A Tool for the Analysis of Change Management Processes in Software Development Cycles

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Abstract: Change management processes theory specifies the life cycle of a change through an organization. It is a well-known process present in day-to-day operations, with up to hundreds of changes passing through its phases each day. There is a broad range of tools that help with keeping track of each of those changes. However, the use of these tools, and hence the process itself, is not always translated perfectly into an organization. Therefore, it is necessary to analyse how the process has been implemented and how to correct it. Change management systems often offer some degree of analysis, but it is either too little or too obtuse. In this paper we present a tool that can help analyse the data gathered by these systems in order to detect bottle-necks and irregularities in a visual way tailored to the special time needs of the data.

1 INTRODUCTION

Today, change management process is being adopted by most IT organizations to manage continuous change of customer requirements and technologies. It is a well-defined process by standards bodies such ISO/IEC and ITIL which is considered a de facto standard (Lahtela and Jantti, 2011). Thus, organizations are focused on customize their change process and adopt a tool or change management system to trace of each of those changes. These changes involve a set of activities to plan, asses, approve, build, package, test and deploy software in multiple environments and with different technologies. Then changes takes place in a complex scenario; and both managers and developers wish to make these activities light weighted as possible by monitoring and improving the change process. Therefore process managers require tools provide information in order for change process to be monitored, controlled, maintained and changed when required.

Existing management systems provide mainly information to monitor the change process and to foster collaboration among parts involved in change lifecycle, but organizations also require information to analyze the process and then make decisions intended to improve or change it. Thus in this work we focus on analyze the change management process to determine the useful information to detect bottlenecks and irregularities in a visual way tailored to the special time needs of the data. Then make informed decisions in order to modify or change the process.

Hence, in this paper we present an insdustrial study case which use a graphic tool that allow managers to better analize the temporal evolution of the change management process by providing dynamic information on it. We believe that graphical interface makes easier detect loops or bottlenecks between different process stages.

The rest of this paper is organized as described next. Section 2 describe briefly some relevants works related with our propossal. In section 3 describe the too, it includes requirements it satisfy and the criteria we used to desing it. Section 4 deals with the description of industrial case used; and finally in section 5 provides the conclusions and some entries about of future works.

2 RELATED WORKS

Change management process starts tipically when a request for change (RFC) is produced as a consequence of fixing a bug, updating a new software version or satisfying a customer requirement. Then IT organizations are permanently moving on change and the need of process automation is felt such as is pointed out by (Danesh, Amir Seyed and Saybani, Mahmoud Reza and Danesh, Seyed Yahya Seyed). As regards, in their work (Keller, A, 2011) propose

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the automation of the change management process by representing the RFC information as a task graph into a set of steps and establishing how they will be carried out. This work provides evidence about of how graphic information on RFC helps to understand and manage a complex process. In this sense the tool we propose allows to any user understand the process by processing the information produced by change management system, but it also allows traceability of RFC which is one of the main challenges in change management process pointed out by (Lahtela and Jantti, 2011).

3 TOOL DESCRIPTION

This tool has been designed in order to make a graphical analysis of the temporal evolution of change requests. When studying change requests, it is difficult to detect abnormalities in their behavior if the analyst is not using a graphical interface. So, for this reason, it would not be possible to observe bottlenecks or loops between different states.

On the other hand, this tool provides an evolutive vision about a set of requests for change. Although it is possible to perform an static analysis in a given time, its main purpose is to show the temporal development of an individual request or several requests.

3.1 Requirements: Analysis of RFC Transitions and Times

The data used by this tool to analyze the processes is read from a CSV format file, which has to be loaded to the tool by the analyst. Besides, there is no need to use a CSV file because the data could also be loaded from a Change Management System or another data source. The only requirement to be met is to provide information about 5 fields:

- id: request identifier.
- time: arrival time to a certain stage.
- durationtime: time the change request remains in the stage.
- origin: request origin stage.
- destination: request destination stage.

These fields can be extended in order to provide more information about the request for change that is being analyzed. For instance, some extra fields could be type or priority.

3.2 Tool Design

As can be seen in the figure 1, the graphical user interface is divided into three parts. The central area is the most important one because it shows most of the information available at a glance. The footer contains information about a certain selected stage. There is also a left column which contains the controls of the view.

Central Area. The purpose of this area is to show the progress made by the RFC between different stages. Due to the need to be a dynamic tool, it has been implemented a slider that allows the user to move forward or backward in the analysis period. Moreover a progress bar has been placed under the slider because the user needs to know the total time that an individual request for change is in a certain stage. This progress bar is used by the analyst when they are filtering a single RFC.

The starting time of the slider corresponds to the first RFC and the ending time corresponds to the last RFC. Both are variable and depend on the data. With this slider, the user can control the execution time to inspect the progress of the change requests in detail. Talking about the progress bar, it is possible to filter and analyze a single RFC. As seen in figure 2, the progress bar is showing the time of the filtered RFC in different colors depending on the stage. This progress bar is only used when the analyst is filtering a single change request. This is a very important feature of the tool because allows the user to check at a glance if a RFC is in a certain stage during a lot of time just by using colors. There is also a coloured table which has been developed to complement the temporal progress bar.

By using the colors the analyst is allowed to use this tool in a more visual way, making easier the process of analysing requests for change and detecting bottlenecks and loops.

