

Why the industry should move to Price per Function Point Contracts!



Introduction

In this short paper we dive into the benefits of **'Price per Function Point' contracts**.

When the software development industry shifted from traditional ('waterfall') development projects to Agile ways of working, the complete risk and benefits systems in the industry also changed.

- In traditional projects, all the project risk is on the supplier side in a Fixed Price/Fixed Date project, so the supplier has an incentive to be productive and produce quality.
- In the traditional era, the customer organization created requirements document and suppliers would bid a fixed price/fixed date. This was not ideal, as most organizations had (and still have) immature estimation processes. The customer would often select the cheapest and least realistic supplier. This could then result in large-schedule overruns and many discussions with the supplier, who needed to earn back some of his losses. Also, as these projects were often delivered after years in a 'big-bang' scenario, the market needs may have shifted. So the delivered product may not have been as valuable as initially thought.

Moving to an agile way of working

When the industry moved to agile ways of working, the fixed price/fixed date projects did not work any longer, as the scope became flexible.

One agile characteristic is: *'Embracing change over following a plan'*. So, the customer may change the requirements, resulting in more inefficiencies and rework. However, due to short iterations there is a short feedback loop which ensures that the product developed meets the customer demands as much as possible.

In practice, teams encounter lots of rework, especially when the product owner keeps changing the requirements and/or the developers' work is below standard. This results in rework due to defects found, or code refactoring because of low code quality.

As fixed price/fixed date contracts are not possible in agile, the industry moved to 'Time and Materials (T&M)' contracts. This means hourly rates are used to compute costs. So, for example, a customer may hire a senior

.Net developer from supplier X for \$150 per hour, a medior tester from supplier Y for \$80 per hour, etc. This means that the complete project risk is now on the customer side. The customer must ensure that the development team is doing the right thing, spending most of the time on creating value with as little rework as possible. The suppliers don't have an incentive to be productive. In fact, if they spend more hours, they can invoice more hours.

From the customer side, there are a few issues regarding this way of T&M contracting:

- **How to select the right people for a team?** 'If you pay peanuts, you will get monkeys!'
- **How to make sure the team is as productive as possible, while retaining quality.** You need objective metrics here, based on international standards for functional size measurement. But these are often not used in agile teams, as they use the subjective effort metrics based on story points instead. Also, function points are perceived as 'a thing from the past'. 'We tried that 30 years ago, and it didn't work'. This is a very common misconception, unfortunately, as new methods have emerged to make it easier to measure functional size using ISO standards, allowing organizations and teams to benefit from objective metrics.
- **How do you keep good people on the team?** People that have spent years on building up product and business knowledge may leave the team. They may go to another customer of the supplier if they can get a better hourly rate. This means the first customer must select a new person, which also needs to get up to speed again.

From a supplier perspective, this situation of T&M contracts is often not ideal.

- Although they can **invoice all the effort hours spent**, and therefore don't face any risks, they usually are not going to supply all external team members. The customer may select 1 or 2 from that supplier and the remaining team members from other suppliers. Therefore, they are competing on hourly rates. Professional suppliers, that offer their employees extensive education and expertise development options, may have an issue when they compete against self-employed people or offshore and nearshore vendors.

- If the supplier doesn't provide a full team, he can't be expected to take **ownership of the team productivity**, and the product **quality** produced, even when he wants to. Any discussion would potentially end up in 'finger-pointing' which is not good for team morale.

T&M based on hourly rates contracts is a 'bad industry practice', but it's hard to contract in a different way. There is a huge need for output-based contracting.

Output-based Contracting of Agile Teams

In the Netherlands, a large group of tech-buyer companies and suppliers have been working on **NPR5333** (National Practice 5333), which describes the metrics to use in an output-based contract for agile teams. The project lead of NPR5333 has experience with a large application redevelopment project, where one supplier was selected to deliver the whole project using a price per (Nesma) function point. Also, in European tenders, Price per Function Point contracts are becoming more popular.

In NPR5333, a number of metrics are defined in the categories:

- 'Better' (product quality metrics)
- 'Faster' (Speed of Delivery metrics)
- 'Cheaper' (Cost metrics)
- 'Happier' (Team and Customer satisfaction metrics).

The goal is to create a framework of contract metrics that must be met before the customer pays the invoice over a certain period of time. This can either be a fixed amount, but also a fixed price per function point.

Function Points

Functional Size Measurement (FSM) is a standardized method to measure the size of the user requirements that need to be developed or have been developed.

