

PEGOV 2013: 1st International Workshop on Personalization in eGovernment Services and Applications

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1 Preface

The advent of e-government (e-Gov) initiatives has changed the interaction between governments and citizens. Services can now be delivered by means of virtual channels, e.g., through Web portals or mobile apps, or even online communities, and citizens can exploit these channels to interact with public administration. In this new reality, governments can innovate in order to facilitate the access to services by reducing the red tape that usually characterizes the public service provision.

Collecting, understanding and leveraging the characteristics and preferences of citizens is strategic to deliver services and applications of higher value. Only in this way, services and applications can target individual needs, e-Gov offerings can be extended to complex services delivering life-long assistance to citizens and the design of services and applications can be better tailored to citizen requirements. In order to realize this vision, e-Gov services and applications must undergo a personalization process that makes use of automatic user modeling and profiling techniques and delivers solutions that adapt to specific users profiles and follow the citizen along her several and multi-faceted interactions with public administration.

Even though several personalization methods and user modeling techniques have been proposed and successfully applied in several domains (e.g., e-commerce), the application of these approaches in the eGovernment domain is still in its infancy. Personalization in e-Gov is potentially different than in other domains, due to a number of factors. As an example, while, in an e-commerce, we can quite easily catch user preferences and subsequently make suggestions according to the user profile, in the e-Gov domain the concept of preference itself is difficult to define. As another example, personalization methods specific to the eGov domain might consider the obligations and roles that mediate the interaction between a citizen and Governments (e.g., one citizen playing the roles of tax

payer and mother), and other domain-relevant characteristics (e.g., demographic features). There are also potentially ethical (including privacy) issues related to the fact that citizens might be in a dependence relationship with governments, and automatic user profiling might be considered big brother and not desirable.

The purpose of the Personalization in eGovernment Services and Applications (PEGOV) workshop is to provide a forum for stimulating the attention of the scientific and business community on the aforementioned issues in order to move towards the desirability, design and evaluation of user-aware and adaptive services in e-Gov. We are specifically interested in the role of user modeling and profiling in advanced public service design and delivery by dealing also with aspects related to privacy, security, and multilingualism.

The contributions to PEGOV 2013 mainly address four relevant topics:

- Participatory e-Gov,
- Citizen-centered service design,
- Citizen segmentation,
- Personalized e-Gov services.

Most submitted papers were from researchers of the e-Gov community. Since the workshop addresses a rather new topic and a research area that has to be shaped yet, submissions generally presents research at an early stage. However, those ongoing work, methodological approaches and discussions about issues that potentially involve personalization in eGovernment were deemed valuable to workshop attendees. Additionally to the presentations of 5 accepted papers, PEGOV 2013 featured a special event: an invited talk by Adegboyega Ojo, who currently leads the E-Government Unit at the Digital Enterprise Research Institute (DERI).

PEGOV 2013 took place in Rome, Italy, in conjunction with the 21st Conference on User Modeling, Adaptation and Personalization (UMAP) on June 14, 2013.

2 Accepted Papers

- **Authors:** Liliana Ardissono, Angioletta Voghera and Mauro Velluto
Title: Selecting People for Involving Them in Participatory Decision-Making Processes
- **Authors:** Alessandro Bianco, Paolo Campegnani, John Forrester, Leo Iaquina and Maria Alessandra Torsello
Title: SMART project: industrial and academic collaboration for service design
- **Authors:** Sanat Kumar Bista, Surya Nepal and Cécile Paris
Title: The Human Touch of Government Services
- **Authors:** Leo Iaquina, M. Alessandra Torsello, Marco Comerio, Anna Maria Fanelli and Giovanni Semeraro
Title: User Segmentation in e-Government Services

3 Invited Talk

Author: Adegboyega Ojo, *Digital Enterprise Research Institute, National University of Ireland, Galway*

Title: Towards “Deep” Personalisation of E-Government Services

A Co-evolutionary Perspective on Electronic Public Service Personalization

Abstract: Next Generation Electronic Public Service Infrastructure are expected to provide highly personalized, context-aware services to citizens and businesses; exploit feedback and comments about public services on social web for continuous service improvement and enable the participation of citizens in the re-design of existing services or design of new value-added services of interest. In the area of service personalization there are at least two major active streams of research. The first stream of work which is carried out by the Computing and Informatics community attempts to transfer ideas on personalization and recommender systems from domains such as e-commerce and e-learning to the public sector domain. These efforts have delivered some results on self-adaptive government websites, personalized citizen searches and dialogues, and co-design of e-government services. The second stream of work involving personalization of public services is carried out within the Public Administration (PA) practice and research community. The goal of the PA community in the Personalization Agenda is to tailor public services to individual beneficiary needs as much as possible. This is done through a number of related approaches including connected government, participatory public service development, and provision of people-centered services. Interestingly, there is yet to be any significant interactions among these two closely related research communities. In this talk, the speaker argued that developing a viable personalization program for e-government services is contingent on its careful alignment and co-evolution with supporting PA personalization efforts. This viable personalization program, which he call “Deep Personalizatio” entails delivering personalized e-government services over Flexible and Adaptive Public Services. Consequently, he further argued that while the development of effective citizen models and acquisition of functional and behavioral data from citizens are critical for delivering personalized citizen e-services, the fundamental challenge is in ensuring that the underlying public service is sufficiently flexible and adaptive.

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Selecting People for Involving Them in Participatory Decision-Making Processes*

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Abstract. Inclusive e-government is challenged by the limited participation of generic citizens. In order to address this issue, we propose to exploit the online services offered by the Public Administration (which support the establishment of direct relations with the population) for identifying people who might be motivated to contribute at decision making on the basis of their information interests. We propose an application supporting the analysis of users' interests from the usage data collected by public online services and a direct interaction with the selected individuals. This application will be used for involving people in a few participatory processes to be carried out in Provincia di Torino (Italy).

Keywords: Participatory decision-making, people involvement, user interests analysis.

1 Introduction

Participation is one of the principles of good governance listed in the E-Government Survey 2012 [1]. Participatory processes are based on a bottom-up decision-making model which promotes the contribution of the population to public policy development by expressing their needs, proposals and feedback with the aim of raising the Public Administration's awareness of the priorities to be addressed, of focusing on the most useful services, and of reaching consensus on the actions to be carried out. In this context, a big challenge is that of involving representatives of as many stakeholders as possible, including generic citizens, in order to consider different and possibly conflicting viewpoints and to share decisions with a significant sample of the population.

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Most involvement efforts are carried out either via “face to face” interaction in the offices of the local communities or by disseminating information through public web sites. The former method has a narrow scope; the latter promotes participation among generic internet users, who might not be interested in the policies to be discussed. In order to address this issue, we propose to take advantage of all the existing relations between the Public Administration and the population, including the internet-based ones, for searching for people interested in policy making. Public online services can be used for identifying interested interlocutors: most of them provide geo-localized information (e.g., data about a city or an administrative area); thus, they target relatively small virtual communities radicated in the territory. Moreover, as many services authenticate their users, people can be identified and their information interests can be tracked. We thus propose to employ such services as information sources for steering the discovery of candidate participants depending on the scope of the policies to be developed.

This paper presents work carried out to start an analysis of users’ interests emerging from Regione Piemonte’s public online services. For such purpose, we developed a prototype application which enables the Public Administration to identify people who showed interest in specific geographical areas by analyzing the usage data of such services. The application allows to contact people by e-mail, establishing a one-to-one interaction which can be used, e.g., to promote public activities or to invite users in decision-making processes. In 2013, the application will be used in a few River and Lake Agreements in Provincia di Torino (a sub-area of Regione Piemonte).

The river (lake) agreement is a form of negotiated planning. It starts with a voluntary contract mobilizing participation by major institutional and social actors in a fluvial (lake) region to define and implement a common strategic framework. The objective is to incorporate territorial design into policies (soil and water protection, environmental improvement, landscape improvement, regional development) and financing projects, as well as to influence planning and programming [2]. The concertation process involves heterogeneous stakeholder groups. The organizational structure of each contract varies but all of them have a small decision-making body (Control Room) composed of members belonging to the most important stakeholder groups. Although generally defined as enlarged participative processes, there is a tendency to include the most important stakeholders from the economic world, institutions, or representative associations, as well as certain age groups (mainly through projects with the schools), with a limited presence of generic citizens. It is thus interesting to check whether the adoption of an automated service for inviting people who interact with the Public Administration through the web, such as the application presented in this paper, will succeed in including a more representative sample of the population.

In the remainder of this paper, Section 2 presents our work. Section 3 describes some related work. Section 4 concludes the paper and outlines our future work.

