Incorporating Marketing Strategies to Improve Usability Assurance in User-Centered Design Processes

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Abstract. Nowadays, international companies have been using different strategies in order to obtain more attractive products and get a higher impact on the market. But when referring to software products, it is necessary to keep in mind that such strategies are affected by specific quality criteria as usability. Usability and marketing can be combined to offer more attractive products. In fact, specific instances of marketing technics have been gradually adopted by software engineers to improve usability. All in all, there is a lack of systematic approaches dealing with the integration of both marketing and usability through activities in a user-centered development process. To face such challenge, in this paper we have selected the most important marketing strategies to be integrated as activities in a user-centered process model. Activities were classified into Pre-Development, Development and Post-Development, and they have been sorted out depending on the marketing processes taking place before, during and after the development of a software product, respectively.

Keywords: Usability, User-Centered Process, ISO 9241-210, Marketing.

1 Introduction

In the last years, even the biggest companies have come using different strategies oriented to offering more attractive products and make them easier to sell. In this process, strategies related to marketing management and sales play an important role. But, when referring to software products we need to keep in mind that these strategies need to be accompanied by quality criteria. More specifically, and mostly for products oriented to the final user, usability, as a quality characteristic of the software product, is an essential criteria that such products need to include when being released on a specific market.

In general, there is a great deal of technics used to improve usability in software products, not only from the *Human-Computer Interaction* (HCI) point of view, but also from the perspective of the marketing strategies being used. Some well-known strategies of this kind are related to *Digital Marketing* for software applications, *Search Engine Optimization* [1], *E-mail Marketing* [2] and *On-line advertising* [3]. Also, some new technics can be mentioned, such as *Holistic Marketing* [4], a term related to software products and personalized solutions, and the *Customer Relationship Management*

[5], which is a strategy based on *Relational Marketing* [6] where the largest beneficiary is the final user, and not the product itself.

However, when thinking of obtaining usable and attractive products for the final user, the development process is as essential as the product itself. In fact, one of the standards highly used for the construction of usable applications is the ISO 9241:210 [7]. This standard provides a framework for usability assurance by stating planning and analysis phases that can be meaningful to integrate usability and marketing strategies. Those are: planning of the human centered design process, specification of the context of use, and specification of user requirements. In order to accomplish this goal, it is necessary to identify what marketing technics can be integrated in specific activities of the ISO 9241:210 standard, with the goal of obtaining more usable and attractive software products.

In the state of the art, there are some specific examples of marketing technics that have already been adopted by the usability engineering paradigm. This is the case for the *Competitive Analysis* [8], a technic that allows to analyze the market competitor's strengths and weaknesses. However, marketing technics adapted from the usability field are only a few, and there is not a systematic approach when dealing with specific activities and tasks to be considered in a development process model according to the software engineering's criteria.

This way, the main aim of this paper is focused on establishing relationships between the marketing field and the development of user-centered software to improve usability overall. In order to do so, after a conscientious analysis, the most important marketing strategies were selected in form of activities, in order to be integrated in a user-centered process model. These activities were classified in the following categories: Pre-development, Development and Post-development, and they were sorted out depending on the marketing processes taking place before, during and after the development of the software product. The objective pursued is to ensure the usability of a software product throughout the development process.

The paper is structured as follows. Section 2 presents research context and related work. Section 3 provides the main contributions to this paper, that is, the detailed description of Pre-development, Development and Post-development marketing activities to ensure usability. Finally, Section 4 presents conclusions and future work.

2   Related Work

In this section, a thorough analysis of the current literature has been made. First, an informal bibliographical research was carried out but, at first sight, it did not show any relevant results related to the research objective pursued, so that a more focused research method needed to be applied. To carry out this task, a *Mapping Study* [9] was achieved. The main goal of the Mapping Study is to discover academic works that can combine the main fields of research, which are marketing and HCI. After concluding the Mapping Study, there were no academic papers found embodying relevant information about marketing and HCI, or others that could describe an existing and explicit

relationship between the two domains either. Studies between areas of software engineering and usability were found separately, but with no reference to the marketing field. This results back up our initial hypothesis concerning the inexistence of previous works combining marketing activities in a user-centered process to ensure usability.

