

# Data-driven project management is good for your business: A business novel tells you why

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## Abstract

This paper provides a summary of my new business novel “The Data-Driven Project Manager: A Statistical Battle Against Project Obstacles” recently published by Apress (Vanhoucke, 2018). The book tells the story of a young project manager, Emily Reed, who is in charge of implementing a new way of managing projects based on a mix of facts and figures, in combination with experience and intuition.

The paper will summarise the most important lessons-to-learn in the book, and will give an overview of the five main chapters. Moreover, a quick view on the research background used in the book, with references to relevant reading material and other interesting sources will be given at the end of this paper.

**Keywords:** Project Management; Data Analysis; Decision Making; Project Planning; Risk Analysis; Project Control; Earned Value Management; Control Efficiency; Novel

## 1 Introduction

Projects are usually more complex than daily routine business operations since they require more sophisticated resources, risks are greater and deadlines and budgets are tighter. A wide variety of Project Management guidelines, software tools and methodologies have been proposed, aiming at constructing project plans, manage risks, optimise resources, and measure the project progress. However, often times, people do not put much trust in these tools since they contain black-box approaches and often are too rigid or not well-understood and therefore are claimed not to be very useful for their projects. However, a clever and correct use of the tools and methodologies can be of a great merit, on the condition that the user knows what these methodologies exactly can do for the project. More precisely,

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the user should clearly understand why and how these data-driven methodologies can be integrated in a decision-support system to cope with the rigorous requirements of projects, such as:

- Construct plans with inaccurate time and cost estimates
- Handle the never-ending stream of change requests
- Timely react on the sudden unexpected events
- Balance between time pressure and limited resources
- Keep everyone informed and updated

Data-driven project management is known in literature as *dynamic scheduling* (Uyttewaal, 2005; Vanhoucke, 2012b) or *integrated project management and control* (Vanhoucke, 2014) and refers to the integration of different planning, risk and control methodologies in a single decision-support system to manage projects. It requires data of past projects, it is based on accurate time and cost estimates, it offers insights into the impact of risk and it provides a set of key performance indicators to improve decision-making. Rather than solely relying on the project manager’s intuition and experience, the ultimate goal of such a data-driven project management approach is to make better decisions for projects in progress based on facts and numbers. In combination with the project manager’s experience, it aims at maximising the project’s success and delivering it on time and within budget to the project’s client.

In my latest book “The Data-Driven Project Manager: A Statistical Battle Against Project Obstacles” (Vanhoucke, 2018) published by Apress, I present such an integrated data-driven project management approach. It’s not the first time that I write a book about this topic, however, this time, I took a totally different approach. This time: it’s a business novel! As an academic, I learned to write papers and books with a strong focus on the technicalities of the data-driven project management techniques. I learned to focus on detailed calculations, explaining each methodology in a stepwise approach, each time giving a full overview of the underlying assumptions and leaving not much room for own interpretations. Reporting results obtained by experiments is – after all – the mission of an academic. In my new business novel, I decided to focus on the story, with room for personal interpretations and doubts. The book is written as a narrative telling the story of a company that wants to install a data-driven methodology for managing their projects. It’s a story about people who struggle with the new concepts, but also about other people who cannot wait to implement the new system as soon as possible. It combines the explanation of the statistical methodologies (i.e. sound academic research) with the complexities and difficulties to use them in a real business environment (i.e. the practical relevance) in a single story of a

company called GlobalConstruct Ltd.

Storytelling may be trendy in marketing circles these days, but I was already convinced for a long time that storytelling works. After 20 years of academic research, consultancy and teaching all around the world, I have learned that every single person has his/her own way of understanding new (and often) complex topics. Young university students might prefer mathematical details and are not always very interested in the practical relevance, while the (somewhat) more-experienced students (MBA students, or company people) prefer to put these mathematical details into the right perspective, and rather aim at understanding the strengths and weaknesses of the underlying statistical principles. But no matter how students learn and what they aim for, it is the task of a teacher not only to provide them with new concepts and methodologies, but also to explain them why these methodologies work in some cases and why they sometimes miserably fail in other cases. Therefore, a good teacher should invite his/her students to join him/her in a journey and learning experience, and together, they should strive to obtain understanding and conviction that the discussed topics are relevant for their career, now, tomorrow or maybe much later. And telling a story to put the different concepts into the right perspective, works better than just focusing on the formulas and dry details of the methodologies.

