IMPROVED PROJECT ESTIMATION

“60% REDUCTION IN AVERAGE PROJECT ESTIMATION ERRORS”

Engineering Ingegneria Informatica S.p.A. succeeded in improving the accuracy of their project estimation (manpower, cost and elapsed time) through improving their software engineering. This was achieved by building a database compiling their experience gained in earlier projects. The result was to reduce the average estimation error from 25% to 8%.

A KEY BUSINESS LEVER

Project estimates are a key business lever, and are vital for any company when budgeting, planning and managing investments in software applications. There is great motivation for business managers to improve their project estimation, as any improvement which can be made has a direct impact on the business.

Project estimating is important for companies producing software (both for in-house use and for sale by software companies). Bad estimates can lead to missed delivery dates, over-budget use of resources and inefficient project management.

Accuracy in estimations is particularly crucial for software companies to rival increased competition. When tendering for business an estimate which is too high loses the business, whilst one which is too low makes the business unprofitable.

Businesses which buy in tailor made software should ask their software suppliers about the rigour of their project estimation.

AN IMPROVEMENT APPROACH

In this case study the Italian company Engineering faced the problem and achieved an improvement in their estimates of 60%. Average deviations were initially 25% and went down to 8% (ranging from -10% to +10%) in six projects in which it was applied.

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<th>RESULTS</th>
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<th>ACHIEVED</th>
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<td>Average project estimation error</td>
<td>25%</td>
<td>8%</td>
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The approach was to extend their development methodology to cover the formal specification of non-functional requirements (such as ease of use, reliability and portability) so that the impact of these could be traced throughout the development process. This then sets up a self-reinforcing cycle, where better knowledge of these impacts leads to ever-better estimation and project planning.

The cost/benefit threshold is 250 000 ECU projects. Any company developing (either for internal use or for commercial purposes) software applications of that size or greater can benefit from this experience.

Nicola Morfuni, Engineering

“By optimising our software development process and being able to produce better project estimates, we were much more able to convince clients of the soundness of our proposed approach”

Engineering Ingegneria Informatica S.p.A. is a large Italian software house with 420 people and a turnover of 35 MECU in 1994. They are the flag ship of a group of software related companies with a total 1994 turnover of 60 MECU.
Project Estimation Errors

One of the main reasons behind Engineering’s decision to carry out this project was the fact that too many projects were running over their initial estimates made during the commercial negotiations resulting in lost opportunities for profit.

Corporate learning

Engineering develop in a wide variety of environments (dependent upon the client’s target environment) for a range of differing applications. As such, it has access to extensive data about how the development activities vary not only dependent upon the environment but also in relation to the client’s non-functional requirements such as ease of use, reliability and so on. However, this data was not being structured in a systematic and useful manner, meaning that a potential source of competitive advantage was not being exploited.

Before Improvement

Before the improvement project was carried out, the average error in project estimation was approximately 25%, a figure calculated from a sample of ten representative projects. Typically, projects took more time than had been anticipated, and in one case a huge error of under estimation by 76% had occurred, which had a huge effect on Engineering’s project management and resource planning activities.

Results

The project was very successful, with the accuracy of the estimation process improving very significantly. From an average estimation error of 25% (varying between -76% and +12%) over 10 projects prior to the experiment, the average error decreased to just 8% with a variation between -11% and +12% in six projects following the introduction of the methodology extensions.

"Before this project, our average error varied from -76% to +12%"

Customer Response

This project has had a very real effect on Engineering’s business and their relationship with their customers. The methodology which Engineering applied has been presented to key customers and has met with a very positive response.

Engineering’s Strategy for Project Estimation Improvement

- Documentation of non-functional requirements
  - * Educate clients about quality
  - * Demonstrate competence

- Plan appropriate activities based on prior experience

- Reusable knowledge base mapping requirements to activities

- Accurate cost estimates and resource allocation

- Improved project management and profitability
LESSONS LEARNED

Engineering learnt a number of important lessons in the course of this project.

The methodology cannot always be applied

One of the lessons which Engineering learned is that in real commercial situations, it is not always practicable to obtain the information necessary to make a detailed activity plan. Sometimes there is simply not enough time to do so before a proposal deadline.

A minimum worthwhile project size

Any structured approach implies an extra effort over ad hoc approaches. Engineering found that the improved estimation accuracy and other benefits of the methodology extensions were not worthwhile for projects with a value of less than 250,000 ECU.

Tool support is necessary

As many companies find with the adoption of structured methods, tool support is a critical success factor. In the course of this project, Engineering encountered some resistance from project managers unwilling to shoulder an extra burden. This demonstrates the importance of involving all members of project teams in any improvement process, and making them all aware of the importance of improvement activities.

"After the project, our average estimation error varied only from -10% to +10%, a 60% improvement"

Continued Use of Improvements

For Engineering, this project has proved the importance of adopting structure project estimation and planning methodologies. The new methodology extensions will be incorporated into Engineering’s standard procedures during the course of 1996. They will be applied to all projects with a value exceeding 250,000 ECU.

Future Plans

Engineering are continuing to improve their process planning techniques. Work has begun on improving automated support for a knowledge-base to address the issue of the extra overhead that it imposes on project planning. In addition, Engineering is now undertaking a major new metrics project to examine the project lifecycle in more detail and determine the most suitable objective measures for progress. In this way, they continue to benefit from their investment in software best practice.