On the other hand, in order to relate marketing and usability, it is necessary to obtain a common understanding of each field by describing usability engineering and marketing paradigms.

Usability engineering is a discipline that involves user participation during the development of software and it facilitates effectiveness, efficiency and satisfaction of a product through the use of usability specifications and metrics [10]. Also, it is important to get an understanding of the marketing field.

Marketing, more than any other business paradigm, handles customer issues. The general definition that can be given to this process is: "marketing is about managing profitable customer relationships" [11]. In this way, marketing can pursue the goal of attracting new customers by promising superior value and, also, keeping and growing current customers by increasing satisfaction. In addition, marketing can be meant as the process by which companies create value for customers and build strong customer relationships in order to capture value from customers in return. It is also a well-known fact that marketing needs to be viewed as a sense of *satisfying customer needs* [11]. In addition, one of the main goals of marketing is to sell products easily. This step can be easily achieved by understanding the consumer's needs, developing products that provide superior customer value and prices, and distributing and promoting products effectively. Furthermore, a marketing strategy represents the marketing logic by which a company expects to create customer value and achieve profitable relationships. It is very important to decide which customer the strategy will serve (by applying methods of segmentation and targeting) and by which manner it will serve the customer (by differentiation and positioning). From a general point of view, marketing strategies have the role of identifying the total market and, after that, dividing the market into smaller segments.

Integrating marketing in the development of products provides an interesting challenge. In fact, in [9] authors present points of integration where marketing might enrich the overall development process. The integration points related to the marketing field were offered by analyzing the image from a general point of view. Thus, some examples of synchronization tasks are presented, such as the identification of the user's characteristics (from usability engineering), the analysis of the consumer behavior (from marketing), and the identification of the environment (from marketing); all can influence the description of the context of use. Furthermore, one of the principal point of connection between marketing and software development is the consumer behavior. As stated in [12], there are lots of commercial websites that have the goal of inducing users to take part in an idea or encouraging decision-making for a purchase by using marketing strategies. Whereas market research is interested in demographics, usability is more interested in a qualitative understanding of people as individuals with a history, goals, interests and a relationships for the website or product.

Another issue is to select a right development model to create usable software products. After having revised the different user-centered process models, it can be concluded that none of them is completely adequate for a marketing environment, because there are no specific activities such as those for the identification of marketing experts and others concerning marketing environment strategies. However the ISO 9241-210 standard [7] is a good alternative to be used as a starting point for a user-centered process, as it can integrate the description of the marketing activities and allows the integration of the marketing process model. In addition, the IEEE Standard [13] has proven to be very useful, especially concerning activities categorization according to their main role and moment of realization in the lifecycle.

ISO 9241:210 comprises a multi-part standard covering aspects of HCI. Concretely, the 210 part studies the ergonomics of the human-computer interaction and it also provides some guidance on human-system interaction throughout the lifecycle of an interactive systems. In order to integrate the marketing activities in the user-centered model, first we need to design activity groupings for the proposed process model, which involves structuring and ordering activities creating also specific tasks, as it will be described down below.

3 Proposal of Marketing Activities and Integration in a User-Centered Process Model

3.1 Integration Framework

The major contribution to this work is the definition of different marketing activities that can be integrated in the development of software products through a user-centered approach.

The activities proposed in this model, described in Fig. 1, have been structured using the following categories [13]:

- Pre-development: Initial activities that are carried out before starting the development of a software product. Those include team building, marketing research and market analysis (IntA.1, IntA.2 and IntA.3).
- Development: Activities that take place during the development of a software product. These activities are grouped inspired by ISO 9241-210 [7] iterative process, in which the design solution is always evaluated and validated by the user after implementing the final system (IntB.1, IntB.2, IntB.3).
- Post-development: Activities that belong to the marketing mix, mostly related to price and promotion strategy. These two categories of activities are explained at the end of the development of the software product, because of the importance that they can bring to the software development (IntC.1, IntC.2).

