



Tool Guide

RED: Effort Assessment

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Document Details

Purpose

This document has been created to support users of RED in conducting effort estimations in the context of the DTU courses "Requirements Engineering" (02264) and Model Based Software Development (02341). It does not cover the UseCase Point method, or discuss its benefits and challenges, or operationalization, but purely focuses on how values for cost and effort of UseCases can be entered, displayed, and compared using RED. This feature of RED has been created by Johan Paaske Nielsen as part of his MSc-thesis.

Change History

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1. Introduction

An important aspect of project management and requirements scoping is to estimate the cost of a planned project. Since the development of software is often an explorative task, any such estimation is risky, in the sense that it is highly unreliable due to the number of unknowns, including unknown unknowns. Reducing the number of unknowns reduces the risk, and thus increases the reliability of an estimate. The only way of learning about a system (and thus eliminating unknowns) is to specify it at increasing levels of detail. Obviously, this is a costly procedure, so it is up to the client to decide what level of risk they are willing to accept, and what amount of up-front planning they are prepared to pay for.

There are basically two kinds of estimation methods. The classic method for estimating cost, benefit, risk, and any other aspect deemed relevant is to gather a group of domain and technology experts, and ask for their expert opinions. A popular quick-and-dirty method is the "Estimation Game" recently popularized by Scrum.

There are more systematic approaches, though it is not entirely clear whether their effort is offset by the additional cost. A particularly well-studied method of cost estimation is the UseCasePoint (UCP) method. See [Coh05] for a general introduction UseCase Points and [Fro09, AST13] for some research results discussion the benefits and challenges, respectively. In fact, there are several variants of this method, RED implements [FE08] because this seems to be the one best validated by empirical data.

In this guide wo do not cover how either method arrives at particular values for cost or benefit of specific instances of UseCases, but show only how to enter, display, and compare these values in RED.

2. Manual Estimation

In order to prepare for a cost/benefit assessment exercise, you must first open the "Effort Estimation" view of RED by selecting "View>Show View", then "Other>Effort Estimation".

You may obtain estimations for the cost and benefit of UseCases outside of RED. Typically, this is achieved by manual methods such as estimation workshops based on expert opinion, and possibly some kind of structuring exercise such as the "card game" popularized by Scrum. These values can be entered in RED by selecting a given UseCase, and entering values for cost and benefit in the fields "Assigned Cost" and "Assigned Benefit" in the Effort Estimation view (see letter A on the screenshot below). You may also choose a unit in which the values are to appear.

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The values you have entered will be displayed in the bar chart in the bottom (second and third column, letter B on the screenshot above). The first column shows the cost value computed by the UseCase point method discussed below. While entering the values, it may be necessary to "Save" the UseCase element and to press the "Refresh" button to update the graph.

In order to quickly enter these values for many UseCases, open the table view of the folder containing the UseCases and enter values to the columns "Cost Value" and "Benefit Value", respectively. As before, you may choose a unit in which the values are to appear in columns "Cost Unit" and "Benefit Unit".

3. Effort Estimation by UseCase Points (UCP)

The cost of a UseCase can be estimated by the UseCasePoint (UCP) method. There are several variants of this method, RED implements [FE08] because this seems to be the one best validated by empirical data.

In order to prepare for a cost/benefit assessment exercise, you must first open the "Effort Estimation" view of RED by selecting "View>Show View", then "Other>Effort Estimation".

UCPs are computed based on a number of complexity factors of UseCase models and organizational capability levels. The UCP variant implemented in RED has a number of calibrating factors to adapt the general method to the specific factors of a given project and organisation. These factors are set on the "Effort Estimation" tab of the "Project" element and appear at the top of the panel [A]. They can be set to the industry averages as reported in [4] by pressing the "Reset to Default" [B] button. Before these calibrations are done, no UCP value can be estimated.



In order to turn the abstract effort unit computed by the UCP method into concrete cost units, the cost of a working hour has to be provided in the "Cost Factor" field [C]. Before this value is provided, all UCP estimations result in a cost of zero, in whatever unit. The computation of the UCP estimation is documented just above the bar chart in the panel "calculated factors" [D]. In order to apply the project values, the project element has to be saved.

4. Comparing Use Cases

In order to assess and compare sets of UseCases, you must first open the "Effort Estimation" view of RED by selecting "View>Show View", then "Other>Effort Estimation".

The set of UseCases that are to be compared have to be stored in one Folder (A). The folder must be opened to obtain the tabular view, and the Filter has to be set to UseCase (B). Opening the Folder element shows a tabular view of all contained UseCases, adds up their estimated and assigned cost and benefit values, and displays these aggregated costs and benefits in a bar chart (C). Only UseCases directly contained in the Folder are considered. If the Folder is a recursive structure and sub-folders are to be considered, too, "Sub Folder Content" (D) has to be checked. After checking "Sub Folder Content" (or adding more UseCases while this panel is opened), the display has to be refreshed (E).

In order to compare the set of UseCases in a folder for any one particular dimension, the table can be sorted in that dimension by pressing on the respective table header field (F). Pressing it again will invert the sort order. This way, it is easy to find, say, the UseCase that is cheapest to implement or most valuable to create.



In order to compare two particular UseCases, the tabular view described in the previous section must be opened. Then, any two properties can be selected for aggregation (G, H). Selecting any set of UseCases in the table (I) will aggregate that set and display the summations of the previously selected units (J, K).

Literature

[Coh05] Mike Cohn. Estimating With Use Case Points. Methods & Tools 13.3 (2005): 3-13.

- [FE08] Stephan Frohnhoff, Gregor Engels. Revised Use Case Point Method Effort Estimation in Development Projects for Business Applications. Proc. CONQUEST, 2008
- [Fro09] Stephan Frohnhoff. Use Case Points 3.0 Implementierung einer Use Case bezogenen Schätzmethode für das Software-Engineering betrieblicher Informationssysteme. PhD-Thesis, University of Paderborn -Faculty of Computer Science, Electrical Engineering and Mathematics, 2009
- [AST13] Alan W. Armentrout, Joe Schofield, Regina M. Trujillo. Function points, use case points, story points: Observations from a case study. CrossTalk 26.3 (2013): 23-27.