

Developing a Common Personalization Framework for the E-Application Software Systems

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Abstract — E-application represents any online software application including e-governance, e-learning, e-commerce and other e-applications. Organizations are intended to develop their own style of e-application software. They consider personalization issues to positively approach their users. To retain users' trust and loyalty, organizations develop a robust e-application software system, which might complicate the online processes. The user of several e-applications could be the same person. Since each organization has its own e-application, users might find difficulties in using different types of e-application software systems to complete their online services, which might be the same service in some cases. How to help the users to reduce the time needed to accomplish certain service without making their life difficult? How to help the organizations to facilitate their services through the personalized e-application software systems? How to help new organizations understand the needs of their users and develop their own customized personalized e-application software system? Current author argues that this problem could be solved by developing a common template framework for personalized e-application software system? To support this argument, this paper at first addresses the importance of the personalization concept and presents a framework for personalized e-application software system. Secondly it discusses the results of the conducted survey to know whether users support the implementation and usage of a common personalization framework for e-application software systems. The results of the survey were impressive in supporting the argument. This indicates the necessity for having a common personalized e-application software system for all parties: organizations, users and developers.

Index Terms— Personalization, personalization process, personalization framework, online service and e-application software system.

I. INTRODUCTION

E-application software is simply defined as online communication between individuals, organizations or both. It facilitates processing transactions electronically. The 'e' in the e-application terminology means the technology and 'application' refers to the traditional application model [1]. Users of the e-application software receive a lot of redundant information from the internet. To help them in reducing

information overload and saving their time, users could be provided with personalized information collected solely for them. For this, developers could control their websites reactions to be able to display information depending on user's profiles. Currently, personalization of e-application software system is gaining importance with the advancing maturity of such application software [2].

Personalization is an old concept, which origin goes back to 1870s with regards to direct marketing letters. However, the current research focuses on personalization of e-application software systems, which started in the 1990s when marketers showed interest in personalizing their websites to attract more users [3]. In 1996, Yahoo's My Yahoo started following its users' actions, collecting their preferences in user's profile and saving the profiles in Yahoo's database. Yahoo's visitors benefited from the personalized content of the page [4]. In 1997, Peppers and Rogers defined personalization as the practice of delivering specific information to the user based on the user profile [5]. In 1998, Nielsen [6] defined personalization as computer interface attributes by a user model or an algorithm depending on user's selections, behavior, and demographic information. Early 2000s, Lands' End Company applied the personalization concept to get users' preferences on their products. Users' information was analyzed and stored in the company's database in order to produce personalized information for those users. During the same period, Edina, Minnesota-based Net Perceptions offered personalization solutions to the Kmart and J.C. Penney. In 2000, the company helped Guitar Center, which was the leading retailer of music products, and Subsidiary Musician Friend to increase their sales. The companies gained knowledge about product relationship, profit margins, and overstock status. During this period, personalization software were created and used to develop personalized web pages. In 2000, Fink and Kobsa [7] indicated that personalization of e-commerce application used in general to denote user-adaptive system. Late 2000, Goodyear Tire & Rubber Co. turned to personalization to help respond to the demand for the information in a specific format. Also, the Portal technologies from Computer

