



Controlling Project Scope with Function Point Analysis

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Project Managers are very well aware that project scope must be kept under control throughout the entire life cycle of information technology projects. Inability to keep control of project scope is one of the leading causes of project failure.

Function Point Analysis (FPA) can be a useful tool for the control of project scope in many instances. FPA provides an accurate measurement of the scope of an application being developed, and of any changes to that scope during development. The measurements can be taken at various intervals as the application is being developed. Although many aspects need to be considered as well, it behooves project managers to make use of FPA in their efforts to control the scope of appropriate projects.

WHAT IS PROJECT SCOPE?

Project Scope is one of the nine project management knowledge areas described by the Project Management Institute (PMI). According to PMI's *Guide to the Project Management Body of Knowledge* (PMBOK), the following serves as the definition of Project Scope: "Project Scope includes the processes required to ensure that the project includes all of the work required, and only the work required, to complete the project successfully."

Also according to the PMBOK, Project Scope Management includes the following processes:

- Initiation, which is intended to commit the organization to undertake and complete the next phase of the project.
- Scope Planning, which involves drafting a Scope Statement upon which to base future project decisions.
- Scope Definition, or the subdivision of the major deliverables into more manageable components.
- Scope Verification, which involves achieving formal acceptance of the project scope.
- Scope Change Control, or the process of controlling project scope throughout the project.

A Work Breakdown Structure, or WBS, is the output of the Scope Definition process. Harold Kerzner, in *Project Management, A systems Approach to Planning, Scheduling and Controlling*, defines WBS as a product-oriented family tree subdivision of the hardware, services and data required to produce the end product. The WBS is, essentially, a statement describing the project scope.

The WBS, a major part of the Project Plan, can be used as a foundation for the earliest collection of metrics in general, and FPA in particular, for a project. Once these earliest metrics are gathered, they can then serve as the baseline for the control of the project scope as part of the Scope Change Control Process.

CONTROL OF PROJECT SCOPE

The PMBOK Guide states that, “Scope change control is concerned with (a) influencing the factors which create scope changes to ensure that changes are beneficial, (b) determining that a scope change has occurred, and (c) managing the actual changes when and if they occur. Scope change control must be thoroughly integrated with the other control processes (time control, cost control, quality control, risk control, etc.)” Kerzner adds that Project Controlling in general is made up of measuring the degree to which progress towards objectives is being accomplished, evaluating possible reaction to any deviations, and correcting unfavorable trends.

The addition (or even deletion) of scope after it is first defined for a project is often known as “scope creep”. Scope may be modified by customers, project owners, or even the project team itself. Although excessive scope creep has been known to cause project failure, this need not be the case. While the addition of scope can often be postponed for a later project, there are times when it is simply necessary for it to be included in the current project.

These changes to the scope, once identified, must be *controlled*. Proper documentation of both the original scope (the original WBS), and any and all changes, is essential. Once a potential scope change is identified, a change control process should be initiated. Change control processes are often defined for all projects for an organization or even for a particular project. They should, at a minimum, include the following elements:

1. Identify and document the proposed change
2. Determine the impact to the project plan in terms of time, cost and function
3. Communicate the impact to the project owner and other interested parties

4. Receive formal acceptance or rejection of the change from the project owner
5. If it is accepted, permanently incorporate the change into the WBS and elsewhere in the project plan, as appropriate

In many cases, project managers may build some cost or schedule contingency into their project plans in order to better accept the risk of scope change. If such contingency exists, the result of the analysis on the impact of a potential change may be null. In other cases, the amount of functionality being added may be similar in size to that being removed, so that the potential change may be minimal. The resulting impact may even be beneficial to the project in some cases where scope is only being removed. In all cases, however, the process must be followed.

It is sometimes difficult to determine when scope creep occurs. It is even more difficult to *measure* the changes, unless the proper tools are deployed.

HOW CAN FPA HELP?

One such tool available to control project scope is Function Point Analysis. Function Point Analysis provides a measurement of the size of an application or of the change to an application. For a project where there is a proposed scope change, FPA can give a measure of the functions being modified, with respect to the size of the scope for the entire project.