2 Supporting User Involvement in Inclusive E-government

The usefulness of participatory practices and methods to design legitimated and effective public policies is acknowledged by scholars from different disciplines including political science, spatial planning and environmental assessment. However, current partic-

ipatory planning practices are criticized because they are unable to penetrate the formal decision-making process [3], to contribute to citizenship enhancement of marginalized social groups [4] or to generate consistent outcomes in terms of collective decisions. Most of these limits depend on the synchronous and location-based nature of traditional methods for public participation and collaboration [5] but also on the duration of processes, which require long standing engagement. Both aspects might be at least partially addressed by exploiting ICT.

2.1 Analysis of Public Online Services

We aim at enhancing the Public Administration's capabilities to find candidate interlocutors for participatory decision-making by utilizing the Internet for reaching people who have not been attracted so far. The idea is that of complementing the work carried out by means of existing methods with a new approach which leverages the relations between Public Administration and citizens in order to enhance the identification of individuals who are likely interested in the policy making activities to be carried out.

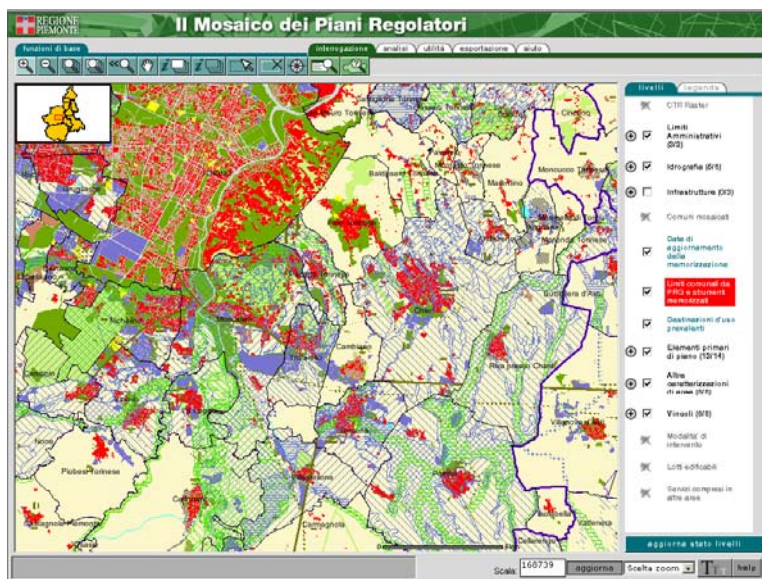


Fig. 1. A general town plan with legenda, generated by the MUPD service (in Italian).

Different criteria might be adopted to identify candidate invitees for participatory decision-making processes. Regarding territorial policies, which are the focus of this research, users' geographical interests are the primary factor to be taken into account as they allow the selection of people who could be directly or indirectly affected by the policies, e.g., because they live or work in the addressed areas.

We analyzed some territorial services offered by Regione Piemonte's Geovagando web portal (www.regione.piemonte.it/geopiemonte) to select a few of them for monitoring users interests. Geovagando enables visitors to find geographical information, browsing the wide production of cartographic information produced by public sector bodies in Piemonte. The web site supports thematic searches (e.g., Agriculture, Environment, Traffic) and offers different types of services (e.g., metadata catalogues, visualizers, download services).

Among the available services we selected the "Mosaic of Urban Planning Data" (MUPD) of the municipalities in Piemonte, in the thematic section "Spatial Planning". This service supports the downloading of maps related to an "interpretation" of the general town plans of Regione Piemonte, which provides information about land uses and urban policies. Specifically, the "mosaicatura" of town planning, provided by the service, is aimed at integrating the territorial choices of different local administrations using a common interpretative method and legenda. Fig. 1 shows a sample town plan downloaded from the MUPD service. The common legenda can be used to compare the land uses, such as residential areas (marked as red in the figure), public services (yellow), productive areas (violet), public green and protected areas (green) and infrastructures (not shown).

As the MUPD service authenticates its users, it allows the tracking of their interests and a one-to-one interaction with them. Its registration form asks the user for permission to track her/his behavior, adhering to the privacy regulation. If the user gives consensus, (s)he is invited to specify first and family name, e-mail account and classification in one of the following categories for statistical purposes: Public Administration employee, professional user, private user and student. This classification is orthogonal with respect to user interests analysis but it is useful to understand whether the service is only used by territorial experts or it has a heterogeneous user base and thus represents a promising source of information for policy making.

The traces of user behavior collected by the MUPD service include data about information queries and downloaded documents. This information is stored in a User Interests Database which maintains the registered users's data and the tracked geo- and time-referenced download events performed by them. For each event, the database stores information about the type of the downloaded item, the geographical area of interest (e.g., city name and identification code), and the date of the event.

The MUPD service has pros and cons: regardless of its technicality, it has a heterogeneous user base because it is relevant for real estate. The users who accessed the service between the beginning of 2005 and February 2013 are distributed as follows: 36.8% of them are professionals (e.g., they could be architects, etc.) and 15.6% are from the Public Administration; 25.8% are private users and 21.8% are students. It is also worth noting that this service provides particularly significant information about user interests because town plan maps are downloaded by people who are analyzing a territory in detail; e.g., for work or education reasons, or because they live, or plan to live there. However, general town plans concern a whole city or large portions of it; thus, they cannot provide information about fine-grained geographical interests (e.g., focused on specific urban administrative areas). Moreover, as such maps change every few years, the same user is expected to rarely download the same document. This



Fig. 2. Searching for people who downloaded information about Torino and Moncalieri since 2012 (anonymized sample of usage data).

also means that the service collects a relatively small number of download events. These characteristics make the service suitable for collecting information to be used in policies having a large geographical scope; e.g., in river and lake agreements, which concern the whole territorial area of one or more cities.

2.2 Our Application

In order to support people involvement in policy making, we developed a prototype Web-based application which helps the Public Administration to search for people to be invited in participatory processes by exploiting the users' geographical interests collected by public online services. The application supports searching for users who downloaded information about a selected geographical area during a certain time interval and makes it possible to contact them by e-mail, e.g., to inform them about the territorial plans under definition or to invite them in a participatory process. The people who answer positively will be involved in the related processes.

While the application supports people identification and invitation, it does not handle the online collaboration within a participatory process. Indeed, existing social networks, such as Facebook, can be exploited as a first solution for that purpose, by enabling communication, document sharing and consultation through polls, within thematic groups associated to participatory projects. That approach was successfully applied by Voghera and colleagues in the Tinella Basin River Contract [6], a governance tool promoting vertical and horizontal subsidiarity for local development and sustainability in the Tinella fluvial region (Italy). In that contract, Facebook was used to handle

the distribution of questionnaires and the management of people's responses in a rapid and effective way.

Given the specification of a geographical area and of a temporal interval, our application queries the User Interests Database and presents the list of accounts satisfying the search criterion. Fig. 2 shows the user interface of our application on a small sample set of anonymized user data used for application development. In the left portion of the page, a map supports the selection of the geographical points of interests; moreover, city names can be entered via form (Seleziona Comune - select city). The form also allows to specify the starting year for the query (2012, intended as January 1st) and the type of user to be considered: non specificato (all users), PA (Public Administration employee), privato (private user), libero professionista (professional), studente (student). The right portion of the page shows the result of the performed query in a table containing a row for each retrieved user. Above the table, the "Invia mail a tutti" button can be used to send an e-mail message to all the retrieved accounts and the "Spedisci mailing list" one can be used to send an e-mail message including the list of accounts for later use.

Each row of the table shows a user id (which can be clicked to send the user an e-mail message), the classification of the corresponding person and the dates of the download actions (s)he performed on the selected geographical area. Moreover, the "Visualizza" (show searches) button makes it possible to retrieve the user's geographical profile by visualizing the list of cities (s)he has downloaded information about in the selected time interval.

We developed our application following a user-centered approach, in cooperation with experts in participatory processes (urbanists) who provided their requirements and contributed to the design of the user interface and of the features to be offered. Moreover, a preliminary test with users has shown that they find the application very intuitive and easy to use. They declared that it conveys the information they need in a simple and efficient way. However, they would like to have a stronger integration of the application with the social network environment to be used during the participatory process, e.g., to automatically generate user groups starting from the user lists they retrieve.

The application currently presents information collected by the MUPD service. However, it can work on usage information collected by other services of the Geovagando web site, provided that such data is stored in the User Interests Database. In that case, basic geographical search might be extended to support finer-grained searches which take information types into account. This would make it possible to search for users interested in specific topics (e.g., related to agriculture, etc.).

2.3 Identification of Candidates for Participatory Processes

We will use our prototype application in a few participatory processes to be carried out in 2013 in Provincia di Torino. Such processes concern the River Agreements of Sangone, Stura and Pellice and the Lake Agreements of Avigliana and Viverone. This activity will help us to assess the degree of participation achieved by inviting in decision-making processes not only the traditionally involved subjects, but also the people identified by analyzing the usage data of the MUPD service. For evaluating our approach, we will also compare the obtained participation data with that collected in previous experiences, such as the Tinella Basin River Contract.

