Requirements Analysis: Document Reviewing, Requirements Changing Procedure

Goals:

Present the recommended procedures for changing a project's requirements and for integrating changes with the project's plan.

Theory Overview:

See lecture notes (Chapter 10).

The consequences of a change can be often very large and can endanger the whole project. That is why the manager has to be cautious of the changes he approves. Generally, a manager can reject some changes in the project. In this context, knowing that changes mean usually supplementary efforts and risks, there is a temptation to completely interdict a change. This approach is harmful for both the project and the client, because it introduces tensions between co-interested project sides.

A change's consequences can sometimes overflow the change itself. It's quite an usual case where one small change in the client's requirements can bring major changes to the product's design. In these situations, changes are very critical as their occurrence gets closer to the project's deadline.

A large number of uncontrolled changes means a large volume of wasted work. This produces supplementary expenses, compared to the initial budgeted ones, but it can also easily lead to the project team's dispirit.

Basically, changes aren't a desired phenomenon but they are nevertheless **inevitable** and the management team must be organized so that it can minimize their impact on long and short terms. Such an organization is part of the *changes control* notion/term.

The changes control system must contain the following elements:

- A base that defines the initial state of the object affected by a change;
- A manner of modifying the changing proposals;
- A mechanism for evaluating the change's impact on time and budget;
- A decision factor that approves or rejects the changes in a coherent manner;
- A method of committing changes (accepting and rejecting);
- A method for communicating the changes;
- Monitoring changes implementation.

Changes are of two types:

- **External Changes**

The external changing proposals come usually from clients that realize during the project's development that they want something else than the already contracted requirements. In the project's initial phase, involved people don't really and entirely understand what everyone expects. Additionally, despite efforts on both sides, for not to change the initial specifications, almost all the times new aspects are discovered that must be explored and understood. These new details can lead to a magnitude of changes to the project. Many times the clients and the designers don't entirely understand the product, until they reach advanced project development phase. In such stages, a change's effects can be monumental.

External changes can come not only from the client but also from the project's developing environment:

- Unavailable components;
- Price changes to the throughputs;
- Unavailable machines;
- New technologies;
- Immaterialized necessary resources;

Such changes to the project's external environment can lead to dramatically changes or even to stopping projects.

Because of the changes' serious effects it's suited that the contract between the client and the services provider must specify clauses that regularize and solve such type of situations.

For introducing changes (requirement or approval) there are forms not necessary the same for all the organizations. It is important that there exists some information that must appear on all the **change forms** for any single organization. Some of these are:

- Change identification;
- Presenting the change's motivation;
- Identifying the change's initiators (including their signatures);
- Descriptive preliminary identifying the change's effects over the project and over the working modules affected by it;
- The approximated estimation of a change's cost in time;
- The approximated estimation of change's cost in budget's domain;
- Establish an unique identification code for a change and its cause.

Once a change was accepted, it must be considered when the project's plan and budget are modified. It is very important that the client expresses its written approval for all the changes. This saves the project's managers from objections related to budget and duration overflow.

- **Internal Changes**

The internal changes are those modifications that come from the project itself. An important characteristic of this type of change is that it's not necessary to consult the

client for implementing them. In consequence, for these changes, the project's manager is fully responsible when it approves them. This is because he cannot invoke an agreement with the client that requested that change. If there appears to be delays or budget overflows caused by the internal changes, the manager must assume them.

As an example there can appear changes in a project that develops a software product for which a top-down approach is achieved. In such approach, firstly we write the high level system specifications that describe principally the system's functionality. Then we pass to the requirements inferior levels, in which system requirements are detailed. At the inferior levels we give technical details, sometimes even implementation details. This process continues to the highest level of detail, when the actual code gets to be written. For this method of development, we can imagine that the engineers that wrote the high level specifications can commit errors because their specifications are not entirely verifiable. If the high level specification are detected to be incorrect, of course there will be executed some changes and these changes will involve definitely lower level changes.

Another source for changes is the simple error checking process from a previous phase or iteration of the development process. This happens when a software sampling finishes and during its testing errors are detected. Usually the samples are delivered immediately to the client, and the immediate correction of an error is impossible. In this case the error correction will take place within the following sample.

Take notice that it's not necessary correcting such an error immediately. It is possible that the next sample has no scheduled time for the change. According to how severe the error is, it can be postponed for further samples. If the change is critical for the functioning system, then it can be solved, and a less severe error is moved in the further sample of the project's plan.

Internal changes can be realized through communication, either by speech (informal), but only in small organizations. This alternative is not recommended. Usually, large and mature organizations have well adjusted processes for controlling changes.

Working Plan:

For one of the applications presented, pass through the requirements changing procedures in the several situations:

- Discharge some of the requirements for reducing costs/duration;
- Adapt to a new technology;
- Add some requirements that were neglected in the first version of the plan;

Propose working plans alternatives for:

- The working procedure for changing a component's design;
- A form for a changing application.