Personas based Support Tool for Requirements Elicitation

Mehrnaz Kazemi Bavani, Rodina Ahmad

Department of Software Engineering,
Faculty of Computer Science and Information Technology,
University of Malaya, Malaysia
E-mail: mehrnaz@perdana.um.edu.my
rodina@um.edu.my

ABSTRACT

Lack of user understanding can bring a damaging effect to software development projects. As we acknowledge, there is a wide variety of users in each software project and consequently there are variation of goals, needs and attitudes within the establishment of users' requirements. So, there are difficulties in organizing and categorizing these information and also, in validating these requirements within a development project. Using personas to capture and analyze users can facilitate user's understanding. However, identifying personas from large user information is difficult. This research examines the persona technique and proposes a software support tool to help developers in gathering and analyzing requirements by using personas. Likewise, the goals and tasks of each persona are established via actual requirements of the users. The creation and utilization of persona have been investigated via proposed tool aimed to elicit and represent users' requirements in a manageable format. A "Personas based Support Tool for Requirements Elicitation (PSTRE)" facilitates software developers to gather and analyze user requirements. The resulting personas which are suggested by the proposed tool, have to be well understood and well presented to the development team and also provide easy way to extract main functionalities and features of the proposed system.

Keywords
Persona, Requirements Elicitation Techniques, Software Support Tool

1.0 INTRODUCTION

Requirement elicitation contains several activities that enable software developers to identify and understand important goals, objectives and needs of users who deal with the proposed system. The success of resulting systems depends on achievement of these requirements and satisfaction of end users who ultimately work with the system (Cheng & Atlee, 2007). Software developers need to understand requirements of the users before making decision about features of the proposed software system. As we acknowledge, the process of eliciting requirements for developing a software system, developers may encounter a large amount of data. The likelihood of successful analysis and management of wide variety information will be realized if an effective requirements elicitation technique be used. Moreover, understanding users and having sufficient knowledge about them is the most critical issue during requirements elicitation. Software developers get information about the users from many different sources. This is especially done for interactive system (Junior & Filgueiras, 2005; Chapman & Milham, 2006). Persona technique was popularized by Alan Cooper in 1999. He introduced persona concept as a model for representing goals and behavior of the users. Persona is a valuable and powerful technique for eliciting user requirements. It provides and represents requirements in a manageable and memorable format for software developers within the project. At present, persona concept is gaining popularity in the context of software development. Because of unexpected power of the persona in software project, many software engineers and designers became eager about the details of the persona technique usages and asked for that. Cooper approach recommended development team to design for unique goals of the specific user rather than design for averages of the users in order to satisfy needs of large important number of users. However, the main obstacle in using persona is in gathering, analyzing and extracting relevant persona from large amount of data. In this paper, we attempt to develop a software support tool to facilitate identifying persona technique in eliciting and gathering requirements. The proposed tool is referred as Personas based Support Tool for Requirements Elicitation (PSTRE). This research has investigated the creation and utilization of personas via PSTRE aimed to elicit and represent user requirements in a manageable format. This paper also proposed a specific process model recommended to be used based on our analysis and observation. Our research examines critically the possible use of persona technique.

2.0 BACKGROUND

?What is a Persona Technique 2.1

Persona is one of the effective techniques in the context of requirements elicitation. Personas are invented based on the characteristics of the real and potential users by using any other techniques (Pruitt & Grudin, 2003). Personas are fictional but they can represent goals, behaviors and attitudes of the actual user groups and provide complete profile which includes their personalities, backgrounds and images. Persona can be seen as a well-known user interaction technique that includes detail user archetype description. This description contains key characteristics of related users and usually conducted based on real user data

(Vyas & Groot & Veer, 2006). Proper focus of the persona technique is to have a deep understanding of user requirements as a way to communicate user requirements between different stakeholders in a software project (Markensten & Artman, 2004). Personas determine different classes of users and define most important properties of each class of the users. Likewise, each persona represents a specific group of the users. Goals and tasks of each persona are established via actual user requirements and user usage (Dantin, 2005). Personas address these particular concerns and provide a framework to represent personalities of each type of the users and allow them to express and customize their requirements. In another word, personas are fictitious user representations created to represent goals, tasks and behaviors of a group of real users among development of the software project. It is a simple representation of the user in order to personify fictitious users that might interact with the software system (Junior & Filgueiras, 2005). Usually, give more analysis on the users will result more accurate and complete portrait of users. Persona technique will fill all blanks in portrait of the users with detailed information earn through researching on them. In summary, personas are "the creation and use of fictional users and concrete representations" of users. It is a powerful design tool in practice and is an infrastructure for engagement. It is a means for communicating data that is collected using other user research methods (Grudin & Pruitt, 2002).

