that Eden or Garry will not like the portrait is 30%; therefore, correlations will not have a significant effect on the results. See chapter 14, “Choosing What Is Most Important: Sensitivity Analysis and Correlations.”
4. The correct answer is **C**. This question relates to the notion of expected value. Expected value is a probability-weighted average of all outcomes that is calculated by multiplying each possible outcome by its probability of occurrence and then summing the results. Probability multiplied by outcome is lower in C ( $\$300 \text{ M} \times 80\% = \$240 \text{ M}$ ). We will learn about expected value in chapter 4, “What Is Rational Choice? A Brief Introduction to Decision Theory.”
5. The correct answer is **A** (your forecast will lead to a 5% longer filming time than the official weather forecast). The moment of risk (when the