I&R Services From a Community Point of View: Supporting Methods and Technologies

Josep Lluis de la Rosa
University of Girona, Spain, EU & Rensselaer Polytechnic Institute, USA
pepluis@isac.cat

Chitra Shanbhogue
Community Answers, Greenwich, Connecticut, USA
cshanbhogue@greenwichlibrary.org

Mercè Rovira
University of Girona & Ajuntament de Girona, Spain, EU
merce@isac.cat

Araceli Moreno
Universidad Autónoma de Tamaulipas, Mexico
araceli@isac.cat

Abstract — In this workshop, a real case of how volunteers help an I&R service will be discussed. Additionally, we will see how putting an I&R database online helps reduce the burden when dealing with an increasing volume of inquiries. There will be examples drawn from I&R services in the European Union and the United States. The starting point is that Public Authorities have increasing difficulties in providing timely and accurate information in response to the wide variety of citizens' enquiries to which they are expected to respond. These often require the citizen to be redirected to other Authorities as the query refers to their area of responsibility. This often leads to frustration and wasted time for the citizen, who has to explain their query several times, before obtaining a satisfactory answer.

The workshop will show as well how online Information and Referral Services (I&R) can help to reduce the administrative burdens while increasing the overall quality of service provided, its availability to full 24/7, and significantly reduce the cost to the administration. There will be discussion over the case of Community Answers, in Greenwich, Connecticut, USA, where the online approach has helped to reduce by a third the staff required to man telephones while the number of calls increased by 25% between 2000 and 2008. We will also discuss the experiences with the Call Center of the city of Terrassa, Catalonia, Spain, Europe, where the service has expanded by 1/3 in the years 2007 and 2008 compared to 2006 without additional costs in the context of a European project for the deployment of open source I&R in Europe.

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1. INTRODUCTION

INFORMATION and Referral (I&R) services refer to a social service describing a unique process of assessment and information-giving that enables people to make informed choices regarding their particular needs and the services that might be helpful to them.

I&R specialists, who are typically public servants, combine skillful questioning and careful listening with sensitivity, support, and guidance to help callers "sort out" their situations and make reasoned and informed decisions. They will identify the agencies/services that are best able to meet the caller's needs and explain the potential outcomes of pursuing one option over another. It is a process that gives individuals a sense of control over their situation. After talking with an I&R specialist, individuals feel much better equipped to make what are often important life decisions.

Many I&R agencies collect data regarding the number and nature of the enquiries they receive, and the information that is used, as an aid to improving the service by identifying gaps in the information available. I&R staff record statistics frequently and forward the pertinent information to the appropriate agencies; we take advantage of this practice in this study.

There are thousands of I&R programs in operation across Canada, the United States, and Europe. In the USA many of these are comprehensive, community-based programs. Others are specialized programs catering to the needs of particular social groups, such as seniors, people with disabilities, children and youth, etc. I&R service providers include non-profit agencies, United Ways, libraries, hospitals, and employee assistance programs.

The most widely accepted definition of I&R is:

"the active process of linking a person with a need or problem with a service which will meet the need or solve the problem." (Alavi and Leidner, 1999).

For example, this type of service would provide detailed information, including the contact information, mailing address, and telephone number for organizations that are able to provide childhood immunizations. There are three basic requirements for an I&R service: creation of a resource file (which we are going to refer as the database, or the I&R database); distribution of the information; and updating of the file. I&R services were originally created to serve the disadvantaged members of underserved areas, but few have actually served this type of population exclusively.

I&R services are symptomatic of the complexity of the present mode for delivering human services by public administrations, and reflect a relatively conventional response to the problems created by such complexity. As quoted from (Kronus and Crowe, 1971):

"It is suggested that I&R services represent a conventional response because they grew out of the tangle of human services and have evolved essentially as partners and perpetuators of the present complexity of human services. [...] The fact remains that human services remain largely inaccessible to a great number of people who need them. The barriers, such as poverty, ignorance, and prejudice, which prevent the utilization of services, are not easily overcome. [...] What appears to be needed is a revolution in the delivery of human services, or the development of an entirely new approach to their delivery that lies completely outside the present structure.”