The advantages of broadening of the decision-making process to a larger range of social actors since the preliminary phases of a participatory process can be examined at the level of the relations among the actors, of the quality of planning and design (decision content) and of the implementation of development scenarios. Concerning the relations between actors, it is conceivable that this first step can bring advantages discernible in the short or medium term. Among them, the improvement of the trust between institutional actors and citizens: on the one hand, citizens' trust in institutional actors might increase because people feel to be explicitly invited to express themselves on decisions affecting their territory. On the other hand, institutional actors might perceive that a significant part of the population is attentive towards the questions that relate to a river/lake or, even more, declares itself open to forms of dialogue and sharing of ideas on the future landscape of the surrounding region. Concerning the quality of decision content related to vast scale/local choices, the consultation of citizens allows to discover the problems and opportunities which characterize a certain region. Furthermore, it enables to make decisions which are (i) more equitable because decision makers have strong collective visions, (ii) wiser because they are aware of a multiplicity of viewpoints, (iii) more efficient due to the reduction of time and cost of interventions, (iv) long-lasting and simpler to implement because they anticipate oppositions [7].

3 Related Work

This work relates to the research on knowledge representation as the analysis of user interests concerns both the identification of the users' geographical areas of attention and the types of information they search for. Until now, we modeled a single data type corresponding to user interests in town plans. However, to support the integration of different types of information, a topic ontology has to be introduced and the information items provided by services have to be mapped to its concepts. Moreover, user interests have to be modeled in a user profile. We will analyze existing ontologies, such as, e.g., NASA SWEET Ontologies (<http://sweet.jpl.nasa.gov/ontology/>), to see whether they can be used for our purposes.

For the analysis of usage data concerning different types of information (e.g., the search engine of the Geovagando web site), our work relates to the research about virtual community detection. In that area, [8] proposes to mine the logs of web sites to recognize spontaneous virtual communities and personalize services for them. Moreover, [9] discusses multidimensional virtual network analysis to support the recognition of virtual communities in which individuals are related by multiple relations. Finally, matrix [10] and tensor [11] co-clustering methods are proposed to support efficient, scalable and reliable community detection.

4 Conclusions and Future Work

In this paper, we proposed to exploit the relations between Public Administration and citizens established through public online services in order to enhance the identification of candidate participants for public policy making. Our hypothesis is that, by selecting people on the basis of their interests and of the geographical scope and topics of the

policies to be developed, it will be possible to identify individuals who might likely be motivated to be involved in participatory decision-making processes because they are interested in the arguments to be discussed.

As a first step, we developed an application which retrieves the e-mail addresses of the users of public online services who demonstrated an interest in a selected geographical area. We are going to use this application to invite people in a few participatory decision-making processes to be carried out in Provincia di Torino during 2013.

In our future work we plan to integrate the User Interests Database used by our application with other public services of the Geovagando web site; this will likely enhance the quantity of information about user interests (in terms of user downloads), its granularity (e.g., focusing on specific districts of a town) and the addressed topics. Moreover, we will enrich the search facilities offered by our application adding topic-based selection criteria, useful to customize the interaction with users. For instance, the interest in more or less technical data (e.g., traffic data w.r.t. chemical composition of water resources), or in specific services, reveals details about users' knowledge and priorities that could be used to restrict the invitation in specific consultations to people interested and knowledgeable in the topics to be discussed.

References

1. United Nations: E-government survey 2012 - e-government for the people, <http://www.unpan1.un.org/intradoc/groups/public/documents/un/unpan048065.pdf> (2012)
2. Kidd, S., Shaw, D.: Integrated water resource management and institutional integration: realising the potential of spatial planning in England. *The Geographical Journal* **173**(4) (2007) 312–329
3. Mantysalo, R., Balducci, A., Kangasoja, J.: Planning as agonistic communication in a trading zone: Re-examining Lindbloms partisan mutual adjustment. *Planning Theory* (2011)
4. Feinstein, S.: *The just city*. Cornell University Press (2010)
5. Boroushaki, S., Malczewski, J.: Measuring consensus for collaborative decision-making: A GIS-based approach. *Computers, Environment and Urban Systems* **34**(4) (2010) 322–332
6. Ardissono, L., Voghera, A.: Participatory decision making: a step towards e-planning for smart cities. In: *Planning Support Tools: Policy Analysis, Implementation and Evaluation*. Franco Angeli (2012) 1338–1349
7. Susskind, L., Cruikshank, J.: *Breaking the impasse. Consensual approaches to resolve public disputes*. Basic Books Inc., New York (1987)
8. Pierrakos, D., Paliouras, G., Papatheodorou, C., Spyropoulos, C.: Web usage mining as a tool for personalization: a survey. *User Modeling and User-Adapted Interaction* **13**(4) (2003) 311–372
9. Paliouras, G.: Discovery of web user communities and their role in personalization. *User Modeling and User-Adapted Interaction* **22**(1) (2012) 151–175
10. Schifanella, C., Sapino, M., Candan, K.: On context-aware co-clustering with metadata support. *Journal of Intelligent Information Systems* **38**(1) (2012) 209–239
11. Schifanella, C., Candan, K., Sapino, M.: Fast metadata-driven multiresolution tensor decomposition. In: *Proc. of the 20th ACM Conference on Information and Knowledge Management CIKM 2011, New Orleans, Louisiana* (2011) 1275–1284

SMART project: industrial and academic collaboration for service design

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Abstract. Governments need to devise services centered on citizens and their needs. The SMART project focuses on the development and validation of new service science methodologies in e-Government domain to achieve value added services able to satisfy explicit and implicit citizen needs. To reach its goals, SMART benefits from the experience of industrial and academic worlds that sharing multidisciplinary knowledge contributes to build services more citizen-centered. SMART considers three different scenarios to devise and validate its methodologies. This paper presents the initial experience carried out by industrial and academic partners in one of the considered scenarios.

Keywords: industrial-academic experience, service design, citizen-centered service

1 Introduction

Service science is an emerging discipline which studies the process for the discovery of customer needs and the creation of deliverable values. It aims to propose more systematic approaches to service innovation compared to the practice already in use [4]. As such, it provides models and principles that a government can apply to innovate citizen-centered services through the proper application of Information Technology (IT), economics and sociology advances. Different expertises may contribute in the development of personalized services by highlighting different needs and constraints. Personalization of e-services has been addressed in different works as a key mean to offer more citizen-centered services [1, 3]. Furthermore, a common vocabulary ³ has been devised in order to enable experts of different domains to easily communicate on the basis of a shared knowledge conceptualized in an ontology.

The underlying question addressed in this paper concerns the possibility to identify aspects and interests shared by academic, industrial and government

³ https://joinup.ec.europa.eu/asset/core_public_service/description

communities that should synergically act towards the provision of e-services personalized to citizens. More precisely, this study describes the experience carried out in the service science domain within the SMART project. SMART (Services and Meta-services for smART eGovernment) is a 3-year project founded by the Italian PON project PON01 00861 and it aims to define and validate new design approaches for citizen-centered e-services and their application in IT service production. The project involves several partners with different points of view and objectives presented briefly in the following:

- Industrial partners are interested in the production of a software application for service distribution. The application should provide citizens with an integrated view of local government services and should ease the interaction between people and Public Administrations (PAs). Moreover, the application should promote further technological development by offering the opportunity to publish and advertise correlated services, thus improving citizen satisfaction;
- Academic researchers are interested in defining new service science methodologies and experimenting their application in real service delivery scenarios. The application should investigate the effectiveness of the proposed techniques to discover citizen needs, the flexibility of methodologies to deal with any legal, economic and sociological issues, and their ability to promote public service re-engineering activities;
- PAs are interested in the innovation of their services. The developed methodologies should promote effective re-engineering activities, reduce waste and improve the efficiency of service production and delivery. Moreover, the developed software application should provide a more immediate and valuable access to public services, reduce the amount of employees' work and increase the citizen satisfaction.

All partners try to develop effective methods for sharing multidisciplinary knowledge and training new service science experts. Thus, the project experience should teach professionals how to effectively collaborate and generate ideas in an environment with different objectives, expertises and backgrounds. In addition, an education project should validate a curriculum for a service science expert.

SMART involves the University of "Milano-Bicocca" and three IT companies, namely Ancitel, Future Space and Halley Sud-Est. The academic partner studies and promotes the application of methodologies for modeling services and training professionals. Ancitel offers services to Italian local governments both at the IT level and at the strategic consulting level; it also contributes in SMART with its knowledge of the local government needs and its service development experience. Moreover, Ancitel hosted an education center for eighteen service science experts who are able to deal with a wide range of topics about information technology, law and government organization. Finally, Future Space and Halley Sud-Est offer e-services to public and private sectors and, in SMART, they are essentially involved to apply the proposed methodologies on real scenarios in order to validate their suitability.