In a recent article “Jeff Bezos Banned PowerPoint in Meetings. His Replacement Is Brilliant” written by Carmine Gallo<sup>1</sup>, the author writes that our brains are hardwired for narrative, and he refers to experiments by neuroscientists that stories are often more persuasive than summaries with details. Moreover, the author states that “Amazon founder and CEO Jeff Bezos clearly understands that logic (data) must be married with pathos (narrative) to be successful, and refers to his quote ”I’m actually a big fan of anecdotes in business”. If Jeff Bezos is a big fan of business stories, probably many people are. I love storytelling, and I saw that it worked in my teaching sessions. That’s why I wrote my new book in a storytelling format.

## 2 The Story

The book tells the story of the implementation of a new project management approach at the (fictitious) company GlobalConstruct Ltd. It is a project management consultancy company headquartered in Brussels (Belgium) with affiliations all over Europe, America and Asia. The company was founded by Jacob Mitchell, a young twentysomething looking for a temporary endeavour, and the company quickly grew into an internationally renowned project management consultancy company. After more than 30 years, Jacob is now the Chief Executive Officer (CEO) of a company of over 2,000 employees in more than 30 offices worldwide.

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<sup>1</sup>Article found at <https://www.inc.com/carmine-gallo/jeff-bezos-bans-powerpoint-in-meetings-his-replacement-is-brilliant.html>

The protagonist Emily Reed, Chief Operations Officer (COO) at the consultancy company GlobalConstruct, is a young project manager always in search of a better way. With her affinity for numbers, her ingenuity in problem solving, and her dyed-in-the-wool belief that data should be the driver in all decision-making processes, she ultimately tries to change the company's project management style. With the support of her mentor and CEO, Jacob Mitchell and fed by the enthusiasm of her number-crunching colleague Mark Rogers (Chief Financial Officer), she starts a journey of team meetings and discussions to better prepare and manage a tennis stadium construction project – with the goal of paving the way towards a more data-driven project management methodology. In her typical interactive discussion style, and with a deep respect for wisdom and experience, she convinces her team members that the price of exploring data is less than the risk of battling the unexpected project obstacles with experience alone.

Implementing a new data-driven approach for managing projects might seem to be an easy task, but it's not. Not every member of Emily's team is as keen on numbers as she is. Often times, people are not familiar with number crunching techniques. They might think that all this data-driven attention will lead to heavy mathematical calculations, complex procedures, an overload of key performance metrics and useless results. Emily's challenge is to cope with these different people, with their often conflicting views, their limited knowledge of data-driven methodologies, and their own way of managing projects.

All the dialogues between the various members are taken from real life, just like the characters, each having a different view on how to best manage the company's projects. Being aware of the diversity of opinions, Jacob Mitchell schedules several team meetings throughout the book. These meetings always include himself, Emily and her colleague Mark, but sometimes he also invites other team members, such as Ruth Bowman, Joanna Barnes and Mick Hudson. Ruth is Head of the Accounting Department and Data Scientist, and she is not afraid of numbers. However, it quickly becomes clear that she has a slightly different view on how budgets and spendings are managed. With her management accounting background, she learned a lot from Emily's project value-based approach.