This assertion as early as 1971 is still valid in 2009, especially as the majority of US and EU administrations go entirely on-line in the coming years. Then, on-line I&R services will become indispensable. Despite many citizens being considered digitally illiterate, the collective knowledge of society as a whole is much more extensive than the knowledge of any one individual. This knowledge is available to all via the Internet and can be linked through the use of database technologies. The Information and Referral database is not just a list of contact names; it is an electronic library that can be used to obtain information on a variety of topics. As technology advances, I&R services will become even more important in helping people make informed decisions about their lives.
greater than many civil servants might think, and can be utilized to answer many of the difficult questions themselves (Howe, 2008). The revolution comes from here, giving tools to citizens in terms of direct access to the I&R information, and letting them improve it.

The recent trend of providing I&R services online is expected to reduce the service’s cost and expand their capabilities and effectiveness. These changes are discussed in this chapter. Moreover, this trend is going to increase rapidly as both the American and European governments aim to go entirely on-line over the next few years.

There are two companies in the USA that offer I&R online solutions: IntelliResponse is devoted to Universities, and WebQA is devoted to public administration as a whole. In Europe, there are few more companies (e.g., Artificial Solutions and iSAC) that are devoted to public administrations; others (e.g., Q-Go) are aim to provide such services to private companies as well. The WebQA, Q-Go, and Artificial Solutions are FAQ-based approaches. IntelliResponse combines Frequently Asked Questions (FAQ) and web searchers, and iSAC is an open source solution for intranet searches. Therefore, we shall study the state of the art in FAQ utilization used in the Question and Answer (QA) search engines.

Recent trends in responding to FAQs by creating answer communities are studied in this paper. Aspects of usability and rewarding approaches to enhance participation are proposed.

2. WHAT IS THE IMPACT OF I&R SERVICES GOING ON-LINE?

Using automatic answering machines prevents citizens from gaining direct interaction with real humans to meet their informational needs, and their effect is the prevention of further phone calls. The same prevention of telephone calls will also occur when I&R services go on-line. We understand by going on-line as to let citizens direct access to the I&R databases and FAQs. The process of I&R services moving online could be accomplished in several ways:

a) Putting some I&R information on the web
b) Letting citizens make directory and other queries through the web using an I&R database
c) Attending to e-mails
d) Using natural language systems to help citizens make their queries directly to an I&R database.

In (a) updating the web with episodic events prevents phone calls. An automated system to assist in the transferring of the database to the web would be desirable. One further possibility is creating and providing a list of FAQs online.

In (b) the web interface has direct query access to the I&R database. This is very useful, especially for local authorities where agendas and city directory queries comprise nearly 80% of citizens’ most common questions.

In (c) more sophisticated questions can be answered at times when the I&R service is less busy with incoming calls. This helps to reduce calls and optimizes the work of human agents, who are much better able to organize their workload.

In (d), more sophisticated questions can be answered on-line through the use of linguistic resources (namely with those Question Answering search engines of WebQA, Q-Go, and iSAC, among others). This is an improvement over (b) in terms of access to the I&R database and (a) in terms of the FAQ on the web.

These common approaches range from quite simple to highly complex. We now analyze their impact in two cases, one in America and the other one in Europe. The first case is that of Greenwich, Connecticut in the USA and the second, is the case of Terrassa, Catalonia in Europe. These locations have two I&R services that share the same principle: to answer any question which has some connection to the city/town, regardless of whether it is about local government, other services provided by national or local services, life in the community, or the city in general. Both I&R services went online in recent years, and they have gathered a substantial quantity of data that can be used to understand their impact over the period that their online service has been running.
Community Answers: Greenwich, Connecticut

Greenwich is a town of over 60 thousand inhabitants about 45 minutes from New York City. Its population is stagnant, with only 3.9% growth in the last 30 years. Greenwich’s I&R service is very peculiar and quite different from the centralized 2-1-1 Connecticut call center with regional community representatives of the State of Connecticut. The Greenwich I&R service, which is known as Community Answers (CA), is run independently from the town hall in Greenwich. Roughly 18% of its budget comes from the United Way of Connecticut, and the rest of the budget comes from local donors. However, CA is providing the service in the name of the whole town. Surprisingly, a significant amount of its traffic arises from town hall civil servants asking questions about their own institution.

A common practice of American 2-1-1 services is to link volunteers with opportunities and donors with recipients who will benefit from the donation (Dan o’Shea et al.; 2004). In most cases, the call center staff takes care of this matching. In some instances, direct referrals are made to an ongoing, community-based volunteer broker. As the benefit estimates suggest, however, 2-1-1 services offer an enormous potential benefit to society. This is exactly the case of CA: it works with highly motivated volunteers at the phone desk.

CA also has an on-line I&R service (Fig. 1).