Footer. The footer area shows the information of the simulation in a certain stage. These data are very important for knowing the behaviour of a change request. As figure 1 shows, if the user clicks on a stage, they will be able to view information about the requests that are on it, which is shown in tables with different columns. The first one shows the id, priority or type of a change request. The filter column shows if the object is filtered or not. The user can also toggle the checkbox to filter or unfilter. This checkbox makes the filtering process easier. Furthermore, the arrival time is the time a certain change request has arrived to the selected stage. Finally, total duration

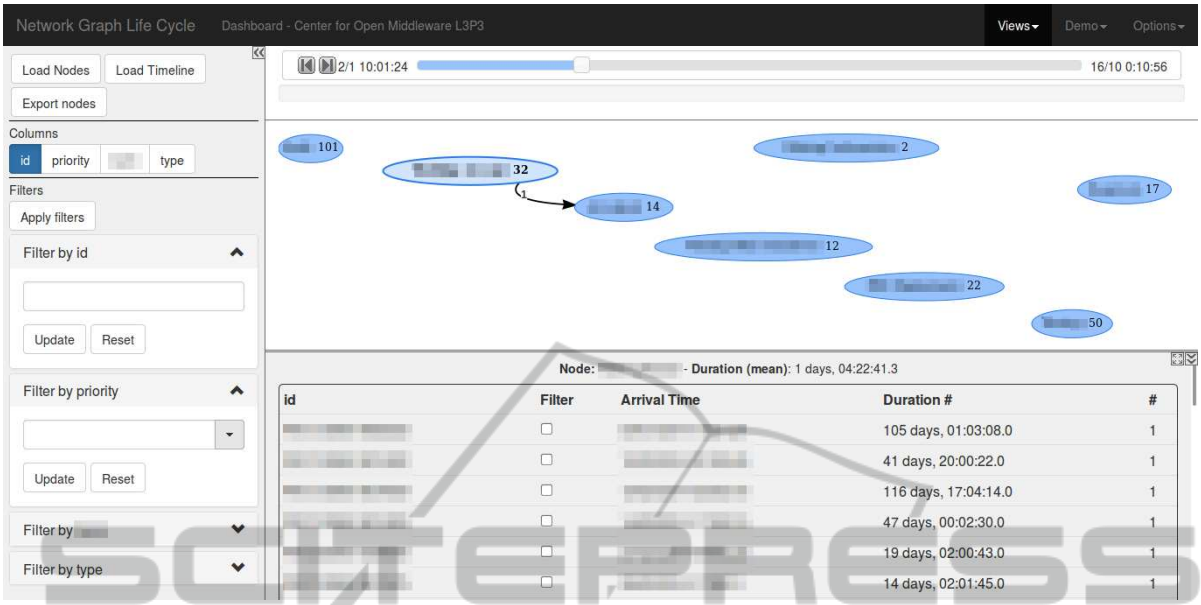

Figure 1: Tool overview.

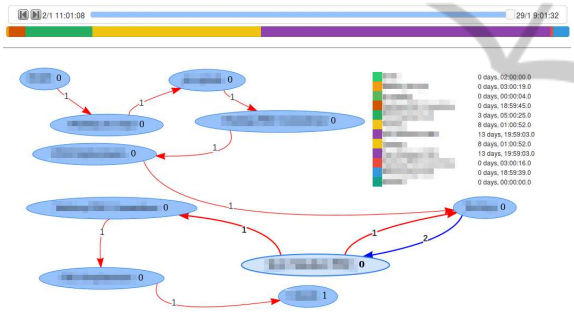

Figure 2: Individual analysis.

field shows the mean duration time of all of the requests in the selected stage.

The footer provides valuable and important statistical information about the analysis and without it, this tool would only be a node network.

Left Column. The left column, which is composed by different buttons and text areas, has three different parts which are used in order to configure the simulation and load data.

The purpose of the import and export data buttons is to import and export the data in the format previously seen in 3.1. These buttons placed in the left column interact with the tables in the footer. For instance, if the user selects the id column the id table will be shown.

Moreover, the visualizer allows the user to filter by id, type and priority. For instance, if the user is filtering by id with ”RFC123456”, the visualizer will just show that RFC. When the user adds an item, a green button will appear in order to show what the user is filtering. We have developed this because when the analyst works with a huge amount of data, they can simplificate the task by selecting an id or RFC priority.

Technology Used. We have used a Javascript based library called Vis.js to draw the nodes and the connections between them. Vis.js is a dynamic, browser based visualization library which has been designed to be easy to use and to handle large amounts of dynamic data. It is also possible to manipulate and interact with the data with this library.

4 CONCLUSIONS

Monitoring, analyzing and improving the change process is a difficult task. Organizations need to make decisions in order to improve their efficiency. For this reason, we have presented in this paper a graphical tool that helps companies to detect problems in the change process.

It is possible to analyze the change management process with this tool based on historical information retrieved from logs. Through the use of this information, the user is able to analyze useful data in order to improve the change management process and detect problems such as bottlenecks, loops, irregularities or processes that are longer than necessary in one stage. As the data contains information about each process and its origin, destination, arrival time and duration

time, it is possible to know why, when and where the error has been produced. These problems could not be easily detected without using this tool.

One of the main advantages of this tool is that it can import and analyze the information from various sources. Not only from CSV files, but from whatever data source that met with the requirements in 3.1. Furthermore, it is possible to use the tool with any process that has a source, a destination and a series of nodes or states for a temporal analysis.

As a future work, it will be implemented various new features to provide more statistical information, apart from the automatic detection of bottlenecks or loops. On the other hand, with a previous knowledge of the maximum time that a process can be in a certain stage, the analyst could detect automatically which process does not satisfy the requirements.

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