In any organization, it is essential to provide an estimate of effort, cost, resources, etc. required to complete a project. This essay will discuss the methods of effort estimation, as well as my personal perspective

Project management is of utmost importance because most projects have budget limitations or time constraints. Effort estimation therefore serves as a guide to ensures that products are delivered within those set criteria. Furthermore, effort estimation helps the team to manage available resources, improve individual performance and eliminate irrelevant tasks. Effort estimation contributes to the overall success of the project and the general efficiency of the team on the long term.

Effort estimation is considered extremely difficult. This is because software development has lots of uncertainties, such as requirement-related or technical limitations (Gevorgyan, 2021). Clients might not describe requirements specifically enough or change them frequently, making it impossible to predict the effort needed to implement a feature. Furthermore, new innovations might be adopted during the development process and developers cannot efficiently employ them. Estimates are just assumptions deduced from incomplete data and can never be absolutely accurate.

The experience-based technique relies on the historical data and the judgments of experts. With this technique, different components and features to be produced and delivered to the customer are identified. In simple words, it breaks the whole development procedure into sub-tasks. Effort needed to complete them individually is calculated and summed up to get the total effort required. The drawback of this technique is that it is not reliable if the said experts do not have relevant experience of working on similar projects. It becomes difﬁcult to accurately estimate the effort required if they cannot catch up with rapidly evolving software development techniques (Sommerville, 2016).

Algorithmic-based technique uses a formulaic approach based on many different parameters like project size, difﬁculty, etc. to estimate the effort. Unlike the estimation-based technique where effort for each task is examined, a formula will be fed with different parameters to calculate the effort. Most algorithmic-based estimations are based on a simple formula: Effort = A x sizeB x M, where A is a constant, size is an assessment of the project scope, B is the complexity of the project and M is a multiplier reﬂecting product, people attribute, etc. (Sommerville, 2016). One thing to remember about this estimation technique is that accuracy of results depends heavily on input information. In the preliminary stages, it is difﬁcult to estimate many parameters. As they are based simply on guesses, some outputs look very precise, but the degree of uncertainty is remarkably high (Casper, 2015). In the experience-based technique, however, experts can factor in the difference between previous experiences and requirements of the proposed project. They also consider the project impact caused by external aspects, making the inaccuracy less prominent. Other difﬁculties using the algorithmic-based technique include the value of parameters B and M being purely subjective, as they may vary from experts to experts. While using algorithmic-based technique it is better to compute a range of estimates rather than just one (Sommerville, 2016).

The main method used by agile and waterfall companies for project planning and feasibility analysis is the experience-based method. Companies working on agile and waterfall projects use both kinds of estimation techniques on a case-by-case basis (Ceschi et al., 2005). There is no single, unified technique that works best for all kinds of development environment. Estimation is something that is carried out during the whole development cycle. During the initial stages, however, using an experience-based technique might give better results. In later stages when certain conditions like architecture or framework have been ﬁxed, it becomes beneﬁcial to use the algorithmic-based technique since it is easy to modify input data and to generate estimations quickly.

For a medium size project, the method mentioned above could also be applied. During the first stages, the managers should negotiate with clients to make the requirements as clear and specific as possible. This helps experts to estimate effort more accurately. When the project reaches a mature stage, the manager should switch to algorithmic-based estimation model to save time as input parameters have become more precise. As a result, the formula can calculate the effort required much more reliably.

References

GEVORGYAN, M., 2021. *Why is Software Project Estimation so Difficult?* [online]. DoWork.ai. [viewed 26 November 2021]. Available from: https://www.dowork.ai

SOMMERVILLE, I., 2016. *Software Engineering*. 10th ed. Boston: Pearson Education.

CASPER, L., 2015. *Software Project Management Project Planning* [lecture online]. 15 March. [viewed 26 November 2021]. Available from: https://www.lkouniv.ac.in

CESCHI, M., SILLITTI, A., SUCCI, G., DE PANFILIS, S., 2005. Project management in plan-based and agile companies. *IEEE Software* [online]. **22**(3), pp.21-27. [viewed 26 November 2021]. DOI:10.1109/MS.2005.75