

Implementation Effort Estimation: Important Aspects

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ABSTRACT

A fundamental part of the planning of implementation projects is estimating the efforts required. Regardless of the type of the prospective project, whether writing a script for a database migration or implementing a piece of application software from scratch, some aspects are always important to consider. Those important aspects are for example: to divide the work to be done in manageable tasks and to estimate effort for each task separately (bottom-up approach), to combine estimates from different subject matter experts, to not only use point estimates but a range defined by a best case, likely case and worst case and to avoid to announce numbers spontaneously, but instead to take the needed time for effort estimation.

Those aspects and some more are regarded in this paper and explained with examples. Being aware of these important aspects will always be helpful for the planning of every implementation project.

INTRODUCTION

In general, an estimate of prospective costs is usually required before the beginning of an implementation project. A customer wants to decide whether it is worthwhile from an economic perspective, to start a project, and the customer must be able to compare different options for solutions. Regardless of the approach, much information needed for a detailed cost listing is not available before a project starts. Even the attempt to gather complete information is not realistic, as it would hardly be less complicated as to implement the project directly. In many companies, projects are also subject to changing conditions, so although experience is very valuable, it is often hard to transfer experience on needed efforts to a new project.

Nevertheless, there are aspects that will always be helpful for the planning of an implementation project. Such important aspects in regard of effort estimation are described in this paper and explained with examples.

It is important to note that effort estimation is not only important for project managers, but also for individual developers, as developers and programmers are often asked to give their assessment of the effort required for a task.

MAIN PART: IMPORTANT ASPECTS

In the following paragraphs, first every presented aspect is described with a headline, an example and a description.

AVOID ANNOUNCING ESTIMATES EARLY

Imagine the following scenario: Someone (colleague or customer) gives you a call, shortly describes you his idea for a new software application and then asks you for your estimate of the needed effort. The one phoning you implicitly expects that for you as a software expert, it should be easy to quickly answer this question. For you it might be very tempting to try to fulfil this expectation by spontaneously uttering a figure (e.g. person-days) describing the total of needed effort based on your gut-feeling. In such a situation, it is very recommendable to abstain from spontaneously announcing numbers, even if you add the remark that your spontaneous estimate is very coarse. People tend to rely too heavily on the first piece of information offered (the "anchor") when making decisions [1]. Thus, your initial estimate will always be the one that the partner in your conversation will have in mind, even if you need to change the estimate later because for example you receive new, more detailed information. If your initial estimate has to be corrected later, this correction will implicitly be compared to the initial estimate. Chances are quite high that you will unnecessarily disappoint others if your initial estimate was much too low or too high. Thus, always take your time to go into detail and do a proper effort estimate before you quote it the first time.

ESTIMATE EFFORT BASED NOT ON SIZE OF RESULT, BUT ON WORK REQUIRED TO REACH RESULT

Think of the following situation: You are asked to re-program a piece of software (earlier written by you) that generates a certain PDF- report. For the re-implementation, a software technology should be used that you are unfamiliar with, whereas the input data for the report should stay the same and the generated PDF-report should look as similar to the old report as possible. Thus, the size of the result (in this case the report based on certain input data) is comparable with the size of what you already have developed earlier, but will the effort be of equivalent size? No, because you need effort to get familiar with the new technology that should be used!

In general, don't think only about the size of the desired result (end-product) while doing effort estimation. Always think of all the steps needed get to the desired result which might strongly vary with the conditions of the given situation.

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BREAK DOWN THE WORK INTO STEPS THAT ARE EASILY MANAGABLE

Often, you might be asked to give a total number of estimated efforts for a new project. Instead of concentrating on estimation of only one total number (e.g. by comparing the requirements of the new project to the ones of similar projects you already finished) it is advisable to determine the work needed and to break it down into manageable steps (ideally with a maximum size of 1 working day). In general, the smaller the steps, the easier it is to reliably estimate the effort needed to perform the steps. The total estimated effort is simply calculated as a sum of the efforts needed for the single steps. Sub-totals can be helpful in providing support for decisions on different implementation solution possibilities. For identifying the steps to be done to implement a piece of software, it is very important to thoroughly understand the scope of the software to be built and to think through the whole process of implementation activities.

REMIND YOURSELF THAT SOME TASKS ALWAYS NEED TO BE DONE

Think of the following, very common situation: a project manager asks a programmer for the estimation of the effort needed to implement a new feature in an existing information system. Most developers will intuitively focus their estimation on the efforts needed for implementation until the source code commit. They thereby neglect important routine tasks in which they are also involved during the course of a project, such as status meetings, administrative tasks, or (intermediate) deployments in their estimates.

It is important to try to think of all possible steps needed to reach an objective, including routine tasks related with the initially identified work steps. It is recommendable to develop a checklist of routine tasks commonly occurring during your own projects. Such a list can be used as an aide-memoire during the process of effort estimation in order to check whether no routinely occurring task was forgotten.

COMBINE ESTIMATES FROM DIFFERENT SUBJECT MATTER EXPERTS

Again, imagine that a project manager wants to know the estimated effort needed to implement a new feature in an existing information system. This time, the manager asks two programmers in parallel for their estimate, sending both a copy of the requirements to be fulfilled. It could happen that the numbers estimated by both programmers differ a lot. There could be many reasons for this, e.g. different implicit assumptions, different level of experience, or unclear formulations in the requirements resulting in a different understanding of the requirements.

Thus, it is always better to ask more than one subject matter expert for independent estimates instead of asking only one expert, because if the different experts agree, then you can have a higher confidence in the quality of the estimate than for the estimate of one expert alone. In addition, if there are large discrepancies in the estimates of different experts, you have a strong indicator that both experts should discuss these discrepancies in order to detect whether for example one of the experts forgot a certain aspect relevant for the estimate or whether the given requirements definitions could be interpreted in different ways, which must be avoided.

USE RANGE ESTIMATES DEFINED BY A BEST CASE, LIKELY CASE AND WORST CASE ESTIMATION

Last, but not least, re-think the situation described in the last paragraph: There is a large discrepancy in the independent effort estimation by two experts for a given task. Their discussion leads to the insight, that both experts have the same understanding of the task, but both differently assess the needed effort, one very optimistic, and the other one much more pessimistic. It is important to be aware that both ways of estimation are an important contribution to the effort estimation, thus it is recommendable to combine these different points of view. This could be achieved as follows:

For each task, make three estimates instead of only one: from an optimistic, realistic and pessimistic point of view. Then, a weighted average can be calculated out of these three estimates and an estimate of the variability in the estimate. If you have a sufficiently large number of tasks (20-30), an estimate for the distribution of the sum of effort estimates can be derived, which can help you to assess the variability in the estimate of the total sum of efforts required (for details on the calculations, see [2]).

CONCLUSION

The question how to get to solid estimation results is often not approached systematically and sometimes even uncared for. Even if one is aware of the importance of this topic, it first might appear as an insurmountable obstacle to estimate the effort needed for an implementation project.

However, the presented best practice aspects will help to generate realistic estimates, even in a situation where only incomplete information or rough requirements are available.

REFERENCES

Web links as accessed on 22nd August 2016:

- [1] <https://en.wikipedia.org/wiki/Anchoring>
- [2] https://en.wikipedia.org/wiki/Three-point_estimation

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