Incentive to report and accessibility: Excel versus mobile web application

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Introduction

The industrial company Prodma in Mariestad develops, industrializes and manufactures refrigeration product solutions for other companies. Development and industrialization is project based and allocation of resources is planned on a weekly basis. Prodma's main goal is to improve efficiency in the product development and industrialization process. For the allocation process an Excel file is used, but project follow-up with regards to resource usage is not satisfactory and report discipline is low. Also, the vulnerability and risk for user mistakes are high due to absence of safety features. Prodma now wants to improve the incentive to report with a different kind of solution which also works well with smartphones and iPads.

Focus area

My aim is to investigate if a user-friendly web based mobile application can improve the incentive to report resource usage in the system.

Prodma wants the final system to contain the following feature, divided into type of user:

Role	Main units	Features
Resources	Smartphones ipads	Calendar based solution including start time and end time SMS reminders or push notifications if data hasn't been reported within a certain time Reporting resource usage
Resource planner	Laptop Stationary computer	Monitoring allocated resource share in percentage Analytical features regarding allocation plan to warn when individual resources are over allocated Study ost-calculation of: ● how much resources that actually were used compared to the original plan ● how long development and industrialization took compared to the original plan
Admin	Laptop Stationary computer	Handling individuals rights to see, plan or report within the application

Table 1. Roles, units used and features for a web solution handling resource allocation

This study will focus on creating an interactive frontend prototype mobile application for the *resources* and the features they need. If reception is positive, discussions outside the scope of this thesis with the company may be held for further development and a working full stack solution.

The research questions I want to answer and analyze for this project are:

- **RQ1**: What makes a mobile app user friendly for the employees in this company?
- **RQ2**: Do the end users find the mobile app more user friendly compared to the Excel file? If so, why?
- **RQ3**: Does the mobile app improve the incentive to report resource allocation compared to an Excel file? If so, why?

Collect, analyze and evaluate

To answer the research questions, I intend to ask both qualitative and quantitative questions regarding user friendliness and incentive to report about user friendliness and when comparing the design of the Excel based version and the created application. The answers will be analyzed to see which design the users prefer and why, and their answers will be evaluated by using relevant literature.

Motive and value

The term "Industry 4.0" refers to how industry management can be improved using smart devices to collect data for analysis. One significant factor is optimizing production planning activity using a web-based planning tool. This can lead not only to reduced time for resource planning and optimized resource allocation, but also large cost reductions. In summary, improved resource planning might lead to more efficient and competitive production [1]. Therefore this study might be of relevance to all kinds of industrial companies dealing with resource planning.

As stated in the introduction, Prodma now uses an Excel spreadsheet for resource allocation. Using spreadsheets is a common solution for production planning in enterprises [2]. One reason is that self-designed spreadsheets usually are more transparent, compared to dedicated production planning systems where the underlying code is not visible. Thus the planner understands the underlying work of the spreadsheet better. Also, including extra functionality might be easier with a spreadsheet. However, planning using spreadsheets might also increase time spent planning. And because of the freedom that comes with using spreadsheets, error in input might lead to broken links and unreliable output data.

Prodma also has problems with employees under-reporting in the shared spreadsheet. A study has shown that employees might not be reporting data because it is time-consuming, complicated and unpractical. By designing a user-friendly mobile solution, including a backend server, a web application and mobile application addressing these complaints, the incentive to report might increase. Simple login procedure, pre-defined fields and being able to take specific notes can be helpful features [3]. The implementation of tailored notifications could also facilitate the use of an application [4].

In summary, by creating a user-friendly mobile application, including a notification feature, for resource allocation, the study might lead to more frequent and safer reporting. This can result in improvement in efficient and competitive production for the company. For other enterprises still working with spreadsheets for resource

allocation, this thesis might make them more aware of the potential benefits of using mobile web applications as an alternative. The effect could be that companies are more willing to employ web programmers in order to effectivize productions. In doing so, these companies might see benefits in contacting universities, suggesting future thesis work in the field. An increase in collaboration between universities and industry might help to reduce unemployment rate and facilitate theses dealing with real enterprise solutions.

Challenges to consider here are what techniques are relevant to use when creating the app for each requirement in the prioritized list. Also to take into consideration is what kind of features would make the app user friendly while still fulfilling the requirements for the resources using the application as stated in the focus area section of this paper. If the application is not user friendly the willingness to use it may be hampered.

Literature search

I searched for relevant articles on Google Scholar. For most of my articles I filtered out results from 2018 and forward in order to get relatively recent articles. The following search terms, which can be divided into three categories, were used.

- **Benefits of resource planning**
  - effective resource planning
  - resource planning benefits

- **User friendliness in resource planning**
  - user friendly mobile reporting
  - push notification motivates
  - usability mobile resource planning
  - usability enterprise resource planning

- **Tools for resource planning**
  - web application manufacturing industry
  - spreadsheet tool manufacturing
  - mobile resource planning

I intend to look for journals, articles or sites that will highlight characteristics of user friendly mobile applications. This together with the first research question will have me focus on key elements with regards to user friendliness while creating the app. I also intend to use a book for guidance on user experience design while creating the application [5].

References

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