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Short paper

Estimating Application Maintenance and Support using ISBSG Data

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Introduction

The International Software Benchmarking Standards Group (ISBSG) plays a critical role in improving software cost estimation practices. It provides a valuable resource - a vast repository of historical data encompassing diverse software development projects across various industries. This data extends beyond initial development, including information on the often resource-intensive phase of application maintenance and support (M&S).

Studies suggest that **M&S activities can consume a significant portion, ranging from 65% to 85%, of a software application's total ownership cost**. Accurate estimation of M&S effort is crucial for organizations to effectively plan resources, budget appropriately, and manage expectations.

This report explores the use of ISBSG data in estimating application M&S effort. It will discuss the availability of relevant data within the ISBSG repository and highlight different approaches to utilize this data for M&S estimation. We will also explore the benefits and limitations associated with this approach.

If you wish to do your own analysis, or if you are interested in using the ISBSG data for software cost estimation, benchmarking, performance measurement, procurement, etc., please subscribe to the data here: https://www.isbsg.org/project-data/

ISBSG Maintenance and Support Repository Data

The ISBSG Maintenance and Support (M&S) repository is a rich source of historical data, used to estimate effort involved in maintaining and supporting software applications. This section delves into the specifics of what data is available and how it can benefit M&S estimation endeavours.

Data Availability:

The ISBSG M&S repository has data for more than1900 completed M&S projects. This extensive collection offers valuable insights into the real-world effort expended on various M&S activities.

Data Types:

The ISBSG data encompasses a range of attributes crucial for M&S estimation. Here's a breakdown of key attributes:

- **Description Details:** These details provide context about the application, including its functionality, size (e.g., functional size using Function Points), and industry domain.
- **Effort and Effort Attributes:** This data captures the total effort spent on M&S activities, potentially further broken down by specific types of maintenance tasks (e.g., corrective, preventive, adaptive).
- **Defects:** Information on the number and types of defects encountered during the M&S phase provides insight into the complexity of maintenance activities.
- **Application Type:** This data shows the type of application the data is about, e.g., web application, datawarehouse application, order processing application, etc.
- **Process and Technology Details:** The repository contains details about the underlying technologies of the application. This information is helpful for identifying potential correlations between maintenance effort and specific development approaches.

Benefits of Using ISBSG M&S Data:

The ISBSG M&S data offers several advantages for M&S estimation:

- **Reliability:** The data originates from completed projects, providing a realistic picture of actual effort expended.
- **Diversity:** With a vast collection encompassing a wide range of application types and industries, the data allows for comparisons across different contexts.
- **Industry Standards:** The ISBSG data reflects industry benchmarks for M&S effort, providing a valuable reference point for organizations.

By using this comprehensive and reliable data set, organizations can gain a data-driven approach to M&S estimation, leading to more accurate project planning and resource allocation.

Using ISBSG Data for Estimation

The ISBSG M&S repository provides a treasure trove of data for estimating application maintenance and support (M&S) effort. This section explores two key approaches that can be used to transform this data into actionable insights that can contribute to real, accurate M&S estimates.

Benchmarking for M&S Estimation

Benchmarking is a powerful technique that uses historical data from similar projects to estimate effort for new projects. The ISBSG M&S repository allows us to perform M&S estimation through benchmarking by following these steps:

1. **Project Characterization:** Define the characteristics of your target project or application, including its functionality, size, technology, and industry domain.

2. **Data Retrieval:** Query the ISBSG M&S repository to identify projects with similar characteristics to your target application. This might involve filtering based on industry, application type, technologies used and functional size.
3. **Effort Comparison:** Analyze the M&S effort data (e.g., total effort, effort breakdown by task type) for the comparable projects retrieved from the repository.
4. **Effort Adjustment:** While the retrieved effort data provides a valuable benchmark, it's crucial to consider specific factors that may cause deviations. This might involve adjustments based on the complexity of your application, the experience of your M&S team, or any unique requirements.

Through benchmarking, you can gain a realistic understanding of the M&S effort range for engagements like yours. This serves as a solid foundation for your M&S estimate, improving its accuracy.

Effort Breakdown Structure (EBS) Analogy

Another approach in using ISBSG M&S data involves utilizing the Effort Breakdown Structure (EBS) details from the repository. An EBS is a hierarchical representation of the work involved in a project, breaking down the overall effort into smaller, more manageable tasks.