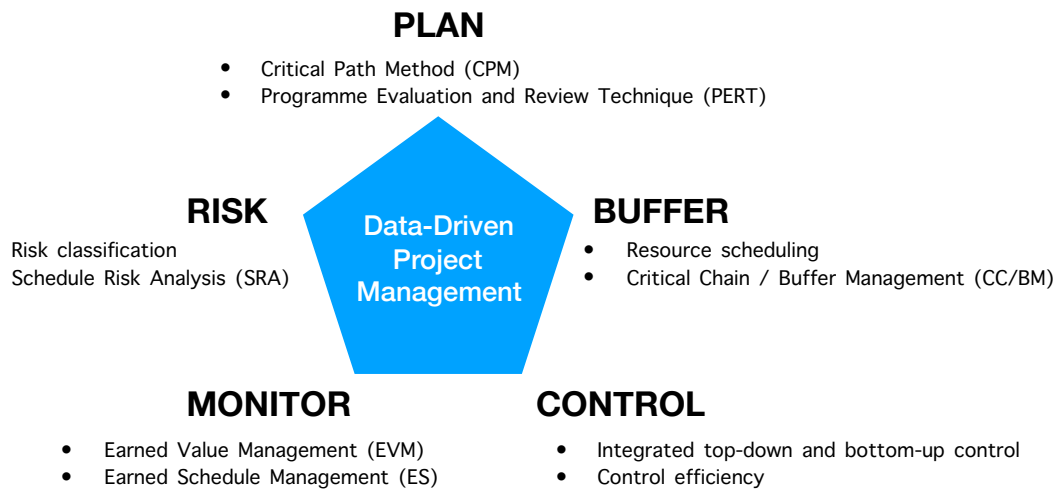
Joanna Barnes has not a data-driven mindset. As Head of the Human Resource Management Department, she mostly cares about the well-being of her people. While project planners treat people as *scarce resources*, Joanna continuously warns the team that people deserve respect and attention, and that treating them well is more important than number crunching. Mick Hudson is known as the IT wonder-boy and spreadsheet guy. He has a computer science background, and works in the IT Department. He is the only team member without a project management background. Nevertheless, he intensively collaborates with Emily on a new project dashboard in MS Excel. Together, they develop an easy-to-read and easy-to-use project control dashboard that should improve the decision-making

process of the company's projects.

Jacob was convinced that Emily was the right person for this challenging task. Not fully aware of the difficulties she could possibly face, Emily could only see the beauty of the challenge and the beneficial impact it could have on the future of GlobalConstruct. She had never been afraid of the impossible – and she had the ability to transform any impossible endeavour into an exciting challenge. And a challenge it turned out to be!

### 3 Book chapters

In this section, the main lessons-to-learn of the different chapters of the book are outlined. The book consists of 5 main chapters, as illustrated in Figure 1, extended with some additional introduction and conclusion chapters. In the next section, I will briefly summarize the content of these 5 chapters and I will each time use three keywords to structure this content.



**Figure 1:** Summary of the book chapter themes

#### 3.1 Plan

The first chapter is the least novel and discusses the well-known techniques such as the *Critical Path Method* (CPM) and its extended version to the *Programme Evaluation and Review Technique* (PERT). While the origin of these techniques dates back to the middle of the previous century, their relevance for business as well as their underlying mathematical details are often not well-understood. Moreover, the construction of a plan, discussed in

this chapter, is crucial for all later phases of the project and constitutes the foundation of the book. The three keywords for this chapter are given below, and will be briefly outlined afterwards.

## ACTIVITY – NETWORK – PROJECT

**Activity analysis:** The activity analysis consists of defining three time estimates for each activity, known in PERT as the optimistic ( $a$ ), realistic ( $m$ , abbreviation of the median) and pessimistic ( $b$ ) estimates. It is known that the use of three estimates is less prone to biases (over- or underestimates) and results in more accurate duration estimates. The underlying principle of the beta distribution is explained in the book, and the chapter shows that the formulas used to calculate the average value and standard deviation for each activity duration are simplified versions of the real average and standard deviation for the beta distributions. However, it is shown that these simplifications are not just random choices but rather cleverly chosen simplifications based on standard principles such as weighted averages and three-sigma intervals.

**Network analysis:** The network analysis aims at linking the activities to each other to model precedences, and is presented to the project team as the *Design Structure Matrix* (DSM). This DSM can be graphically presented as an activity-on-the-node network (or as an activity-on-the-arc network, but the latter is less widely used in project management, and therefore, not discussed). Based on the project network, and the average values for the activity duration, the so-called *Earliest Start Schedule* (ESS) can be easily calculated using the well-known *Critical Path Method*. Concepts such as activity slack, activity criticality and project variability are discussed and explained during the network analysis.

**Project analysis:** In a final step, the project's critical path and schedule are analysed to make a decision. The well-known *Central Limit Theorem* (CLT) from statistics plays a central role in this analysis, since it allows to set confidence intervals or service levels on the expected project duration. In the book, Emily had to choose between two projects, and her final decision will be based on a comparison between two normal distributions calculated by means of PERT. Easy statistics used for selecting projects!