![Fig. 1 The I&R service in Greenwich, Connecticut accessible at http://www.communityanswers.org](http://www.communityanswers.org)
Fig. 2 displays the evolution of questions at CA. This organization had three phone shifts until 2005; shifts were reduced to two in 2006 after the successful addition of on-line information via the sharing the I&R database with citizens on the web. The on-line service, equipped with e-mails and the web, was inaugurated in July 2001. In 2004, a counter was installed on the website to determine how many consultations were performed directly via the web. These actions have provoked a yearly decrease in the number of phone calls.

The burden decreased by 33.3% (one of the former three shifts was discarded) between the years 1998 and 2008 after a 61.5% phone call reduction. In contrast, the number of questions answered grew by 99.8% (i.e., the service nearly doubled the number of answers it provided). Highly motivated volunteers provide the service. The reduction of the number of shifts did not significantly reduce the costs (because CA is a volunteer based service), but it eased management responsibilities, and let the volunteers be focused on more complicated, and thus more interesting, questions. Answering more challenging questions also provides a higher added value for citizens, as well as more interesting and rewarding for volunteers. It therefore has a double benefit. It is interesting that the number of questions doubled within the same population, and this statistic provides a rough idea of the service need in the town of Greenwich, as its population, though stagnant, is getting digitally literate.

CA in Greenwich has three part-time staff devoted to the organization of the service, recruiting volunteers and donors, searching for information updates, and tutoring and supervising the volunteers. As at many sites, significant staff effort is spent maintaining the completeness and accuracy of the resource database; these costs are embedded in non-call staff wages and other costs. It is interesting to compare the performance of CA vs. the 2-1-1 service of the State of Connecticut using data from (O’Shea et al, 2004) shown in Table I. The CA deals with higher rates of calls per inhabitant (11.15% vs. 8.07% of the State of Connecticut). Additionally, the CA service is much more efficient in terms of the cost per call (dropping to US $5.43 per call compared to the state US $13.28) when the on-line and phone services are considered. In fact the CA costs per phone call have dropped by nearly 3 times after putting their databases online. Many repetitive and simple calls are prevented by the on-line service, and the remaining calls definitely require the human attention of volunteers who can more intensely engage the situation and needs of the caller or provide specialized services that require more time due to their complexity.
Table I. Comparison of the 2-1-1 State of Connecticut I&R and the Community Answers (CA) I&R of Greenwich, Connecticut

<table>
<thead>
<tr>
<th>Comparison as of 2004</th>
<th>2-1-1</th>
<th>CA phone</th>
<th>CA + on-line</th>
</tr>
</thead>
<tbody>
<tr>
<td>Call volume</td>
<td>281.188</td>
<td>6.937</td>
<td>19.786</td>
</tr>
<tr>
<td>Population</td>
<td>3,483,372</td>
<td>62,236</td>
<td>62,236</td>
</tr>
<tr>
<td>Ratio Call/Pop</td>
<td>8.07%</td>
<td>11.15%</td>
<td>31.79%</td>
</tr>
<tr>
<td>Cost</td>
<td>$3,733.390</td>
<td>$107,418</td>
<td>$107,418</td>
</tr>
<tr>
<td>Ratio Cost/Call</td>
<td>$13.28</td>
<td>$15.48</td>
<td>$5.43</td>
</tr>
<tr>
<td>Model</td>
<td>Refer/Centralised Volunteers Volunteers/On-line</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Staff</td>
<td>35</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>Ratio Staff/Call</td>
<td>1:8.034</td>
<td>1:4.625</td>
<td>1:13.191</td>
</tr>
<tr>
<td>Funding</td>
<td>100% state &amp; local</td>
<td>0% state &amp; local</td>
<td>0% state &amp; local</td>
</tr>
</tbody>
</table>

Servei d'Atenció Ciutadana: Terrassa, Catalonia

Terrassa is a city of over 207,000 inhabitants in the outskirts of the city of Barcelona. Terrassa has experienced a 21.8% growth in its population in the last 10 years. The city has a strong I&R phone and desk service funded by the City Hall that is accessible through a 0-1-0 number. Its model, similarly to CA is to provide citizens with answers to questions about the government and the city. Between 1999 and 2002, the service counted only calls asking for information. It already had an on-line web service to answer straightforward informational queries at that time, and the impact of this service was clear in the period between 1999 and 2003. The I&R service expanded in 2004 to answer phone calls for not only city information but also city applications, thereby causing a huge increase in the volume of phone calls. The I&R service through the 0-1-0 phone number attended a higher volume of phone calls after 1999, especially after a 2003 campaign to promote this service in the city.

