Guideline

for the use of software metrics in contracts

nesma

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Preamble

Contracting of software development projects and maintenance continues to be a difficult task for many organizations. They struggle to determine which questions they need to ask in the ´Request for Proposal (RFP)´ and contracting phases. These organizations wish to find the questions that would enable them to compare the bidding suppliers in an objective, yet meaningful way and they wish to select the right supplier based on this comparison. In practice, the industry sees many RFPs that seem to achieve this goal at first glance, but which offer a comparison that is not objective and meaningful at all. As a consequence, in many cases the wrong supplier is selected, which can (and often does) result in a failing project. Repeatedly, suppliers argue with client organizations about the objectivity of the tender and the reasons for missed offers and sometimes they even start legal action.

Recently the urgency to improve the management of contracts and the execution of software projects again became evident in the conclusions of the Dutch Parliamentary Investigation ICT (the Elias committee)[1]: the Dutch government has insufficient control over the majority of their own IT projects. Many projects fail, while keeping a 'green light dashboard status' until the end, even when the project gets cancelled.

Nesma believes this "Guideline for the use of software metrics in contracts", together with the new "Base Of Estimate" (BOE)[2] for software services (published as a recommended practice by the American Association of Cost Engineers (AACE)) will improve this situation significantly .

This publication zooms in on RFPs and contracts in which Function Points and derived metrics are used, like productivity of the development team and quality of the development process. Nesma presents this guideline to help client organizations ask the right questions during the bid phase and the contracting phase. But it is also meant for supplier organizations, giving directions on which data to collect and analyze of completed projects and on which metrics to be calculated, stored and benchmarked. Furthermore, Nesma gives its vision on which metrics to use and how to use them during the contract phase. With this document, Nesma wishes to facilitate the industry in order to make the next move towards professionalism in outsourcing contracts. It is meant as reference for both client and supplier organizations.

[1] http://www.tweedekamer.nl/kamerleden/commissies/tcict
[2] The BOE for software service can be downloaded for free from the Nesma website: www.nesma.org.

One of the strengths of the Nesma conferences is the presence of subject matter experts to discuss and find solutions for operational challenges. In this light, Nesma convened a SIG (Special Interest Group) with the following task:

“Draw up a Nesma document that serves as a guideline (or perhaps even more!) for client organizations and supplier organizations on how to use function points and quality metrics in RFPs and in contracts regarding software development and maintenance”.

This guideline is the result of the work of the following persons:

- Harold van Heeringen, Sogeti Nederland B.V. (chair)
- Hans Kuijpers, Software Improvement Group (SIG)
- Rini Scholten, Kadaster
- Frans Schoot Uiterkamp, Rendeck automatisering
- Jolijn Onvlee, Onvlee Opleidingen & Advies
- Hans Bernink, Jim Bernink B.V.
- Marcel Pereboom, Mediaan

1 Introduction

People often think that measurement and metrics cost a lot of money, while in fact, when applied properly, they save a lot of money… and prevent a lot of trouble!

1.1 Purpose

The main purpose of this document is to increase the success rate of software projects and maintenance contracts.

Management and specialists should be able to use the methods provided by this guideline to execute projects within time and budget, and to achieve the required quality. There are a number of reasons why you should be interested to read this guideline:

From the customer's point of view:

- You are going to issue a Request for Proposal (RFP) in order to select a supplier to deliver a software product for you and you wish to be able to compare the bids from the suppliers in an objective way in order to select the right supplier;
- You wish to measure the performance of your supplier over time and monitor whether the suppliers' promised performance improvement (e.g. productivity, cost or quality) really occurs;
- You wish to select a realistic offer instead of a cheap offer, because you realize that cheap offers often result in large overruns and in the end might turn out to be more expensive.

From the supplier's point of view:

- You have to respond to an RFP and you wish to answer the metrics based questions in the way the client wishes;
- You wish to prepare your metrics department in order to be ready to answer future RFP's in which the client organization uses this guideline;
- You want to know which subjects and details should be included in an RFP or contract to avoid disagreements afterwards.

1.2 Scope

This guideline describes the way Nesma believes that function point based metrics and quality metrics should be applied in contracting and in contracts regarding software realization projects and maintenance. The scope therefore includes the following contract types:

- Software development projects, including new development, enhancements and (major) adaptive maintenance (releases);
- Maintenance and Support contracts, including for example user support, problem investigation and corrective, perfective and preventative maintenance;
- Framework agreements comprising the activities mentioned above.

The scope includes all kind of technologies and methods of implementation, like for instance Java, .Net, Oracle, and Prince2, agile, waterfall, package implementation, websites, mobile apps, data warehouses, etcetera.

1.3 How to use the guideline

The guideline is divided into different Mini Guides to support the different types of audience. The reader can select the Mini Guides that are applicable for his or her role, interests and goals. It makes the total guideline easy to read. In the next chapter the Mini Guides will be explained shortly.

The documents that together make up the total guideline are:

- [1] Guideline for the use of software metrics in contracts (this document);
- [2] Mini Guide for Development Methodologies;
- [3] Mini Guide for Maintenance;
- [4] Mini Guide for Management;
- [5] Mini Guide for RFP questions;
- [6] Mini Guide for Functional Quality;
- [7] Mini Guide for Pricing Mechanisms;
- [8] Mini Guide for Technical Quality;
- [9] Mini Guide for Assessing Suppliers Performance;
- [10] Mini Guide for Software Metrics based on FPA;
- [11] Mini Guide: Requirements for Supplier organizations;
- [12] Mini Guide: Requirements for Customer organizations.