In addition, there is also some integral activities that need to be addressed in pre-development, development and post-development stages, respectively. This is the case for activities concerning the marketing strategy, the marketing mix, and the product strategy (IntA.4 and IntB.4, and also the aforementioned IntC.1, IntC.2).
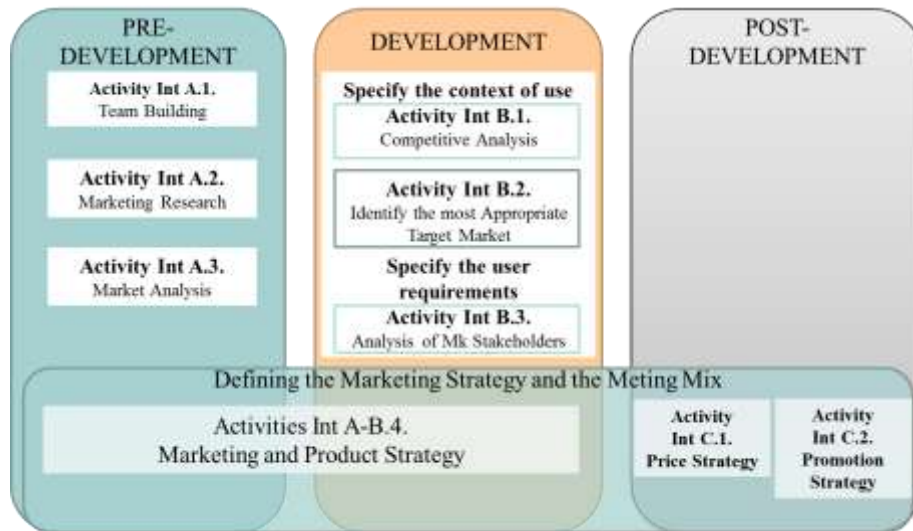
Fig. 1. Proposal of Marketing and User Centered Model Process

3.2 Process Model

We propose a model including three kinds of process elements: Activity Groupings, Activities and Tasks (see Fig. 1):

- Activity Grouping: Are categories of activities grouped according to a same development stage, according to the IEEE 1074-2006 Standard [13] and, also, fitting the definition of marketing strategy and the marketing mix [11].
- Activity: They represent main actions to carry out during the process.
- Task: They correspond to a subdivision of activities into smaller ones in order to split workload and sharing.

3.3 Activity Groupings

As commented before, in order for marketing activities to be integrated in a user-centered process model, activities were classified into Pre-development, Development and Post-development groupings. Groupings and activities will be described down below.

Pre-development Activities (IntA). These activities are depicted in Table 1. It is a common fact that there are different aspects that need to be taken into account before starting the development of a software product, such as processes and workflow, authorization and assignment control, when and where change happens across the lifecycle and who is in charge of communicating such changes to all involved, and so on. This way, at the beginning of the software development the work team needs to be built

(IntA.1.). As it can be shown in Table 1, the most important aspect that needs to be taken into account here is that, not only usability engineers, requirements engineers, developers, analysts, but also marketing experts need to be included in the team (IntA.1.1). Furthermore, after having identified the exact marketing experts that will be included in the product development, an analysis of their main goals and interests is also needed (IntA.1.2.).

After having accomplished the team building, it is necessary to represent the systematic design, collection, analysis and reporting of data relevant to a specific marketing situation involving an organization. In order to achieve a good research plan, there are some steps that need to be accomplished (IntA.2): the definition of the problem and main research objectives (IntA.2.1.) and the gathering of all the research information and its analysis (IntA.2.2.).

The process continues with the identification of a target market in which the product will be further developed and then launched (IntA.3.), thus identifying the size of the market (IntA.3.1.), the market segmentation (IntA.3.2.) and also targeting the most important segments of the chosen market (IntA.3.3.) and the market differentiation (IntA.3.4.)

The product strategy activity represents the beginning of the marketing mix description, which is the main phase regarding the marketing process model. Products are considered a key element in the overall market offering. Marketing mix planning begins with building an offer that brings value to target customers (IntA.4.). This activity grouping is focused on detailing the initiation of the product development (IntA.4.1.).