The large increase in phone call volume and the growing population suggested that further on-line measures were required, such as making the I&R database available online. The service received over 300,000 calls in 2006, at which point they initiated a full, on-line I&R service utilizing the open source platform for on-line I&R services known as iSAC.
The service’s 0-1-0 phone call service steadily grew during this period. As shown in Fig. 4 over period of 2006-2008, the number of phone calls to the Terrassa I&R service decreased by 17.2%. In contrast, the organization increased its service by answering more than 80,000 new questions per year at any time of any day. This figure represents an increase of the 23.4% in their attentional capacity. Consequently, the cost per question was reduced by 23.4%.
The online service thus helped to reverse the increasing trend in phone calls while expanding the service so that it was now available 24 hours a day, seven days a week. This I&R service is thus always available when the phone service is not.

**Reducing Costs and Burden**

We have seen two approaches that share the same principle of putting I&R databases on-line. Greenwich and Terrassa are two cases of significant cost reduction accompanied by an increase in the volume of answered questions. To keep this impact up, it is essential an I&R service with provide updated information, and lots of it. A new problem then arises in how the I&R database should be updated without increasing backup costs or requiring additional use of the I&R staff.

This problem is key for the adoption of the online I&R, but it is challenging and costly as well. The staff could work on this task full-time but still have plenty of missing, incorrect, or obsolete information. One of the possibilities is to take advantage of the knowledge of citizens or volunteers. To understand how to do this, we must first examine the state-of-the-art of FAQ technology. Then, we will determine how to assist in the creation of FAQ lists through the use of citizens.

A second issue is that the difference between the two on-line I&R systems of Greenwich and Terrassa lies in the fact that the I&R service of Terrassa had linguistic resources in its search engine. Since the on-line service deals with over 80% of the most frequently asked questions (i.e., those regarding the directory and agenda), the questions tend to be simple. They can thus be expressed in terms of simple keywords and answered using search engines like Google. However, citizens should appreciate the natural language interface as friendlier and provide a higher degree of satisfaction than simple, keyword-based interfaces. Next section will measure the citizens satisfaction. Unfortunately, this perception has not yet been translated nor measured in terms of cost reduction.
3. ABOUT CITIZENS SATISFACTION

In the previous section we have seen the costs reduction while expanding the I&R services, but two questions arose: how can the I&R can be filled up with us much as information as possible with the minimum cost, and what is the satisfaction of users using search engines for their questions. Let us first analyze how the Frequently Asked Questions (FAQ) work, and how can they be improved by citizens participation.

FAQ Technology

A popular way of sharing inquiry-based, I&R information on the Internet involves listing FAQs and their answers on web pages or text documents. FAQ lists are still today the most common way of providing answers to common questions online. Many internet-based organizations and corporations will first direct clients and citizens to read through a publicly available FAQ document before submitting questions to support personnel. This limits the number of redundant questions and reduces the resources spent on support personnel.

A FAQ document has several drawbacks in comparison to an interactive Question and Answer (QA) system. If the FAQ is too small, the questions will most likely not cover sufficient breadth of the topic. A small size is positive in that it enables readers to quickly skim through the FAQs to determine if their questions are covered. A large FAQ set, on the other hand, can be intimidating to read and is not always guaranteed to provide the correct answer. Sometimes, larger FAQ sets will be covered in several documents, each dealing with a more specific area or topic. This can provide some structural advantages, but makes it harder to search for specific keywords relating to a question, as the user may not be familiar with the hierarchy used to organize the FAQs. Another problem with a static FAQ set is that there is no straightforward way for an I&R specialist to find out the types of questions citizens are actually asking. This can be solved by providing some sort of feedback, such as email. However, the citizen will typically want the question to be answered right away and will search elsewhere for an answer before submitting any feedback. If feedback were to be provided, an administrator could theoretically refine the FAQs based on empirical knowledge as to the types of questions being asked most frequently.

One of the greatest drawbacks with static FAQ sets is that users are not given the option to ask free-form questions; instead, they are forced to re-phrase the question in such a way that it matches the information available. Since citizens can be considered a type of insider, they may best understand and answer the questions of other citizens, then we expect to utilize citizens to answer each other. If storing the questions and answers, this will lead to complete FAQ sets that contain answers to virtually any question.

