

Analysis of Global Trend Research Report on Software Engineering by the Japanese IT Promotion Agency (IPA)



Introduction

The **2024 Development and Enhancement repository**, maintained by the International Software Benchmarking Standards Group (ISBSG), contains over 12,500 data points of completed, new development projects, releases of existing applications and (series of) completed agile sprints.

Most of the data in the repository was measured using an ISO standard for functional size measurement (IFPUG, Nesma or COSMIC). Therefore, the metrics derived from the data are objective and easy to compare. For example:

- **Project Delivery Rate (PDR):** effort hours spent per functional size unit delivered.
- **Cost Efficiency:** Cost per functional size unit delivered.
- **Delivery Speed:** Number of functional size units delivered per calendar month.
- **Process Quality:** Defects delivered per 1000 functional size units delivered.
- **Value Delivered:** Functional size units delivered per \$1000 budget spent.

Calculate these metrics, for your own projects, then compare them to the ISBSG repository data of relevant peer groups. This will enable your organization to understand its competitiveness and assess whether there is room for improvement per (agile) application development team.

Since these metrics are objective, they can be compared internally and externally, giving many insights to all stakeholders, e.g., C-level management, IT-management, product owners, scrum masters, and the teams themselves.

This short paper summarises the results of the recently published Global Trend Research Report on Software Engineering, published by the Information-technology Promotion Agency (IPA) of Japan. Many experts from the software measurement community, e.g., experts from Nesma, COSMIC, IFPUG, ISBSG, etc., were interviewed and have provided input for this research.

Global Trend Research Report

The Global Trend Research Report on Software Engineering provides a comprehensive overview of current and emerging trends shaping the software engineering landscape.

The summary contained in this short report focuses on highlighting critical insights relevant to the software measurement community. By examining the IPA's analysis, we aim to gain a clearer understanding of the forces driving innovation and change within the software engineering domain.

This report also examines the global trends in software engineering, as observed primarily in the U.S. and Europe. It looks at how these trends contrast with those in Japan.

- Software is increasingly critical not just in IT but across industries, shaping competition.
- Japan's software development still relies heavily on traditional methods, unlike the U.S. and Europe, which are moving toward model-based approaches.
- The research aims to highlight these differences and guide future software engineering policies in Japan.

Background and Objectives

As the mantra "Software Is Eating the World" signifies, software is now central to competitiveness for nations and companies alike.

The IPA's analysis, based on a "FY2023 Questionnaire Survey on Software Development," indicates that Japan's software development practices are still heavily reliant on outdated methodologies, such as estimating software projects based on man-months and source lines of code (SLOCs). This contrasts sharply with Western approaches that prioritize model-based development.

The report aims to identify and analyze the differences in software engineering trends between Japan and other leading regions, with the objective of informing future software engineering policies in Japan.

Research Overview

The research was conducted by a third party provider (Scaleout Inc.) between June and October 2024, utilizing literature reviews, web analyses, and online interviews with experts from various software engineering organizations. The study focused on several key themes:

1. **Software Development Planning Methods:** This encompasses estimation methodologies, available project metrics for estimation, development work period determination methods, and the purpose of development project plans. It highlights how U.S. and European firms are more advanced in strategic estimation, exploring cost estimation methods based on historical data.
2. **Software Valuation Methods:** The research explores the pricing models for SaaS (Software as a Service) and value-based compensation in outsourcing. While outcome-based pricing models are emerging, especially in B2B SaaS, examples of value-based compensation for outsourced projects remain scant.
3. **Modelling:** This theme examines the adoption of modelling approaches, modelling languages, and interoperability between models—observing that model-based development is gaining traction in safety-critical sectors but is still underutilized in enterprises.
4. **Building Blocks:** This includes the transition from monolithic architectures to microservices and the conversion of legacy systems to APIs. The findings suggest a strategic approach to leveraging existing software creatively to generate new value.

The state of Software Engineering in Japan compared to other countries

Despite agile development metrics becoming popular, standardization is lacking in Japan, leading to a focus on self-improvement rather than benchmarking. Additionally, there is insufficient activity in research and case studies on component-based estimation methods.

The approach to software development planning is also evolving in Japan, shifting from traditional metrics, such as accumulated man-hours, to a value-driven delivery model that highlights the importance of delivering

customer value rather than merely achieving quality, cost, and delivery targets. Ultimately, the report aims to inform policies and drive the strategic direction of software engineering in Japan by recognizing and addressing these discrepancies with global trends.

Conclusion

The conclusions drawn from the report are as follows:

1. **Outdated Methodologies:** Japanese software development remains heavily reliant on outdated methodologies, such as man-months and SLOCs, whereas the U.S. and Europe are advancing towards model-based development approaches.
2. **Gaps in Strategic Approaches:** There is a significant disparity between Japan and Western countries in the strategic aspects of software estimation methods, with U.S. and European companies exploring new estimation methods based on historical project data.
3. **Emerging Business Models:** In Japan, there is a movement towards value-based compensation models, particularly in the B2B SaaS sector, where there is an increasing focus on outcome-based pricing linked to clients' performance.
4. **Interest in Agile Metrics:** Despite the growing popularity of agile metrics, there is currently no standardization in Japan, leading to a lack of benchmarking against other projects.
5. **Limited Component-based Estimation Research:** There is inadequate research and case studies focused on component-based software cost estimation methods in Japan.
6. **Shift towards Software Valuation:** The value-driven delivery model is gaining importance, as it emphasizes delivering customer value over merely achieving traditional quality, cost, and delivery targets.
7. **Modelling Adoption:** Although model-based development has made strides in safety-critical industries like automotive and aerospace, it is not yet widely adopted in the enterprise sector.

8. **Focus on Interoperability:** The OMG's Unified Architecture Framework (UAF) is gaining prominence in the enterprise sector, emphasizing interoperability at organizational and business levels.

Overall, the report underscores the need for Japan to evolve its software engineering practices to align with global advancements and emphasizes a strategic shift towards valuing customer outcomes in software development.

ISBSG and Japan

The Japanese JFPUG (Japanese Function Points Users Group) organization was an ISBSG gold partner and the annual ISBSG workshop and IT Confidence conference was organized in Tokyo (Japan) in 2013.

Unfortunately, nowadays JFPUG no longer is a gold partner, which may be one of the reasons the software engineering community is somewhat disconnected from the software measurement, metrics, estimation and benchmarking practices that are now commonly used outside of Japan.

Given the results of this report, it may be a good time for JFPUG, or similar organizations, to reconnect with the international measurement community.

In China, for instance, there are two ISBSG Gold partners (China SPI and BSCEA) that actively promote software measurement using ISO standards for functional size measurement as well as using ISBSG historical data for benchmarking, estimation, outsourcing, contracting, etc.

An overview of the current ISBSG Gold partners can be found here:

<https://www.isbsg.org/about-isbsg/>

Why should you want to join ISBSG as a Gold Partner? Check the advantages here: <https://www.isbsg.org/board/>

The International Software Benchmarking Standards Group (ISBSG)

The ISBSG is a not-for-profit organization founded in 1997 by a group of national, 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. The aim is to help all organizations (commercial and government, suppliers and customers) in the software industry to understand and to improve their performance and decision making.

ISBSG sets the standards of software data collection, software data analysis and software project benchmarking processes and is considered 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 <https://www.isbsg.org/data-subscription-2/>

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:

<http://isbsg.org/board/>