

World Scientific – Now Publishers Series in Business: **Vol.13**

# Project Risk Analysis Made Ridiculously Simple

Lev Virine

Michael Trumper



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**Lev Virine**  
**Michael Trumper**

Project Decisions, Calgary, Canada

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## About the Authors

**Lev Virine** has more than 20 years of experience as a structural engineer, software developer, and project manager. In the past 10 years he has been involved in a number of major projects performed by Fortune 500 companies and government agencies to establish effective decision analysis and risk management processes as well as to conduct risk analyses of complex projects.

Lev's current research interests include the application of decision analysis and risk management to project management. He writes and speaks to conferences around the world on project decision analysis, including the psychology of judgment and decision-making, modeling of business processes, and risk management. Lev received his doctoral degree in engineering and computer science from Moscow State University.

**Michael Trumper** has over 20 years of experience in technical communications, instructional and software design, and training project risk and economics software and theory. Michael has authored papers on quantitative methods in project estimations and risk analysis. He is a co-author of two books on project risk management and decision analysis.

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## Introduction

You left for the airport two hours early, but were then stuck in traffic and missed your flight. You borrowed tens of thousands of dollars to open a restaurant that specializes in perogies, but no one was interested. You hired a programmer to develop new CRM software, but he spent more time messaging his new girlfriend than on his work and the project was delayed indefinitely.

All these things are characterized by two words: stuff happens. “Stuff happens” could be due to your own mistakes, but it could be due to events outside of your control. Regardless of why, “stuff happens” is a source of a huge burden on our life. Imagine a world without risk, we would save not only huge amounts of time and money, but also reduce our stress and improve our quality of life. Alas, life is not without risk, so the question is “Can we do something about these risks?” The short answer is yes, we can. We can identify, analyze, and manage them in such a way that when done properly, it will greatly improve our project’s chances of success.

If you want to be successful in your personal and professional life including your projects, you need to know the answers to these three questions:

- What could happen?
- What is the probability that it could happen and what will be the impact?
- What can you do about it?

This book is the third in our series about project risk and decision analysis and project risk management. The first book “*Project Decisions: The Art and Science*” (Virine and Trumper, 2007) is focused on project decision analysis. The second book called “*ProjectThink: Why Good*

*Managers Make Poor Project Choices*” (Virine and Trumper, 2013), where we covered the psychology of project risk management. This book is about project risk analysis or the process of determining project risk probabilities and impacts, risk prioritization, and analysis of mitigation plants.

In this book, we discuss both qualitative and quantitative risk analysis with a greater emphasize on the quantitative risk analysis. In many cases, projects are relatively simple and only require very basic mental processes. For example, if you think that the probability of being stuck in traffic on your way to the airport is significant, you could leave your home earlier. But, in many projects related to your business, you would better advised to use more advanced techniques, particularly different quantitative methods as they will provide your analysis more certainty. Therefore, the primary focus of this book is on quantitative project risk analysis. The subjects will include analysis of risk events with Monte Carlo simulations, sensitivity analysis, and other related concepts. In addition, we will pay a lot of attention to Event chain methodology, a technique that is focused on identifying and managing events and event chains that affect project schedules.

Project risk analysis is closely related to risk management, which we briefly discuss in this book as well. Risk management is focused mostly on what to do with risks, particular risk communication, response planning and governance. Risk analysis can be a part of project risk management.

If this all sounds a bit complicated, you would be correct as in many cases with complex projects the process must be equally complex. However, for both qualitative and quantitative project risk analysis, the concepts are quite straight forward and use very basic mathematical concepts. Luckily, there are a lot of very good and proven software in the market that will do the heavy lifting for you. All examples in this book were performed using RiskyProject project risk analysis and risk management software by Intaver Institute Inc. However, you can use any risk analysis software, a list of which is included in the appendix of this book. Our goal is to provide a straightforward approach to project risk management for project managers, business analysts, and other project team members without requiring mathematical or statistical background of a risk specialist.

We hope you will enjoy our book.

Lev Virine and Michael Trumper  
Calgary, Alberta, Canada



## Test Your Judgment: Why Do You Need Project Risk Analysis

Here is a quiz to test your judgment. All these problems can be easily solved using quantitative project risk analysis. However, some people believe that project risk analysis is unnecessary because they can make accurate estimates without any analysis. You may be one of them, so let's see how you feel after this quiz.

1. Billionaire Roland Drump wants to build a new Cleopatra casino in Pacific City. He estimates that casino will cost only \$200 Million dollars. However, he plans to do some additions:
  - 200 ft. Golden statue of Cleopatra and Drump together has an estimated cost of \$40 M, but the probability that he will build this statue is 30%.
  - 1000 sq ft. fresco "Drump in the Swimming Pool" has an estimated cost of \$30 M, with a 20% probability that it will be constructed.
  - 300 ft. Gallery with portraits of Drump and other executives of Drump Enterprises has an estimated cost of \$50 M with a 10% probability that it will be completed.

What is the expected cost of casino?

- A. \$223 M
  - B. \$320 M
  - C. \$252 M
2. A group of gangsters are planning to rob Washington–Washington casino in Las Vegas. Their initial plan:
    - Task 1: John and Don will plant the explosives and blow up a power transmission line going to Las Vegas. It will take 30 min to 1 h.
    - Task 2: Starting the same time Danny and Lenny will steal a getaway car and park it near the casino, which will take 10–20 min.
    - Task 3: After power is knocked off, Terry and Barry will rob the casino. It will take 5–10 min.