The rest of the paper is organized as follows. Section 2 describes the main activities of SMART, focusing on three demonstrative scenarios. Section 3 describes the joint experience carried out by academic and industrial partners considering the first scenario. Section 4 concludes the paper.

2 The Three SMART Scenarios

The project activities were begun by analyzing the current needs of local governments and citizens with respect to ease and efficiency of access to services, law and administration rules that enforce the technological upgrade, available funds and readiness to accept innovation. The analysis has provided some insights about three specific scenarios identified as interesting study cases.

For each scenario, SMART has aimed to develop “Value Added Services” (VASs), i.e. protocols and tools for an integrated access to basic services that a citizen requests driven by a motivation. Different basic services could be actually related whenever they are useful to satisfy a unique need of the citizen. The discovery of these latent relations should relieve the citizen from the cognitive, organizational and logistical burden needed to produce and execute a plan that allows the access to basic services. Hence, in a first approximation, we may consider a VAS as a package or bundle of basic services which, taken together, cover a need. In addition, a VAS should take into account that in different situations the same need may be covered by different sets of basic services. Consequently, the citizen should interact directly with many services by using them in different production processes. Hence, the main aim of a VAS is to define a proper orchestration plan of basic services in order to satisfy explicit and implicit citizen needs. The scenarios are briefly described in the following:

Public business opening: in this scenario, the VAS offers an integrated view of services that an entrepreneur uses in order to establish and maintain a company. Italian laws introduced an unique access point, named “SUAP”, which aims at coordinating all the administrative requirements needed for creating enterprises in order to streamline relations between PA and citizens. The VAS to be developed for this SMART scenario should contribute to making SUAP services more citizen-centered. In this way citizens could perceive the SUAP not only as an institution able to eliminate useless constraints, but also as a help for efficient company start-up. The partners involved in the development of this VAS have different interests. Specifically, Ancitel is interested in developing an application for on-line SUAP services; academic researchers are interested in exploring innovative methodologies to add value in SUAP services. The starting point was the analysis of the SUAP domain to understand actual needs of entrepreneur and PAs. Precisely, analysis effort focused on services for opening café and Bed & Breakfast (B&B) businesses. More details on this analysis are given in section 3.

Demographic information update: in this scenario, the VAS offers an integrated view of the interaction between PAs and citizens when they need to update demographic information. In this VAS, the analysis focused on

services for residence change since PAs are interested in providing service bundles able to reduce the delivery effort and to enhance care for citizens. Such service bundles may help citizens to quickly change residence, offering them insights useful to make more comfortable their residence change and allowing them to share related information with other communities. The main interest of Ancitel in this VAS concerns the development of applications to enable citizens to change residence on-line in real time, according to the current law which was introduced as a key element in a nation wide effort to increase productivity. The academic researchers are interested in the design of strategies that create added value by composing service bundles. The VAS development began with the domain analysis focusing on Italian laws about change of residence and services that could be useful to citizens when they change residence, such as services related to school and nursery.

Territory control: in this scenario, the VAS offers an integrated view of information provided by actors, such as police, PAs and citizens. For instance, the VAS would allow police agents to carefully monitor the territory by also discovering stolen vehicles and common violations. Services for territory automatic control allow to reduce the amount of work, improve the effectiveness of investigations and interventions increasing citizen reliance on PAs. In this VAS Ancitel is involved in developing applications for allowing citizens to report violations and police agents to effectively intervene in reported violations. Moreover all partners are interested in exploring the opportunity of using open data and user generated content to deliver informative services. The early work in this VAS was the analysis of the police procedures, possible ways to gather territory information and to produce meaningful reports, for instance about vandal and criminal acts on public infrastructures.

One SMART outcome should be the VASs implementation by a web platform that integrates several services. The system should offer a common access point for PAs and other involved subjects to provide a service ecosystem enabling citizens to use VASs. Currently, some components of the platform have been analyzed and designed. Ontologies and models have been studied in order to allow providers and local governments to easily code their services and to quickly subscribe them in the platform with a minimum effort. Algorithms for automatic composition and selection of services have been devised, so that the platform is able to support the choice of the most valuable service combination and to automatically provide a bundle proper to needs of a specific user.

3 Experience in the Public Business Opening Scenario

This section describes the experience carried out by SMART industrial and academic partners to gather data about the demographic information, usage experiences and needs/expectations of entrepreneurs within the scenario on public business opening. To collect information about entrepreneurs, we devised questionnaires considering two kinds of public businesses, namely café and B&B. A questionnaire contains two main sections to collect respectively demographic

data and information about usage experiences on services for opening public businesses in Italy. Precisely, the first section includes questions about gender, age, marital status, children number, citizenship, residence, income, occupation and production field. Questions of the second section concern a set of services identified during the SUAP domain analysis (e.g., requests for certifications such as Italian anti-mafia attestation, acoustic influence attestation, and supplementary services such as insurance or wi-fi). Specifically, entrepreneurs were required to answer questions about some aspects of considered services such as the time spent to request it, the time to obtain it, its cost, its transparency, its ability to fulfill entrepreneurs' needs. For each aspect, entrepreneurs were required to indicate their perceptions by choosing one of the levels among those included in Likert scales commonly used in survey researches [2]. Two different strategies have been employed to provide questionnaires: entrepreneurs have autonomously completed online questionnaires or they have been assisted by an interviewer.

The gathering phase has involved entrepreneurs who have started their business during the year 2012. Precisely, we have selected from the Italian Registry of Company about 200 entrepreneurs of café and about 250 entrepreneurs of B&B from different Italian regions. Then, we have contacted them to obtain their availability to complete the questionnaire and 38 entrepreneurs of café and 64 entrepreneurs of B&B have completed at least the demographic section.

Successively, we have performed the descriptive analysis of the collected data. In this phase, for each question, we have analyzed the answers and computed some statistical descriptors on the collected values useful to increase knowledge on entrepreneurs using public business opening services. In the following we provide some graphics showing value frequency distributions for some sample questions. Graphics about gender, age and occupation questions are shown in Fig. 1. For some questions, collected data have been integrated with statistical data published by the Italian National Institute of Statistics (ISTAT) to derive more informative data. For instance, starting from the residence city specified by entrepreneurs we have derived the city size in terms of habitant number. Moreover, we have also determined the altimetrical zone corresponding to the specified residence in order to recognize the activity context by distinguishing among hill, litoral hill, plain and mountain zones. Such additional information may heavily affect expectations and requirements of users when they have to open a public business. Fig. 2 shows the frequency distributions for residence provinces ("*Other*" includes provinces with the lowest frequency), altimetric zones and city sizes.

As concerns questions of the second section, we have analyzed the perception distributions. As an example, Fig. 3 shows the distributions for all aspects of the insurance service. Perceptions are expressed on a scale from L1 (the most unsatisfactory level) to L7 (the highest satisfactory level). L0 is the level for unexpressed perceptions. In addition, we examined how perceptions are distributed with respect to the actual values of each service aspect. Fig. 4 shows an example of the distributions for the cost of the insurance service. For each perception level expressed by entrepreneurs, the figure shows box plots indicating insurance cost

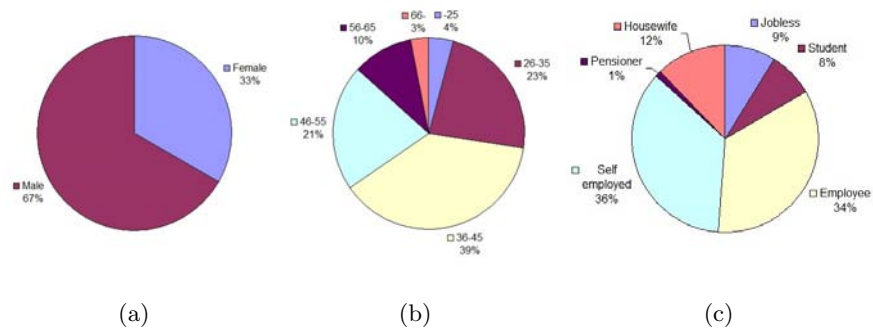


Fig. 1. Frequency distribution of gender(a), age (b) and occupation (c)

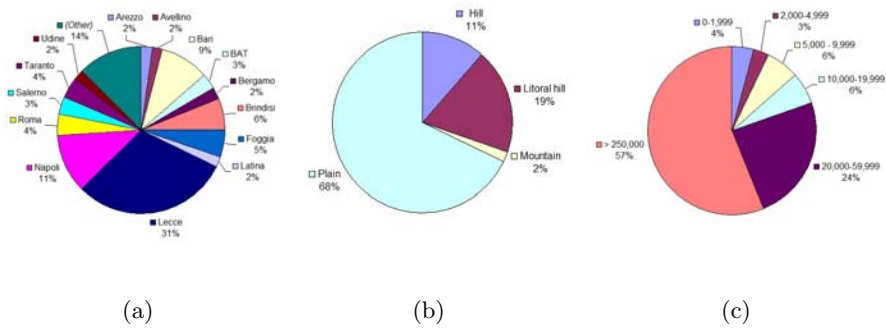


Fig. 2. Frequency distribution of residence (a), altimetrical zone (b) and city size (c)

values on which they expressed the corresponding perception level. The gathered information is the basis for a future knowledge mining process. Such process will highlight service characteristics that can be enhanced in order to improve values perceived by entrepreneur groups. Its results will also allow personalization of VASs according to group membership. For example, Figure 3 shows that entrepreneurs are mostly concerned with insurance cost and that there is a niche who would benefit from reduced delivery and request time. Hence, a VAS can improve value by reducing costs and times by means of IT improvements.