Maybe the first chapter is not written for statistical dummies, but it does not require expert knowledge in statistics or mathematics either. Instead, it provides an easy-to-grasp look behind the secrets of PERT, and shows that it can be easily used for analysing projects without needing an overwhelming amount of data. In the chapter “PLAN” of the book, the reader will learn the following topics:

- How planning works or fails
- How multiple estimates improve planning quality

- How variances should be added and compared
- How statistical simplifications lead to small errors
- How times have changed over the years

### 3.2 Risk

Risk typifies projects and an anticipation of the impact of potentially unknown events is key to the success of the project. Understanding a project's risk allows the project manager to focus his/her attention to the most crucial parts of the project, and will likely result in better and quicker decisions. The risk analysis chapter is explained using the following three keywords:

#### DEFINE – CLASSIFY – ANALYSE

**Risk definition:** Defining risk means getting to know where unexpected events can possibly show up and endanger the project objectives. Such a list of events is not always easy to get, but with team work and good communication, some of these events can be revealed. It does not mean that a project manager should try to address each and every risk factor, but rather he/she should be aware of the most critical ones. Once having such a list of possible risk factors, gathering data about their probability of occurrence, as well as their potential impact on the project objectives is necessary. Indeed, if you read a randomly chosen article about risk, then you will see that  $risk = probability \times impact$ .

**Risk classification:** Before the risk can be analysed, values should be set for the probability and the impact dimensions, and distributions should be defined to allow a proper analysis. Indeed, classifying risk means that each event must be put in a set of classes, defined by the *distribution type* (e.g. normal distribution, beta distribution, ...) as well as the *distribution parameters* (values for the average and standard deviation of the distribution). In the book, I classified each activity in one out of five possible classes (from low risk to high risk), as follows: *risk-free*, *variation*, *foreseen uncertainty*, *unforeseen uncertainty* and even *black swans*. Each of these five classes results in a different distribution type, and different values can be chosen for each type. On top of that, it is shown that risk is not only defined by its *probability* and its potential *impact*, but also by its so-called *controllability* which measures the company's ability to cope with the risk. These three dimensions (probability, impact, controllability) define how risk should be analysed to make good decisions for the projects. This brings us to the next step: analysing risk.

**Risk analysis:** The analysis of risk can now be started using the distributions defined in the previous step. Such an analysis – known as *Schedule Risk Analysis* (SRA) – aims at prioritising the risks. If a project manager can do this effectively, he/she can focus the

majority of the time and effort on the most important risks, and make decisions that do good to the project. In the book, Emily explains to her colleagues that such an analysis can be best done using *Monte Carlo Simulation* (MCS) which iteratively draws numbers from the distributions and reschedules the project a couple of thousands times. Consequently, MCS acts as a time machine, imitating all possible futures one by one, each time measuring the time/cost criticality of each activity, and eventually providing the user with a set of so-called *sensitivity metrics* to detect the bottlenecks and the most important risks.

Most work of this chapter is inspired by my research study I published in Vanhoucke (2010b) (which I summarised later in layman’s terms in a paper published in the *Journal of Modern Project Management* (Vanhoucke, 2015)). In this study, I tested the power of MCS and the validity of different sensitivity metrics, such as the *criticality index*, *significance index* and *schedule sensitivity index*, that are all discussed in the book. In the chapter “RISK”, the reader will learn:

- How a time machine works
- How probability and impact define risk
- How controllability reduces the fear of risk
- How sensitivity to changes helps detect bottlenecks
- How black swans should be ignored

