The Business Case of Rebuilding Legacy Applications

Introduction

ISBSG is a not-for-profit organization that collects industry data of application development and maintenance/support activities. The ISBSG collects industry data, where output is measured using ISO/IEC standardized and therefore objective, repeatable, auditable methods. These include: Nesma, IFPUG and COSMIC function points counting methods. Typical key metrics based on function points are:

- Project Delivery Rate (PDR)[1]: Hours spent per function point
- Cost efficiency: Cost (or Price) per function point
- Quality: Defects per function point (in test and/or 1st month of production)
- Speed: Function points delivered per calendar month.

The ISBSG repository - 'New Developments & Enhancements', contains thousands of completed projects for which these metrics are calculated. This enables organizations to use this industry data for fact-based understanding and decision making.

In this short paper, we explain the way ISBSG data can be used to support high-level business cases, like the replacement of a large legacy system by a modern application.

---

[1] The PDR is the inverse of the universal concept of Productivity (output/input) as it is easier to process for human minds, which usually struggles with metrics with many decimals.

Legacy Software

In the last few years, almost all organizations have started their digital transformation journey, as they need to adapt quickly to fast-changing market conditions.

However, the backbone of some organizations are large, legacy systems with millions of lines of code in Cobol or PL/I. They are difficult to maintain and very costly to change.

In many cases, the maintainability of these systems is low, and it can be time-consuming to implement changes. Also, these systems are usually business-critical and large incidents and subsequent outages can easily result in significant loss of business or worse.

The number of people that can maintain these applications is decreasing as they grow older and retire. Younger people are not interested in learning older programming languages. Instead they wish to develop 'cool' applications in modern, programming languages. Therefore, almost nobody dares to touch the legacy software any longer, which is slowing down the digital transformation, as these systems need to be upgraded.

It's easy to say, many CIO's have headaches because of their legacy systems, and many wish they could rebuild their system in a modern language. But how much would that cost? ISBSG data helps to build the business case.

In this short paper we describe how a high-level business case, to rebuild a large legacy Cobol application of 10.000 FP in Java technology, can be made as a case study.

Case Study - Baseline cost

The cost of running an application consists of multiple parts: hardware cost (e.g. mainframe), connectivity (e.g. network), infrastructure cost (e.g. server management), application maintenance & support (e.g. incident management) and application development to implement changes.

The application usually consists of source code, and in this case study, the application was first released in the year 1998. It has evolved into the current application of approximately 10,000 IFPUG/Nesma function points and over 2 million lines of code.

The cost of application maintenance and development are rising every year, as the code quality gets lower with every release and incident volumes go up. The current situation is shown below in Figure 1.
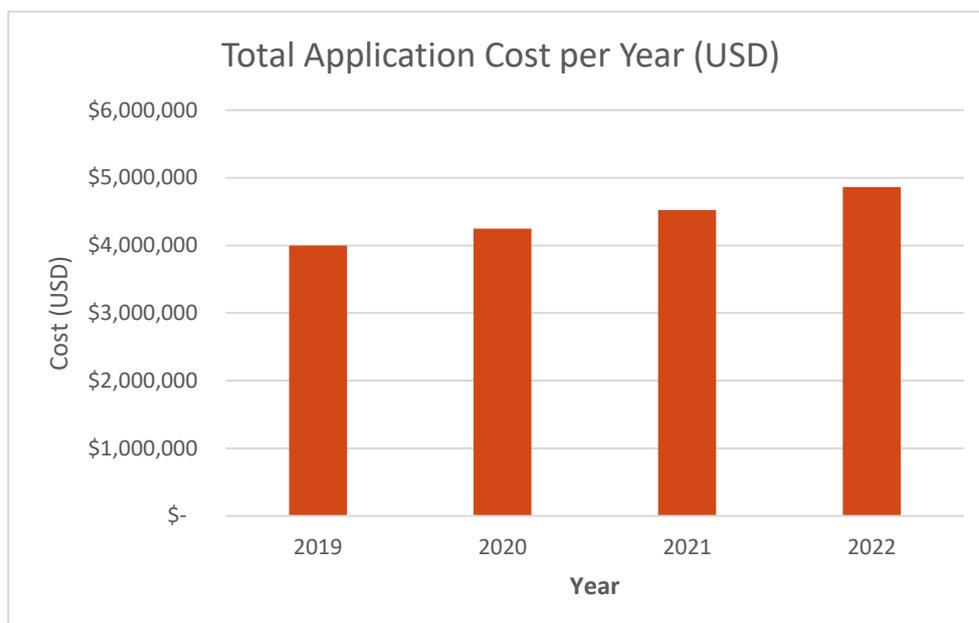
Figure 1: Total Application Cost per Year (USD)

To support the business case to rebuild the application in a more modern technology, the organization first collected some baseline data for the current situation. This data is shown in Table 1, below.