3.0 MOTIVATION FOR THE RESEARCH

3.1 Typical Problems during Requirements Gathering Within Software Project

There are a few challenges faced by software developers in the context of requirements elicitation. Requirements elicitation analysis process are challenging due to the following reasons:

1- There are many potential users with different backgrounds. There may be many different needs, goals and wide variety of usage from the view point of each user which cause potential conflicts. So, there is a lack for existence of the average user requirements in the development project.

2- Requirements are initially ill-defined in software development project. Users are uncertain about their requirements.

3- There are many type of users and it is quiet difficult to reach all of them. Consequently, developers may not listen to users at all and there may some difficulties in seeing individuals and also in communicating them clearly. So, there is a need for concentrating on users solely and consider some communication issues with the users.

4- Because of the huge amount of user data, there may be some difficulties on analyzing and organizing these requirements within a development project. Gathering and analyzing data on users are difficult

and tedious because, there are many aspects and perception that can be gathered.

3.2 Why Is Persona Different from Other Requirements Elicitation Techniques?

So far, majority of requirements elicitation research have concentrated on methods and techniques to improve accuracy, correctness and diversity related to the requirements. However, personas use an analogical approach which enables it to understand requirements more deeply (Cheng & Atlee, 2007). Personas based requirements elicitation has gained increasing importance in software engineering since it provides many advantages over the other techniques. Persona has acted as a tool in order to better understand the users as well as a way for introducing them and presenting their requirements among development team. Personas can help requirement engineers to understand different types of the users in context of the software project and it focus to identify user interests and patterns which they use to interact with the system. Therefore, persona technique come out to have potential in which situations that stakeholders are different and they may or may not be directly involved in the system. Personas based requirements elicitation provides new opportunity to simplify the process of stakeholder needs acquisition. This technique has been established to resolve the problems including social and political issues in software project development. Because of the promising results concern with the personas usage, many studies have interested to apply it in some particular types of software project and select it as a technique for gathering and modeling user requirements. Personas are more functional and efficient in contrast to the other requirement elicitation techniques, since it keeps more practical information about the users. Personas identify different goals, motivations and behaviors of the users as several distinct roles which they act in interacting with the software system. This way will avoid preparation of unnecessary information about the users and will conduct all the essential profile data related to the background of the users. Basic information related to each perspective of the users can model different types of the users and be used as a user modeling (Junior & Filgueiras, 2005). Development of the personas helped software team be aware about all potential users and provide great understanding of them throughout the development process. Software team may discover personas as a powerful tool in design process since personas embody social, political and geographical aspects of the users which often unconsidered during development process.

3.3 How Personas Facilitate the Requirements Elicitation Process?

As we acknowledge, elicitation process for gathering software requirements for interactive system requires huge research on users. Persona technique helps to identify important attributes of users and managing and classifying users. It is useful to model the requirements as personas or even by combining with other requirement elicitation techniques. In addition, it is very helpful to understand and

prioritize requirements during elicitation process through specifying and developing software system (Markensten & Artman, 2004). A main focus of personas was on translating large amount of data from different stakeholders with different background, different organizational and individual aspects into organized and structured requirements which are usable for product development (Vyas & Groot & Veer, 2006).