Associates International Inc. enabled the users to access and arrange several types of the personalization information in relation to users' products for personalization purpose. The literature indicated that number of companies, which used personalization features, has increased from 36% in the early 2000 to 56% in the mid 2001. This shows how important the personalization is to the organizations [4]. It was indicated by [8] that the intention of the marketers for using the WWW was to generate specific or personalized sales opportunities within the mass market. This helped the marketers to achieve user's expectations. Further, the use of the WWW facilitates developing user's profile. In 2001, Kemp [9] pointed out that personalization appeared to be hard to define, apply and execute because it has different meanings under the context of different businesses. In the same year, Kotler *et al.* [10] indicated the need to link segmentation, targeting and positioning towards targeted marketing. Other researchers linked personalization to Consumer Relationship Management (CRM). In 2002, Palmer [11] indicated that personalization makes it easy for customers to use e-service website. In 2003, Murthi and Sarkar [12] defined personalization as collecting users' preferences, matching products to users' preferences and checking user preferences with the selected products. In the same year, Pierrakos *et al.* [13] indicated the close relationship between Web usage mining and Web Personalization. Also, they constructed a conceptual model of interactive integrated marketing communication. This model has four components: 2-way of communication, the level of response control, the personalization of the communication relationship and the database technology. In 2004, Goldsmith [14] included personalization as one of the major changes that are influencing and will continue to influence e-marketing. In 2005, Adomavicius and Tuzhilin [15] defined personalization as an iterative process of understand-deliver-measure cycle. The Personalization Consortium in 2005 defined personalization as the use of technology and user details to control the interaction of online business between personalization and individuals [3]. In 2006, Vesänen and Raulas [16] created the personalization process and categorized two types of variables in the personalization process: objects and operations. Later, personalization in a general context was defined as a technology that represents the online experience for individual purposes by generating personalized web page based on user's profiles. For this purpose, users' information is stored in a central database which recognizes a website visitor from previous visits and actions. Accordingly, it produces specific web page with contents and information prepared mainly for that user. To collect user's information, a cookie, which is a text file, was sent to the computer of the visitor to collect user's specific information and his interest profile [17]. In 2008, Sunikka and Bragge [18] analyzed definitions

and typologies of personalization in the web context and they suggested a conceptualization of personalization. In 2010, Chien-Chih [19] proposed an integrated service framework for combining personalized and community functions to support mobile travel planning and management. Al-Kasasbeh and colleagues [20] appraised the user satisfaction as an improvement predictor of the success of e-application software. Also, in the same year, Khapre and Chandramohan [21] proposed a personalization algorithm for the customization of the user profile to support different steps of interaction with e-services.

The purpose of this study is to investigate about the importance of e-application software in general, understand the development process of personalized e-application software and show how personalization issues could be used to effectively support those applications. This study shows the desire to develop stronger relationships between the organizations and their users, improve the online services, reduce time needed to complete online services, increase users' loyalty for the involved organizations, increase organizations' profit margins and increase their product cross-selling. It is hoped from this study that it would be possible to identify and produce general guidelines and a personalized e-application software framework for other organizations to use. The common personalization framework could then be customized and used depending on the requirements of the involved organizations.

II. PERSONALIZATION

In this paper, personalization is defined as a concept of generating a well organized and an intelligent list of products and recommendations to the users of the involved website depending on the users' preferences to gain their loyalty and increase their interest in this kind of websites. Personalization could be based on structure or content aspects [22]. Most of the personalization techniques nowadays use the former aspect of personalization. These aspects of personalization are very important for recognizing the features of personalization [23]. Karat *et al.* [24] originally proposed 75 features of personalization of the e-commerce applications, collected from different sources. From the studies done to check user experience on personalized websites, they found that 14 features are the commonly used ones to check whether the website is successful or not. These features have been used for the Ibm.com website. They [24] include: personal book, universal profile, subscription-based service, service and support, recommendations based on profile data, adaptive presentation tailored to user characteristics, live chat-like or phone-based help or sales support (personal shopper), feedback that the system recognizes a "repeat" visitor, transaction history, loyalty programs, incentives, future purchase considerations and the store or website, built by an expert. These common features could be used

completely or partially by other organizations to check the quality of their websites.

Developing successful personalized e-application software system needs a good design of information architecture about users' profile. Several issues should be considered for this purpose including: privacy of the users, difficulty of producing appropriate personalized web pages for different users, preference of users to be anonymous and personalization might limit products that can be seen by the user depending on his preferences [23]. Personalization process is a cycle as discussed by Vesanen [3] and Schubert [25]. It involves receiving and processing user's data, modeling and customizing user's profile, and developing personalized organization's website.

