

1. Record Nr.	UNINA9910131295203321
Autore	Abran Alain <1949->
Titolo	Software project estimation : the fundamentals for providng high quality information to decision makers / / Alain Abran
Pubbl/distr/stampa	Hoboken, New Jersey : , : Wiley, , [2015] [Piscataqay, New Jersey] : , : IEEE Xplore, , [2015]
ISBN	1-118-95932-9 1-118-95931-0 1-118-95930-2
Descrizione fisica	1 online resource (290 p.)
Disciplina	005.1
Soggetti	Computer software - Development - Estimates
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Note generali	Description based upon print version of record.
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Foreword xiii -- Overview xvii -- Acknowledgments xxiii -- About the Author xxv -- Part One Understanding the Estimation Process 1 -- 1. The Estimation Process: Phases and Roles 3 -- 1.1. Introduction 3 -- 1.2. Generic Approaches in Estimation Models: Judgment or Engineering? 4 -- 1.2.1. Practitioner's Approach: Judgment and Craftsmanship 4 -- 1.2.2. Engineering Approach: Modest-One Variable at a Time 5 -- 1.3. Overview of Software Project Estimation and Current Practices 6 -- 1.3.1. Overview of an Estimation Process 6 -- 1.3.2. Poor Estimation Practices 7 -- 1.3.3. Examples of Poor Estimation Practices 9 -- 1.3.4. The Reality: A Tally of Failures 10 -- 1.4. Levels of Uncertainty in an Estimation Process 11 -- 1.4.1. The Cone of Uncertainty 11 -- 1.4.2. Uncertainty in a Productivity Model 12 -- 1.5. Productivity Models 14 -- 1.6. The Estimation Process 16 -- 1.6.1. The Context of the Estimation Process 16 -- 1.6.2. The Foundation: The Productivity Model 17 -- 1.6.3. The Full Estimation Process 18 -- 1.7. Budgeting and Estimating: Roles and Responsibilities 23 -- 1.7.1. Project Budgeting: Levels of Responsibility 23 -- 1.7.2. The Estimator 25 -- 1.7.3. The Manager (Decision-Taker and Overseer) 25 -- 1.8. Pricing Strategies 27 -- 1.8.1. Customers-Suppliers: The Risk Transfer Game in Estimation 28 -- 1.9. Summary - Estimating Process, Roles, and Responsibilities 28 -- Exercises 30 -- Term Assignments 31 -- 2.

Engineering and Economics Concepts for Understanding Software Process Performance	32
2.1. Introduction: The Production (Development) Process	32
2.2. The Engineering (and Management) Perspective on a Production Process	34
2.3. Simple Quantitative Process Models	36
2.3.1. Productivity Ratio	36
2.3.2. Unit Effort (or Unit Cost) Ratio	38
2.3.3. Averages	39
2.3.4. Linear and Non-Linear Models	42
2.4. Quantitative Models and Economics Concepts	45
2.4.1. Fixed and Variable Costs	45
2.4.2. Economies and Diseconomies of Scale	48
2.5. Software Engineering Datasets and Their Distribution	49
2.5.1. Wedge-Shaped Datasets	49
2.5.2. Homogeneous Datasets	50
2.6. Productivity Models: Explicit and Implicit Variables	52
2.7. A Single and Universal Catch-All Multidimensional Model or Multiple Simpler Models?	54
2.7.1. Models Built from Available Data	55
2.7.2. Models Built on Opinions on Cost Drivers	55
2.7.3. Multiple Models with Coexisting Economies and Diseconomies of Scale	56
Exercises	58
Term Assignments	59
3. Project Scenarios, Budgeting, and Contingency Planning	60
3.1. Introduction	60
3.2. Project Scenarios for Estimation Purposes	61
3.3. Probability of Underestimation and Contingency Funds	65
3.4. A Contingency Example for a Single Project	67
3.5. Managing Contingency Funds at the Portfolio Level	69
3.6. Managerial Prerogatives: An Example in the AGILE Context	69
3.7. Summary	71
Further Reading: A Simulation for Budgeting at the Portfolio Level	71
Exercises	74
Term Assignments	75
Part Two Estimation Process: What Must be Verified?	77
4. What Must be Verified in an Estimation Process: An Overview	79
4.1. Introduction	79
4.2. Verification of the Direct Inputs to An Estimation Process	81
4.2.1. Identification of the Estimation Inputs	81
4.2.2. Documenting the Quality of These Inputs	82
4.3. Verification of the Productivity Model	84
4.3.1. In-House Productivity Models	84
4.3.2. Externally Provided Models	85
4.4. Verification of the Adjustment Phase	86
4.5. Verification of the Budgeting Phase	87
4.6. Re-Estimation and Continuous Improvement to the Full Estimation Process	88
Further Reading: The Estimation Verification Report	89
Exercises	92
Term Assignments	93
5. Verification of the Dataset Used to Build the Models	94
5.1. Introduction	94
5.2. Verification of DIRECT Inputs	96
5.2.1. Verification of the Data Definitions and Data Quality	96
5.2.2. Importance of the Verification of the Measurement Scale Type	97
5.3. Graphical Analysis - One-Dimensional	100
5.4. Analysis of the Distribution of the Input Variables	102
5.4.1. Identification of a Normal (Gaussian) Distribution	102
5.4.2. Identification of Outliers: One-Dimensional Representation	103
5.4.3. Log Transformation	107
5.5. Graphical Analysis - Two-Dimensional	108
5.6. Size Inputs Derived from a Conversion Formula	111
5.7. Summary	112
Further Reading: Measurement and Quantification	113
Exercises	116
Term Assignments	117
Exercises-Further Reading Section	117
Term Assignments-Further Reading Section	118
6. Verification of Productivity Models	119
6.1. Introduction	119
6.2. Criteria Describing the Relationships Across Variables	120
6.2.1. Simple Criteria	120
6.2.2. Practical Interpretation of Criteria Values	122
6.2.3. More Advanced Criteria	124
6.3. Verification of the Assumptions of the Models	125
6.3.1. Three Key Conditions Often Required	125
6.3.2. Sample Size	126
6.4. Evaluation of Models by Their Own Builders	127
6.5. Models Already Built-Should You Trust Them?	128
6.5.1. Independent Evaluations: Small-Scale Replication Studies	128
6.5.2. Large-Scale Replication Studies	129
6.6. Lessons Learned: Distinct	