Data gathered through questionnaires may be conveniently exploited to identify groups of users sharing similar characteristics and thus providing service bundles tailored to their actual needs and expectations. More specifically, the software platform will gather demographic information from the user and will use it to deliver more personalized services depending on the user group.

4 Conclusions

This paper has presented a joint experience of academic and industrial partners in SMART, a research project that aims to define and validate new methodologies for more citizen-centered services. SMART considers three scenarios to

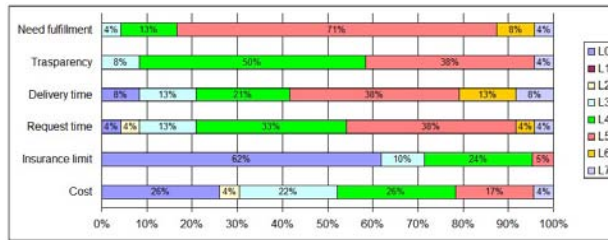


Fig. 3. Frequency distribution of perception levels for insurance service

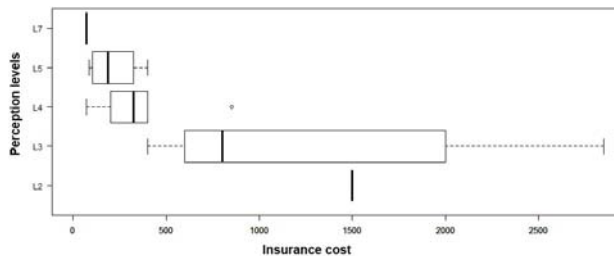


Fig. 4. Insurance cost distribution with respect to perception levels

develop VASs able to bridge the PA-citizen gap by providing service bundles that satisfy explicit and implicit citizen needs. The paper has reported the experience carried out within the scenario for public business opening. The descriptive analysis of data gathered by questionnaires will allow to mine knowledge about entrepreneurs that can be useful to devise effective VASs. In particular, such analysis may be considered as a preliminary step for the activity of identifying homogeneous groups of users to offer personalized services according to their mined characteristics.

Acknowledgment

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References

1. Malak Al-hassan, Haiyan Lu, and Jie Lu. A framework for delivering personalized e-government services from a citizen-centric approach. In *iiWAS*, pages 436–440, 2009.
2. I. Elaine Allen and Christopher A. Seaman. Likert scales and data analyses. *Quality Progress*, 40(7):64–65, 2007.
3. Nikolaos Loutas, Vassilios Peristeras, and Konstantinos A. Tarabanis. A citizen-centric, semantically enhanced governmental portal. *EG*, 8(4):363–384, 2011.
4. Paul P. Maglio, Cheryl A. Kieliszewski, and James C. Spohrer. *Handbook of Service Science*. Springer, 2010.

The Human Touch of Government Services

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Abstract. As personalisation is becoming prevalent in many areas, there is an increasing desire to provide personalised services (e.g., personalised brochures) in the government domain. The idea behind these services is that they would be fully automated, but feel personalised to the users. We argue in this paper that, sometimes, and in particular for some groups of citizens, the “human touch” is important – i.e., having a human interface with the citizens. We further argue that this is now possible with social media, which affords one-to-many interactions. We draw examples from a preliminary study of the discussion forum in a one year trial of an online community developed to support welfare recipients.

Keywords: Government Services, Online Community, Personalisation, Social Media

1 Introduction

Personalisation is used extensively in many domains, from recommending items to buy or recipes to cook to offering advice and encouragements to help people losing weight. As a result of this widespread use of personalisation and its apparent success, there is an increasing desire to provide personalised services in the government domain. These could include, for example, personalised brochures [1], or services which ask the user some questions first to ensure the appropriate service is provided (e.g., the newly launched Payment Finder service from the Australian Government Department of Human Services (referred thereafter as Human Services)¹. The idea behind these services is that they would be fully automated, but feel personalised to the users.

In this paper, we argue that, sometimes, having a human present is important. We term this here the “human touch”. Such a human interface already exists, of course, via call centres, front-desk workers or social workers. It is, however, expensive as it requires one-to-one interactions. It thus poses issues of scalability and economic sus-

¹ <http://www.humanservices.gov.au/customer/payment-finder/>

tainability. With the emergence of social media, including its use by governments, we believe there is now an opportunity to provide the human touch in a scalable manner: through social media and the one-to-many interactions it affords.

Social media has given a voice to the citizens and a new place to find information. A person's difficulties in getting government services becomes everyone's experience through social media, and a question can be addressed to peers rather than to the government. Social media can be used to (crowd) source an answer to any question – see, for example, Q&A forums. Nowadays people may turn to social media before they turn to an official web or a call centre (especially when there are long waiting times). Consider for example the posts in Fig. 1, taken from the *bubhub* forum². The first post asks a question to the community about a specific payment and its relationship to another payment, the Family Tax Benefit (FTB). It is answered by another member in that forum through the second post. This behaviour is frequent in forums and in microblog sites (e.g., Twitter).

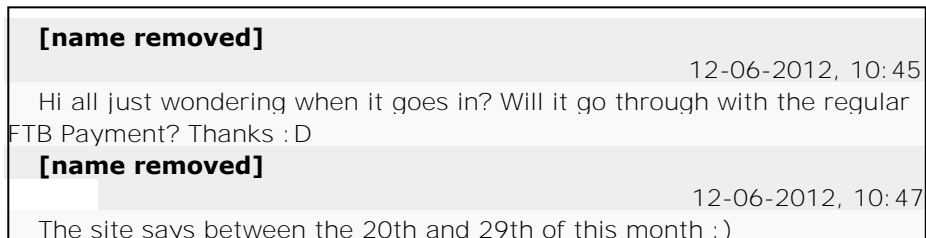


Fig. 1. Questions and Answers from Forums

Consider now the post in Fig. 2. It is from a staff member from the Department of Human Services, who noticed that there were a number of queries about a specific topic (another specific government payment: The SchoolKids Bonus). To ensure that the information obtained by bubhub members is correct and that no misinformation is propagated, Rahul goes ahead and answers some of the queries, clarifying some points and correcting others (the specific responses are omitted from the figure).

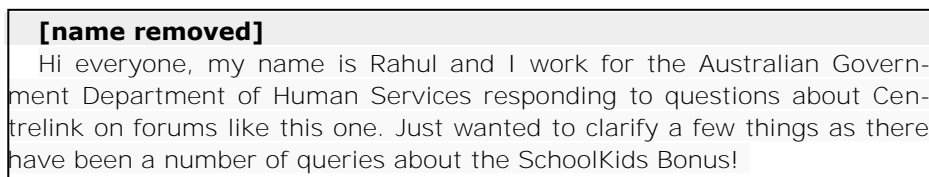


Fig. 2. An answer in a forum from a staff member from Human Services

This is an example of the type of one-to-many interactions that can occur in social media. While Rahul answers specific questions, and thus can be seen as providing

² <http://www.bubhub.com.au/>

personalised answers, his answers also benefit a large number of people, through their visibility.

Before the existence of social media, it was possible to contain information and news within a certain group or set of people. With social media, however, information spreads quickly and is potentially far-reaching. This is good for fairness, quality and equality. Having a human intervene in this context can provide the “human touch” that is sometimes required to provide accurate information or diffuse issues. It can still have a large impact because of the potential spread of information, including jumping silos, as some individuals are likely to transmit the information from one place to another (e.g., one forum to another, onto Twitter and Facebook). This can be capitalised on to provide personalised services with a human touch.