Refer to the figure 1, developers can classify large amount of user data into several distinct user groups by using personas and then for each group of the users, elicit all the important requirements. So through this process, requirements of specific groups of the users will be determined and organized in a structured way. Moreover, personas may be used to translate these user requirements into design features of the proposed system.
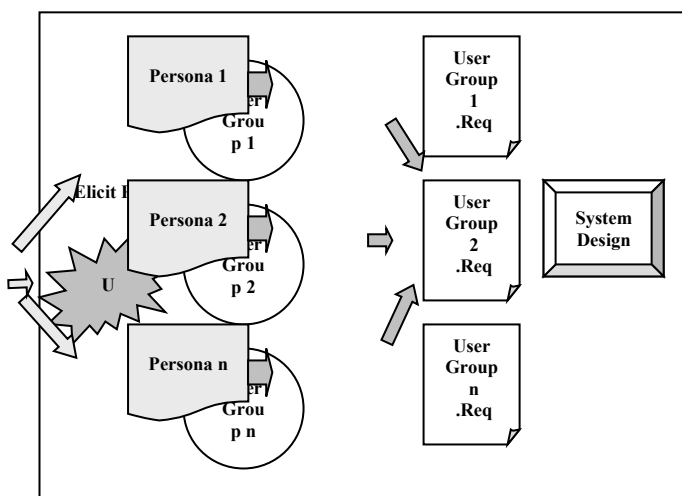

Figure 1: Personas have design the system base on elicited requirements of the each user group.

3.4 Benefits of Using Personas in Software Development Process

Due to the powerful impact of the personas in the process of product development, a wide range of the developers are interested to apply it in software development process. Applying personas in the product development, lead developers to fulfill a clear understanding of the users and obviously realize that who is designing for. Consequently, some common problems such as the "elastic user" and "self-referential design" can be resolved (Cooper & Reimann, 2003). Moreover by using the personas, designers would be able to concentrate on ultimate needs of realistic users in the design process and therefore this leads to develop a product with more usable design (Wiggins, 2007). According to Vasara, the primary benefit of a well-developed persona in product development is to serve as an explicit design target (Vasara, 2003). The outcome of persona usage has been favorable in the development team. As has been reported from development teams, persona effort has helped making assumptions clearly on target audience by focusing on particular target audience and also, make critical decisions during development process. Some

critical reasons of using the personas in software development process could be summarized as follows:

1. Early focus on the users and their needs in product development.
2. Active involvement of the users in development process.
3. Help to have clear understanding of the users and their requirements.
4. Help to recognize and simplify design work.
5. Facilitate to concentrate on specific user rather than average users.

4.0 DIFFICULTIES OF USING PERSONA TECHNIQUE

4.1 What Are the Problems of Applying Persona Technique in Software Development Project?

Understanding the challenges associated with the personas are important in order to improve the process of persona creation and to make efficient use of it. Personas illustrate user characteristics that ultimately use the product and also illustrate product requirements that should satisfy user needs. However, system analysts can not develop every thing for every persona. It is difficult even impossible task to design product which satisfy all the users. Therefore, there is a lack of unique technique and principle in transforming gathered user requirements into personas. For that reason, identification and creation of personas should be done as a unique process model as presented in the subsequent section. The analyst should analyze requirements aimed to construct the personas by make a comparison on user data and find their similarities and differences between them. Since it is done unsystematically, it is a difficult activity due to the large amount of user data.

A few supports are needed to create personas:

1. A way to store and keep personas systematically.
2. A way to represent, validate and update personas.
3. A way to arrange and organize user requirements.
4. A way to organize and categorize user information.
5. A way to analyze and compare among user requirements.

5.0 PROPOSED PROCESS MODEL FOR IDENTIFYING PERSONAS

Due to problems and difficulties which mentioned in the previous section, there is an important need to facilitate the process of persona creation for software developers. The primary need is to develop a software support tool to provide a standard and systematic way in order to apply persona technique within the software project. This research propose a design and development of Personas based Support Tool for Requirements Elicitation (PSTRE) which enables developer to elicit and demonstrate requirements based on creating users' personas. PSTRE is a

web based tool which can facilitate gathering and modeling of the requirements during elicitation process. We observed and examined how personas are created from two case studies, library information system and university record system.

Some of main features and functionalities of the PSTRE are summarized as below:

- PSTRE can facilitate the process of eliciting user requirements.
- PSTRE can represent user requirements in a manageable format.
- PSTRE can propose some main user categories based on analysis of the user requirements.
- PSTRE can provide an easy way for creating user personas based on suggested user categories.
- PSTRE can extract some main services of the proposed software system.