This article is limited to the discussion of information technology projects, but even in these instances, costs other than those directly related to software development or modification may be included in the scope. Function Point Analysis cannot help control the scope of such activities as developing training or the purchase software or hardware. FPA, therefore, should be employed as a tool to control project scope only for projects where there is significant software development or modification. Even for these projects, changes to scope that do not affect the

function point count still need to be put through the change control process as well. Given these caveats, FPA can still be tremendously useful in controlling a great deal of the scope for many projects.

In order to employ Function Point Analysis for this purpose, there must be agreement among all parties associated with the project. The project owner, customers, project team and other stakeholders must understand how FPA is to be used, as well as its impact on the project development. They must “buy in” to the concept that FPA will be *the* measurement tool for control, and thus part of the controlling mechanism.

For many projects, an FPA measurement is taken at an early point in a project. This often occurs just after the analysis phase, since the requirements are defined by this time. One purpose of this measurement is to provide input to a project estimating process. FPA is an excellent tool for this purpose.

In order to use FPA to control project scope, however, a function point measurement should be taken as soon as the scope is defined in terms of the WBS. At this point, it may only be possible to estimate the scope with a Rough Order of Magnitude count, since the requirements may not be known in detail. Subsequently then, as soon as it is possible to do so, a detailed function point count should be taken. Again, this may occur at the end of the Analysis phase, since all of the detailed requirements will have been defined by this time. The initial count, regardless of the amount of detail, will serve as the initial baseline for the project. If the initial count was a Rough Order of Magnitude Count, the detailed count will supersede it as the baseline for the project, once it's available.

As changes to the original scope are identified through the early stages of the change control

process, they are to be added to the count. These changes are designated as adds, changes or deletions to the baseline, as appropriate, to delineate them from the original baseline functionality. The result will be designated as an enhancement count.

This enhancement count provides useful information to the project manager and the entire team. The number of function points to be changed, with respect to the original baseline can be an excellent way to communicate the impact of the potential changes to the project owner and other stakeholders. As with the original counting information, the change information is used as input to the estimating process. In the case of a change, the project manager must determine whether to re-estimate the entire project (if, for instance, the changes are quite significant), or only the changed functions.

Once the change control process is completed, the eventual disposition of the proposed changes will be known. If the changes are to be included in the scope, they should also be incorporated into the function point baseline. The enhancement count should be saved (after any further changes are applied). The changes identified in the enhancement count are then to be updated in the baseline, producing a new, updated baseline for the project.

As the project progresses, the project manager should continue to monitor the ongoing function point baseline, as well as any and all enhancement counts. The ongoing baseline is the measure of the functionality planned for development and delivery. Additionally, as an input to the estimating process, the ongoing baseline count can be used to continually monitor the project's progress towards its goals. The aggregate of the enhancement counts shows the sum of the changes that have occurred to the project scope since inception. Resulting changes to cost and schedule should have already been

communicated, but the enhancement counts provide on-going substantiation.

At the conclusion of the project, an implementation count can be evaluated against the original, and the latest baseline counts to determine the effectiveness of the requirements definition process. Some analysis may be necessary if there are significant discrepancies.

ADDITIONAL CONSIDERATIONS

It is extremely important that all changes to scope be identified as such, and that these changes are added to the Function Point Baseline. Although they may be bundled together, all changes then need to be accounted for during the change control process. If any changes to project scope are permitted to bypass this process, the result will be additional (and unneeded) project risk.

One other consideration is the amount of *effort* involved in identifying and analyzing potential changes themselves, regardless of the effort to be expended in developing them. Even when the potential changes are rejected, the time and

effort of change evaluation and execution of change control needs to be built into the project plan.

Of course many Information Technology projects involve more than developing or changing software. The ability of Function Point Analysis to assist in controlling project scope is limited to what can be measured by FPA.

Simply having control mechanisms such as the change control process and Function Point Analysis are often enough to discourage all but the truly necessary changes to project scope. In many instances, the party requesting the change may not want to experience the change control process, or learn about the impact of the proposed changes. Using FPA to determine the size of changes to project scope enables the project manager to effectively communicate the impact to the project schedule, cost and quality of functionality. If changes that aren't absolutely necessary are discouraged, there is a much better chance of the project being completed within the original schedule and cost.

About the author

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