Models by Size Range	133
6.6.1. In Practice, Which is the Better Model?	138
6.7. Summary	138
Exercises	139
Term Assignments	139
7. Verification of the Adjustment Phase	141
7.1. Introduction	141
7.2. Adjustment Phase in the Estimation Process	142
7.2.1. Adjusting the Estimation Ranges	142
7.2.2. The Adjustment Phase in the Decision-Making Process: Identifying Scenarios for Managers	144
7.3. The Bundled Approach in Current Practices	145
7.3.1. Overall Approach	145
7.3.2. Detailed Approach for Combining the Impact of Multiple Cost Drivers in Current Models	146
7.3.3. Selecting and Categorizing Each Adjustment: The Transformation of Nominal Scale Cost Drivers into /Numbers	147
7.4. Cost Drivers as Estimation Submodels!	148
7.4.1. Cost Drivers as Step Functions	148
7.4.2. Step Function Estimation Submodels with Unknown Error Ranges	149
7.5. Uncertainty and Error Propagation	151
7.5.1. Error Propagation in Mathematical Formulas	151
7.5.2. The Relevance of Error Propagation in Models	153
Exercises	156
Term Assignments	157
Part Three Building Estimation Models: Data Collection and Analysis	159
8. Data Collection and Industry Standards: The ISBSG Repository	161
8.1. Introduction: Data Collection Requirements	161
8.2. The International Software Benchmarking Standards Group	163
8.2.1. The ISBSG Organization	163
8.2.2. The ISBSG Repository	164
8.3. ISBSG Data Collection Procedures	165
8.3.1. The Data Collection Questionnaire	165
8.3.2. ISBSG Data Definitions	167
8.4. Completed ISBSG Individual Project Benchmarking Reports: Some Examples	170
8.5. Preparing to Use the ISBSG Repository	173
8.5.1. ISBSG Data Extract	173
8.5.2. Data Preparation: Quality of the Data Collected	173
8.5.3. Missing Data: An Example with Effort Data	175
Further Reading 1: Benchmarking Types	177
Further Reading 2: Detailed Structure of the ISBSG Data Extract	179
Exercises	183
Term Assignments	183
9. Building and Evaluating Single Variable Models	185
9.1. Introduction	185
9.2. Modestly, One Variable at a Time	186
9.2.1. The Key Independent Variable: Software Size	186
9.2.2. Analysis of the Work-Effort Relationship in a Sample	188
9.3. Data Preparation	189
9.3.1. Descriptive Analysis	189
9.3.2. Identifying Relevant Samples and Outliers	189
9.4. Analysis of the Quality and Constraints of Models	193
9.4.1. Small Projects	195
9.4.2. Larger Projects	195
9.4.3. Implication for Practitioners	195
9.5. Other Models by Programming Language	196
9.6. Summary	202
Exercises	203
Term Assignments	203
10. Building Models with Categorical Variables	205
10.1. Introduction	205
10.2. The Available Dataset	206
10.3. Initial Model with a Single Independent Variable	208
10.3.1. Simple Linear Regression Model with Functional Size Only	208
10.3.2. Nonlinear Regression Models with Functional Size	208
10.4. Regression Models with Two Independent Variables	210
10.4.1. Multiple Regression Models with Two Independent Quantitative Variables	210
10.4.2. Multiple Regression Models with a Categorical Variable: Project Difficulty	210
10.4.3. The Interaction of Independent Variables	215
Exercises	216
Term Assignments	217
11. Contribution of Productivity Extremes in Estimation	218
11.1. Introduction	218
11.2. Identification of Productivity Extremes	219
11.3. Investigation of Productivity Extremes	220
11.3.1. Projects with Very Low Unit Effort	221
11.3.2. Projects with Very High Unit Effort	222
11.4. Lessons Learned for Estimation Purposes	224
Exercises	225
Term Assignments	225
12. Multiple Models from a Single Dataset	227
12.1. Introduction	227
12.2. Low and High	