By using PSTRE, software developers can create some general user requirements within list of general questions about the users in a particular software system. Also, PSTRE provides helpful facility for software developers to create specific questions about main features and services of the examined software system. By using general and specific questions, PSTRE be able to analyze user requirements and then it starts to do some comparisons on different users' requirements. Based on analysis on different users' answers, PSTRE applies specific strategy in order to suggest some user categories as explained in the following:

1- A list of specific questions about services of examined software system present some of the important requirements of the proposed system.
2- PSTRE assigns specific questions as requirements of proposed system.
3- PSTRE calculates percentage of users who answer questions as important or very important.
4- PSTRE recognizes a question which has a large amount of users with important or very important answer and identify the most important requirements from the given view point of the users.
5- PSTRE determines similarities between the most important requirement and other requirements within the proposed software system by calculating participation of the most important requirement with all of the other requirements one by one.
6- PSTRE categorize users with similar requirements into the same category.
7- Software developers can create persona for each suggested users categories. They may also create personas to represent main requirements of the proposed user category using suggested persona template.

In essence, suggested users categories can be used as a basis for personas creation. Developers will enable to create persona for each user category. They can create persona based on specific persona template suggested by the PSTRE as shown in figure 4. The activation evolved in abstracting personas is modeled as a process. Figure 2

illustrates this process model by using activity diagram. Figure 3 show the use case model for PSTRE. The example of resulting persona which provided within the proposed tool is presented in figure 4. Like a real user, each persona is typically represented name, photo, personal information, background and goals.
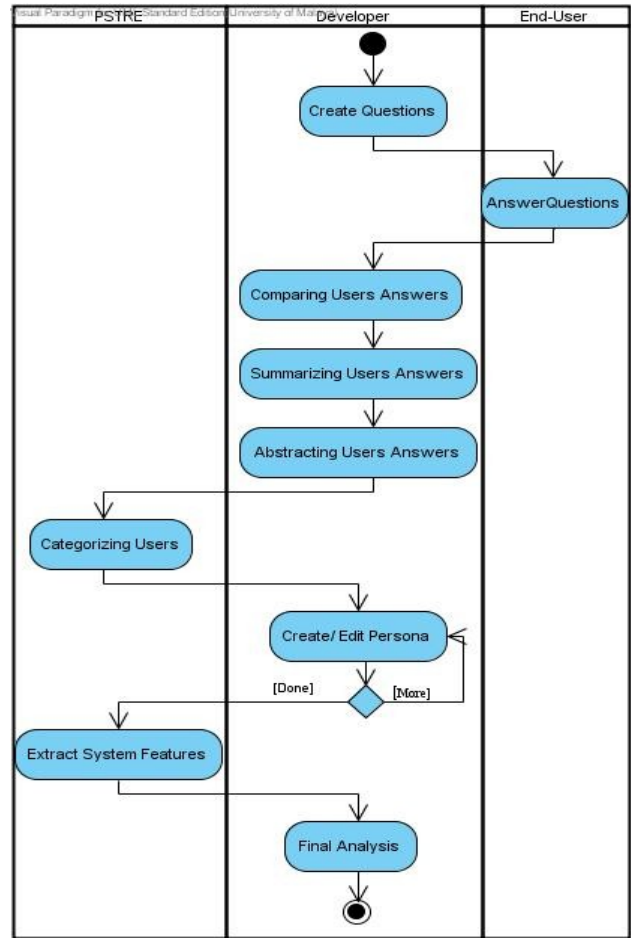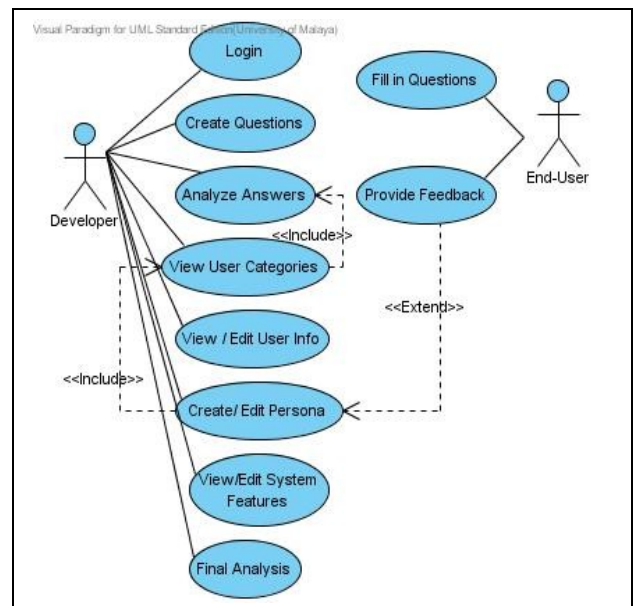