Awareness of the users about the personalization is important. The reason for this is that personalization is used to strengthen the relationship between the users and the engaged organizations. This leads to increasing user's trust in the content sources of the personalization. Also, the organizations should be aware of the ability that users can edit their information and that the information should be transparent to the involved individuals [26].

As it appeared from the literature, personalization is used to cover a very fragmented set of ideas. It differs from one business to another; therefore a common understanding of personalization issues between different organizations is a must. For this purpose, a clear personalization framework is needed [3]. Personalization in the broad context of e-application software systems considers an exchange between two parties: the user and the organization. For the organization, the value of personalizing the e-application software system in hand involves the cost of gathering information and the benefits which might be received from this online process. However, for the user, the value of personalization involves several factors including: security, privacy, trust and the value of the relationship between organizations and users [24]. For the personalized e-application software (e.g. e-shops software), there are a lot of integrated software packages available which supply the full range of e-application services including: Amazon.com personalization system, One to one (Broadvision), Dynamo Relationship Commerce Suite (Art Technology Group), Personalization Manager (Net Perceptions), ADAPTe (Responselogic) and ATST WorldNet.

The idea of creating a common framework is to provide tailored personalization services, which do not require to be based on specific user behavior. Rather it depends on predefined audience experience and community [27]. User information is collected in a data set file termed as "user profile". This information is collected by requesting it directly from the user during interaction and the information collected implicitly from the website by following users' actions. Since modeling user profiles is one of the important aspects in the personalization framework, it is important to

know different types of user profiles. These types are divided into two main categories: Explicit profiles and implicit profiles. Explicit profiles refer to the information collected by requesting it from the users through sort of data collection techniques such as forms, questionnaires or other alternative data collection method. However, implicit profiles refer to the information collected through user actions on different website activities. E-application software system follows and collects user preferences as a series of transactions or actions through which user browsing history is collected and stored in a database prepared for this purpose. The complete list of users' profiles is provided in [25].

By keeping in mind the need for a common framework on personalized e-application software system, one should think about how best to define user profile. As stated by [25] that most user profile models have been defined for a specific e-application software system. He discussed about the demand for making use of user profile, which could serve different applications. The discussion of this aspect helps in providing architecture for the personalized e-application framework. Mapping between the use of users' profile and the framework is required. It should be understood that the idea behind developing it is to use for different applications. This should maintain the consistency between the personalized e-applications for different organizations. Currently, research focuses on separating users' profiles from their applications. A common framework for personalized e-application software system could serve as a template for different organizations. This template could be used to maintain consistency level between the users. This would therefore save time and effort of both developers and users. The organizations could use the template framework directly or customize it according to the needs and satisfaction of their users. The successful framework needs a consideration of three most important components [25], [23]: user needs, content of the personalized page and personalization rules. With regards to personalization rules, each organization has a set of rules. Organization rules are discussed in [28]. As an alternative approach to these rules, the personalization might use a common template generated for this purpose. It should have integrated set of rules collected from several best and well experienced organizations. It was hinted by Jobst [23] that there are some software available for the personalization to key in user's needs and contents to receive appropriate personalization rule for the specific type of organizations.

A. THE PROPOSED COMMON PERSONALIZATION FRAMEWORK

In the current research, the proposed common personalization framework (Figure 1) is a modified and an improved version of the Vesanen's framework [3]. It is divided into three major components: The user, the framework interface and the organization. The middle

section; framework interface; is the soul of the whole framework. It uses a list of generalized user needs as input to the process of the framework. Since this is intended to be the common framework for most or all organizations, organizations should be allowed to use the existing list of rules and to add some more rules if needed. At the end, the organization could use a combined list of rules from the existing and the new added ones to satisfy its needs. These rules should be checked to know how to apply them on the common set of services provided by the websites of different organizations to satisfy user needs. For the users, the framework provides services' benefits including: lower price, better preference match, better product, better

service and communications, and services' cost including: privacy risks, spent time, extra fees and waiting time. However, for the organizations, the framework provides services' benefits including: Low processing cost, higher price, better response rate, user loyalty, better user service, bigger workplace, and services' cost including: Investment in technology, investment in education and brand conflict. Since this framework is common, each organization could customize it according to its satisfaction. By doing this, a specific organization and mainly the new ones could benefit from the experience of other well established organizations.

