

ESTIMATING WITH SOFTWARE SIZE

The main use of functional size is to provide an estimate of the effort of implementing a piece of software. The size is based on the functional specification.

For estimating on basis of functional size, both the size and the effort (i.e. the related number of work hours) of a number of pieces of software must be captured. With help of simple regression analysis ('Ordinary Least Squares') the relationship between sizes and work hours can be obtained and made visible in a spreadsheet. The relationship between sizes and work hours can be expressed by e.g. a linear function (see the Figure). Given a functional size, this function can be used for

- a tender and/or a Return of Investment estimate,
- to serve as a second opinion to an estimate given by a project manager or a contractor.

When a new implementation has been finished, its software size and the accompanying work hours, the company data registration can be updated for estimations of future implementations.

As an example, suppose that the specifications of a number of pieces of software below have been measured and realized, with the indicated implementation effort:

Software	Size (CFP)	Effort (hours)
Software1	50	190
Software2	90	355
Software3	45	165
Software4	60	315
Software5	85	370
Software6	120	365
Software7	30	195
Software8	65	295

These data result in the graph of the Figure, with the relationship between size and effort indicated by the trend line. The Figure also displays the formula of the trend line and the 'determination coefficient' R^2 . The determination coefficient indicates the preciseness of the model, of which the maximum is 1. The closer to 1, the better the line fits the points.

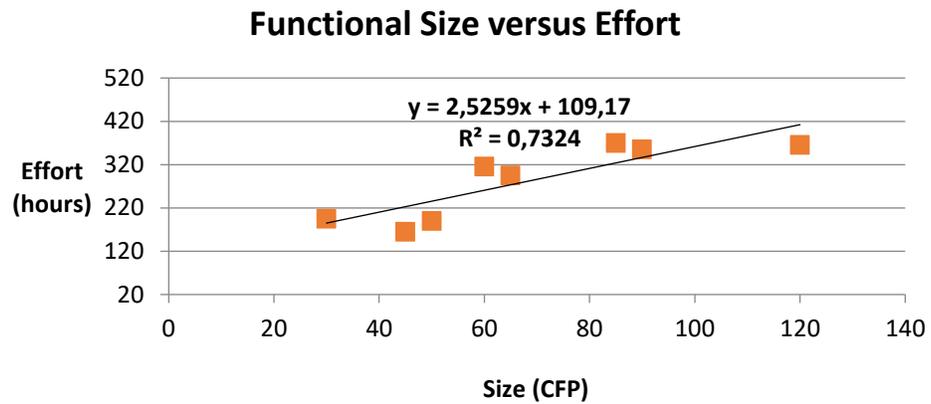
As the formula is a 'best fit', it makes no sense to use all decimals of the indicated formula, it produces 'order of magnitude' estimates of effort needed to implement a piece of software, given its sizes in CFP. I.e. the formula can be rounded, meaning that efforts can be estimated with help of the simple formula.

$$\text{Effort (hours)} = 2,5 * \text{Size (CFP)} + 109$$

As an example, with a measured size of a specification of 100 CFP, the estimated effort would become $2,5 * 100 + 109 = 359$ hours.

Note that it is vital to realize that

- The hours of all pieces of software be collected *for the same set of implementation activities*. Each estimate is the estimate of the hours to perform that set of implementation activities;
- The formula is calibrated for the organization where these numbers were collected. An organization with a different development environment may get different efforts;
- The formula is calibrated for the available size range, i.e. don't use it for sizes far outside this range;
- The formula will change when new data are added.



The estimation model