State of the Practice on Software Release Planning

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Abstract. In the recent years, the academic literature has reported many different proposals addressing the problem of Software Release Planning (SRP). However, nearly none of these results has been transferred to commercial tools for project management, although many of these tools claim to support some SRP tasks. In this paper, we present a study on 119 project management tools to know to which extent they use advanced AI-assisted algorithms/techniques to support SRP tasks.

Keywords: Software Release Planning · Project Management Tools · AI-assisted techniques

1 Introduction

Software Release Planning (SRP) is the problem of finding the best combination of features to implement in a sequence of releases. SRP seeks to maximize business value and stakeholder satisfaction without neglecting the constraints imposed by the availability of adequate resources and the existence dependencies between features [5].

In [2], we presented a literature review on scientific approaches to SRP. This review was based on the results of a former systematic literature review by Svahnberg et al. [6] and helped to update the current knowledge on the area from a research-oriented point of view. One of the conclusions of [2] is that, except for one case, none of the reviewed proposals went beyond presenting a proof-of-concept tool to prove their feasibility, let alone a mature tool ready for the general use.

In this paper, we complement the results of [2] with an analysis of the state of the practice which focuses on finding tools available in the IT market and analyse which are the capabilities that are not satisfactorily covered in relation to SRP. These are tools for project management, and in particular those that claim to provide scheduling facilities. In particular, we are interested in the algorithms and techniques that these tools use to plan the releases.

2 Research Method

The paper presents a review of project management tools. The tools were selected by considering reviews from specialized magazines as well as by using simple Internet search. The following selection and categorization criteria were used:

- What was the last release date of the tool? Tools with last release older than 18 months were discarded.
- What is the current version of the tool? Alpha versions were not considered
- What are the key features of the tool and what type of scheduling support does it offer?
- Do they offer features for agile development (e.g., Burndown Charts, Product Backlog, User Stories, Scrum Methodology, Kanban)
- Is it web-based or a desktop application?
- What is the price?
- Other relevant remarks

This choice of criteria is motivated by the fact that for commercial products, it is usually very hard to find out more publicly available information about them.

A total number of 119 tools were analyzed out of which a short list was selected for a more detailed qualitative analysis.

2.1 Research Questions

In order to generate (semi-)automatically effective software release plans, with optimal selection of features and optimal assignment to developers, advanced algorithms are needed. The state of the art conducted at [2] confirmed that such algorithms are still object of interest by researchers. To complement this study, we want to know if any of the tools currently available on the market uses this kind of algorithms. Even if none of them uses it, it is worthwhile to point this out. In this case, it may also well happen that tools have some level of automation (e.g., artificial intelligence (AI)-based assistants) as part of the tool features.

This preamble motivates our research question:

RQ1: What kind of AI-assisted feature release planning and/or task scheduling capabilities are supported by project management tools currently available on the market?

2.2 Selection of studies

We started with a list of project management software from Wikipedia (https://en.wikipedia.org/wiki/Comparison_of_project_management_software) which contained 119 tools at the moment of the search (December 2015). Then we searched for more information about each product using Google web search and Google Scholar. Different combinations of the following keywords were used in this process: automated scheduling / planning; project management + scheduling / planning; task scheduling; critical path scheduling; critical chain scheduling; queue based scheduling; constraint-based scheduling; feedback scheduling

This search lead to the websites of the developers of the tools, where all the required data was collected according to the selection and categorization criteria stated at the beginning of this section. After analyzing and filtering the collected data, we obtained a shortlist of 11 candidate tools (see Annex) at the end of this first iteration.

In a second iteration, these 11 tools were analysed with respect to RQ1. To this end, the documentation of each individual tool was examined. The exclusion criteria were:

- Low maturity of the tool
- Poor functionality and features
- Unavailability of automated project planning methods and algorithms

2.3 Threats to validity

The two main threats to validate are related to the fact that: 1) some tools may have not been located, 2) some tools may not have been examined in detail due to the impossibility of probing all their features for free. An external validity threat also emerges in the sense that we are restricting our study to project management tools, while release planning may be also included in some other type of tools.

3 Results

A detailed analysis of the eleven selected tools can be found at [1]. The overall finding is that the tools put little focus on automated scheduling capabilities and methods.

The following tools provide more advanced features for (automatic) task scheduling:

- **Workfront**. Soft constraint-based task scheduling.
- **Genius Project**. Simulation capabilities.
- **Oracle Primavera**. Critical path scheduling.
- **LibrePlan**. Queue-based (automated) resources planning.
- **Sciforma**. Critical chain scheduling.
- **JIRA**. Automated scheduling of tasks.
- **Microsoft Project**. Automated scheduling of tasks.

These scheduling methods are generally aimed at supporting project managers in the beginning of a project or a sprint in the case of agile development projects. These methods do not generally feed back into the scheduling problem the results of an automated assessment of the "is"-state of the tasks being scheduled.

There seems to be a method and feature gap concerning the ability of tools to dynamically adapt the schedule according to decision-support algorithms. On the one hand, this is caused by the fact that developers only report a task when it is finished, while there is no such thing as a progress-meter for each task. This impedes a fast and accurate automated re-scheduling of tasks depending on their current progress state.

4 Conclusions

We have found some commercial project management tools that provide means for automating the scheduling of tasks. However, none of the tools analyzed in this review

provide algorithms-assisted features for release planning and task schedule optimization. On the one hand, this seems to call for further approaches that transfer well to commercial tools. A promising step in this direction is the tool described in [4]. On the other hand, it is reasonable to ask why AI-assisted features (with the exceptions of some simulation, prediction, and forecasting features, which are all semi-automated and require users to provide the tools with suitable input data) are not provided by project management tools currently available on the market.

One possible explanation is that, in its present state, the market does not demand such features from different reasons (e.g., unknown employee reaction, mistrust in AI-assisted optimization, etc.). Another explanation could be that companies are still experimenting with such features without finding a good way to release them.

In any case, entering the market with a brand new project management tool, which also offers AI-assisted features, would be a difficult task because (1) it must also beat other widespread, massively adopted tools in what regards other, more conventional features; (2) it must be able to explain the benefits of AI-assisted features for planning and optimization; and (3) it has to fulfill its promises in a real development environment, which is not the same as an experimental research-oriented one.

In this context, one feasible approach for any novel component would be to start by providing AI-assisted plug-ins for one or two popular tools (such as JIRA and Workfront). Alternatively, if a complete new tool is envisioned, it should have means for seamlessly integrating with these tools in the way described in [3].

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Annex

Table 1. List of the 11 candidate tools after the first iteration

Product Name	Web site	Version	Release Date
Workfront	www.workfront.com	-	July 2015
Hansoft	hansoft.com	9.0022	October 2015
Planisware	www.planisware.com	V6	April 2015
Assembla	www.assembla.com	-	October 2015
Genius Project	www.geniusproject.com	V8.0	September 2015
Oracle's Primavera 6	www.oracle.com/applications/primavera/products/project-management.html	15.2	October 2015
Planbox	www.planbox.com	-	July 2014
LibrePlan	www.libreplan.org	1.4.1	April 2015
Sciforma	www.sciforma.com	7.0	December 2014
JIRA	www.atlassian.com/software/jira	6.4.8	July 2015
Microsoft Project	products.office.com/en-us/project/project-and-portfolio-management-software	2016	September 2015