Here's how to use ISBSG data for EBS development:

1. **Identify Relevant EBS Components:** Analyze the M&S effort breakdown data available in the ISBSG repository for projects similar to yours. This data often details the effort spent on specific maintenance activities (e.g., corrective maintenance, preventive maintenance).
2. **Construct Specific EBS:** Based on the retrieved EBS components and your understanding of your target application's needs, build a project-specific EBS for your M&S activities.

3. **Effort Estimation for EBS Components:** Estimate the effort required for each component within your project's EBS. This might involve using expert judgment or analogous estimation techniques based on the historical effort data from the ISBSG repository.

By building an EBS tailored to your project and using ISBSS data for component-level effort estimation, you can create a comprehensive and detailed M&S estimate that accounts for the specific tasks involved.

Limitations to Consider

It's important to acknowledge the limitations associated with relying solely on ISBSG data for M&S estimation:

- **Project Uniqueness:** While the ISBSG repository offers a vast collection, there may not always be a perfect match for your specific project's characteristics.
- **Data Quality:** The accuracy of your estimates depends on the quality of data used from the repository. Ensure you select projects with well-documented M&S activities.
- **External Factors:** Unexpected issues or changes in project scope can significantly impact M&S effort. It's crucial to consider these external factors during estimation.

Example of an M&S estimate

In this example, an estimate is made of a web application that has just been released. The functional size is 500 IFPUG/Nesma function points.

The first step is to set a filter on the columns of the Excel spreadsheet, containing the ISBSG M&S repository data. This shown in Figure 1. This will enable us to create the dataset.

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M&S Data Release 10 V01 August 2023	1921 rows				
	Rating	Derived Data - Note: Scaling Factor has beer			
ISBSG ID	Data Quality Rating	Year	Age at Benchmark	Scaling factor	Total Maintenance hours
10006	A	2018	8	1	264
10006	A	2019	9	1	334
10006	A	2020	10	1	303
10006	A	2021	11	1	93
10010	A	2020	9	1	232
10010	A	2021	10	1	242

Figure 1: ISBSG M&S Data in an Excel spreadsheet

Then we start filtering:

- Data Quality Rating = A or B.
- Year: >2020.
- Application size: between 300 and 750 FP.
- Application size approach = Nesma or IFPUG FP.
- Application type = Web application.
- Technology = .Net or Java.

This gives a dataset of 19 data points. High-level analysis of this data shows an average M&S effort per year of:

- Maintenance effort: 115 hours.
- Support hours: 123 hours.

The average number of extreme defects is 3, the average number of major defects is 7 and the average number of minor defects is 23 defects per year. The total average number of defects is 33 defects per year.

This information allows to estimate the effort necessary to carry out the maintenance and support activities for the new application.

Conclusion

ISBSG M&S data offers a valuable resource for organizations seeking to improve the accuracy of their application M&S effort estimates. By applying benchmarking techniques or leveraging the data to build project-specific EBS structures, organizations can gain valuable insights and establish a data-driven foundation for M&S effort estimation. However, it's important to remain mindful of the limitations and exercise sound judgment when incorporating this data into your estimation process.

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The International Software Benchmarking Standards Group (ISBSG)

The ISBSG is a not-for-profit organization founded in 1997 by a group of international software metrics associations. Their aim was to promote the use of IT industry data to improve software processes and products.

ISBSG is an independent, international organization that collects and provides industry data of software development projects and maintenance & support activities. It aims to help organizations (commercial and government, suppliers and customers) in the software industry to understand and improve their performance and decision making.

ISBSG sets the standards of software data collection, data analysis and project benchmarking processes. It is thought to be the international thought leader in these practices.

The ISBSG mission is to support commercial and public organizations to improve the estimation, planning, control and management of IT software projects and/or maintenance and support contracts.

To achieve this:

ISBSG maintains and grows 2 repositories of IT software development/ maintenance & support data. This data originates from trusted, international IT organizations and can be obtained for a modest fee from the website www.isbsg.org/project-data/

Help us to collect data.

ISBSG is always looking for new data. In return for your data submission, we issue a free benchmark report that shows the performance in your project or contract against relevant industry peers.

Please submit your data through one of the forms listed on http://isbsg.org/submit-data/

A specific Agile/Scrum data collections questionnaire can be downloaded here: https://cutt.ly/4vnuXVT

Partners

This page will help you to find an ISBSG partner in your country:

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