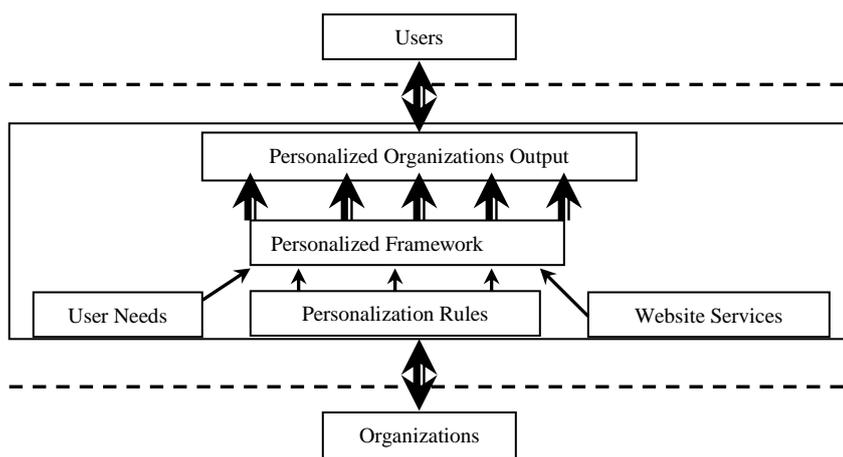


Figure 1: The Proposed Common Personalization Framework

III. CASE STUDY: THE PERSONALIZED E-APPLICATION SOFTWARE SYSTEM OF AMAZON.COM

Amazon.com's websites are considered as ones of the most successful sites. They utilize rich profile information as the basis for providing valuable services. Therefore, they are regarded as a model for those who want to personalize their websites [29], [23]. For this research, Amazon.com online book shopping service is considered as a case study. It is the Internet leader on book, music and video retailing. It started its virtual web life in July 1995. With respect to commerce websites, Amazon.com site is one of the most widely known, used and cited. The site provides more than 4.7 million books, music CDs, videos, DVDs, computer games, online auctions, free electronic greetings cards and other products [30]. Its main focus is concentrated on creating end user experience for best user satisfaction. Therefore, it personalizes its product and service offerings using personalization features such as: greeting end user by name, instant and personalized recommendations for the user, best seller and chart-topper listings, personal notification service, purchase pattern filtering and a number of other related features.

The current study carried out an investigation about the importance of the personalization issues in e-application software and whether the users of those

applications are aware of such issues. This investigation involves constructing a questionnaire and distributing it to a sample of participants of academics and students, from a selected academic institution; that might benefit from the Amazon.com online book shopping service. Amazon.com; online book store notifies the users in advance that the web-server of its webpage is willing to collect their personal information and keep them in its central database. The stored user's profile could be used to personalize webpage for the users [17]. The users should be aware of what are the benefits and their involvement in achieving the personalized web pages. Amazon.com; the focus of this project incorporates use both aspects of personalization: structure based and content based [23]. Amazon.com uses personalization features found in [31].

Regarding the personalization process cycle, Amazon.com interacts with its users through its personalized website, through which it collects the data for that specific user and saves the data in a user data file. This file should be processed to produce the data in an organized format to fill the provided template for saving the user profile. This profile should further be customized to know the preferences of the current user to enable the website search engine to search for the required data (i.e. Books) and locate it as the marketing

output for that user. The search engine might provide several options of the book lists, which could be processed to find the best match to satisfy the preferences of the user in hand. Finally, the best match of the marketing output (e.g. preferred book list) should be delivered to the user in an attractive way to take the attention of the client and satisfy his needs. This is done through Amazon.com by showing the user his preferred list of books on a screen located near the top of the website page of Amazon.com.