The most important systems currently using the FAQ approach for I&R services are: WebQA3, Q-Go4, Artificial Solutions5, IntelliResponse6, and iSAC7. The main difference among these systems is that iSAC, installed in the city of Terrassa, addresses the main problems of FAQ lack of completeness. First, it "crawls" inside the organization to search for information; then, it allows citizens to participate in the information exchange process, by providing with any information that helps citizens with their day to day problems and enables them to fully participate as members of their democratic community. It is information pertaining to the availability of local services such as health care, financial assistance, housing, transportation, education and childcare services; as well as information on recreation programs, clubs, community events, and information about all levels of government. This is what is called community information (Pettigrew, 1996).

The Community Answers (CA) of Connecticut also provides community information, though it does not have any self organized capability, so can be considered a directed community. We suggest that those communities which provide self-organizing capability to provide assistance to other members of the

3 http://www.webqa.net
4 http://www.q-go.com
5 http://www.artificial-solutions.com
6 http://www.intelliasponse.com
7 http://www.isac.cat
city/town, such as iSAC in Terrassa are much better in allowing citizens to freely interact. The question then becomes: how to empower citizens so that they generate the questions and answers that fill the FAQ?

Weaknesses of the FAQ Approach and the Community Solutions

Despite the successes of both iSAC and Community Answers in delivering community information using the FAQ approach there are still considerable weaknesses that need to be addressed if the service is to be of maximum benefit to all citizens. (Sneiders; 1999) reports that FAQs have been traditionally presented as lists of answers which users have to scan to find the solution to their problem. This leads to a number of issues as it assumes that users all have similar issues that they wish to resolve, and that they can identify potential solutions easily when they are presented to them. In particular, users do not have the opportunity to ask any questions of their own. They are required to search among a long list of pre-canned questions until they find the one that comes closest to their problem, if one even exists at all. This is because the information provider does not know the actual questions that are currently being asked. They therefore answer the questions that they suppose that users might ask, or collect together answers to questions that have previously been answered, or a combination of the two. This leads to poorly organized lists with inadequate indexing, making it very hard for a user, who is unfamiliar with the language and concept used by the information provider.

When the list is too long or is disorganized, users normally adopt one of two strategies for working with it. They can either read all the questions in it or they can search for the question using a key word. This helps if the list is classified, but there are lists whose classification is ambiguous or the terms are unfamiliar and the users do not know where to look. This is a particular problem with the sorts of I&R systems we are considering as the information providers are typically Authority personnel whose knowledge and understanding is different from the normal citizen posing the question. The two systems discussed in this chapter deal with this issue in rather different ways. The provider might also provide assistance by constructing a list of FAQs within a FAQ. When users choose a question that comes close to their problem, they can find another list of possible questions. The problem with this approach is that the search can become too long if the users have followed an inappropriate branch and continue with the hope of eventually finding the correct answer.

One way in which these problems can be addressed is to allow users to propose their own questions to add to the FAQ. This allows the questions to be formulated and prioritized according to the needs of real users. It can however lead to excessive numbers of questions which may repeat information that is already available in a slightly different form. Careful editing is therefore required to maintain the integrity of the list and to prune outdated or repeated questions. This can be a time consuming process for the organization that have to allocate significant resources for this task.

Another approach which can help with the problem of maintaining the currency of the information provided is to develop a social environment. These are highly dynamic; virtual span across a broad range of users, and allow rapidly changing collections of resources to be produced. In such environments, personalization and adaptation are paramount to facilitating effective knowledge construction and information sharing and creating a trusting and motivating atmosphere for members of groups, teams and communities to share and work together seamlessly. By developing such a community, local government officials can work effectively with members of the community to draw together information that is useful to all, without excessive workload burdens. Information is updated rapidly as additional information is added, and outdated information is deprioritized.

A recent study on developing communities, to be found in (Kim; 2000) points out that:

"Your community's purpose will evolve, but you need to start somewhere. Plant a stake in the ground and define your initial purpose as clearly as you can. To kick-start your thinking, see if you can identify an ongoing, unmet need that your members have in common and which your community is uniquely suited to address. Participating in this kind of project takes time and effort, and unless you fulfill a real need, your members won't be motivated to keep coming back. As you ponder this, you may find it useful to refer to Maslow's Hierarchy of Needs (see the following Fig 5), which can help you focus on the basics, while keeping up with the evolving needs of your members".
People rely on communities in all areas of their lives as we can see in Table 1. In this line, a study carried out in the AmI@work communities by the Computer Supported Collaborative Work (CSCW) research community [AmI@Work] in the Emerging Trends in Collaborative Technologies shows there is a number of Future Emerging Trends which are on the increase, such as based blogging, shared workspace and, last but not least, the wikis (on the increase by 53%). All these areas are of interest to I&R services, as they give a greater understanding of the ways that individuals interact online to solve their problems.

