
Preface

The time for action is now. It's never too late to do something.

—Antoine de Saint-Exupery.

What Is This Book About?

In this book, we focus on the estimation of software development effort. Three aspects are considered important for the proper handling of effort estimation: (1) *foundations* of software effort estimation, (2) selecting the most suitable estimation *approach*, and (3) successfully using effort estimation in specific *contexts*.

What Is This Book NOT About?

This book does not include project planning activities that typically follow effort estimation. We do not discuss such aspects as how to allocate project resources to work tasks, how to sequence work activities, how to determine critical paths, and how to resolve resource conflicts. Finally, we are not addressing project scheduling or budgeting. We refer readers interested in these subjects to books that address project management topics, for example, the PMI's (2013) Project Management Body of Knowledge (PMBOK Guide) or OGC's (2009) PRINCE2, which offer very useful overviews of common project management practices.

To Whom Is This Book Addressed?

In its very early stage, this book was intended as a collection of notes, where the most relevant estimation principles, definitions, and empirical observations, found in the literature and from experience, were gathered. In the course of time, this was shared with others. This book aims to inherit the intention of these initial notes and the needs of people they were shared with. It is addressed to those who want to take

actions in order to improve their estimation practices, yet are missing (1) the necessary knowledge and understanding of estimation principles and (2) a concise reference of best practices and most common estimation approaches they can start with and adapt to their particular needs. This book assumes one prerequisite about its intended audience: it assumes that readers believe that it is never too late to do something about your estimation practices, irrespective of whatever shape they are now in.

Software Practitioners

This book is intended for all software practitioners responsible for software effort estimation and planning in their daily work. This includes primarily, but is not limited to, those who are responsible for introducing and maintaining estimation practices in a software development organization.

Students

In this book, we also appreciate the value of the old saying “as the twig is bent, so grows the tree” and address the content to students of software engineering programs, particularly project and process management courses.

How to Read This Book

We anticipated this book to be a reference guidebook you can grab whenever you need to learn or recall specific aspects of effort estimation. The way you read the book depends on your particular needs at a given moment. So before you start, think for a moment—what do you want to achieve?

- *If you want to understand the basic challenges and principles of software effort estimation, read Chaps. 1 and 2.*
- *If you want to master the principal concepts and techniques of existing estimation methods, read Chaps. 3–5 and the Appendix.*
- *If you want to select the most suitable estimation method for estimating software development effort in your specific context, read Chaps. 6 and 7.*
- *If additionally you want to get a quick insight into the most common estimation methods, including their prominent strengths and weaknesses, read Chaps. 8–15, or only some of them if you are interested in any specific method we present there.*
- *If you want to introduce a new estimation approach or improve the one you have been using, read Chap. 16.*
- *In any case, read the best-practice guidelines we present in Chap. 17.*

Moreover, each part of the book begins with a brief summary of the chapters it encompasses. Refer to these summaries to quickly decide which chapter to read.

Key Terminology Used in This Book

In this book, we use several basic terms, which in other literature and in practice are often used interchangeably. In order not to confuse the reader, we would like to start by clarifying the most important terms we will use throughout the text.

Cost Versus Effort

Although principally and intuitively different, the terms “cost” and “effort” are often used as synonyms in the software project management area. The Webster dictionary defines cost as “the amount or equivalent paid or charged for something” and effort as “conscious exertion of power” or “the total work done to achieve a particular end”. In the software engineering domain, cost is defined in a monetary sense, and with respect to software development projects, it refers to partial or total monetary cost of providing (creating) certain products or services. Effort, on the other hand, refers to staff time spent on performing activities aimed at providing these products or services. In consequence, project cost includes, but is not limited to, project effort. In practice, cost includes such elements as fixed infrastructure and administrative costs for example. Moreover, dependent on the project context (e.g., currency or cost of staff unit) despite the same project effort, project cost may differ.

In the software engineering literature and practice, “cost” is often used as a synonym for “effort.” One of the ways to notice the difference is to look at units used. Cost in a monetary sense is typically measured in terms of a certain currency (e.g., \$, €, ¥, etc.), whereas cost in an effort sense is typically measured as staff time (e.g., person-hours, person-days, person-months, etc.).

In this book, we focus on estimating software development effort, and we consistently differentiate between cost and effort.

Estimation Versus Prediction Versus Planning

In software engineering, effort estimation, prediction, and planning are related to each other; yet, they have different meanings, that is, they refer to different project management activities. Actually, the dictionary definitions perfectly reflect the differences between these three processes:

- *Estimation*: “the act of judging tentatively or approximately the value, worth, or significance of something”
- *Prediction*: “the act of declaring or indicate in advance; especially: foretelling on the basis of observation, experience, or scientific reason”
- *Planning*: “the act or process of making or carrying out plans; *specifically*: the establishment of goals, policies, and procedures for a social or economic unit”

Estimation Versus Prediction

Both estimation and prediction contain an element of uncertainty; the first refers to approximating an actual state, whereas the latter refers to a future state. Simplifying, we may define prediction as estimating in advance. Since in software engineering, effort estimation refers to approximating development effort in advance, before development is completed, it should actually be called effort prediction. Yet, in practice, both terms are used interchangeably. In this book, we will follow this practice and use estimation and prediction as synonyms for foretelling the effort required for completing software development projects.

Prediction Versus Planning

There is, however, a significant difference between prediction and planning. Prediction refers to an unbiased, analytical process of approximating a future state. Planning, on the other hand, refers to a biased process of establishing goals with respect to the future state. Although predictions form a foundation for planning, plans do not have to be (and typically are not) the same as predictions. In the case of software development, the goal of prediction is to accurately foretell resources (such as effort) required to provide project outcomes. The goal of effort planning is, on the other hand, is to plan the project in such a way that the project goals are achieved. In other words, we plan means within a project to achieve a specific project's end.

Kaiserslautern, Germany
Sydney, NSW, Australia

Adam Trendowicz
Ross Jeffery

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Trendowicz, A.; Jeffery, R.
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