### 3.3 Buffer

And the novel continues... Over the last decades, GlobalConstruct has provided solutions to improve project performance with proven project management consulting and sound approaches that have been implemented in hundreds of organisations all over the world. The company is especially known for diagnosing problems for quick recovery of projects in trouble, an intuitive solution approach based on years of experience, and better management of key project issues. From the very beginning, the company mission expressed a strong focus on providing key resources to monitor and follow up its clients’ projects. To that purpose, the company provides *senior project management consultants* to its clients to help them manage their projects and to deliver better value from the early project phases to the final delivery. These project management consultants assist GlobalConstruct’s clients during the project’s entire life cycle from negotiation and planning, to monitoring and supervision, and even to successful delivery and post-delivery once the project is finished. Their tasks include setting up project plans with the client, managing key resource dependencies during project progress, and providing advice when labour shortages start to bring the project objectives into the danger zone. GlobalConstruct’s client remains the owner of the project, and has the final responsibility in communicating with its stakeholders. Moreover,



the labour for the project work is always delivered by, and under the responsibility of, this project owner, and so these are external project teams for GlobalConstruct, but these teams work under the direct supervision of GlobalConstruct's senior project management consultants. The consultants' day-to-day activities are often complex and vary depending on the needs of the client and the type of project. Their ability to work with large international teams across various sites undoubtedly has helped many clients deliver successful projects well ahead of their competitors.

Since these senior project management consultants are the most important resources of the company, this chapter enters the exciting world of *resource-constrained project scheduling*. Indeed, a limited number of consultants is assigned to the tennis stadium construction project, and the constructed schedule should assure that enough consultants are available at all times during the project. Since the earliest start schedule shows resource over-allocations at some periods, the project needs to be rescheduled to avoid these stressed periods of over-allocations. Different options are suggested by different members of the team, ranging from the traditional *levelling* approach to the presented *buffering* approach. This buffering approach is loosely based on the book *Critical Chain* (Goldratt, 1997) and is explained using the three keywords, as follows:

### **CUT – PLAN – BUFFER**

**CUT:** Activity durations are cut into pieces to obtain so-called *aggressive time estimates* that only take a fraction of the initial estimates. The underlying idea is that activities should not contain a safety margin, and estimates should be set sharp but nevertheless realistic. Consequently, a lot of safety time is removed from the estimates, resulting in a much shorter project duration. Of course, this shortened project duration is dangerous, and the real project duration is likely to exceed the schedule's planned duration. That's why two other steps – plan and buffer – are necessary.

**PLAN:** The project is scheduled with these aggressive time estimates using traditional resource levelling tools, but every activity is now scheduled as-late-as-possible (instead of using the traditional *earliest start scheduling* approach). One of the reasons for such a *latest start scheduling* approach is that it allows the planner to work backwards, from the promised deadline till today. Obviously, the schedule should now be free of over-allocations to avoid pressure on the senior consultants.

**BUFFER:** Since the safety has been initially removed from the activity estimates, the schedule constructed in the previous step is very sensitive to activity delays. From the moments the slightest delay occurs, it might have an immediate impact on the total project duration. Therefore, Emily proposes to add the removed activity safety time again in the schedule as buffers. This time, she will not put these buffers at the activity level, but rather

at strategic, cleverly chosen places in the project network. She therefore proposes different approaches, such as the 50% buffer (add buffers at the end of chains of activities), the split buffer approach (cut the buffer into pieces and add them at various places) as well as an approach in which the buffer size is equal to the removed safety time for the aggressive time estimates of the "CUT" phase (i.e. give the project back what you initially took). The reason why different proposals are discussed, both for sizing and placing the buffers in the network, is because the right choice is key to guarantee maximum protection against delays.

The discussion between Emily and her team members about setting/sizing buffers is heavily inspired by the critical chain/buffer management approach of Goldratt (1997), but it does not go as deep as the original book. The chapter is also inspired by my recent research on project buffering, more specifically by the research in Colin and Vanhoucke (2015) and Martens and Vanhoucke (2017a,b) that shows that buffer management is useful for coping with risk. In the chapter "BUFFER", the reader will learn:

- How to avoid a burnout
- How to cope with scarcity of resources
- How change is easy to propose, but difficult to implement
- How buffering is a matter of giving and taking

### 3.4 Monitor

The three previous chapters (plan, risk and buffer) focus on the preparatory work that must be done even before the construction project starts. In the current chapter, the project has finally started, and the chapter opens after ten weeks have passed. While the first few days of the start-up of the project were hectic as usual, the work gradually returned to a normal day-to-day rhythm. As from the beginning, Jacob, Mark and Emily were feeling quite confident that the project was going to be a success. To make sure that they would be able to deal with unexpected events, it was agreed that there would be a ten-weekly reporting cycle: every ten weeks, both the progress and the costs for each of the work packages were to be reported. This information, combined with their approved project plan and risk analyses, should be enough for informed actions if the project would risk running into the danger zone. Emily proposed a system that is based on the following three foundations:

#### COLLECT – MEASURE – PREDICT

**COLLECT:** The system that Emily suggests is nothing more than the well-known *Earned Value Management* (EVM) approach, which is why Emily states that three key metrics should be collected every ten weeks. The *Planned Value* (PV) is known from the plan,

and should therefore be available from the project start, but both the *Actual Cost* (AC) and *Earned Value* (EV) are only known when the project progresses. Emily proposes a so-called *work package control* approach and collects the data for the three key metrics on the level of the work package in the work breakdown structure. Such an approach is less detailed than an activity-based collection approach, but still contains enough details compared to a project-based approach, and therefore holds the middle between a burdensome approach full of details and a helicopter view approach which potentially masks most of the project problems. The necessity for the right level of detail for monitoring and controlling projects has been beautifully expressed in a paper published by Lipke et al. (2009) and states that “a detailed schedule analysis is a burdensome activity and if performed often can have disrupting effects on the project team”.

**MEASURE:** Based on the three key metrics, the schedule and cost performance is calculated by the so-called *Schedule Performance Index* (SPI) and *Cost Performance Index* (CPI). During this step, Emily also proposes an alternative for the SPI, since it is not reliable for measuring time performance (Lipke, 2003), known as the SPI(t) based on the *earned schedule* metric. This new metric basically is identical to the earned value metric, but is now expressed in a time unit (e.g. weeks) instead of a monetary unit.

**PREDICT:** Given the known time and cost performances of the previous step, the total expected time and cost of the project at its completion should be calculated (that’s why the predictions are called *Expected At Completion* (EAC(t) for time and EAC(€) for cost)). Emily shows that these predictions can be done in various ways, and integrate both the known performance (data) as well as the project manager’s knowledge about the current project problems (experience). While data cannot replace experience, experience without data also might be an inferior way for good decision-making. That is why the combination of both data and experience lies at the heart of the predictions, and that is exactly why Emily is so enthusiastic about the EVM methodology.

The previously mentioned combination between data and experience is of course well known in EVM. The data is given by the CPI, SPI and SPI(t) measures at the current day of the project progress. The experience is the project manager’s own judgement of how the future of the project will most likely be. This so-called *performance factor* is used to correct the expected future performance in various ways, and is discussed in the first paper I ever wrote about EVM, published in Vandevoorde and Vanhoucke (2006). Ever since that paper, I have done a lot of research in this exciting field, and much of what I wrote in my business novel is based on the studies presented in my first book “Measuring Time” (Vanhoucke, 2010a) (although that book is much more technical than my business novel). In the chapter “MONITOR”, the following lessons-to-learn are discussed:

- How to collect data
- How time and cost can be integrated

- How planning finally gets a *raison d'être*
- How good performance can be misleading
- How predictions depend on past experiences and future expectations
- How the beauty of a unified system lies in its simplicity
- How value is not the same as progress

### 3.5 Control

At the start of this chapter, thirty weeks and multiple meetings had passed for the project now, and CEO Jacob knew that the third project progress meeting would be a crucial one. While the previous meetings were often cordial and exploitative, this meeting was supposed to be the one where a final decision about the new project management and control approach should be taken. Indeed, the purpose of this chapter is to present a new integrated project management and control methodology, incorporating all the previous analyses, in order to make good and quick decisions for projects in trouble. For this reason, Jacob brought the right people together from across the company in order to get things done quickly. The following three key points are on the agenda:

#### ALARM – FOCUS – SHOOT

This chapter aims at integrating all the methodologies discussed in the previous chapters, in order to present a single integrated decision-support system to manage the project of the company. Emily wants to convince all the team members, regardless of their background, that planning, risk and control should be used to take quick and good decisions. She will present this new methodology as a three steps methodology (alarm, focus and shoot) with only one goal in mind: How can we, as a company, make efficient decisions, quick enough such that it does not consume all our precious time, but good enough such that it solves the project problems. Here is what she proposes:

**Warning signals (*alarm*):** Warning signals must be generated by the EVM system discussed in the previous chapter, and act as triggers for drilling down in the work breakdown structure to search for problems. Hence, thresholds must be set on the performance metrics (CPI, SPI and SPI(t)) that give the project manager an indication – once they are exceeded – when he/she should spend time and effort to search for problems.