Sensitivity to Functional Size Increases: Multiple Models 228 -- 12.3. The Empirical Study 230 -- 12.3.1. Context 230 -- 12.3.2. Data Collection Procedures 231 -- 12.3.3. Data Quality Controls 231 -- 12.4. Descriptive Analysis 231 -- 12.4.1. Project Characteristics 231 -- 12.4.2. Documentation Quality and Its Impact on Functional Size Quality 233 -- 12.4.3. Unit Effort (in Hours) 234 -- 12.5. Productivity Analysis 234 -- 12.5.1. Single Model with the Full Dataset 234 -- 12.5.2. Model of the Least Productive Projects 235 -- 12.5.3. Model of the Most Productive Projects 237 -- 12.6. External Benchmarking with the ISBSG Repository 238 -- 12.6.1. Project Selection Criteria and Samples 238 -- 12.6.2. External Benchmarking Analysis 239 -- 12.6.3. Further Considerations 240 -- 12.7. Identification of the Adjustment Factors for Model Selection 241 -- 12.7.1. Projects with the Highest Productivity (i.e., the Lowest Unit Effort) 241 -- 12.7.2. Lessons Learned 242 -- Exercises 243 -- Term Assignments 243 -- 13. Re-Estimation: A Recovery Effort Model 244. 13.1. Introduction 244 -- 13.2. The Need for Re-Estimation and Related Issues 245 -- 13.3. The Recovery Effort Model 246 -- 13.3.1. Key Concepts 246 -- 13.3.2. Ramp-Up Process Losses 247 -- 13.4. A Recovery Model When a Re-Estimation Need is Recognized at Time $T > 0$ 248 -- 13.4.1. Summary of Recovery Variables 248 -- 13.4.2. A Mathematical Model of a Recovery Course in Re-Estimation 248 -- 13.4.3. Probability of Underestimation $-p(u)$ 249 -- 13.4.4. Probability of Acknowledging the Underestimation on a Given Month $-p(t)$ 250 -- Exercises 251 -- Term Assignments 251 -- References 253 -- Index 257.

Sommario/riassunto

Software projects are often late and over-budget and this leads to major problems for software customers. Clearly, there is a serious issue in estimating a realistic, software project budget. Furthermore, generic estimation models cannot be trusted to provide credible estimates for projects as complex as software projects. This book presents a number of examples using data collected over the years from various organizations building software. It also presents an overview of the non-for-profit organization, which collects data on software projects, the International Software Benchmarking Standards Group. This data collection is based on the ISO standards for measuring the functional size of software. Additional features of this book are: . End-of-chapter exercises and 'terms assignments'. 100+ figures to illustrate concepts presented throughout the book. Examples with industry data. References to the ISO standards and the standards of the International Software Benchmarking Standards Group (ISBSG) In summary, Dr. Abran instructs readers how to build their own estimation models from the data of an organization using a sound statistical basis, and how to focus on the quality of the estimation models built.
