

# **Technical Recommendation Sheets (HRT) for Support of Software Development Process**

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**Abstract.** Due to the great diversity that exists in the development of software, it is difficult to establish standard criteria of implementation for all projects. Each development has unique characteristics that make it different from any other. A form to acquire development capacity is through the experience and the accumulation of elements or re-usable techniques in new projects. This document proposes an incremental mechanism of acquisition of capacity of development through an artefact (the HRT's) that should be present in every stage of the development.

## **1 Introduction**

A software development process is a guide that defines an organized form to generate software defining development phases, rolls, activities and artefacts to be generated during this process.

In general, a software development process assumes that the development team has certain degree of technical knowledge for the suitable implementation of the functional aspects of the system. Also it supposes that the technology to use independent of the development in terms of the process since this one does not vary the technology changes. In the practice, a development process it is used as administrative guide and as a times control tool for human resources but as reference of how the activities that this one defines, are due to make.

For the accomplishment of this work, three development processes were analyzed (TSPI, Team Software Process[1]; The Unified Software Development Process[3], and eXtremme Programming[2]). This was made in order to find similar elements the proposal of the present article. Only in eXtreme programming[2] was found element called "spike" that suggests to do a previous investigation and test the development or the implementation of certain complex functionality that arises during the development. However, this strategy does not offer a mechanism to the registry

this information for its reuse and does not propose a mechanism for tracking the proposal.

In the following sections it is proposed to include, to the development process of an organization, an artefact that will register technical proposals and will include information for administrative aims and tracking. Also it is suggested a format for control management and another one for the resultants to these proposals. Finally, the automation of this proposal is recommended and, at the end, it is exposed an example of the utility based in four projects in which this mechanism was used.

## 2 Proposal of technical recommendations sheets

The technical recommendations sheets (in the successive HRTs) are an addition to the set of artefacts to be generated in a project. These indicate what type of technical activities must be considered or be carried out during certain phase of the development process by a certain roll, rolls or the full team. A HRT can, at any time of the development, be presented / displayed by any member of the team, for its evaluation and later approval for its execution. The main objectives are the following ones:

- i. To support to the risk mitigation plan generated in some phase, or to mitigate risks that were identified later to this plan.
- ii. To serve as a base or reference for the decisions to be taken in the development of the system.
- iii. To serve as a technical reference in later developments and, in this way, decrease times and costs, reusing the knowledge generated previously.
- iv. To increase the capacity of development of the organization by reducing the dependency of specialized human resources.

## 3. Description

The technical recommendations sheets are documents that define a formal frame of administration and tracking proposals that suggest doing activities that will facilitate, in the development, the decision making and/or the mitigation of identified risks and, at the same time, the recovery of knowledge generated in previous developments for their use in the present development. Each HRT will include administrative data:

- Reference. (Sequential number which defines, in a unique way, each technical recommendation sheet).
- Name of the project to which it belongs.
- Phase and cycle in which the recommendation was generated.
- Creation date.
- Deadline for execution.
- Author of the recommendation.

Responsible for execution.

Approval (Team members signatures who agree in consensus about the execution of the recommendation).

In a similar way, each HRT will present/display technical data:

Origin (reason that motivated the proposal).

Proposal (the recommendation itself) This one must meet the following criteria:

- a. To suggest activities non contemplated in the scripts of the organization development process.
- b. Is due to evaluate the positive impact of the proposal in the project or the development process and to conclude that this one is representative.

Justification (reasons that supports the proposal).

Strategy (explicit way in which the proposal will be done).

Benefits.

Disadvantages.

Impact in quality (Quality characteristics -according ISO/IEC 9126- that the proposal promotes in the development)

Involved Technologies.

## Tracking

In order to provide a formal frame for administration and tracking the different recommendations, a control format it is proposed to register the necessary things for such effect. This it is the registry for control and tracking of HRTs (that will be called RCSH format in the successive). Next, the elements that will be included in this format are listed and explained:

ID. Unique Identifier of the HRT.

IDR. Identifier of the document or documents that were product of the recommendation.

Date of creation. Date in which the recommendation was answered.

Responsible for execution. Acronym and roll of the human resource assigned to the execution of the task.

Status. One of the following indicators:

- a. Proposed.
- b. Approved.
- c. Rejected.
- d. In process.
- e. Finished.

Observations. Additional information that complements the documents that were generated in the execution of the HRT.

## Resulting Documents

each technical proposal corresponds one or several resulting documents that must properly organized and classified for their later recovery. In this way, the organization will increase the maturity in the software process production.

Additionally, in these documents it is registered how to make certain activities that could be necessary to repeat in the future. The record format has five attributes:

- ID. Unique Identifier that along with the attribute part, forms a key.
- Part. Consecutive associated to each ID, useful for the identification of sub documents with a same ID.
- Date of generation. Date in which the document were generated.
- Location of archives. Physical location of the resulting archives of the execution.
- Report of results. A general description of the final result of the recommendation

## Automated Control

With the purpose of offer a control automated process for the administration of the HRTs and additionally to generate a knowledge base with information about how they arise and solve certain technical aspects, it is presented a tool whose objective is to support and to facilitate this kind of activities.