Figure 2: Activity diagram of PSTRE.

Figure 3: Use case model for PSTRE.

Figure 4: Example of a persona, reported by PSTRE.

6.0 RELATED WORKS

In this section, the authors have reviewed existing works related to the personas based requirement elicitation and have mentioned major findings of eliciting requirements by using persona technique. By reviewing existing related literatures to the personas, the researchers find out that to date almost all the work related to the persona technique is in the field of interactive design, usability, user-centered design and HCI (Belcher et al., 2005; Dong, Kelkar & Braun, 2007; Blomquist & Arvola, 2002). However, persona technique appears to provide a unique elicitation approach in the context of requirements engineering (Aoyama, 2005). Requirement engineering literatures focuses on the needs and goals of different types of stakeholders. There are some research related to the role and place of the personas and also, highlight the huge power of personas and its capability on communicating design priorities to the large group of stakeholders (Khalayli, Terum, Nyhus & Hamnes, 2007; Nieters, Ivaturi & Ahmed, 2007). Moreover, persona technique is often thought as design groups' tools (McGinn & Kotamraju, 2008). Pruitt and Grudin, have used persona technique on two such small and large projects. Their effort aimed to apply personas to help development team for understanding target audience as well as an aid in design work (Pruitt & Grudin, 2003). Also, they have used personas in the design

of mass-market commercial software products and used various quantitative and qualitative research data in order to gather requirements (Pruitt & Grudin, 2002). Cooper and Reimann, used personas as a central part of 'Goal-Directed Design' process (Cooper & Reimann, 2003). Personas have been used as a powerful user modeling technique. Some researches have done on user modeling technique and indicate persona technique as the best candidate for modeling the users (Junior & Filgueiras, 2005). With due attention to the existing works, researchers find persona technique as a tool for managing requirements and for helping to make sure that what functionality goes in and what does not and also which of tasks or outcomes are most common or more important. Although there are some key concepts to apply persona technique in the software development, but actually there is no specific methodology based on persona technique. Also, there is no precise guideline to identify persona technique which can be developed and deployed during the requirements acquisition process. So far, many recent researches in context of requirement engineering have focused on effective methods and ways for applying persona technique in software development project. In fact, there was no serious attempt to facilitate this process by using appropriate software support tool. Previous studies related to using persona technique show the lack of software support tool for applying this technique in the software development. Therefore, there is an urgent need for developing appropriate software support tool aim to assist in employing this technique.

7.0 CONCLUSION

This paper deals with a means to elicit software requirements using persona technique. Persona is found to be useful and provide many advantages among other techniques. In this paper, implementing the personas based support tool for wide usage in software requirements elicitation is under consideration. However, there are a few difficulties associated with the creation and utilization of the personas in software development project. These problems have reported from various researches on persona development. The overall intention of this paper is to propose a way to resolve existing challenges which related to the use of personas. This research proposed specific personas based support tool which facilitate defining and presenting user requirements in software project. The development of personas based requirement elicitation tool will enable developers to deal with the difficulties such determining real users' needs, defining complete and understandable requirements, obtain unambiguous requirements, correct identification of software requirements, clear representing and modeling of users' requirements to the development team and also, having well communication of users' needs between all the stakeholders. Actually, proposed tool aid developers to use elicited user requirements effectively. As a main feature of this tool it facilitates organizing user requirements. This support tool helps software developers to analyze user requirements by comparing, summarizing, abstracting and

categorizing them into at least one main persona and two or three secondary persona. Different team members can focus attention on different types of users due to the affect of applying persona tool and by using this tool they will be able to identify actual users of the system.

