

# Output-Based Contracting of Application Development Services



## Introduction

As the ISBSG repository contains more data for projects carried out in an agile way of working, analysis of the differences between traditional projects and agile projects becomes more significant. 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. Typical key metrics based on function points are:

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

The ISBSG 'Developments & Enhancements' repository 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 contract application development teams based on output instead of the usual Time & Materials method.

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<sup>1</sup> 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.

## Contracting of software development

Many organizations rely on external vendors to supply them with application development team personnel, such as developers, testers, scrum masters, etc. These team members are usually paid hourly rates. In many cases, the vendors and customers have negotiated certain rates based upon function/role and level. An example is shown in Figure 1, below.

Role	Onshore (Netherlands)
Project manager senior	€ 144
Project manager mid-level	€ 133
Project manager junior	€ 98
Developer senior	€ 122
Developer mid-level	€ 111
Developer junior	€ 100
Architect senior	€ 133
Architect mid-level	€ 116
Scrum Master senior	€ 139
Scrum Master mid-level	€ 116
Scrum Master junior	€ 100
Project Leader senior	€ 144
Project Leader mid-level	€ 133
Project Leader junior	€ 98
Solution Architect senior	€ 133
Solution Architect mid-level	€ 116
Solution Architect junior	€ 97.55
Solution Engineer senior	€ 98
Solution Engineer mid-level	€ 103
Solution Engineer junior	€ 103

**Figure 1: Hourly Payment Rates (in Euros) Based on Role**

The payment is simply calculated by the number of effort hours worked multiplied by the appropriate rate. Therefore cost per sprint is very predictable.

From a procurement point of view, this is simple. However, from an economic point of view it is not in the customer's best interest to pay per hour, without measuring productivity and quality.

If there is no pressure to be as efficient and effective as possible, effort hours may be spent on many things that are not that important. In general, it is in the interest of the supplier to invoice more hours instead of fewer.

Professional vendors also don't like this way of contracting as they are often caught up in discussions concerning hourly rates. They wish to demonstrate that their people are more productive and capable than, for instance, self-employed people. Therefore, it would be interesting if there is some way to use output-based metrics

in contracts of application development services. This could be done to measure team performance using standardized metrics.

### Determining Team metrics

In the previous short report, it was explained how the functional size produced per agile team can be measured in an objective, repeatable and auditable way using any of the ISO standards for functional size measurement. The functional size added, modified, and removed in a sprint or release is measured in Enhancement Function Points (EFP). Then meaningful team metrics can be calculated:

- Project Delivery Rate: effort hours spent per EFP
- Cost Efficiency: Cost of effort hours spent per EFP
- Process Quality: Defects per 1000 EFP
- Delivery Speed: EFP per month

Monitoring these metrics per team provides insight and understanding as to what is happening in the team. When fewer EFP are developed, it may be a signal that there is an issue. These metrics also enables comparisons between teams and with industry (ISBSG) data.

An example of comparing teams' PDR is shown in the next figure.

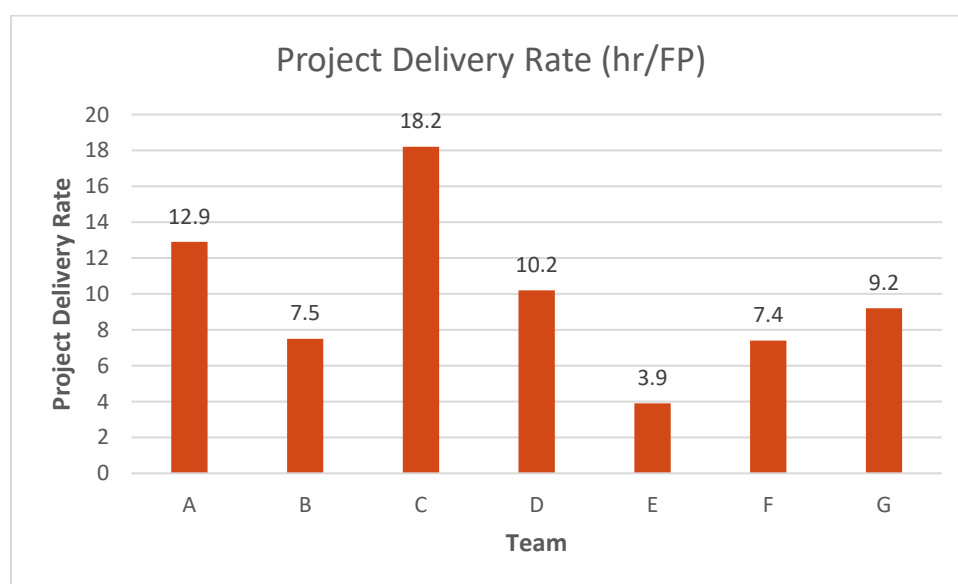


Figure 2: Comparing the project delivery rate of teams at a given time

### Metrics in contracts

If these metrics are measured consistently over sprints, it becomes possible to also use them in contracts. ISBSG data then helps to determine what the industry average PDR is, for a specific technology. For example, to understand if team C, in Figure 2

above, is now better or worse than industry average, select the relevant dataset in the ISBSG repository. An example is given in the next table.

Percentile	PDR
P10	4.6
P25	8.2
Median	14.8
P75	21.9
P90	24.8

**Figure 3: ISBSG Repository Statistics for Projects with a Specific Technology**

The Productivity of Team C lies between the industry average (median = 14.8 hours/FP) and the 75<sup>th</sup> Percentile (21.9 hours/FP).

If a supplier is asked to replace this team with a complete team of his/her own people, a target of 14.8 hours per FP could be put in the contract. Maybe even a bonus/malus can be agreed upon. This is a win-win situation, as the supplier gets paid extra for good performance and the customer gets the value (functionality) – speed and good value-for-money. In addition, everybody stays sharp and focused on delivering functionality as fast as possible. Also, the Cost Efficiency (Cost per EFP) is interesting to use.

In this case the supplier can build the most optimal team, where productivity and hourly rates are the levers to play with. Maybe a team with only seniors is the most productive, but also cost the most per function point. In addition, quality should not be forgotten, because if a team works very productively, but quality is low, nobody will be happy in the end. Product Quality is therefore an important part of these type of measurements. There are many commercial tools available that can be used for this purpose.

### **Conclusion**

Using standardized metrics in application development contracts can mean a win-win situation for both the customer and supplier. The customer gets value for money, and faster delivery of value with good quality. The supplier can take ownership of the application if he/she can supply the full team and work with clear productivity, cost efficiency and quality targets. When over-performing he/she may charge extra, while the customer pays less when underperforming. ISBSG data helps to select the right industry average targets per team, based on thousands of data points of completed sprints, releases and sprints.

## 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/data-subscription-2/](http://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>

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