The HRTs administrator or AHRTe, (as it will be mentioned from now) it is a tool of authenticated access that permits:

- To define projects and participants.
- To assign rolls.
- To generate, to assign and to reassign HRTs
- To solve HRTs.
- To give pursuit to the development of the HRTs.
- To generate reports.
- To define and to execute consultations on HRTs.

The AHRTe will keep and recover information from a repository central of data and could be acceded from any equipment that has access to network Internet.

## 7 Application

This proposal has been proven successful with four developments that have similar characteristics. In this document they will be called To, B, C and D respectively. Next, appears a brief description of each one of them:

Project A. Web system for query information based on sheets of definition of search criteria and sheets of presentation of results with hyperlinks of expanding such information.

Project B. Web system for capture and query information for the support in the evaluation of the qualitative and quantitative characteristics of a software product.

Project C. Web system for capture and query information for the support to the generation, tracking and administration of HRTs.

Project D. Web system for capture and edition of information related to the estimate the value of a social interest house.

Next a summary of the information obtained in these projects tries to justify the four objectives of the present work:

- In the four projects were used 100% of the proposed low support classes generated the project A HRTs. (this supports the fulfillment of objective iii)
- The development team for each project was different, but the development process that integrated this proposal was the same one, so this is independent of the knowledge and experience of specialized developers. (this supports the fulfillment of objective iv)
- If the number of HRTs generated for project X is  $n(X)$ , then it has been observed that:

$$n(A) > n(B) > n(C) > n(D)$$

(this supports the fulfillment of objective iv)

- If the number of HRTs reused for project X is  $r(X)$ , then it has been observed that:

$$r(A) < r(B) < r(C) < r(D)$$

(this supports the fulfillment of objective iii)

- The following HRT, that was generated in the project A, was reused in the other projects, and served to mitigate a risk (what supports the fulfillment of objective i) common to all the these projects:

- Origin. It is not known which data base management system will be the definitive one in the production environment.
- Proposal. To prepare the system so it can be adapted to an arbitrary database management system.
- Justification. This proposal is a form to mitigate the identified risk. It will save codification time at the moment of selecting the definitive DBMS.
- Strategy. To implement a class whose objective is to translate SQL strings between different DBMS.
- Benefits
  - i. The system acquires portability.
  - ii. Facility of scalability, update and maintenance.
  - iii. Minimization of integration errors with different DBMS.
  - iv. This proposal is re-usable in other projects.

- Disadvantages

- i. Investment of time in the implementation of this automatic process of translation.
- ii. It is required knowledge of several SQL dialects.

- Impact in quality.

- i. Maintainable.
- ii. Robust.
- iii. Scalable.
- iv. Portable.
- v. Modular.

- Involved Technologies

- i. Java
- ii. SQL

Finally, the following HRT served as a base for the decision making on the project A (this supports the fulfillment of objective II) and later, it was reused in projects B, C and D.

- Origin. The architecture of the system through the selection of an suitable architectonic pattern to the technology is due to define that will be used
- Proposal. To use architectonic pattern MVC.
- Justification. Architectonic pattern MVC adapts itself to the technology to use since this one offers feasible elements of being used like Views, Models and Controller of natural way
- Strategy. To implement the Vista with elements JSP and HTML, the Model with Java Beans and the Controller with Servlets
- Benefits
  - i. Attachment to a recognized architectonic pattern.
  - ii. This pattern can be reused in other similar projects.
- Disadvantages
  - i. Investment of time in the assimilation and maturation of a new architectonic pattern.
  - ii. It is required of solid knowledge of Java and HTML.
- Impact Quality
- Mantenable
- Robust
- Modular
- Involved Technologies.
  - i. Java.
  - ii. HTML.



## 8 Conclusions

The integration of the technical and technological context in a development process will allow developing software in a more and more systematic way avoiding redoing work and reducing the dependency of specialized human resources. With this technique it is expected that, for later projects, the number of HRTs for the analysis, design and implementation phases diminish, if the use or purpose of software is similar in these new developments.

In general it is expected that, after the accomplishment of several projects (of different types) the HRTs of the subsequent developments can be useful in others and thus to generate less HRTs every time. In other words, this generation of recommendations will decrease as the organization is releasing more and more systems and possibly, will be minimum the number of recommendations to generate, given the acquired knowledge.

In the practice, has been observed that this strategy of inclusion of technical recommendations to the course of the development has been successful and it is proposed as a future work to obtain statistics of more developments so they can reaffirm this proposal.

The disciplined inclusion of technical recommendations to the set of documents that integrates a development facilitates the reusability of the same ones in later developments and it reduces the dependency that exists between an organization and the specialized human resources.

Another aspect important to consider in favour of this process of knowledge acquisition is that it reduces in an important way the curve of learning and investigation for the new human resources that are integrated to the organization. The previous thing impacts directly in the quality of the product, since this mechanism allows to analyze and in its case, to update or to improve a proposal in order to generate later, superior products.

Additionally, this mechanism is independent of any process of development. For this reason, it is easy to integrate to the work of development of any organization.

## References

- 1] Introduction to the Team Software Process. Watts S. Humphrey Ed. Addison Wesley 1997.
- [2] Extreme Programming. Kent Beck. Ed. Addison Wesley 2000.
- [3] The Unified Software Development Process. Ivar Jacobson, Grady Booch, James Rumbaugh. Ed Pearson, 2000.