Table 1. Pre-development Activities

Activity Groupings	Main Activities	Main Tasks
IntA.1. Team Building	IntA.1.1. Incorporation of Marketing experts in the software development project	---
	IntA.1.2. Analysis of the main goals and interests of every Marketing expert	---
IntA.2. Marketing Research	IntA.2.1. Defining the problem and research objectives	IntA.2.1.1. Exploratory research
		IntA.2.1.2.Descriptive research
		IntA.2.1.3 Causal research
	IntA.2.2. Developing the research plan for collecting information	IntA.2.2.1 Analysis of primary data
		IntA.2.2.2 Analysis of secondary data

IntA.3. Market Analysis	IntA.3.1. Determining Market size	IntA.3.1.1 Analysis of market volume and the market potential
		IntA.3.1.2 Analysis of competitive sales (bottom-up approach)
		IntA.3.1.3 Analysis of competitive sales (top-down approach)
	IntA.3.2.Market Segmentation	IntA.3.2.1 Geographic segmentation
		IntA.3.2.2 Demographic segmentation
		IntA.3.2.3 Behavioral segmentation
		IntA.3.2.4 Psychographic segmentation
	IntA.3.3.Market Targeting	IntA.3.3.1. Selection of two important market targets
	IntA.3.4.Market Differentiation	IntA.3.4.1. Undifferentiated Targeting
		IntA.3.4.2. Concentrated Targeting
		IntA.3.4.3.Multi-segment Targeting
IntA.4. Defining the Marketing Strategy and the Marketing Mix	IntA.4.1.Product Strategy – The new product development process	IntA.4.1.1 Idea generation
		IntA.4.1.2 Idea screening concept
		IntA.4.1.3 Concept development and testing

Development Activities (IntB). These activities are depicted in Table 3. In this case, as development activities imply technical task concerning product development, the activities have been designed taking into consideration the ISO 9241-210 user-centered development process, in which the design solution is always evaluated and validated by the user after implementing the final system. This way, as shown in Fig. 1, activity groupings IntB.1 and IntB.2 have been integrated in the ISO 9241-210 stage "Specify the context of use", whereas activity grouping IntB.3 has been integrated into the ISO 9241-210 stage "Specify the user requirements". Also, activity groupings concerning marketing and the marketing mix strategy has been added.

The main point here is to gather and analyze information on the current context in order to understand and then specify the context for the future system. For this reason, a thorough Competitive Analysis and the identification of the most appropriate target market need to be done (IntB.1.). Also, marketers need to identify the competitor's goals (IntB.1.1.), and carefully assess strengths and weaknesses (IntB.1.2.). This process is usually achieved by analyzing secondary data, personal experience and word of mouth, or by conducting primary marketing research with customers, suppliers and dealers (IntB.1.3.). After having identified its main competitors, a company needs to design some broad marketing strategies by which it can gain competitive advantage. The problem in this situation represents what broad competitive marketing strategies might the company use and, from these, which are best suited for a company or for the company's different visions and products. After having realized a marketing research and also an analysis of the most important competitors that exist nowadays on the market, there is a high demand on determining the most important target market (IntB.2.). In order to realize this activity, there are two main steps that need to be accomplished: the analysis of the internal factors of the company (IntB.2.1.) and also the analysis of the external factors (IntB.2.2.). Furthermore, an analysis of the most important marketing stakeholders (IntB.3.), referred to different users that will work with the software application in the future, needs to be realized (IntB.3.1.). Also, after the product has passed the business test, it goes to the next stage, which is the product development. In this stage, the research and development department or the engineering department will be in charge of transforming the concept of product into a physical one. It represents an important step to show whether the product idea can be turned into a workable product or not (IntB.4.1.). Finally, a marketing test should be carried out in order to expose the product to a sample population for deciding whether to reject it before launch or not (IntB.4.2.).