There are a few different ISO standardized methods for FSM. The predominant ones are:

- NESMA (ISO/IEC 24570)
- IFPUG (ISO/IEC 20926)
- COSMIC (ISO/IEC 19761)

These methods measure the functional size in function points (FP). As these are standardized methods, the results are objective, repeatable, verifiable and defensible.

The number of FP is independent of technical environments, which means that an application of 1000 FP written in Cobol offers as much functionality to its users as an application of 1000 FP written in Java. This creates the opportunity to contract external teams using a Price per FP, but also to measure objective metrics like:

- Project Delivery Rate (Hours spent per FP)
- Cost Efficiency (\$ per FP)
- Delivery Speed (FP per month)
- Process Quality (Defects found per FP).

As these metrics are based on an objective unit of measurement, they can be benchmarked, for instance against industry data of the ISBSG repositories¹.

Price per FP contracts

Price per FP contracts have the potential to become more popular, especially after NPR5333 became an ISO standard. This type of contracting solves the bad practices issues as mentioned before. For the customer:

- The option to send out Request for Proposals out using a Price per FP allows them to select the cheapest supplier. An example is the contract between the European Securities and Markets Authority (ESMA) and Accenture, as presented at the Nesma conference in 2022 in Haarlem: [link](#).
- No need to select the right team members. The supplier has an incentive to be as productive as possible to increase his margin. More FP produced per sprint means more money. Of course, quality must still meet the KPI's as well.
- The option to include arrangements regarding key employees' retention in the contract.

¹ <https://www.isbsg.org/data-subscription-2/>

For the supplier:

- The option to supply full teams to the customer.
- The option to take full ownership of team performance and quality produced, allowing also increased profit margins which benefits both customer and supplier.
- When the customer product owner keeps changing requirements, these are also paid. Every functional change (in the Nesma standard at least) results in a project size. The Project size according to Nesma is: **FP added + FP modified + FP removed** in a project (or release or sprint). For the customer this means he needs to think hard about the requirements to avoid rework, and for the supplier to be paid for rework as well.

This means that a Price per FP contract balances the risk between customers and suppliers, while also solving all the issues regarding the T&M bad practice contracting.

Realistic Pricing in a Price/FP contract

For any Price per FP contract, or any other objective FP-based metrics in contracts, it's important for a supplier to quote a realistic value. If the price is too low, the vendor will lose on the contract, no matter how well he tries to be as productive as possible. If the price is too high, cheaper competitors may have a greater chance of winning the contract.

From a customer point of view, it's also important to understand what a realistic value is, as choosing a vendor that is unrealistically cheap may result in discussions and a negative environment.

A realistic value is therefore important for both the customer and the supplier. It's best to use your own data to calculate the price per function point to be quoted, but also the ISBSG data can be used to understand what the industry is capable of.

An example:

A government agency issues a Request for Proposal for the following scope – a development project for a new application that will be approximately 1000 Nesma FP. The supplier needs to provide the Project Delivery Rate in Effort hours per FP and a Blended hourly rate for all effort hours spent. The programming language to be used is .Net.

It is very important to not automatically select the cheapest option, as starting a project with unrealistically (low) expectations, may result in large overruns. This is shown in Figure 1.