One can ask whether the presence of a government department staff in social media is desirable or welcome, and what role such a person can play—e.g., [2]. We describe here our experience with an online community we developed in partnership with Human Services to support welfare recipients. In particular, we look at the role of moderators and argue they provided personalised information and services and a crucial “human touch”. Importantly, because this was done in a social media context, although their answers were personalised to an original query, they benefited a large number of people.

The remaining of the paper is structured as follows: Section 2 presents related work in the use of social media in government. Section 3 provides a brief description of our online community, its members and some of the design decisions. Section 4 presents some preliminary results about how our community members felt about the moderators and concludes the paper.

2 Related Work

Governments have recognised the potential of the social web. They have begun to actively increase their online presence, both to disseminate information and to engage citizens. Politicians and public servants now use Twitter and Facebook extensively to keep the public informed (e.g., tweetMP to follow Australian Members of Parliament on Twitter, the Facebook page of the Bedfordshire Police in the UK, the Facebook pages³ or Centrelink account⁴ of Australia’s Human Services, etc.). They also use social media for campaigning purposes, e.g., [3-7]. Many governments (at all levels: local or state or national) capitalise on social media to engage citizens. For example, Public Sphere⁵ is a consultation platform to involve people in public policy development; Future Melbourne⁶ engages people in the design and strategy of the future shape of their city; the city of Wellington in New Zealand introduced E-petitions to improve citizen participation [8]. In these initiatives, citizens are encouraged to con-

³ For example, the page for student <https://www.facebook.com/StudentUpdate> -- accessed May 7th, 2013

⁴ <https://twitter.com/Centrelink> -- accessed May 7th, 2013.

⁵ <http://www.katelundy.com.au/category/campaigns/publicsphere/> -- accessed May 7th, 2013.

⁶ <http://www.futuremelbourne.com.au/wiki/view/FMPlan> -- accessed May 7th, 2013.

tribute to the design of government policies and have a voice. In other initiatives, the government is crowd sourcing information. For example, the Victorian State Road Authority uses social media to obtain information about road hazards⁷. In our work, we are exploring the use of social media not as a way to engage citizens in policy making, but to support specific groups of citizens through the creation and mediation of online communities. Online community (and social networks in general) have been shown to have the potential to provide social and emotional peer-support. For some groups of citizens, such support would be important. Some researchers have looked into the use of new media to empower disadvantaged groups of citizens, e.g., [9], but these initiatives were organised by Non-Government Organisations, not governments.

In our work, we look at the role of government in facilitating the creation of online community groups aimed at providing social support to disadvantaged citizens. In this paper, we look at the role of the moderators in such communities.

3 Our Online Community: *Next Step*

Next Step was designed and developed to support parents in receipt of welfare payments transition to a different welfare payment that has participation requirements (i.e., the need to work or study for a certain number of hours each week) when their youngest child reached school age [10]. This transition to work can be difficult, in particular for single parents and people who have been out of the work force for many years. As the Internet has become a social place where people come to exchange ideas, share experience and support each other, we wanted to explore whether an online community could be helpful in supporting people through this transition, helping them be better equipped to find a job and develop a support network. An online community could also be a place for the government to provide information specifically targeted to this group of people.

We designed the community informed from the results of group interviews and a survey we had conducted to gain an understanding of the issues this particular group of people were facing during the transition process, the concerns they had and the type of assistance (i.e., emotional and/or informational) that would be useful for them during this transition process [11,12].

Next Step is organised as a portal. It is not, however, a portal for government services. It is to serve as an online community. Members receive information tailored to their interest in the home page. A community page provides information about what is happening in the community, and there is a page for each resource offered within the community, e.g., forum, information packages, media, and activities. Members can move from one section to another through the navigation ribbon shown in Fig. 3. As also shown in the figure, the portal was clearly branded as being government sponsored.

⁷ https://www.facebook.com/VicRoadsCS/app_354378081311737 -- -- accessed May 7th, 2013.



Fig. 3. The *Next Step* Online Community

During the design of the community, we paid particular attention to the ethical issues, as the target members were in a dependence relationship with the government (i.e., they receive their payment from the government) [13]. Assurance of anonymity in this context was paramount, as we wanted the community members to feel free to express themselves without fear of retribution. Our feasibility study had indicated that people would want the discussion forums to be moderated (88.64%) [11], both to ensure accurate information and to avoid the forum becoming a place where all people do is complain. Yet, we were worried that people would not want to discuss issues with Human Services staff present on the forum. As it turned out, people did express themselves freely (e.g., “*NO I DON’T FEEL SUPPORTED*”; “*not that Centrelink cares*”). They also took advantage of the fact that Human Services staff were present, asking them questions and verifying information they had received from other sources. Human Services’ staff engaged with community members on a daily basis. In fact, community members usually addressed them explicitly (e.g., “*Hi Gigi. I appreciate your positive suggestions to the problems that are being faced by single parents trying to find suitable employment.*”).

4 Were the moderators valued?

The forum is of particular interest to look at the issue of whether the moderators were valued. Like any other forum, this is where the discussions took place and questions were asked. While we are currently analysing the forum data in detail, we want to briefly report here the comments we received in an exit poll at the end of the trial. As we had conducted a trust survey at the beginning of the community, the exit poll was designed to see if people’s trust values had changed over the course of the trial. The poll also included questions with respect to the Human Services moderators involved in the community: how helpful they had been and how useful their responses and information had been. We did not get many responses to the exit poll, but the ones we obtained are very positive towards the Human Services moderators. We also obtained feedback in the forum about the role of moderators. In particular, people were not only happy to have answers to their questions, but they appreciated the fact that a person was listening to them, talking to them, and empathising with their situations. This is plainly as illustrated by the following comments:

“You’ve been a great help, Gigi [Human Services Moderator], and I know we’ve been quite vocal in our discussions here about our disappointments with the changes. I hope you get recognition from your managers for your great work in being the face of Human Services and at the coalface of our issues with Centrelink.”

“Thanks Gigi, it makes a nice change to have someone willing to listen and be sympathetic to the situations some clients may be in.”

“If you mean the staff from Centrelink and CSIRO, they were very professional in their responses, and tried to give advice from the Centrelink sources. They came across as believable, and therefore trustworthy.”

The last comment is particularly interesting as it mentions trust: it indicates how someone who provides trusted advice and is always professional is seen as “trustworthy”. This is very important. Because of the changes that have affected our community members, their trust in the government and anyone related to government has become quite low. It seems that the moderators from Human Services have been able to change that attitude, at least towards themselves.

We believe our community participants appreciated having a person to whom they could ask questions and explain their situation. It made them feel valued. They also knew they would receive the correct information. Given the nature of the specific group we were dealing with, we believe that caring human touch is very important, and a fully automated personalised service would not be able to achieve this. Importantly, because the interactions took place in an online community, they benefited more than one individual, thus mitigating the issues of scalability and sustainability that one-to-one interactions face.

Our preliminary analysis shows that, at the beginning of the community, members were negative towards Human Services, anyone related to that department or to the government, and thus towards the moderators of the community. Over time, member’s comments become more neutral and at the end the comments were still negative or neutral to Human Services but neutral, positive and even defensive of moderators. The comments given above already indicate a positive sentiment towards one of the moderators, Gigi (who was the main moderator of the forum throughout the one-year trial). The following comment given at the exit poll also reflects the feeling of the majority of members:

“Gigi was able to provide responses faster and more accurate than centrelink. Also when accessing social website forums we (the next step participants) were generally aware of info a lot sooner than other parents”.

This shows that it is possible to provide human touch through social media.

We now analyse the exit poll from the top 10 active members in the community, as we would like to see the effect of that human touch. (We excluded the results from 2 other members as they have logged in a very few time in the community during a year trial period to have any significant understanding on the community). It is worth mentioning that our community followed the 90-9-1 Jacob Nielson’s rule, whereby for 1% of highly active participants, there are 9% active and 90% passive members (often called lurkers). In *Next Step*, the top 10 active people contributed 90% of all the posts from community members (as opposed to moderators).

The preliminary results are shown in Fig. 4. All but one member found the moderators very helpful and mostly useful. It is worth noting that the only person who responded negatively was negative throughout the community life and refused offers of help from the moderators.

The results for “usefulness” are lower than those for “helpfulness”. This may be due to the fact some members felt that they could not express their opinion openly due to the presence of moderator (although they mostly did!). It could also be due to the fact that moderators could provide information, help out as much as possible and express empathy, but they could not change the situation nor the policy. (We saw many comments from the members such as: “please change this legislation” – this is clearly not something the moderators could do. They made it clear to the community members that they would pass on the comments to policy makers but that they were not in a position to change the legislation. While this was eventually understood by community members, it was still frustrating to them.)