REFERENCES

Aoyama, M. (2005). Persona-and-Scenario Based Requirements Engineering for Software Embedded in Digital Consumer Products. *Proceedings of the 2005 13th IEEE International Conference on Requirements Engineering* (RE'05), 0-7695-2425-7/05.

Belcher, J., Aidrus, R., Congleton, B., Hall, D., Hussain, S., Jablonski, M., et. al. (2005). NotiFly: Enhancing Design through Claims-Based Personas and Knowledge Reuse. *43rd ACM Southeast Conference,* Center for Human Computer Interaction and Department of Computer Science, Virginia Polytechnic Institute and State University, USA.

Blomquist, A., & Arvola, M. (2002). Personas in Action: Ethnography in an Interaction Design Team. *Paper presented at NordiCHI*, ACM Press, Arhus, Denmark, 197 – 200.

Chapman, C.N., & Milham, R. P. (2006). The persona's new clothes: methodological and practical arguments against a popular method. *Proceedings of the Human Factors and Ergonomics Society 50th Annual Meeting*, San Francisco, CA, 634 –636.

Cheng, B.H.C., & Atlee, J.M. (2007). Research Directions in Requirements Engineering. *IEEE. Future of Software Engineering(FOSE'07)*.

Cooper, A., & Reimann, R. (2003). *.About Face 2.0, The Essentials of Interaction Design*. Chichester, NY, USA, Wiley publishing.

Dantin, U. (*2005*). Application of Personas in User Interface Design for Educational Software. *Australasian Computing Education Conference*. Conferences in Research and Practice in Information Technology, *42*, 239 – 247.

Dong, J., Kelkar, K., & Braun, k. (2007). Getting the Most Out of Personas for Product Usability Enhancements. *Usability and Internationalization*, Part I, HCII, LNCS 4559, 291–296.

Junior, P.T.A., & Filgueiras, L.V.L. (2005). User Modeling with Personas. *Proceedings of CLIHC'05*, ACM Press, 277 – 281.

Khalayli, N., Terum, T., Nyhus, S.I., & Hamnes, K. (2007). Persona Based Rapid Usability Kick-Off. *Proceedings of CHI 2007*, ACM Press, 1771– 1776.

Markensten, E., & Artman, H. (2004). Procuring a Usable System Using Unemployed Personas. *Proceedings of the third Nordic conference on Human-computer interaction Tampere*. NordiCHI '04, ACM Press, *82*, 13 – 22.

McGinn, J., & Kotamraju, N. (2008). Data-Driven Persona Development. *CHI 2008 Proceedings*. Character Development, Florence, Italy.

Nieters, J.E., Ivaturi, S., & v, I. (2006). Making Personas Memorable. *Proceedings of CHI 2007*, ACM Press, 1817 – 1823.

Pruitt, j., & Grudin, J. (2002). Personas, participatory design and product development: an infrastructure for engagement. *Paper presented at Participatory Design Conference*, Malmo, Sweden, 144-161.

Pruitt, j., & Grudin, J. (2003). Personas: Practice and Theory. *Proceedings of the 2003 Conference on Designing for User Experiences (DUX'03)*, ACM Press, 1-15.

Vasara, K. (2003). *Introducing personas in a software project*. Master thesis. Department of Computer Science and Engineering, Helsinki University of Technology.

Vyas, D., Groot, S.D., & Veer, G.C.V.D. (2006). Understanding the Academic Environments: Developing Personas from Field-Studies. *Proceedings of the 13th Eurpoean conference on Cognitive ergonomics: trust and control in complex socio-technical systems*, *250*.

Wiggins, A., Building *a Data-Backed Persona.* Retrieved September 14, 2008, from http://www.boxesandarrows.com/view/building-a-data

Williams, K.L. (2006). *Personas in the Design Process:A Tool for Understanding Others*. Master thesis. Academic Faculty, Georgia Institute of Technology.