<table>
<thead>
<tr>
<th>Area of Life</th>
<th>Type of Community</th>
</tr>
</thead>
<tbody>
<tr>
<td>Family</td>
<td>Extended Family</td>
</tr>
<tr>
<td></td>
<td>Club group</td>
</tr>
<tr>
<td></td>
<td>FTA</td>
</tr>
<tr>
<td>Work</td>
<td>Workplace</td>
</tr>
<tr>
<td></td>
<td>Professional Group</td>
</tr>
<tr>
<td>Play</td>
<td>Games</td>
</tr>
<tr>
<td></td>
<td>Hobbies</td>
</tr>
<tr>
<td></td>
<td>Sports</td>
</tr>
<tr>
<td></td>
<td>Fan Club</td>
</tr>
<tr>
<td>Spirituality</td>
<td>Church or temple</td>
</tr>
<tr>
<td></td>
<td>Meditation group</td>
</tr>
<tr>
<td></td>
<td>Bible study group</td>
</tr>
<tr>
<td></td>
<td>Support Group</td>
</tr>
<tr>
<td></td>
<td>Drumming Circle</td>
</tr>
<tr>
<td>Politics</td>
<td>Political campaign</td>
</tr>
<tr>
<td></td>
<td>Environmental group</td>
</tr>
</tbody>
</table>

Finally, remark that there is a solution in the model included in the Research paper by (Moreno et al. 2006) stimulated to develop the WikiSAC virtual community. Starting from the following Figure 6, which was integrated into the iSAC platform with wiki to edit new answers from citizens, organised by means of knowledge contribution methods? This helps the construction of FAQ by citizens’ participation while reducing its costs. And citizens are satisfied by receiving answers that are better targeted by their own needs. Users (as well as experts) can be encouraged to engage in the QA synthesis process by empowering them with tools for answering questions. This makes sense, since first, citizens tend to be best at understanding the problems of other citizens. That is, they are insiders, and they understand the ways questions are posed. Second, they can share their personal experiences as citizens in their answers. This is applicable to questions ranging from very common curiosities to very rare, even personal questions regarding the public administration.
Citizens Satisfaction

It is not really valuable to reduce costs as long as the citizens are not satisfied with the new service. The satisfaction is the final measure of the I&R service, and the real aim at having sustainable on-line I&R services.

There are several measures of citizens satisfaction, namely first how many answers as qualified as “good” out of the total amount of questions put forward, second, how many questions are qualified as “good” compared to those are qualified as “bad”, third, on-line marks from 0 to 10 of the service, and fourth, and indirect measure of the growth of how many people use the service.

Let us see the first measure, as compared fulfillment of on-line I&R vs. 0-1-0 call center and Google. The test consists of a set of questions to measure the satisfaction of citizens (good/bad answer) and compare it the performance (fulfillment) of the online service compared to the call center (0-1-0 number) which answers at a first shot, when the call center answers after requiring for further information (a 2nd question), the answers provided by a keyword oriented search engine (Google) digging inside the Terrassa City Hall databases and the general Google. For iSAC and Google search a valid (good) answer is considered if it can be found in the first 20 results page. The test was performed in May 2007 by several people asking the same set of questions to the call center, to iSAC and to Google.

The output shown in Table 2 is that the online I&R with iSAC was able to match the same level of fulfillment of the call center (64%) as long as the human agent asked for further clarifications and details about the questions put through by the citizens. Google with a 36% could barely reach the fulfillment of the call center when the human agents asked no clarifications (as of 36%), and got worse when it included global information out of the city of Terrassa, because a lot of “noise” came in (27%). As a conclusion, the online I&R did a very good work, comparable to the human based call center 0-1-0, without the need of figuring out all the citizens potential questions, as it was able to understand the citizens questions and find out or create the answer.