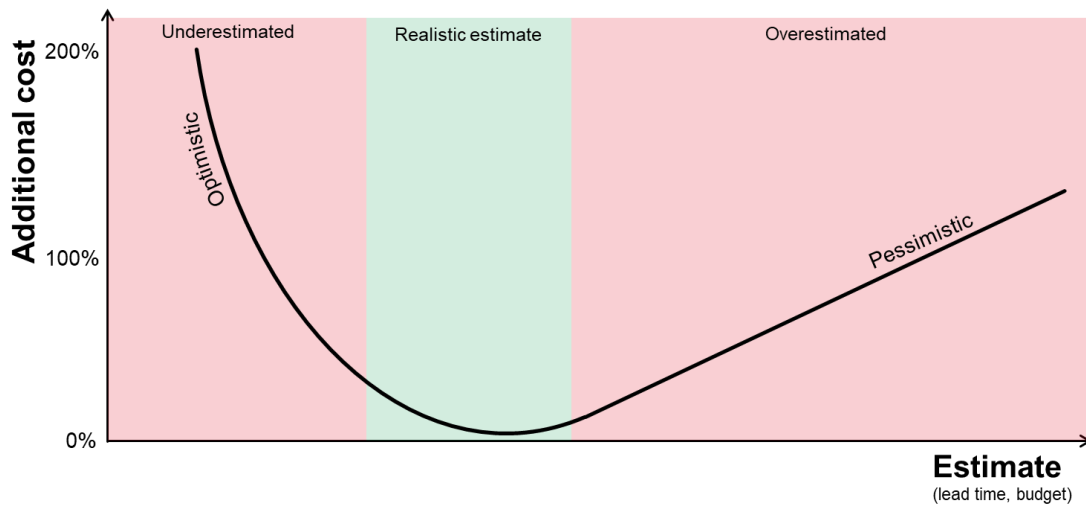


Figure 1: The result of low and high estimates on the project cost

Figure 1 shows that if an estimate is low, extra costs increase exponentially. This is because there will be management intervention, stress in the team (resulting in defects and rework) and ineffective management decisions, like adding people to the team.

On the other hand, starting with a pessimistic estimate results in linear extra costs as 'Parkinson's law', kicks in. This law states that if one gets extra budget or time to complete a task, this time or budget will likely be spent as there are always possibilities to make it even better.

Therefore, selecting a realistic range in which an offer should fall is an important task. The ISBSG Developments and Enhancements Repository currently contains over 12500 data points of completed projects, releases and sprints and can therefore be used to create this reality range for almost any project.

After selecting the appropriate dataset in the ISBSG Developments and Enhancements repository, both the customer and the supplier may have the same information about the industry, which is shown in Table 1.

Statistic	Hours per FP
N (number of projects in sample)	89
P25 (25 th percentile)	6.3
Median	7.9
P75 (75 th percentile)	11.2

Table 1: Distribution of the Project Delivery Rate (hours per FP)

In this example, the 'reality range' is between 6.3 hours per FP and 11.2 hours per FP. For the customer, this should indicate not to accept offers below 6.3 hours/FP.

Using the blended rate the cost/FP can be calculated as well. For example, as shown in the next table:

Vendor	Project Delivery Rate (Hours per FP)	Blended Rate	Price per FP
Vendor A	7.2	\$100	\$720
Vendor B	8.1	\$ 90	\$729
Vendor C	9.3	\$ 85	\$791
Vendor D	5.5	\$ 75	\$413

Table 2: Cost/FP of 4 proposals in the example

Here, vendor D seems like the winner. However, it quotes a Project Delivery Rate that is too optimistic, in combination with a low hourly rate. This indicates that vendor D may have a more junior team. An experienced customer would probably not select vendor D, unless there are compelling arguments that vendor D is able to actually deliver a good quality product in this PDR and Cost/FP.

If vendor D is not selected, vendor A is the best option, as it offers a realistic PDR, and an hourly rate that suggests a more senior team, which increases the chance that the PDR will be met.

Note that if this was a pure T&M bid, the customer would probably select vendor D, as it is much cheaper than Vendor A. In practice, however, vendor D may end up spending twice as many hours as vendor A, resulting in cost and schedule overruns as well.

Conclusion

After most of the Application Development industry has moved to an agile way of working, procurement departments have moved from contracting external vendors using fixed price/fixed date RFP's and contracts to Time and Material (Hourly Rates) based contracts. Not because they want to, but because of the flexible scope which makes it impossible to quote a fixed price/fixed date for any agile development project. This is a bad practice, which does not result in advantages for both customers and vendors.

Price per FP contracts are becoming more popular and there are initiatives in the market to formalize these types of contracts into international standards. This would allow organizations to contract agile teams in an output-based way, for example, using metrics like Project Delivery Rate, Cost Efficiency, Delivery Speed, Process Quality and Product Quality as KPIs that must be met before it will pay. Payment may be even based on a Price per FP.

It's important to understand that only metrics based on functional size can be used, as these are objective, repeatable, verifiable and defensible².

When going for an output-based contract, it's important to understand the offers of the different vendors. Therefore, it is a good practice to request the PDR (hours/FP) and a blended rate for the team.

Using the ISBSG repository, both customers and suppliers can get an overview of the industry averages for certain projects, allowing the customer to understand which are realistic offers and which are not. In the end, the customer may select a higher priced offer when it comes to price per FP, but in the end, he will be much happier, especially when the project is delivered within budget, schedule and quality.

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

² This is completely different from for instance the widely used story point, which can only be used for the estimation of the backlog items to deliver in the next sprint

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. Its 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 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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