Asia Pacific
Academy of Science Pte. Ltd.

ORIGINAL RESEARCH ARTICLE

Experiences and social impact in the application of requirements engineering in the development of an intelligent platform

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ABSTRACT

Rural Community Tourism (RCT) is an activity that contributes to the economic, social and sustainable development of a country in rural areas. In this research, the goal is to develop an intelligent platform (IP) to meet the needs of different participants in RCT. It presents the experience of focusing on requirements engineering, going through different iterations where a SWOT analysis was performed, while using extreme programming, complying with ISO 25010, etc. The accurate identification of requirements is essential for the implementation and usability of the platform to have a social impact on the direct participants.

Keywords: experience report; rural community tourism; requirements engineering; intelligent platform

1. Introduction

Rural Community Tourism (RCT) has been strengthening as a fair, and socially and environmentally responsible alternative. However, in this field, there are various challenges. For example, people's participation and reaction and promotion of tourism products are in a traditional way, which generates informality in the management of information among the actors of RCT. Tourism resources and attractions are hard to notice online so those existing tourism resources and scenic spots do not have strong advantages. Tourists cannot learn basic information about tourism resources and products, let alone learning routes that meet their needs. In addition, Internet search engines offer traditional travel products including airline tickets, accommodation, restaurants and mobility for hire to what is called the "eTourism" (electronic tourism). According to Buhalis[1], this is the digitalization of all processes and value chains in the tourism, travel, hotel and restaurant industries,

which allows organizations to maximize their efficiency and benefits. However, the use of the Internet poses new challenges for the tourism industry. Among different types of consumers including Silent Generation, the Baby Boomers, Generation X and Generation Y[2,3], Generation Y are the most active ones and much more involved in internet travel plan. They use communication devices and make online reservations frequently, which shows that they use online travel a lot, consider tourist destinations, explore activities and places to go shopping and eating, and pursue rich tourism experiences including festivals, activities and athletic performances. They welcome those online advertising[3]. According to Kim, Kandampully and Bilgihan[4], 56% people believe those comments and experiences from their families and friends, which promotes the so-called "eWOM"(electronic Word-of-Mouth). Currently, in Peru, Community-based Rural Tourism (CRT) has been promoting as a fair and socially and environmentally responsible alternative. This research paper presents the experience of building an intelligent platform (IP).

2. Problems and solutions

This section emphasizes the overview of RCT and platform, the process of determination in requirements engineering, the application of SWOT analysis[5], on the determination of intelligent platform requirements, improvement actions and the impact of correctly determining requirements, to realize the implementation of the platform. Community-based rural tourism refers to every tourism activity that takes place in rural areas in a planned and sustainable manner. These activities are organized for the benefit of the community, based on the participation of the local population, and rural culture is an important component of the product. The goal is to promote sustainable tourism in rural areas as a tool for economic and social development in Peru[6]. In sustainable rural tourism, the participation of local communities is an important part of the tourism activity, which is regulated by Law No. 29408 (*General Law of Tourism*) and the approval of its regulations by D.S. No. 03-2010. Its purpose is to promote, encourage and regulate the sustainable development of tourism. Among the platforms related to the use of ICT in Latin America, TripAdvisor needs to be highlighted. At the beginning, users shared their experiences with hotels, restaurants and travel. Today it allows users to book hotels and flights. Italian Association for Responsible Tourism (http://www.aitr.org) and CTM Altromercato (http://www.altromercato.it/) play an important role in the promotion and realization of solidarity economy initiatives in Italy. In Peru, there is a portal (http://www.turismoruralcomunitario.gob.pe/) which provides basic information about the places where RCT has been applied. However, none of them is an intelligent platform (IP) where a tourist can get basic information and a smart route (based on his needs), offering a tourism product such as culinary tourism or integrating some production chains to increase competitiveness and showcase tourism resources and attractions[3]. For the development of the intelligent property (IP), the basic requirements, required functions and other areas such as architecture, database and interfaces for different users were analyzed for validation by different participants of RCT. Later, a SWOT analysis was conducted to understand the current situation in RCT; to identify the processes taking place in RCT; and to identify the modules of the platform, mainly the expected functions of the platform, for the direct participants. Subsequently, the SWOT analysis was performed to know the current context of the RCT; and the processes that happen in the RCT were identified; as well as the modules of the Platform were identified and mainly the desired functionalities of the platform for the use of the direct stakeholders. SWOT analysis is one of the tools used in strategic planning that helps decision makers to track the future trajectory of the organization is SWOT analysis (strengths, weaknesses, opportunities, and threats)[5]. The focus is on strengths and opportunities, with the aim of proposing an e-government model for RCT, considering the different needs of direct participants, regulations and tourism trends. The main advantages