A. Identifying Key Points for the Questionnaire

The questionnaire is used as a tool to measure participants' acceptance or rejection on the issue of using personalized e-applications. It reviews the level of the internet industries and promotes it in such a way to help the involved parties in this frame: organizations and users, to understand the value of this important and growing technology. The questionnaire was constructed with the aim of targeting participants from the academic area such as students and faculty staff from the Sultan Qaboos University. The study shows that 92 in total participated in the experiment. This is divided equally

into 46 females and 46 males. This was further divided into equal size of students and faculty members in each category. This type of participants was selected because the questionnaire is to check the status of the personalized e-application of the Amazon.com and mainly the online book service. The raw data of the questionnaire was saved in Microsoft EXCEL sheet, which was imported into the SPSS software to organize and analyze the data. Since the data set is multi dimensional, the most appropriate statistical test to be used is the Chi-Square test. It checks for a matrix of data with the assumption that variables have equal chance in contributing to the results of the statistical test. The key points for the questionnaire were identified with the help of the features of the personalization concept discussed before. Six parts are included in the questionnaire as follows:

Part 1: General information about the participants: This covers participants' age, gender, occupation (student or a faculty staff) and the usage of the computers for their work. The data was organized with the help of the age groups:

Table1: Participants of the Study

Age Group	Female		Male		Total
	Faculty	Student	Faculty	Student	
18-25years	4	13	0	11	28
26-35years	5	9	5	6	25
36-45years	10	1	7	3	21
46-55years	3	0	6	2	11
> 55 years	1	0	5	1	7
Total	23	23	23	23	92

It is good to mention that the current study tackled students of different age groups, who were either undergraduate or post-graduate. The same was applied to the academic staff being junior or senior staff. The purpose of this was to check if there is any significant relationship between the age of the participants and their acceptance of using the e-application software or the personalized e-application software. The study highlighted clearly that almost all participants were using the computers daily. Only 3 females out of the 92 participants were using the computer weekly.

Part 2: Status of the e-application software in general: This is to find out the value of the importance and acceptance of the e-application software in general and

online shopping in specific. Also to find whether the participants would like to use a common e-application software for online services and whether the participants support paying electronically. These points are used to check the quality of this type of applications and how it could be improved to empower the internet technology. Following age groups, it was seen that the demand for using the e-application decreases when age of the participants increases. For details, 25 out of 92 participants in the age group1, 22 participants in age group2, 19 participants in age group3, 10 participants in age group4 and finally, 6 participants in age group5 agreed to have e-application for online shopping. The following table shows the reaction of the participants for the three points mentioned above.

Table2: Importance of having e-application software system

Importance of:	Significant	Neutral	Not Significant	Total
e-application software	82	7	3	92
Common e-application software	66	12	14	92
Paying electronically	68	8	16	92

Part 3: Status of the personalized e-application software in general: This is to find out the acceptance and acknowledgement of the participants on the importance of the personalized e-application software and to check the level of the user acceptance of the personalized websites and products received from these

sites and improve the quality of the personalized e-application software. One of the purposes of this section is to find out how to increase the loyalty of the users. The authors of this research are seeking to get an indication of the following points shown in the table.