**Detect problems: (*focus*):** Once the alarm went off (i.e. the thresholds are exceeded), the project manager should spend time and effort to find at the detailed activity level what exactly went wrong. In order to do that in an efficient way, the project manager should



focus on the most critical activities first, since they are most likely responsible for the problems. Consequently, the risk analysis discussed in the “RISK” chapter can now be used to steer the project manager’s focus to the right activities. Only the most critical activities really matter, and the risk sensitivity metrics can give a good indication which activities are really worth investigating. The central idea of focusing on the critical activities is worth exploiting, since the project manager wants to control the project with minimum effort, i.e. he/she wants to avoid to become a control freak (everything is critical) or simply lazy (nothing really matters). The real project manager wants none of these two extremes, and aims at being efficient.

**Take actions (*shoot*):** Taking corrective actions to bring the project back on the right path are key to the success of a project. Once the project manager has detected the problem, he/she must search for solutions, preferably solutions that have a high-quality impact on the project objectives (i.e. the project should be brought back on track).

This final chapter is meant to contain many new research results that are not widely known in practice. Indeed, once Emily starts with something, no-one can stop her. That is why she closely works together with Mick, the IT wonder boy, to design some experiments for experimental learning (the developed project management dashboard is shown in Figure 2). These experiments rely on data of past projects to improve the understanding of the company’s future projects. Such an approach lies in the heart of the well-known *Reference Class Forecasting* (RCF) technique based on the principles of Kahneman and Tversky (1979) and Lovallo and Kahneman (2003). This RCF methodology has been tested on projects by Flyvbjerg (2006) and has recently also become part of my own research agenda (Batselier and Vanhoucke, 2016, 2017). However, most of the work in the chapter is based on my research done in Vanhoucke (2011), and technical details about calculations can be found in my book *Integrated Project Management and Control* (Vanhoucke, 2016).

The central theme of this chapter is the *control efficiency* concept. It assumes that a good project manager has to balance between the effort for detecting problems (FOCUS) and the quality of the actions to solve these problems (SHOOT). The idea is discussed in my simulation study published in Vanhoucke (2011) and validated on real project data in Vanhoucke (2012a). It basically aims at controlling projects with the minimum possible effort, but aiming at high quality results. The idea of avoiding overreactions when false warning signals go off (ALARM) and missing real problems when warning signals do not, but should, go off, is the central idea of hypothesis testing in statistics, and is brought here in the project management world of Emily and her team. For details, the reader should read the exciting story of Emily and her team. In the chapter “CONTROL”, the reader will learn:

- How to set your alarm

- How focusing always pays off
- How to aim and shoot in one motion
- How effort and quality are different sides of the same coin
- How efficiency is a goal in management
- How a control freak gets crazy
- How being lazy always turns out to be bad

## 4 Background

It is needless to say that writing a business novel cannot be done without the hard work and inspiration of others. I have been inspired by many people, inside and outside the academic world, and I devoted a whole chapter on the research studies I used for writing Emily's search for a better decision-making methodology for managing GlobalConstruct's projects.

First and foremost, the story is based on real people that I have met during my project management consultancy work, my trainings I gave in companies, and also my MBA students. All the book dialogues between the team members are taken from real life, just like the characters: the *technician* who only looks at the figures and numbers, and thinks faster than anyone else, the *opponent* who is absolutely not interested in a data-driven approach, the *interested colleague* who really wants to understand every little detail, but who is struggling with the mathematics, and probably many other people you and I have met in life. For each character I could name ten people that I have met over the years. All their different perspectives are covered in the story, and that was a conscious choice. It's not because I believe that approach X is better than approach Y, that other people cannot think differently. They might have their own reasons – right or wrong – for doing things in a totally different way. I tried to incorporate these different points-of-view in my book by casting the characters well.

