THE IMPORTANCE OF BUSINESS REQUIREMENTS IN SOFTWARE PERSONALIZATION PROJECTS

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The article primarily underlines a range of guidelines that can be used to translate customer needs into business requirements. The main scope of the article is to bring upfront the results of the pilot research that can help demonstrate the importance of business requirements. The results will validate that the most important software personalization activity is tagged to gathering and defining business requirements while the most important risk category perceived by both customers and suppliers is the business requirement category. The pilot study of this article is taking a different approach and wants to determine how risks are perceived from customer and supplier side, this being actually the novelty element in the research.

Keywords: software personalization, software customization, business requirements.

1. Introduction

According to ISO/IEC IEEE/29148:2011 [1], requirements engineering is an interdisciplinary function which has an important role in mediating the seller and the buyer in order to reach a common ground with regards to the requirements that need to be met by a system, a software application or service. The purpose of requirements engineering is to understand the problem that arises from the needs of stakeholders, including, but not limited to, customers and end-users and transform it into requirements to define and design the related solution [2]

Customization requirements are built by documenting the interests and expectations coming from stakeholders or through existing processes and information modeling [3]. The purpose of business requirements is to determine the properties of the product and processes variables where the product in question is operated [4].

In order to have a better understanding over risks that occur in software customization projects, first it is needed to define the risk. Project risk is an

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uncertain event or condition that, if it occurs, has a positive or a negative effect on one or more project objectives such as scope, schedule, cost and quality; a risk may have one or more causes and if it occurs, it might have one or more impacts [5]. In this article software personalization projects refer solely to projects that have the main scope to deliver tailored software applications along with their associated services. Also the main purpose of the article is to underline the importance of business requirements by highlighting how gathering and defining business requirements is a major activity in software personalization process and that these activities carry a significant level of risk both on client and supplier side.

2. Business requirements characteristics

Business requirements must meet a number of quality criteria, that actually come to help in the light of the fact that they guide the requirement definition and wording [6].

According to Artem Katasonov [7] requirements validation is the process to determine whether the requirements have been defined properly, they are not in contrary to stakeholder's expectations and/or contradict each other; it is actually the control of the quality requirements. Requirements validation deals with the process of reviewing the requirements documented in order to ensure that they define the right software (the software that users expect to utilize) [8]. Kotonya [9] mentioned that the requirements should be checked in order to: be validated, understood, coherent, traceable, complete, realistic and verifiable.

Business requirements definition starts with the identification of clients ' needs and objectives which are then transposed in a formal way through customization requirements.

A well formulated business requirement is a phrase that [1]:

- can be verified
- can be measured and quantified in order to be evaluated
- needs to be satisfied by a system or software application to solve a customer's problem or to achieve the client's objectives.
- defines the system performance when in usage.

A business requirement is a phrase expressing a need together with the conditions and constraints associated with it. Most times such a requirement is expressed in a common language, thus when formulating requirements, it must be taken into consideration to include a subject, a verb and an adverb [1].

Below it can be seen the complete syntax of a business requirement. [1] (Fig.1):

[Condition] [Subject] [Action][Object][Constraint]
E.g.: When the contract is signed **[Condition]**, the system **[Subject]** must change **[Action]** the contract status to valid **[Object]** in 5 seconds **[Constraint]**

Fig. 1 - Business Requirement Structure

Source: ISO/IEC/IEEE 29148:2011

Conditions are qualitative and quantitative attributes to be specified for each business requirement [1]. Constraints restrict the system design and implementation; therefore, constraints may be present at the level of each business requirement. Examples of constraints can be found below [1]:

- Interfaces to other systems already established
- Legislative limitations
- Technology and existent technological platforms
- Capabilities of end users

In Fig. 2 it can be noticed the characteristics of business requirements [1]:

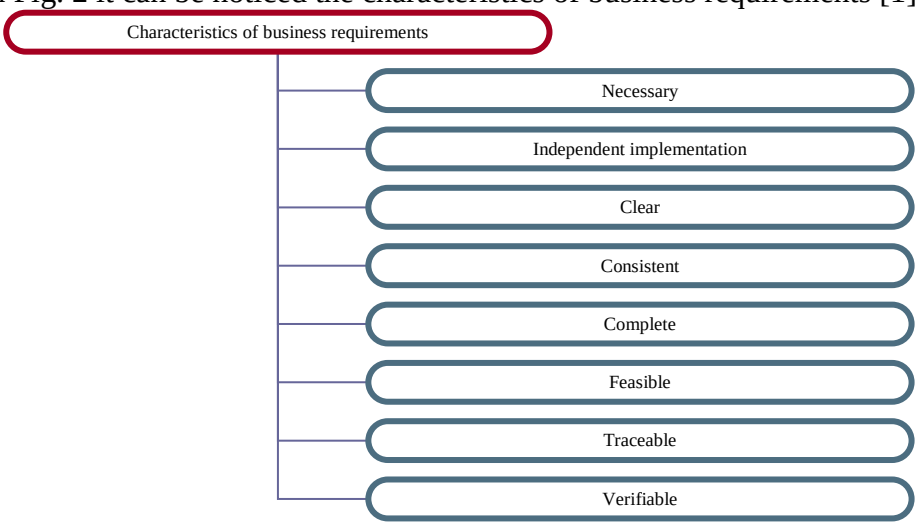

Fig. 2 Characteristics of business requirements

Business requirements must bring out "what" is the need and not to describe "how" the requirement can be designed and implemented [1].
Vague expressions and generic terms should be avoided, the basic idea is that the requirements must be defined in an explicit and specific way and leaves no place for doubt or interpretation. Expressions that should be avoided are superlatives like “the best”, “the worst”, subjective language like “easy to use”, vague pronouns like “that” or “those”; comparisons “better than…”, open doors like “potentially”, “probably”, negative phrases like “should not last long” [1].

In order to analyze business requirements, they must have formulated a series of attributes, these include [1] (see Fig. 3).

Ruhaya and Bernard [9] have conducted an analysis to demonstrate that software development projects are considered succesfull when the project has achieved a range of criteria: the outcome of the project meets all the specified requirements, the overall quality of the product is high, the requirements-related tasks are successfuly completed, the outcome of the project meets the business goal, the project is completed within scope. Menzes, Gusamao and Moura [10] have identified in their paper entitled Defining Indicators for Risk Assessment in Software Development projects that one of the top software risk indicator of software development is related to requirement specification and includes factors like requirement stability, requirement clarity, requirement dependece and requirement complexity.

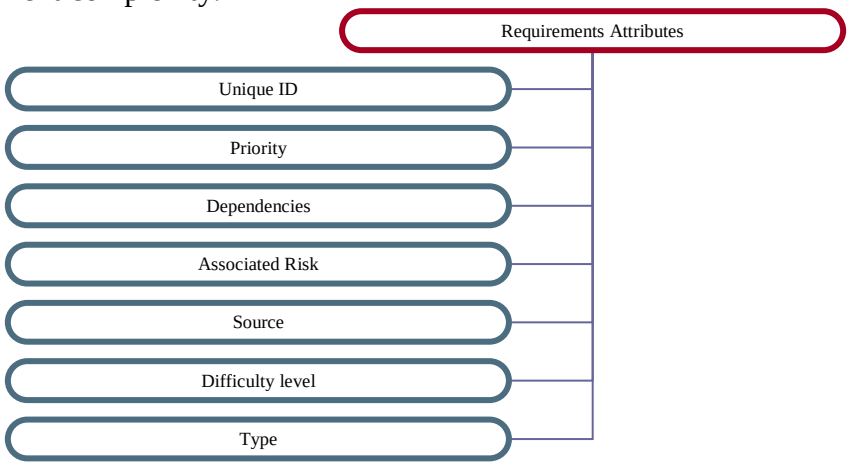

Fig. 3- Business Requirements Attributes

Song Hao and Jiang Jirong studied the types of risks that occur in software development projects. The results of their study [11] reveald that the risk of having incorrect requirements ranked 5 out of 9 and the risk of having developers not familiarized with requiremnts ranked 9 out of 9; the top 3 ranknгs were taken by risk to depend on a few key staff and hardware risks like needed hardware not on position and bad hardware quality. Song and Jiang divided the characters into managers and developers and expected them to have different perceptions of different risks for the reason that their scope of work is different [12]. Figure 4 demonstrates that managers have identified more risks concerning requirements, users, testing, team and project while developers are more focused on design and hardware risks [11].

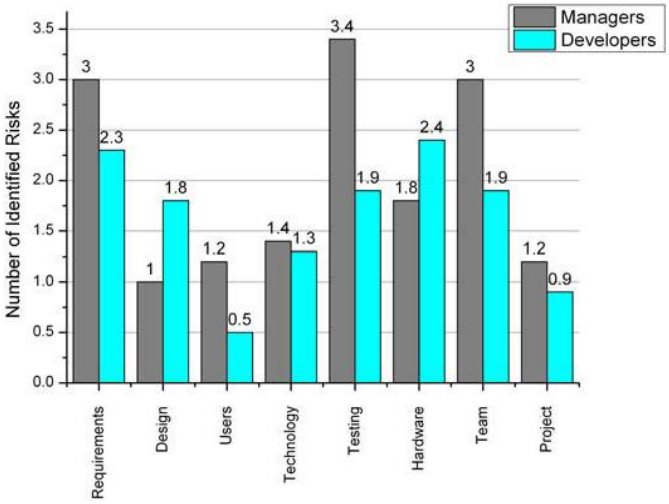

Fig. 4- Number of identified risks per character

3. Research Methodology, Data Analysis and Findings

In order to underline the importance of business requirements in software personalization projects, the authors have pursued specific targeted study in this direction.