of considering the implementation of the platform include the presence of RCT associations, consisting of experience, the existence of potential tourism resources that have not yet been invested in value, but do receive sporadic visits, and the recovery of ancestral knowledge (crafts, gastronomy, medicinal plants) and respect for the environment.

Among the opportunities that were identified include linking productivity with the RCT, poverty reduction, climate change mitigation and employment generation with the ventures that are implemented. With the knowledge of the strengths and opportunities in the RCT, the work begins to identify the functional requirements of the platform, so that it meets the needs of the different stakeholders. The knowledge of the existing weaknesses and threats in the RCT, helped us to complement the implementation of the platform and subsequent use of the actors; that is, we worked intensively in the management of the RCT and implementation of the RCT to have the respective social impact and directing so that the actors, subsequently use the platform. In order to identify and model processes, business process modeling is used. This is a set of methods, tools, and techniques for designing, representing, analyzing, and controlling operational business processes[7]. Among the steps followed, the identification process is available. In this stage an analysis was made of the processes that exist and are executed in the different actors visited, various techniques were used such as visits in the areas, task lists of the areas or people, interviews; as well as the desires that people had in relation to their function. Identify the owners of the processes: In this phase, the processes present and implemented in the different participants visited were analyzed, using various techniques such as visits to the area, lists of tasks in the area or people, interviews; and people's aspirations related to their functions. In this phase, the people associated with the processes (process owners) were identified, mainly those responsible for the execution of these processes and for maintaining the relationships between the processes. It was assumed that business processes are not isolated, but maintain a certain

level of relationship between them, therefore, emphasis was given at the time of representing the processes. All phases of process modeling are documented, documenting evidence for identifying processes that are subsequently reviewed, analyzed, and validated. It is important to emphasize that these files are not necessarily just physical files, but also digital files. The import list is in the process of being finalized. Initially, we have the process of booking tour packages–independent tourists, the process of potential risks, the process of creating social projects (group-voluntary tourism), the process of maintaining and reducing risks, the process of creating services, the process of tourist census In order to define the functional requirements of the RCT platform, we visited different national and international experiences, as well as institutions, public and private projects that have been working on this type of tourism; through meetings, interviews (prior communication by phone) and other means, it was possible to extract basic information to obtain the required technical implementation of the platform. Relevant information was also collected from related scientific articles, reports, official websites, and official documents in general. One of the agile methodologies for development is Extreme Programming, which is advocated by Beck and Andres[8]. This approach consists of a set of important values and practices that form an approach to software development. Within these practices, acceptance tests are created, which represent some of the expected results of the system, which ensure that the requirements are met and make the system acceptable. We listed 5 stages to identify the requirements; i) prioritization of requirements, after identifying the requirements, the list of requirements for the digital platform was prioritized, this was done in order to have an order of requirements to be implemented and an established sequence when developing the platform; ii) planning of the first iteration, three requirements were selected for the first iteration of the development of the platform; the list of tasks to be performed during a set time that lasted the first iteration was made. Once this time was over, the 3 requirements were delivered implemented and ready for beta testing of the platform; iii) analysis of

the requirements of the first iteration, having the list of tasks, the class diagram of the selected requirements was made, for which the classes involved in the first iteration were identified and the relationships between them were analyzed. iv) preparation of the base repository of the project, the structure of the platform was developed in such a way that it is scalable and easy to maintain, using agile development technologies. The entire initial structure was transferred to a private repository so that it can be accessed by the members of the development team and v) development of the "Tourist Resource Registration" requirement, which began with the development of the backend of this requirement. Later, the frontend was developed; which can be viewed from any browser.