Table 2. Development Activities

Activity Groupings	Main Activities	Main Tasks
IntB.1. Competitive Analysis	IntB.1.1. Identify the competitor's goals	---
	IntB.1.2. Selecting the most or least dangerous competitors	---
	IntB.1.3. Competitive strategies	IntB.1.3.1 Adopting overall cost-leadership
		IntB.1.3.2. Differentiation
		IntB.1.3.3. Focus
IntB.2. Identifying the most appropriate target market	IntB.2.1 Analysis of the internal factors of the usability company	---
	IntB.2.2. Analysis of the external factors of the usability company	

IntB.3. Analysis of the Marketing Stakeholders	IntB.3.1. Identifying the stakeholders	---
	IntB.3.2. Analysis of the goals, interests and conflicts of the stakeholders	IntB.3.2.1. Identifying and characterizing the necessities and the interests of each stakeholder
IntB.4. Product Strategy	IntB.4.1.Managing the new product development	IntB.4.1.1.Customer centered new product development
		IntB.4.1.2.Team-based new product development
		IntB.4.1.3. Systematic new product development
	IntB.4.2. Marketing Test	---

Post-development Activities (IntC). These activities are depicted in Table 3. After having accomplished the pre-development and development of the software product, the post-development activities take place. In this situation, the activities that belong to the marketing mix enter into discussion: price strategy (IntC.1.) and promotion strategy (IntC.2.). These two categories of activities have been addressed at the end of the development of a software product because of the importance that they can bring to the software development, especially from the marketing point of view, in order for the software/usability company to obtain a certain amount of benefits after finishing the software product. Actually, one of the most difficult and important elements is the decision on money and how much to charge the customer (IntC1.1., IntC1.2., IntC1.3. and IntC1.4.). Finally, current promotion strategies need to be identified (IntC2.1.) in order to correctly advertise the brand image of the product. Some of the tactics that are applied here are advertising, sales promotion, public relations and direct marketing.

Table 3. Post-development Activities

Activity Groupings	Main Activities	Main Tasks
IntC.1. Pricing Strategy	IntC.1.1.Market skimming pricing	---
	IntC.1.2.Market penetration pricing	---
	IntC.1.3.Product Mix Pricing	IntC.1.3.1.Product-line pricing
		IntC.1.3.2.Captive product pricing
		IntC.1.3.3.By-product pricing

		IntC.1.3.4. Product bundle pricing
	IntC.1.4.Pricing adjustment Strategies	IntC.1.4.1.Discount allowance pricing
		IntC.1.4.2.Segmented pricing
		IntC.1.4.3.Psychological pricing
		IntC.1.4.4.Promotional pricing
		IntC.1.4.5.Geographical pricing
		IntC.1.4.6.International pricing
IntC.2. Promotion Strategy	IntC.2.1.Identifying the promotion strategies	

3.4 Methods and Technics

In order to accomplish the presented activities, some of the existing methods and technics appearing in the current literature can be used, such as *focus groups*, *questionnaires*, *Delphi method*, *ethnography field research*, *unstructured interviews*, *conceptual maps*, to cite a few [1] [10]. For instance, unstructured interviews, where questions are not prearranged, allow flexibility as questions are developed during the interview. Another important technic is focus groups in order for the user to present spontaneous reactions and ideas, allowing the expert to observe group dynamics and organizational issues.

4 Conclusions

The main goal of this paper was to analyze the development of user-centered software through the use of marketing strategies, with the aim of increasing usability assurance [14]. In particular, the main contribution presented is the proposal of specific activities in a user-centered process model, establishing a relationship between marketing and usability, and addressing the lack of specific approaches in the state of the art so far. Standard ISO 9241-210 has been considered as a user-centered process model that recognizes important aspects of planning the human centered process or the specification of user requirements, highlighting appropriate aspects useful to be considered for integrating the marketing activities in the proposed model. Therefore, marketing activities

were gathered in three development groupings: pre-development, development and post-development. This classification has been achieved according to the IEEE 1074:2006 standard. In general, we propose the integration of specific activities such as team building, marketing research, and market analysis. Also, other proposed activities identify the importance of knowing the competitors that the specific product might be facing before released, as well as a better knowing of the market in which the product will be further launched. Finally, other late activities are also presented including promotion and price strategies.

As future work, we expect to refine the development activities and create others. Also, we plan to carry out a validation of the proposed process model with a real application construction, and propose an evaluation criteria based on a quality model.

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