The main purpose of the pilot study is to demonstrate that one of the most important activities performed within software personalization refers to gathering and documenting business requirements. This ranking also comes with associated risks that are outlined in the analysis below.

Another main focus is to emphasis that not only one of the most important software personalization activities consists in gathering and defining business requirements but also the top risks encountered in software personalization projects are strictly related to business requirements definition.

3.1 Research Methodology

Number of questions: 5 questions with open answer, the first two questions were marked as mandatory, the rest of the questions being optional. The period during which the questionnaire has been made: 2017/01/24 8:44:43-2017/02/17 1:25:51
Method used: crowdsourcing.
Participants number: 26
Questions within the questionnaire which highlighted the importance of business requirements:

Table 1

The questions addressed in the survey

1	In what industry are you currently working ?
2	What is your current job role ?
3	What activities do you believe are specific for software customization projects ?
4	What are the top 3 risks in software customization projects from client's perspective ?
5	What are the top 3 risks in software customization projects from vendor's perspective ?

3.2 Data Analysis and Findings

From the analysis of the industrial sector where respondents are currently employed, it was concluded based on the results displayed in figure 5 that that the majority of the respondents come from the IT & Telecom sector (76%): 38% work in the IT industry and 39% work in telecommunications. The remaining percentage of 23% is split equally between areas such as: real estate, consulting, transport, business services, education, manufacturing.

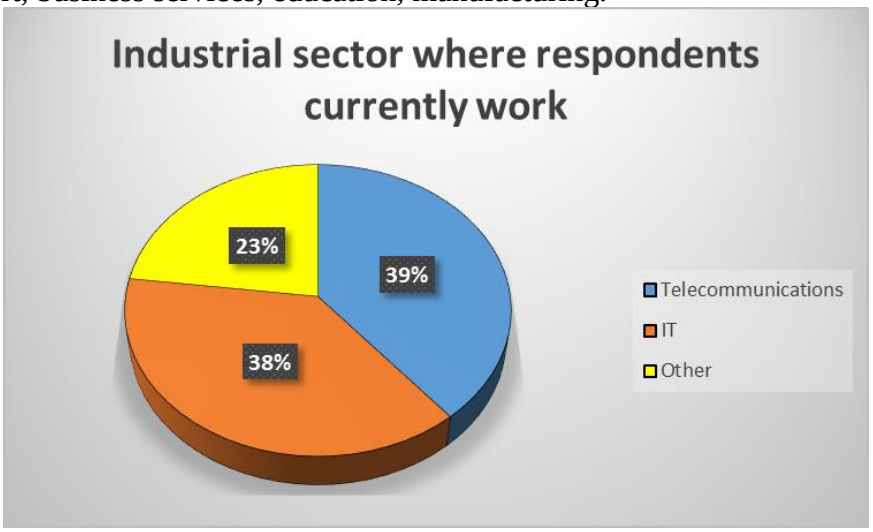

Fig. 5- Industrial sector where corespondents currently work

In order to provide a clearer image, job roles have been grouped in four types: business consultancy, project management, technical management, process management. Fig. 6 shows that the majority of respondents (62%) are project managers, 19% of the respondents are occupying technical roles, this giving another perspective over the results besides the business and management approach. Other roles included business consultancy, process management and management.