1.4 Target audience

This document is targeted to all people involved in contracting software development and maintenance in both client organizations and supplier organizations (not limited):

- Procurement;
- Bid management;
- Vendor management;
- Supplier management;
- Demand management;
- Delivery management;
- Account management;
- ICT management;
- Software Cost Engineers;
- Business management;
- Project management.

1.5 Disclaimer

Although a lot of care and effort has been put into this document and Nesma believes that this document is of great value to the industry, Nesma does not accept any responsibility for the results that occur after the use or misuse of this document.

Nesma welcomes and appreciates all comments and additions for further improvement. These can be sent directly to Nesma (office@nesma.org).

2 Mini Guides

The Mini Guides support the reader in selecting the required detailed content without having to read a huge document. The audience interested in 'Selecting the most appropriate supplier' is possibly completely different from the audience interested in 'measuring the agreed KPIs during the contract phase'. In this chapter one paragraph per Mini Guide explains its content in short.

2.1 [2] Mini Guide for Development methodologies

Agile software development is often sold as the silver bullet to help the business to become more in control in adding business value. But does agile development deliver business value in time, as well? After an agreed period of time (sprints), the budget is finished and functionality is released. But scope churn and rework reduces the planned functionality, therefore extra sprints and budget are required to fulfill the expected business value.

Controlling and improving team productivity is key in successful projects. This guide explains why function points and related metrics are useful metrics to add in contracts. It also reveals why story points and velocity are very useful metrics for some purposes (like sprint planning), but that these metrics are absolutely not suitable for contract(ing) purposes.

This guide also explains the specific metrics related to traditional (waterfall) projects. It zooms in on the metrics that support both supplier and customer in executing more predictable projects and it explains how to handle changes. The guide explains the effect of the major enabler of successful projects: good productivity, because this:

- Reduces project effort and cost (less hours per function point);
- Creates better code (maintainable, reliable and secure code);
- Better functional quality (less number of defects);
- And last but not least it helps in adding business value on time, keeping the customers happy.

2.2 [3] Mini Guide for Maintenance

This guide focuses on how to ask for maintainable software and it explains how metrics help in continuous improvements. Many maintenance contracts are based on the number of defects resolved and resolution time compared to service level agreements instead of defects prevention. This way bad code and more defects benefit the supplier. This guide zooms in on how to measure maintainable software and the metrics that are drivers for cost reduction.

2.3 [4] Mini Guide for Management

Many projects fail and create a conflict between customer and supplier. This guide explains in general "why" to use metrics in software development and maintenance contracts. It does not explain in detail "which" metrics and "how" these needs to be applied. For those type of questions, the other mini guides are available.

2.4 [5] Mini Guide for RFP questions based on metrics

Which questions have to be asked during the contracting phase for selecting the best supplier? In this guide the principles are explained that are needed to reach the level of knowledge necessary for a good Request for Proposal (RFP) questionnaire. The guide focuses on RFP management of single software development projects, but the same principles apply to framework agreements and maintenance contracts as well.

2.5 [6] Mini Guide for Functional Quality

Projects are sometimes delivered with (very) poor quality. But how does the customer know that the requested functionality is ready for delivery and production? Is a bonus / malus scheme a good driver for early delivery and better functional quality? This guide focuses on useful metrics, like defect potentials, defect removal efficiency, defect trend lines, etc. It also zooms in on the delivery process, test process and change process.

For explanation about the non-functional quality of software, the mini guide for technical quality is available.

2.6 [7] Mini Guide for Pricing Mechanisms

This guide explains the most used types of pricing mechanisms of software development projects, frameworks and maintenance contracts. It zooms in on the common pitfalls and the pros and cons of fixed price, time & materials, effort or output based contracts.

2.7 [8] Mini Guide for Technical Quality

IT suppliers usually wish to develop good software but they often fall victim to their own global scale, size and/or business model. Customers can help their suppliers by making product quality a measure of the key performance indicator (KPIs).

As most of the costs in the application lifecycle is usually spend during the operations phase as a result of changing the application (because of different market needs or user needs), characteristics like the maintainability of the code of an application is important for customers. However, most customers do not have the knowledge on how to assess the code quality and therefore have no choice but to rely on the supplier. This mini guide zooms in on how to assess the technical quality of software which enables customers to add technical quality to all their contracts.

2.8 [9] Mini Guide for Assessing Suppliers Performance

In this guide it is explained how to objectively select a supplier for a long term software development framework contract. The general idea is to ask the competing suppliers for the data of a number of relevant completed projects, analyze the data, and score the suppliers against a predetermined scoring model.

2.9 [10] Mini Guide for Software Metrics based on FPA

This guide zooms in on software metrics especially fit for use in contracts in order to provide a knowledge base for readers who wish to start using the guideline.

You should have read this basic information, to gain the knowledge in metrics based on Function Point Analysis applicable in all lifecycle phases.

2.10 [11] Mini Guide: Requirements for Supplier organizations

Next to the required knowledge in how to respond to an RFI and/or RFP, the supplier organization needs to know why and how performance measurement can and should be applied. This guide focuses on these processes and zooms in on the crucial standards for size measurement, project classification, data collection and metric definitions for benchmarks.

2.11 [12] Mini Guide: Requirements for Customer organizations

After a project has failed, do not directly point one finger to your supplier, because three fingers are pointing to yourself. Was the root cause really the bad performance of your supplier or did you get the so-called 'deserved' supplier? This mini guide zooms in on how size measurement, functional and technical quality metrics can be applied, how you can governance performance and continuous improvements by using KPIs and which pitfalls you should avoid.

3 Conclusions

The Guideline for the use of software metrics in contracts consists of this document and a number of mini guides. Based on your role and/or interest, you may select all of the mini guides to read or just a selection of the mini guides that you feel are most interesting for you.

Please check the website www.nesma.org/publications for the mini guides that have been published and the possibilities to obtain them.