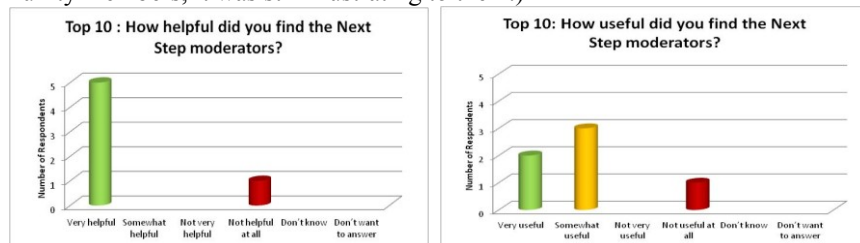


Fig. 4. Exit Poll Results on Helpfulness and Usefulness of the Moderator

We are currently analysing all the data from the community in detail, including the forum. Some of our aims are to identify when and how the change of attitude towards the Human Services moderators occurred during the course of the trial, whether people’s trust values changed, and how the moderators addressed some of the situations that arose (e.g., members showing distress or extreme anger, etc.).

5 Acknowledgements

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6 References

1. Colineau N, Paris C, Linden KV (2012) Government to citizen communications: From generic to tailored documents in public administration. Information Polity,

- Special Issue on Open Government and Public Participation, Editors: L F Luna-Reyes, S Ae Chun and V Atluri IOS press 17 (2):177-193
2. Wright S (2006) Government-run Online Discussion Fora: Moderation, Censorship and the Shadow of Control. *The British Journal of Politics & International Relations BJPIR* 8 (4):550-568
 3. Mascaro CM, Goggins SP (2011) Challenges for National Civic Engagement in the United States. In: *Proc.C&T 2011 Workshop on Government and Citizen Engagement*. , Brisbane, Australia, 30th June 2011 2011. vol 2. IISI - International Institute for Socio-Informatics pp 8-14
 4. Muhamad R Political Blogging and the Public Sphere in Malaysia. In: *Proc. of the C&T 2011 Workshop on Government and Citizen Engagement*, Brisbane, Australia, 30th June 2011 2011. vol 2. IISI - International Institute for Socio-Informatics, pp 23-31
 5. Sweetser KD, Lariscy RW (2008) Candidates make good friends: An analysis of candidates' uses of Facebook. *International Journal of Strategic Communication* 2 (3):175-198
 6. Vargas JA (2008) Obama raised half a billion online. <http://voices.washingtonpost.com/44/2008/11/obama-raised-half-a-billion-on.html>. Accessed October 20 2010
 7. Williams C, Gulati GJ Facebook grows up: An empirical assessment of its role in the 2008 congressional elections. In: *Proceedings from Midwest Political Science Association*, Chicago, 2009.
 8. Toland J E-Petitions in Local Government: the case of Wellington City Council. In: *Proc. of the C&T 2011 Workshop on Government and Citizen Engagement*, Brisbane, Australia, 2011. vol 2. IISI - International Institute for Socio-Informatics, pp 15-22
 9. Baroni A Deliberation and empowerment in Rio de Janeiro" s favelas. In: *Proceedings of the C&T 2011 Workshop on Government and Citizen Engagement*, Brisbane, Australia, 2011. vol 2. IISI - International Institute for Socio-Informatics, pp 49-57
 10. Bista SK, Colineau N, Nepal S, Paris C The design of an online community for welfare recipients. In: *Proceedings of the 24th Australian Computer-Human Interaction Conference*, Melbourne, Australia, 2012. ACM, pp 38-41
 11. Colineau N, Paris C, Dennett A Capitalising on the Potential of Online Communities to Help Welfare Recipients. In: *Proceedings of the C&T 2011 Workshop on Government and Citizen Engagement*, Brisbane, Australia, 2011. vol 2. International Institute for Socio-Informatics, pp 59-65
 12. Colineau N, Paris C, Dennett A Exploring the use of an online community in welfare transition programs. In: *25th BCS Conference on Human-Computer Interaction*, Newcastle-upon-Tyne, United Kingdom, 2011. British Computer Society, pp 455-460
 13. Paris C, Colineau N, Nepal S, Bista SK (2013) Ethical considerations in an online community: the balancing act. To appear in *Ethics and Information Technology In Press*

User Segmentation in e-Government Services

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Abstract. E-Government is becoming more attentive towards providing intelligent personalized services to citizens so that they can receive better services with less time and effort. This work presents an approach for inferring user segments that could be properly exploited to offer personalized services that better satisfy user needs and their expectations. User segments are derived starting from data that essentially describe demographic characteristics of users and that are gathered by questionnaires. A clustering process is performed on gathered data in order to derive user segments, i.e. groups of users sharing similar characteristics. Finally, for each derived segment, we define a user profile that summarizes characteristics shared by users belonging to the same segment. The suitability of the proposed approach is shown by providing results obtained on a case study.

Keywords: clustering, e-Government, user segmentation.

1 Introduction

E-Government (e-Gov) concerns the use of innovative systems, information and communication technologies to provide advanced and efficient services to users (citizens and businesses). The acceptance of these powerful tools in this domain has led to a variety of benefits including reduction of costs, revenue growth, transparency and accountability to governments, greater convenience, and increased productivity. Moreover, e-Gov services have a great potential for delivering better governmental services to users, improving the quality of the provided services and the accessibility to information/services.

One key factor that can help to increase the success of e-Gov is represented by the possibility to provide personalized services that are able to meet the actual needs and demands of users. Hence, in e-Gov domain, a crucial activity consists in acquiring extensive knowledge about target users of public services. Research interest is focusing on the development of strategies aimed to endow governments with personalization mechanisms that enable to conduct their communications

and services in a more user-centric way [1, 5]. One of the most employed strategies for collecting and analyzing knowledge about users is segmentation that, in general terms, refers to the process of identifying groups of users (i.e., segments) which share specific needs, characteristics or behaviour. The aim of user segmentation is to gain extensive knowledge about users in order to satisfy their needs, and to build customised relationships with them [6]. Segmentation approaches can be broadly distinguished into two main types, namely user-based segmentation and product/service-based segmentation. Based on the first approach, segments are derived by considering user characteristics involving demographic, geographic and psychographic/lifestyle variables. In the second approach, segments are derived by considering specific features of the products/services that have to be delivered such as their properties, expected benefits and usage motives.

This work focuses on user segmentation in the e-Gov service domain and it presents preliminary results of an experience carried out within the Italian research project SMART (Services & Meta-services for smART e-Government). SMART is aimed to define, develop and validate innovative methodologies, technologies and tools for the design and the delivery of services in the e-Gov context. Specifically, in this paper, we present a user-based approach for deriving segments from data gathered by questionnaires. Firstly, a number of variables related to user characteristics are identified as segmentation basis, i.e. variables used in the effective process of user segment derivation. Then, data are gathered by requiring users to fill a questionnaire prepared to acquire information about users of a set of services. In the next step, a clustering process is performed on the collected data in order to derive a number of groups of users with similar characteristics. Finally, each derived segment is described by a profile that synthesizes characteristics of users belonging to each segment.

The paper is articulated as follows. Section 2 describes our approach to user segmentation. In section 3, we present results obtained by applying the approach to a case study. In section 4 some conclusions and future works are drawn.

2 The User Segmentation Approach

Starting from data about some user characteristics, the aim of the approach is to derive a number of user segments, i.e. groups including users that are similar with respect to the considered characteristics. To achieve this aim, four main steps are performed namely Segmentation Variable Definition, User Data Gathering, User Segment Derivation and Segment Profile Definition (see Fig. 1). In the following, we provide details for each step.

Segmentation Variable Definition. The first step is devoted to select features that allow to effectively characterize users. The main goal of this step is to identify a set of variables related to user characteristics that can be employed as a basis for segmentation, i.e. variables used for grouping together similar users. A wide number of variables could be selected as segmentation bases. Among these, the most employed variables concern different user features related to

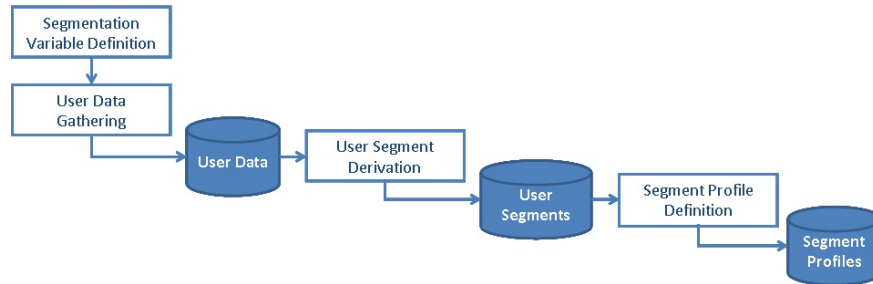


Fig. 1. The user segmentation approach

geographic, demographic, psychological, psychographic and behavioral characteristics [4]. Broadly speaking, some approaches segment users exploiting only one kind of variables, often simple to obtain, such as in geographic segmentation or demographic segmentation. On the other hand, more sophisticated approaches combine different kinds of variables in order to obtain a better user characterization allowing the derivation of more significant segments. For instance, in life-style segmentation, demographic and psychological variables are combined together to characterize users. In this work, demographic and geographic variables are selected as a basis for segmentation. Precisely, selected variables are age, gender, marital status, family, children number, occupation, and residence city features (size, chief town, altimetric zone, tourist vocation). This choice is essentially due to the fact that in the considered domain users of provided services can be properly differentiated with respect to demographic and geographic characteristics.