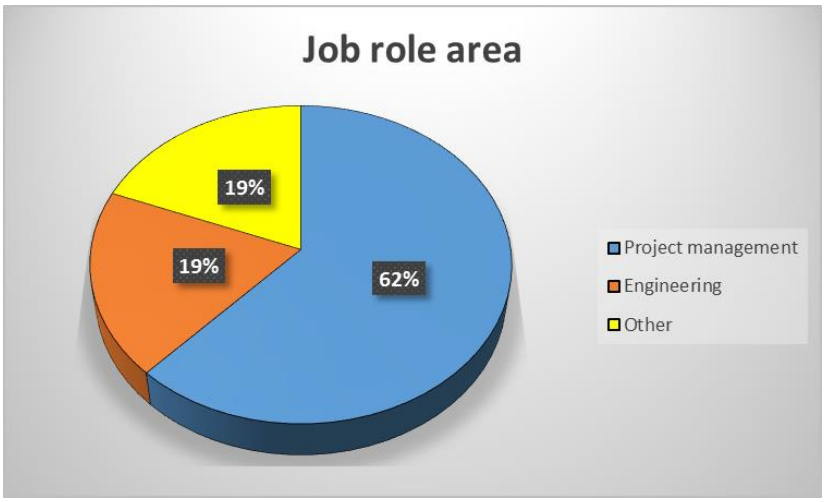

Fig. 6 – Job role aria

Through the analysis of the answers given by respondents to questions 1 and 2 it can be concluded that the segment of activity in which respondents belong to and their nature are relevant to this study.

A ranking of the most common and important tasks of software personalization would look as follows (fig. 7):

1st place: defining the business requirements (the category was retrieved in 24% of answers)

2nd place: software development activities (this category has been found in 12% of answers)

3rd place: testing activities (this category has been found in 11% of answers)

In the activity group related defining requirements were taken into consideration answers such as: customization requirements gathering, requirements definition, clarification of the requirements from the customer end, the identification of clients ' needs. Included activities under development are: tuning the software according to client's needs, solution construction, configuration, small customized developments, build, source code modification, content update (branding). Testing activities that were mentioned along the responses are: UAT (user acceptance test), ORT (operational ready test), integrated testing, regression testing. Other activities include: prototyping, study & research, optimization, design, installation, gap analysis.

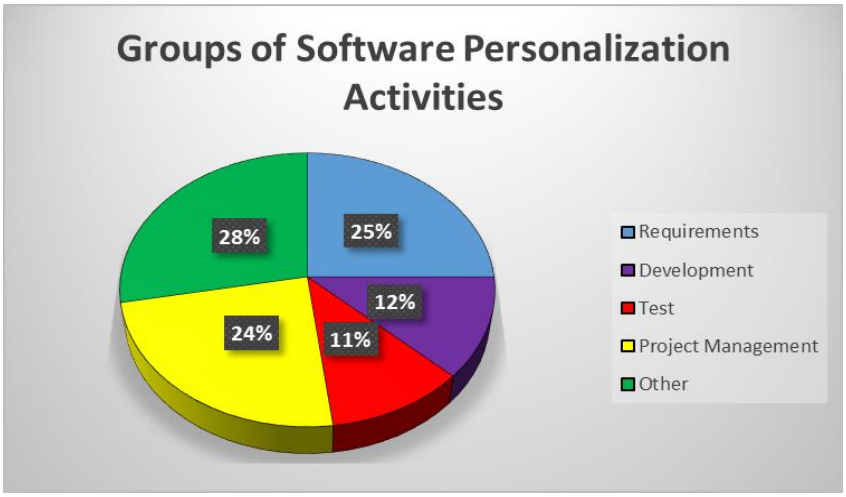

Fig. 7 Software personalization activities

With regards to the top three categories of risks encountered in software customization projects and viewed from the perspective of the client it was observed based on figure 8 that the main risks are related to

- business requirements: -21% of respondents have identified this risk category as a major one
- costs-18% of the respondents has identified increasing costs as one of the three main risks,
- customization duration, quality and software complexity are risk categories that together sum up 9% of the total responses.

In order to have a better understanding on the main risks related to the business requirements we will analyze in detail what answers were placed in this category.

Among the answers that have highlighted the risks associated with software business requirements are included the following: the risk of having unclear requirements or incomplete requirements, the risk of not covering all the requirements from the very beginning, the risk of misunderstanding the requirements or having a different understanding of requirements compared to client's expectations, the risk of having a software is not built to meet the business requirements.

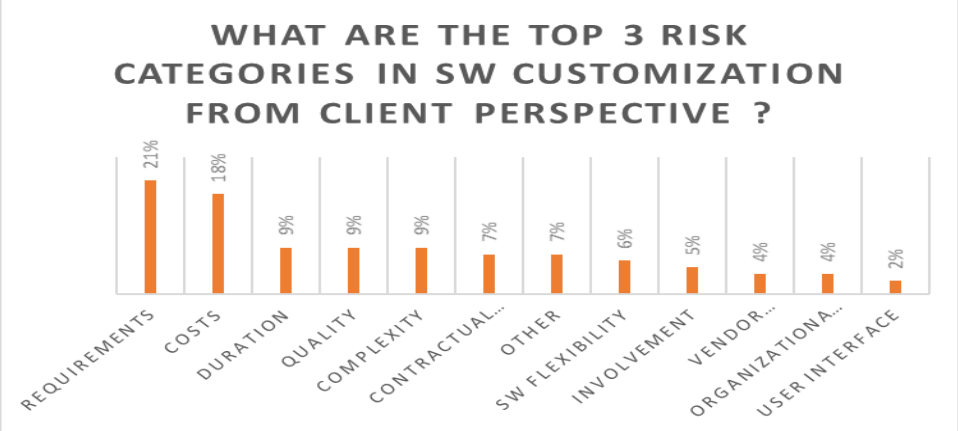

Fig.8 – Risk categories in software personalization projects seen from client's perspective