Uncertainties in duration of which task will affect total robbery time the most:

- A. Tasks 1
- B. Only task 2 and 3
- C. All tasks

3. Billionaire Roland Drump decided to arm all casino dealers in his new Cleopatra casino in Pacific City with assault rifles so they can kill unruly clients or preemptively kill clients they suspect might become unruly. Killing clients are:
  - A. Mitigation Plan
  - B. Response Plan
  - C. Both Mitigation Plan and Response Plan
4. Mexican drug lord El Stuppo and his associates are digging an escape tunnel from his prison cell. He found that his project risks will fall into three categories: duration (tunneling could take too much time), cost (tunneling could cost too much money), and security (somebody in prison will discover this project). Duration is two times more important for him than cost and security are three times more important than duration. What are the priorities of these categories?
  - A. Duration 29%, Cost 26% and Security 45%
  - B. Duration 30%, Cost 20% and Security 50%
  - C. Duration 35%, Cost 20% and Security 45%
5. The Beast must learn to love another and earn her love in return before the rose's last petal falls. He has 10 days, remaining, but developing a loving relationship with Beauty most likely will take 6 days but could be completed as early as 4 days or take up to 12 days and it is defined by triangular distribution. What is the chance that the Beast will be able to break the spell?
  - A. 87%
  - B. 92%
  - C. 95%
6. The famous magician David Ironfield is planning to see the body of his assistant in two during the show. Usually, it takes him 1 min to cut the body in half, but this time he has a new magic box and expects two potential delays. There is a 30% chance that assistant may not be able to bend her legs inside the box fast enough. This would delay the trick by 20%. There is also 20% chance that the second assistant, whose legs are supposed to stick out after body is cut, would not be able to hide

her head. It will delay the trick by 50%. How long the trick would take on average:

- A. 1 min 30 sec
- B. 1 min 10 sec
- C. 1 min 5 sec

7. Young wizards Jerry Throter is trying to defeat a troll, which usually takes 10–12 min. So far, fight continues for 8 min and Jerry Throter estimates that only 50% of his battle is complete: the troll is badly wounded, but continues fighting and making inhuman sounds. How much time would it take to defeat the troll with certainty of 70%:

- A. From 15.2 min
- B. From 18.3 min
- C. From 20.5 min

8. Famous crook Terry Fadoff is working on new financial pyramid scheme. He is planning to pump and dump stock of Fadoff Enterprises and get \$10–12 M from it. The issues is his must to pay \$4–5 M in bribes, \$3–4 M to his associates, and \$1–2 M to develop an accounting software to hide his activities. All uncertainties are uncorrelated and defined by uniform distributions. What is his maximum payout after all expenses with 80% probability:

- A. \$1 M
- B. \$2 M
- C. \$3 M

9. Two pirates, Jonny Death and Orlando Plume are preparing an expedition to Treasure Island. The Expedition would cost in dollar equivalents \$80,000–\$120,000 and take 5–6 months, but most likely 5.2 months. What would be the chance that cost will be below \$100,000 and duration will be below 5.4 months at the same time?

- A. Around 60%
- B. Around 50%
- C. Around 30%

10. Popular singer, Tracy Terry is planning a new Global Tour, which would take 60 days.
- Her stopover in Bujumbura (Burundi) could be delayed by 5 days with a probability of 50% if her local fans demand another concert.
  - Her stopover in Tobolsk (Russia) could be delayed by 2 days with a probability of 80%, as she may miss a flight due to signing autographs for her fans.
  - Her stopover in Nuku'alofa (Kingdom of Tonga) could be delayed by 3 days with a probability of 60% because the King may invite her for a lunch.

Which stopover could cause the longest delay on her tour?

- A. Bujumbura
- B. Tobolsk
- C. Nuku'alofa

## Answers to Judgment Quiz

1. Correct answer is (A). You need to multiply probability on cost, sum them and add original \$200 M. We will learn about project expected value in Chapter 12.
2. Correct answer is (A). Task 1 has most uncertainties. Task 2 is not on the critical path at all. We will learn about sensitivity analysis in Chapter 9.
3. Correct answer is (C). If dealer kills client before he or she becomes unruly, it is a mitigation plan. If dealer kills client after he or she become unruly, it is a response plan. In this case, it is both mitigation and response plans, because dealer will be shooting on all types of clients. Read Chapter 4 for more information.
4. Correct answer is (A). This can be calculated using Analytic Hierarchy Process, which we will discuss in Chapter 3.
5. Correct answer is (C). You may use analytical solution, but it is simpler to do using Monte Carlo simulation. We will learn about distributions and Monte Carlo simulations in Chapter 5 of this book.
6. Correct answer is (B). This is a cumulative effect of two uncorrelated risks. You need to perform Monte Carlo simulations with risk events. We will discuss it in Chapters 6–8.
7. Correct answer is (B). This is related to automatic calculation of remaining duration for partially completed tasks, which we will discuss in Chapter 10.
8. Correct answer is (B). You need to perform Monte Carlo simulation and calculate 80<sup>th</sup> percentile (P80) of the statistical distribution of project cost. You may read percentiles in Chapter 5.
9. Correct answer is (C). This question is related to Joint Confidence Level analysis which we will discuss in Chapter 13 of this book.
10. Correct answer is (A). It is related to ranking risks for quantitative risk analysis. You will learn about it in Chapter 9 of the book.

Now score yourself and see where you fall on the table below:

---

# of correct answers	Some advice
1–3	Don't worry, most of people have difficulties answering these questions without computer analysis. In this book, you will learn how such types of analysis is performed.
3–7	Not so bad. If decision makers as CEO and politicians would have such good judgment and ability to analyze things, our salary would go up and taxes down. However, we still recommend you to read this book, there is always a space to improve your analytical abilities.
7–10	You don't need to use any computer software for project risk analysis, because your brain is a computer. Your analytical abilities are superior. You can tell your management that they don't need to buy a computer for you and can give you the money they saved.

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