3. Improvements

After identifying the functional requirements of the platform and the processes, we focused on the website in its first iteration. Most users reject a site because of its appearance, which is more than just having a "good-looking" website without considering the others. In fact, how good a website looks is subjective, but not relative to neat, practical and user experience. Therefore, in the second iteration of determining the platform requirements, the focus was on usability and user experience. The international standard ISO 25010[9] defines "usability" as "the ability of a software product to be understood, learned, used and attractive to users under certain conditions". In other words, it is the ease with which users can navigate and access the contents of a website. And the user experience (UX) according to ISO 9241-210, is "the result of the perceptions and responses of a person by the use and anticipated use of a product, system or service" In order to improve the usability and user experience of the platform's website, a new website design was necessary, developed by a team of professionals experienced in these issues. In this opportunity, new functional requirements for the usability of the platform were imposed by the actors known as "rural entrepreneurs in production centers", who are the ones who provide products and services to other participants. As a final product, files developed in the Photoshop program were obtained, which had to be implemented on the platform's website. Once the implementation was finished, the internationalization of the URLs of the website was developed and implemented. This new design developed, would provide a better usability and user experience to the entrepreneurs; as well as to the web visitor. Subsequently, in a last iteration, a training of the usability of the platform was held to those who would be the local tour guides, formed by members of the indigenous communities, who did not know the existence of similar platforms and never had access to the use of computers, but they did have access to cell phones with social networks.

Initially, we taught them how to use other platforms so that. With this acquired knowledge, they will see the difference in our platform. Local guides identified new usability requirements, which included providing more information on tourism resources/attractions so that they could understand the tourism information and thus provide better guidance to tourists. Impact of the requirements. With the implementation of the functional requirements on the platform, the promotion and dissemination of the platform started, mainly among the direct participants (entrepreneurs, local guides and tourists), and the next thing to do is to promote and disseminate the platform among tour operators and ecotourism tourists worldwide. It is also necessary to mention that the Ministry of Foreign Trade and Tourism and PROMPERU are aware of the platform. In addition, while developing the platform, the team met with other actors promoting RCT, none of these projects as well as institutions considered using ICT, much less implementing a specific platform for RCT; as well as considering ICT training for rural entrepreneurs. It is important to highlight, that this research work was integral and the other projects and institutions (SAYWA project of the European Union, MINCETUR, DIRCETUR and local Municipalities) began to follow this model that was disseminated through social networks. This platform, called CAMINOS DEL INKARRI, is still unique in South

America for dealing with artificial intelligence, operations research and data science. The precise identification of the main functional requirements is fundamental for the fulfillment of the goals and objectives set; it is necessary not only to focus on the direct actors of the use of the platform, but also on the indirect ones. Initially we did not have the support of all the actors and neither the confidence of those who worked with us. To achieve what we wanted, we had to work on complementary tasks; that is, in social areas, helping them to implement the RCT. Using good requirements management practices reduces the time to obtain the necessary and enough information. The feedback of the requirements is the basis for the adequate specification. The direct connection with the community stakeholders can help them. In other respects, the most important thing is to make them feel that they "own" the platform (by taking their suggestions into account) and to ensure success, thus making the use of the platform better.

4. Conclusions

The necessary and sufficient functional requirements of an intelligent platform for rural community-based tourism have been identified. This identification allowed the immediate implementation and usability of the platform by the direct actors and during the development of the research work; as well as it has generated interest from public and private institutions, for being a platform that considers Artificial Intelligence, Operations Research and Data Science. Among the future work that we have, is to implement other modules, such as volunteer tourism, scientific tourism, among others, for entrepreneurs to

offer their products and services; as well as the application of statistical techniques to generate public policies, market identification and make predictions that benefit the actors of the RCT.

Conflict of interest

The authors declare no conflict of interest.

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