With regards to the top three categories of risks encountered in software customization projects and viewed from the perspective of the vendor it was observed based on figure 9 that the main risks are related to:

- business requirements - 32% of respondents identified this risk category as a major one
- customization duration-14% of respondents identified the risk of having an increase customization duration
- resources -10% respondents identified this risk category.

In order to have a better understanding on the main risks related to the business requirements we will analyze in detail what answers were placed in this category.

Among the answers that have highlighted the risks associated with software business requirements are included the following: the risk of having incomplete and erroneous description of the current state and the desired future state, the risk of dealing with a customer that is not consistent in what is needed, the risk of not having a full customer internal alignment on requirements, lack of customer understanding of the solution, the risk of having additional requirements that are not covered by the contract, the risk of inadequate understanding of the client's organization, processes and work flows, the description that was sold to the customer does not fit with what the product can do even after the customization is applied; the risk of having unclear business rules or not according with the real workflows, frequently changing business rules.

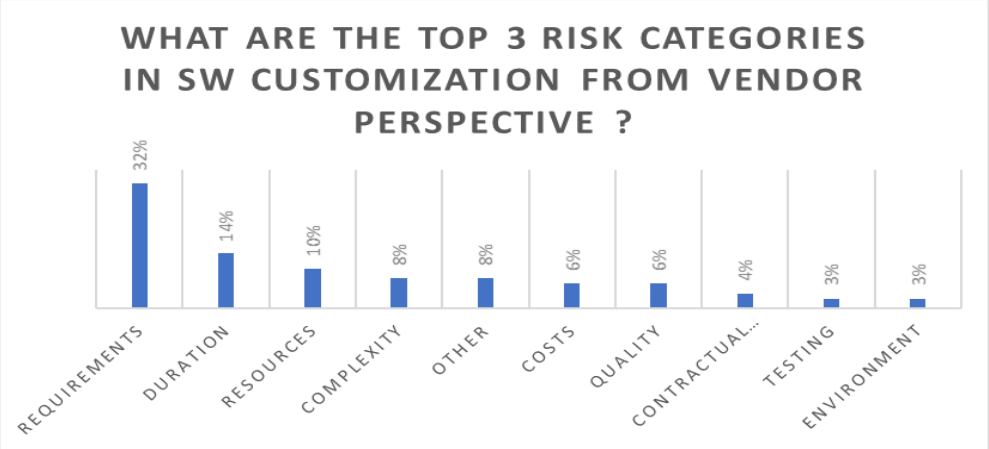

Fig.9 – Risk categories in software personalization projects seen from vendor's perspective

4. Conclusions

Gathering business requirements represents the most important umbrella of activities within software personalization projects. Authors underline that the success of this umbrella of activities determines the success of the project, this was also captured by other researchers who have studies what drives a successful project. The results of the pilot survey demonstrate that gathering, defining and validating business are the key software personalization activities. This was also underlined by Ruhaya and Bernand who have demonstrated that project success is driven by being able to meet the business requirements, in this case the author's survey results emphases the same idea.

The group of respondents that participated in the study is relevant as they have IT & Telecom background both in management and technical field. Song Hao and Jian Jirong [11] have studied how risks are perceived by managers compared to developers. The study of this article is taking a different approach and wants to determine how risks are perceived from customer and supplier side, this being actually the novelty element in the research. Based on the analyzed results it can be concluded that the risks related to business requirements have the highest rank and this is the most important risk category perceived both by the customers and vendors, business requirements being the most important risk category to consider as part of project risk management.

While Menzes, Gusamo and Moura [10] have identified top risk factors as requirement stability, requirement clarity, requirement dependence and requirement complexity, the authors have identified additional risk factors like requirement consistency, requirement alignment, requirement understanding.

By the results obtained from this pilot research, authors contradict previous researches where risks related to business requirements scored 5 or 9 in ranking (see [11]) as the authors have underlined that risks associated with business requirements are the most significant risks perceived by both customers and suppliers, this being a common ground of understanding. Future research in this field can focus on expanding the analyzed sample or can be industry specific.

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