Table3: Importance of having personalized e-application software system

	Significant		Neutral		Not Significant		Total
	Female	Male	Female	Male	Female	Male	
participants to be known in person	10	35	6	0	30	11	92
getting personalized list of products	26	36	10	0	10	10	92
providing participants credit card details electronically	18	29	9	2	19	15	92
providing the participant's e-mail address electronically	34	35	3	1	9	10	92
providing participant's home address electronically	24	34	3	0	19	12	92
Dealing with secured e-application	44	43	2	0	0	3	92
having authorization from the user for using their details	43	43	2	1	1	2	92

The study showed that almost all male participants were more supportive for giving their detailed information online than females. This fact is true as well for providing male participants credit card details electronically. It seems that female participants were more conservative in providing their credit card details electronically. Also this study gave an indication that participants are willing to use the e-application software and provide their e-mail addresses when requested. A close look at the results it was seen that participants were more reluctant to provide their home address than to provide their e-mails addresses. Dealing with secured e-application is important. This makes the end users trust working with such applications. Almost all participants

strongly agreed that the dealers of the e-application software should seek for authorization from the end users before collecting and using users' personal details. This helps the users to have confidence to work with such applications.

Part 4: Status of the e-application software of the Amazon.com: This is to check the level of the acceptance and acknowledgement of the participants concerning the e-application software of the Amazon.com, check the quality of the e-application software of the online shopping of the Amazon.com and find out how to enhance it. Table 4 shows participants' answers.

Table4: Importance of Amazon.com e-application software system

Importance of:	Significant	Neutral	Not Significant	Total
e-application software of Amazon.com	50	7	35	92
online book service of the Amazon.com	83	3	6	92

Part 5: Status of the personalized e-application software of the Amazon.com: This is to check the level of the participants' acceptance and appreciation of the personalized e-application software of the Amazon.com and mainly the personalized online book service, check the acceptance of the users' to allow the Amazon.com or

any other organization to collect their personal details and finds out if the participants support receiving personalized list of books electronically from the Amazon.com. Table 5 provides participants' view on these points.

Table5: Importance of the Amazon.com personalized e-application software system

Importance of:	Significant	Neutral	Not Significant	Total
personalized e-application software of Amazon.com	80	8	4	92
allowing the Amazon.com to collect the users' personal details	57	12	23	92
receiving personalized list of books electronically from the organization	83	3	6	92

The study showed that the support of the participants is valid and the Amazon.com should make more effort to make its personalized e-application more attractive and reliable to the users. The study showed that some participants were conservative to allow the Amazon.com or any other organization to collect and use their personal details. Also the study indicated that it is very

important to receive personalized list of books electronically from the Amazon.com, say.

Part 6: Comments and suggestions from the participants: This is to collect any extra comments and suggestions from the participants. In almost all cases this part was kept empty.

IV. CONCLUSIONS AND FUTURE PROSPECTS

The current research helps in the analysis of the important issues of personalization. Although most users know consequences of delivering personal data to ensure personalized services, they were found to be willing to give up some privacy of their personal information [32]. In this direction, it was obvious from the findings of this current research that participants were looking forward to have personalized e-application software system which could provide them with personalized list of products. The participants supported the idea of having a common personalized e-application software system to facilitate their work, save their time by dealing with consistent applications. The findings of the questionnaire proved that the current author's direction was well conceived and important to study and take care of. All findings proved the validity of the issues discussed and answered the research questions and objectives rose in this research. The objectives of the current research were positively achieved. As informed by Jobst [23] that a good framework for personalizing a website is not available, the current research responds to this need by proposing the common personalization framework. Since the framework requires a model website to be followed, the current authors recommend using the website of the Amazon.com for this purpose because it represents the best website as investigated. Future work could consider selecting different domains of participants that could help in strengthening the fact of accepting the personalized e-commerce applications. Organizations and retailers should be considered in the study because they play important role in the framework. Also, future work could be focused on enhancing the development of a common personalized e-application. It is recommended to enhance the security of these applications. It is hoped that the future will bring new challenges and that personalization will continue to be one of the most important issues in the modern internet world. It is expected that the personalized e-application and discussion of its features will provide a source of information and inspiration for further research and development of user modeling systems and user-adaptive applications.

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