Activity Type	Description	Averages	
M&S	Number of Incidents	300	Per month
M&S	Number of Problems	20	Per month
M&S	Hourly Rate	$100 (USD)	Per hour
M&S	Incident management	4	Hours/incident
M&S	Problem management	16	Hours/problem
App Development	PDR	22.4	H/FP
App Development	Cost Efficiency	$2,240 (USD)	$/FP

Table 1: Metrics for Existing Application

Building the business case

The ISBSG data repositories contain data for more than 10,000 new development projects. This data can be used to help estimate the cost of new software projects. In this case study, the organization chose to rebuild 100% of the functionality, so the functional size in scope is 10,000 Nesma/IFPUG function points.

To assist with estimations, an appropriate data set is selected from the ISBSG repository. For this project, the likely Project Delivery Rate of 8.5 hours per FP was selected, so the Application Development costs is estimated to be $8.5 million

dollars (USD). After the project is implemented, the following metrics are the most likely based on the data:

Activity Type	Description	Averages	
M&S	#Incidents	100	Per month
M&S	#Problems	10	Per month
M&S	Hourly Rate	$100 (USD)	Per hour
M&S	Incident management	2.5	Hours/incident
M&S	Problem management	12	Hours/problem
App Development	PDR	8.4	H/FP
App Development	Cost Efficiency	$840 (USD)	$/FP

Table 2: Metrics for Proposed Replacement (using ISBSG Data as a guide)

Using these numbers, the high-level business case can be calculated. In the next graph the difference in cost between the old system and the new system become clear. This is shown for Application Maintenance & Support (AMS) and Application Development (AD) in Figure 2 below.
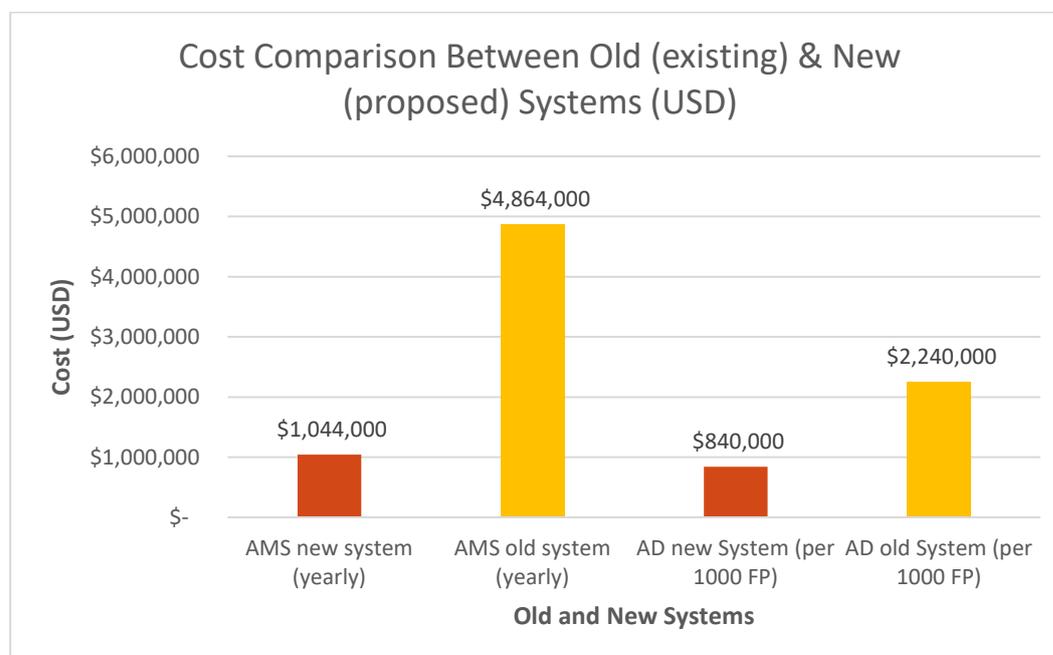

Figure 2: Cost Comparison Between Old and New Systems

By spending $8.5 million dollars (USD) to replace the system, the annual cost of the Application Maintenance & Support is reduced by almost $4 million dollars (USD). The application development costs are reduced by $1.5 million dollars (USD) per 1000 function points delivered. Of course there are other effects which are harder to quantify:

- Lower incident numbers lead to happier users and happier workers
- The use of modern technologies to help attract younger talent

- Modern architecture results in rapid changes when necessary
- Developing cloud-native results in infrastructure and hardware savings (when monitored and managed).
- And many more!

Of course, this is just a high-level business case, and it does not cover all the costs, only the Maintenance and Support costs and the Application Development. It shows how business decisions can be made more factually and based on data instead of opinions.

Conclusions

The data in the ISBSG repositories helps to support impactful business decisions. In this paper, a very high-level analysis of rebuilding a legacy application, with a more modern language, is presented. This is an important topic in the industry right now, as legacy applications may hinder the speed of transforming into a digital business model.

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 in order 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 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:
https://www.isbsg.org/board/