

Case Study

Estimating Large, Complex Programmes



Software Measurement Services Ltd.

Consultancy and training in the management of Information Systems.

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The Question

How to accurately estimate time, effort - and therefore cost – of a multi-year programme with many different systems that have to be integrated to create the end process?

The Project

A major software supplier to a public services organisation was responsible for delivering a high profile project running over a number of years.

There was no data to support the agreed cost and delivery-time estimates in the contract to supply. The supplier had no systematic approach to estimating and a level of staff turnover that was both high and fast – resulting in a rapid dissipation of the individual knowledge which might have guided their estimating. The result was a growing mismatch between actual timescale and budget required, and the customer’s expectations.

This posed a very real risk to the project. The supplier’s management team recognised a need for quantifiable information to support their case for re-negotiating the contract based on demonstrably more reliable estimates.

SMS’s role

SMS were asked to construct and calibrate an estimation model which could be applied to the whole system development life cycle.

This involved several hundred developers and several sub-contractors.

All the system components had to be taken into account – training, documentation, sub-systems to be

developed and tested. Staff, resources and cycle time all needed to be quantified for each part of the production.

A well-stocked “kitbag” of tools and expertise would be required to address this complex issue, together with the ability to synthesise the different techniques and specialisations to produce a solution which met the client’s business goal of managing the risk to their project.

Software Measurement Services is one of the few organisations which could bring together the skills and experience necessary to develop an estimating model for a system of this size and complexity.



The SMS Approach

“Value Stream Mapping” is a Lean Engineering technique derived from the innovative – and highly effective - Toyota production system. It focuses on the value delivered to the customer by each stage of the process. This identifies the unproductive elements (= *waste*) and facilitates a continuous product flow.

SMS are in the vanguard of using Value Stream Mapping to identify and understand the systems of product development – not only software development but the whole system development lifecycle including training, documentation, development and testing. Using this approach, we were able to gain an understanding of the measurements needed to estimate the size of the system and the interdependencies between the different elements.

Software development was estimated using the COCOMO 2000 estimation method, based on COSMIC Function Point counts. Appropriate estimating methods were applied to other system components such as requirements-gathering, definition of training materials etc. The data was compiled into a tailor made estimation model, (spreadsheet, user guide, and training material). The model was calibrated against recent historical information.



When is a software programme like a production line?

When a system is large and complex, and involves multi-releases over a number of years it is essential to understand how the elements of product development interact. Like a production line, the quality and timely delivery of each component can affect the efficient production of the other components.

Benefits of the method

The model could be applied immediately, while work continued to improve and refine it. The SMS Lean and Agile Method for Improvement Teams (SLAMit) was used to make incremental improvements to the model. The work was approached by a series of bi-weekly “sprints”, each of which added to and improved upon the spreadsheet to produce a new working version.

The integrated project teams comprised SMS consultants and leaders of the client’s estimating team, ensuring that changes were aligned to the client’s business goals. The estimating team were always up-to-date with the latest developments.

Benefits of the project

At the end of the project, the supplier was in a much better position to manage the on-going project. They had acquired an estimating model tailored to their specific requirements, and staff with a thorough understanding in how to apply it. Staff were also trained in appropriate measurement and estimating methods for the different parts of the system. The result was a dynamic estimating technique which could continue to be updated and improved. It could be used not only to forecast the cost to complete over the remaining years of the particular project for which it was designed, but also for estimates in support of future contracts.

In developing a solution to a specific problem, SMS delivered the capacity for the supplier to improve their approach to estimating and negotiating contracts for supply – thus avoiding a repeat of the high-risk situation in which they initially found themselves.