<table>
<thead>
<tr>
<th>% fulfillment</th>
<th>Call center answers at one shot</th>
<th>Call center asks for further information to answer</th>
<th>iSAC answers at one shot</th>
<th>Google Searches only inside the City Hall DataBase</th>
<th>Google Searches everywhere</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>36%</td>
<td>64%</td>
<td>64%</td>
<td>36%</td>
<td>27%</td>
</tr>
</tbody>
</table>

Let us see a second measure, from the built-in feedback system of iSAC. The analysis is the feedback (good/bad) of the questions from January 1, 2008 to April 22, 2009. It is of 117,403 questions that citizens consulted the results (if no result on a page is clicked then the question is considered “not answered”). The
feedback was of 1.32% of the answered questions, 1,545 evaluated answers. The positive answers are 613, a 39.7%. Taking into account that the spontaneous explicit negative feedback of citizens is from 5 to 7 times higher the spontaneous explicit positive feedback (because the most of the satisfied citizens simply take the information and go without feedback, but unsatisfied citizens are much more willing and active at explaining their bad experience) then the statistics is corrected 5x1. Thus the proper reading of the test is that there are an estimated 76.7% of satisfied citizens.

Let us see a third measure, again from the satisfactions measures of the iSAC system. The average satisfaction of people measured in the 0 to 10 interval was of 5.9 in one year from May 2008 to April 2009 with a slightly growing satisfaction trend as shown in Fig. 7. These were 4.301 citizens, 3.39% of the questions made in the period. The measures from April 2008 to January 2009 are bimonthly, and monthly from February 2009.

And let us see the fourth measure, that is the trend of number of questions of the online I&R service, that were of 70.914 questions in 2007 and 103.000 questions in 2008, that is a 45,25% of growth, that gives an indirect idea of the success of the service.

In conclusion, after 4 types of measures, the satisfaction of the on-line I&R is comparable to the 0-1-0 call center and sustainable through time. This sustains the core value proposition that the on-line I&R are able to answer the questions of citizens while reducing costs and burden of the public administration. However, there are aspects that have not being measured in this chapter as for example the usability and comfort of having 24/7 the I&R service, though accordingly to the iSAC statistics (See Fig. 8) nearly of 20% of questions are put forward out of the time of the 0-1-0 call center and in holidays. This is another symptom of the utility of such an on-line service.

### Table 3 Satisfaction test of iSAC

<table>
<thead>
<tr>
<th>From Jan 1, 2008 to April 22, 2009</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Satisfactory answers (Raw Data)</strong></td>
</tr>
<tr>
<td>Bad 932 60,3%</td>
</tr>
<tr>
<td>Good 613 39,7%</td>
</tr>
<tr>
<td>Total feedback 1545 100,0%</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of users that has shown unsatisfaction compared to the total of questions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bad 932 0,8%</td>
</tr>
<tr>
<td>#questions 117403 1</td>
</tr>
</tbody>
</table>

![Fig. 7. Satisfaction of users by getting their feedback in the scale of 0 to 10. The format of time is of yy-mm.](image)
FUTURE WORK

As will be seen, great strides have been made already in the development of online Citizen Attention Services (I&R in the USA). Both iSAC and Community Answers provide models where the community and the officials work together effectively to provide timely and accurate answers that meet the citizen – enquirer’s needs. They do however still require considerable human intellectual input to function effectively and provide an accurate and authoritative set of answers to the complete range of potential queries. This level of service is inevitably expensive to provide, and opportunities need to be explored that can provide means of reducing this burden without compromising the level of service. This can best be done by automating some of the activities required using various artificial intelligence methods. For example, within the field of FAQ great efforts have been made to develop information retrieval techniques. This research has explored different solution alternatives such as grammatical analysis, question-type evaluation, work done with WordNet and the Web, noisy-channel transformations, semantic analysis and the inference model. (Sneiders; 2002) examined problems with FAQ, focusing in particular on the answers provided, since these can be a source of user dissatisfaction. (Moldovan et al.; 2003) explores the role of answer providers in FAQs, alluding that people behind them are experts in the field.

Another approach is to use virtual assistants. These are intelligent pieces of software that act as intermediaries between the citizen requiring information and the various information sources that can provide the answers (Wahlster, 2006). They attempt to provide the level of service that would be provided by an I&R expert. The state of the art of virtual assistants includes private virtual assistants dedicated to customer service and a virtual assistant dedicated to local government citizen information service. At present, there are some good public Citizens Attention Services in many countries which offer personalized attention in various forms, e.g. face to face, over the phone or internet. As a result, in these cities there has been more effective interaction between the citizens and the public administration. All virtual assistants share similar ways of capturing user questions and displaying answers: when the question corresponds to an answer found in a static list of answers, it is presented to the customer. Alternatively, the customer is presented a set of answers that could be related to the question; or the virtual assistant may suggest other sources for locating the information, such as electronic mail, telephone assistance, and an address for face-to-face personalized service. The size and the maintenance of the static list of answers may vary, according to the local experts’ anticipation of possible questions.
Modern Citizen Information Systems need to fulfill a large number of criteria. Consequently, the development of these systems is not a trivial process. In order to improve the citizen’s experience, these systems often need to personalize the information based on the current citizen’s needs and personal context (e.g., number of family members or citizen’s current employment state, his interests in dog’s owner’s communities/ hobbies, etc).