Secondly, much of the work is based on my own research. Much of the research I carried out with my team members at the *Operations Research and Scheduling* (OR&S) group<sup>2</sup> is published in academic journals, but it is often highly technical and therefore not easy to understand by people not in the academic world. I hope that the new book format (business novel) reduces the technicality of the topic, and narrows the gap between academia and business. The new format should make the book easy to read to everyone with an interest in data-driven decision-making. To those who are still interested in technical details,

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<sup>2</sup>Please visit [www.projectmanagement.ugent.be](http://www.projectmanagement.ugent.be) for more information.

I have spent a whole chapter with references to my own research papers.

Looking back, I have now spent more than a decade on Earned Value Management, and I never expected that I would spend so much of my precious research time on this fascinating topic. After all these years, it still keeps me busy. It goes without saying that this is thanks to a lot of people, too many to mention. I am especially grateful to the *Project Management Institute* (Belgian Chapter) and the *International Project Management Association*, who awarded my research in 2007 and 2008 respectively. At that time, my research was done on artificial project data, with little to no interest in the practical application. But suddenly, my research seemed to have practical relevance (awarded!), which gave me an incentive to keep doing the work, until today!

Of course, I should mention also many other research papers written by colleagues, friends, and people I don't know. Obviously, my own research is based on excellent research of others. I know that I did not mention many other research studies in this paper here, and I did not mention them in my book either. It's not that these studies were not important, on the contrary! It's just ... that I don't know where to begin. There is an overwhelming amount of relevant research on planning, risk and control, and that's why I decided to refer the reader to my own research. In the references of my papers, the reader can explore the interesting world of data-driven project management. It's an interesting and exciting world, with lots of methodologies and new concepts, some of them with immediate relevance in business, others with a focus on advanced technologies that might be useful in the future. I believe that the search for data-driven methodologies to make better decisions, whether it is for projects in progress or for any other business, is just about to begin. Exciting times are ahead of us: both for academics and professionals!

## 5 Conclusion

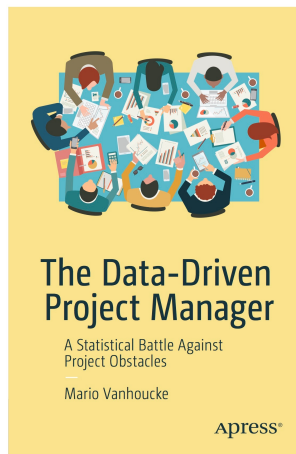
This paper gives an overview of the main themes of my business novel on data-driven project management, for which a summary is given in Figure 3. The book focuses on project planning, risk analysis, resource management, project monitoring and project control and integrates well-known and novel methodologies in one easy-to-read book.

The book is written for anyone with an interest in decision-making and project management. For people who are already convinced that it is best to rely on data for measuring risk and controlling projects, this book will mainly act as a reference for refreshing the existing statistical methodologies. These people can learn how to integrate these data-driven project management methodologies into a single decision support system. But the book might also be relevant for people who are not very familiar with data-driven tools and techniques. For them, this book should serve as an inspiring novel that – I sincerely hope



– should convince them that a data-driven decision-making approach is not as complex as it sounds. With a good understanding and a little bit effort, these data-driven methodologies can be easily implemented for any project. It will contribute to a data-driven decision-making process, where human expertise and intuition can be combined with facts and figures, in order to improve the quality of the corrective actions necessary to bring projects in trouble back on track.

If you have a passion for project management, an appetite for decision-making, and an affinity with numbers, then I invite you to read this book.



- Structured as a novel, this book provides real-time simulations of how project managers can solve common project obstacles
- Teaches a data-driven project management methodology which allows project managers to plan, monitor, and control projects while delivering them on time and within budget
- Focuses on integration of three crucial aspects: baseline scheduling, schedule risk analysis, and project control
- Presents different project management planning tools and techniques, such as PERT/CPM, to compare the expected risk of two very similar projects
- Based on case-based lectures given at universities and business schools
- More information: [www.or-as.be/books](http://www.or-as.be/books)
- Available at [www.apress.com](http://www.apress.com)

**Figure 3:** Book summary

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