User Data Gathering. This step has the aim to acquire data about users according to the variables selected in the previous step. User data can be gathered through several methods that may be distinguished into two main classes: methods that require a strong involvement of users and methods that acquire data without asking for the explicit intervention by users [4]. Typically, methods of the first class collect user data by means of questionnaires, telephone interviews, and focus groups. Conversely, the second class methods implicitly gather data from different sources that collect information exchanged by users when they interact to share opinions, perceptions, etc. For example, behavioral and psychographic data can be derived through the application of mining techniques on user generated content shared in blogs, social networks, etc. Other important data sources are informative systems that, collecting information on user interactions during their running, allow to mine data about users and their behavior. In this work, data about users are gathered by means of a questionnaire devised to collect not only demographic data of users but also perceptions about their usage experiences of a set of services on some aspects, such as the time spent to request the service, the time passed to obtain the service, the cost, the service ability to satisfy user needs, the service quality, etc. In addition, starting from the residence of users gathered by questionnaires, geographic data related to residence

city features are obtained by exploiting data of national statistics. To segment users in this work, only demographic and geographic data are considered. Data gathering is performed in some cases by requiring users to autonomously fill online questionnaires and in other cases by interviews (questionnaires are filled by the interviewer).

User Segment Derivation. Once user data are gathered, the next step consists in deriving user segments by grouping together similar users on the basis of segmentation variables. Among the wide variety of segmentation techniques, clustering remains the most popular and widely applied technique. Clustering techniques attempt to identify groups, called *clusters*, of similar users by maximizing the homogeneity within each group and the differences between different groups through the application of suitable distance measures able to evaluate the (dis)similarities existing between each pair of users. The process of clustering can be accomplished in different ways: users may be grouped to derive a partition in which each group represents a cluster (*partitional clustering*) or users may be grouped to form a tree structure in which the intermediate nodes represent clusters of possible partitions (*hierarchical clustering*) [3]. In this work, user segments are derived by a partitional clustering technique, namely the *k*-means algorithm [3]. Such algorithm is a simple but powerful iterative technique that implicitly partitions the available user data by minimizing the distances between each user into a set of *k* centroids summarizing user data belonging to each cluster in the partition. The iterative process ends when distance values stabilize or a prefixed maximum number of iterations is reached. As a result, *k*-means derives *k* cluster centroids represented as *n*-dimensional vectors where *n* represents the number of the considered segmentation variables. A user is matched with all centroids and he is associated to the segment corresponding to the nearest centroid.

Segment Profile Definition. The last step of our approach is devoted to describe user segments derived in the previous step. The aim of this step is to provide extensive knowledge about users belonging to each segment. Such knowledge can be useful in order to select the target segments and to plan the most appropriate strategies that effectively address needs of the targeted users. Specifically, in this step, for each user segment is defined a profile that summarizes the relevant aspects of users within the segment. Typically, information included in a segment profile comprise an identifier that permits to unambiguously refer to the segment, a textual description that synthesizes the most important characteristics of users within the segment and a collection of properties on the set of variables selected in the first step for segmenting users. To derive profiles, the components of each segment centroid are used to describe the characteristics of users belonging to the segment in terms of actual values taken by the corresponding variables.

3 A Case Study

The proposed approach was applied to a case study in order to show its suitability. In particular, the approach was applied in order to derive and characterize

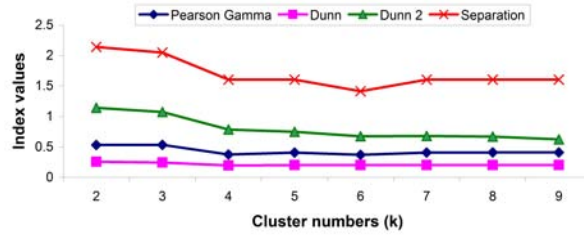


Fig. 2. The obtained index values

segments of entrepreneurs interested in services that are useful to open public businesses in Italy such as café and Bed & Breakfast (B&B).

To gather user data, about 200 entrepreneurs of café and about 250 entrepreneurs of B&B from different Italian regions were contacted and, among these, 38 entrepreneurs of café and 64 entrepreneurs of B&B have accomplished the questionnaire. Before segmenting entrepreneurs, we mapped values of nominal variables of gathered data into numerical values to represent data in a more suitable form for clustering. Successively, k -means was applied on the available data to segment entrepreneurs. We performed several runs with different k ($k = 2, \dots, 9$) and, to establish the proper number of clusters (segments) for the gathered entrepreneur data, we employed some validity indexes (Pearson's gamma, separation and Dunn indexes [2]) that are usually used in literature to this aim. Fig. 2 reports the index values obtained in correspondence of k values. As can be observed, index trends show sharper variations in $k = 3$, thus we selected such value as appropriate number of segments to partition entrepreneurs.

Table 1 shows the centroids obtained by k -means related to the three segments derived from gathered entrepreneur data. Each row contains the component values of a centroid for the corresponding segmentation variables indicated in the column headers. In addition, the last column reports the coverage values on the total number of entrepreneurs of each derived segment.

Finally, each derived segment was described by a profile. A possible interpretation of the defined profiles is as follows:

- S1 Males aged 40-50 years, self-employed. Conjugated with an average family with 4 members including 3 dependents. They live in large municipalities that are not of tourist interest located in coastal hilly area.

Table 1. The three centroids obtained by k -means

	Gender	Age	Marital status	Family	Children number	Occupation	Residence city: chief town	Residence city: altimetric zone	Residence city: littoral	Residence city: mountain	Residence city: tourist vocation	Residence city: size	Coverage
S1	1.71	3.57	2.00	4.14	2.57	3.86	1.00	2.14	0.71	0.14	0.00	5.86	19%
S2	1.40	3.00	1.80	3.70	2.00	2.70	0.00	2.30	0.10	0.20	0.10	2.80	28%
S3	1.63	3.37	1.79	2.74	0.21	3.58	0.68	2.84	0.74	0.21	0.16	5.53	53%

- S2** Mostly women aged 36-45 years, involved in employee jobs. Married with an average family of 4 people with 2 dependents. They live in small-medium sized cities that are not of tourist interest located in internal hilly area.
- S3** Mostly male of about 40 years, professionals. Living with an average family of 2 people and no dependents. They live primarily in medium-large sized chief-towns located in plains or coastal areas of some tourist interest.

The knowledge mined from demographic and geographic data about users, embedded in the defined segment profiles, could be conveniently used to adapt services according to the user characteristics and to provide personalized services able to meet their actual needs.

4 Conclusions and Future Works

This work has presented an approach for user segmentation in e-Gov domain based on a partitional clustering technique exploiting demographic and geographic variables. The suitability of the approach was shown by considering data about entrepreneurs interested in opening public businesses. The obtained preliminary results encourage the application of the approach to wider scenarios involving e-Gov services. As future work, the integration of other segmentation variables that describe behaviours and attitudes of users could be fruitful to infer segments able to better capture needs and expectations of users in order to predict their future behaviours.

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References

1. X. Guo and J. Lu. Intelligent e-government services with personalized recommendation techniques. *Int. J. Intell. Syst.*, 22(5):401–417, 2007.
2. M. Halkidi, Y. Batistakis, and M. Vazirgiannis. On clustering validation techniques. *J. Intell. Inf. Syst.*, 17(2-3):107–145, 2001.
3. A. K. Jain, M. N. Murty, and P. J. Flynn. Data clustering: a review. *ACM Comput. Surv.*, 31(3):264–323, 1999.
4. C.W. Lamb, J.F. Hair, and C. McDaniel. *Essentials of Marketing*. South-Western College Publ., 2011.
5. J. Lu, Q. Shambour, Y. Xu, Q. Lin, and G. Zhang. BizSeeker: A hybrid semantic recommendation system for personalized government-to-business e-services. *Internet Research*, 20(3):342–365, 2010.
6. M. Wedel and W.A. Kamakura. *Market Segmentation: Conceptual and Methodological Foundations*. Kluwer Acad. Publ., 2000.