These technologies can be used effectively to improve the quality of Citizens Attention Services. This can be done by understanding citizens’ demands through their natural language (Fig. 9); it is based on the semantics of the communication process as a whole, and on structuring and semantic tagging of content to improve and simplify retrieval process. Such systems need to take a citizen-centered approach to provide integrated views of information over heterogeneous data sources. Since these data sources are usually autonomous (i.e. maintained by different local, regional and national public administrations) and distributed, frequently overlapping and changing, citizen attention services have to work hard to extract knowledge; this may prove to be a very challenging technology transfer issue. As stated in the workshop, the contributions of citizens are highly valuable to fill the gap of information that inevitably have all I&R services, especially when trying to reduce costs and burden. Though it is valuable, the public bodies have concerns about how clearly separate the information of the government from the one provided by citizens about the local government, the city, and other administrations. A number of solutions will be discussed in the workshop, taking Fig. 10 as an example.

Fig. 9. Generalized answering question machine
CONCLUSIONS

We have seen two cases of significant cost reduction accompanied by an increase in the volume of answered questions. The difference between the two on-line I&R systems lies in the fact that the I&R service of Terrassa had linguistic resources in its search engine. Since the on-line service deals with over 80% of the most frequently asked questions (i.e., those regarding the directory and agenda), the questions tend to be simple. They can thus be expressed in terms of simple keywords and answered using search engines like Google. However, citizens appreciate the natural language interface as friendlier and provide a higher degree of satisfaction than simple, keyword-based interfaces, as well as perform as good as call center based I&R.

We now understand that an I&R service with a lot of updated information is better for answering questions on-line. A new problem then arises in how the I&R database should be updated without increasing backup costs or requiring additional use of the I&R staff.

This problem is key, but it is challenging and costly as well. The staff could work on this task full-time but still have plenty of missing, incorrect, or obsolete information. One of the possibilities is to take advantage of the knowledge of citizens or volunteers. These issues will be discussed in the workshop.

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KEY TERMS & DEFINITIONS
I&R – INFORMATION AND REFERRAL
SAC - SISTEMA D’ATENCIÓ CIUTADANA, THE I&R IN EUROPE.
FAQ – FREQUENTLY ASKED QUESTIONS
QA – QUESTION AND ANSWER
I&R Services From a Community Point of View; Supporting Methods and Technologies

Josep Lluis de la Rosa, PhD, is the director of EASY Innovation Center, TECNIO at the University of Girona. Presently on leave at Rensselaer Polytechnic Institute in New York. He published over 200 papers in international journals and conferences in the fields of intelligent agents.

pepluis@eia.udg.edu

Chitra Shanbhogue, Executive Director of Community Answers Inc. has been with the organization for 5 years. Under her leadership the organization has expanded its services to meet the changing needs of the town population and trimmed costs by absorbing many of high cost professional services in-house by using volunteers and retraining staff. Before joining Community Answers, she was the Executive Director of the Indo-American Chamber of Commerce in Houston, TX, where she coordinated and facilitated a reciprocal partnership between MD Anderson Cancer Research Hospital, Texas, and premier research institutes in India. Her educational background is in Psychology, Economics and Social Studies.

cshanbhogue@greenwichlibrary.org

Merce Rovira. Visiting scientist to the University of Girona, CAT, EU, and founder and former head of the I&R of the city of Girona. MSc in Management of Quality in services, and PhD candidate in Innovation in organizations, a PhD program in the University of Girona. Fulbright Scholar in USA (1993-94), specializing in Public Policy Management and Evaluation. At present, she is member of ARLab research team in the University of Girona, and project leader for knowledge transference projects (3Helix work) on Innovation in Local Administration.

merce@isac.cat

Araceli Moreno. Visiting scientist to the University of Girona, CAT, EU. Professor of Computer Science in the Autonomous University of Tamaulipas and Technological Institute of Madero City in México. PhD candidate in Information Technologies program in the University of Girona, Spain. She is doing research on Virtual Communities associated with Questions and Answers (Q&A).

araceli@isac.cat