Information System for Mobile Devices of the Guàrdia Urbana City Police

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Abstract: The Barcelona City Council has focused on the application of the Information Technologies on the government of our city, not only in order to improve the services to the citizens, but also to make City Council internal services more efficient and user-friendly. The case exposed is one of the latest successes that show the benefits of the mobility approach taken in the Guàrdia Urbana City Police. PDA's use with remote access to corporative systems allows improving and speeding up street-level actuations, thanks to a real time access to the corporative information in order to finalize penal actions in-situ. At this point, errors are reduced and exists the possibility to notify and collect the fine at the same moment.

1.   Introduction

As technology moves forward and new products are being offered, its adaptation to work processes is increasingly indispensable. Technological mobility offers have evolved from devices with limited features like agenda and contacts management to great capacity portable offices. Nowadays, the fact that any person can be constantly connected to their organization applications or services entails a good placement and a high competitiveness.

The Guàrdia Urbana City Police agents, who carry out their activities in the street, do an important job for citizens. Furthermore, their activities have a direct impact in the Council internal systems. This is the reason why optimizing their street jobs allows to speed up the Council's internal processes. It also reduces management time and offers the possibility to provide a better service to citizens.

The aim of the action is to improve the efficiency and service level of the Guàrdia Urbana Police using workstations (PDAs) to ease the policemen's activities in the city.

The main reason to carry out this project was to improve the response capacity of the Guàrdia Urbana when finding any incidence on the street. This collective required faster and error free actuations as well as access to more information, such as situation of vehicles, City Council documentation, licenses, sanctions or the land registry. These requirements meant that a more efficient and adaptable treatment circuit was needed.

Thus, the PDAs provide more security to the street-level actuations of the police force and open a portal to communicate with other information systems, such as the Department of Motor Vehicles or other security forces like the Fire Brigade.

2.   Objectives

The main aims of this paper are:
1. To present the innovative mobility approach proposed in order to improve the Guàrdia Urbana Local Police capacity of response, efficiency and effectiveness.

2. To present a best practices model case description about the implantation of a support system to the mobility platform, common to all users and mobile applications, that gives answer to the universal needs of mobile devices.
3. To show this approach may be transferred to other public administrations to accelerate adoption of new ICT and processes to improve their efficiency and quality of service.

3. Business Case

3.1 Background

The prior system was not mechanized; accusation data was gathered manually by policemen using a fine ticket. The ticket was sent to the Territorial Unit to be classified and reported to a company responsible for mechanized data input. This mechanization included data treatment and depuration to facilitate the work of the different Council collector systems, responsible for denounce procedure and their notification via mail to the offender.
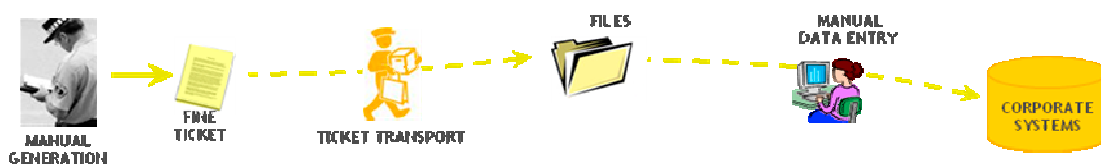

Figure 1: Prior System

3.2 Technological Solution

This system we present changed the whole process, starting with the on-line data input and following with the procedure in the Council systems. Now, the accusation is handled at the same moment that is detected and reported thanks to mobile devices. It is significant to point out the possibility of in-situ notification and the incorporation of new payment possibilities that allow the completion of the procedure at street-level.

The solution used to implement the system is based on the use of the new information technologies in the context of mobile applications. The development on the client side uses the operating system Windows Mobile 2003, including .NET technology, taking benefit of data synchronization with the BackOffice systems allowed by local databases (Oracle Lite). This system is prepared for an on-line operation with or without GSM/GPRS network coverage. Whether being out of range or not, the capacities offered by the synchronization of the PDAs' local databases can be used.

On-line access to the Council systems uses a wireless GSM/GPRS solution that is an extension of the corporate network (LAN) with GSM-LAN. The printers' connection is made via Bluetooth.

In order to compile as much features as possible, the equipment provided to the Guàrdia Urbana agents to support their street-level work consists of:

- PDA terminals fitted with photographic camera, access to the GSM/GPRS network, Bluetooth and Wi-Fi.
- Portable printers fitted with a long-life battery, easy to extract and easy to install in vehicles with Bluetooth connection; digital certificate readers (identification) and magnetic card reader (in order to pay).
- Support material: additional battery, SD cards to load new software versions and download pictures taken.

The complete system consists of a client side installed in the PDA and a server side integrated in the different Council systems. It includes a tax collection system and different enquiry databases that allow the on-line validation. This integration is made using standards such as web services of exchanging XML files.
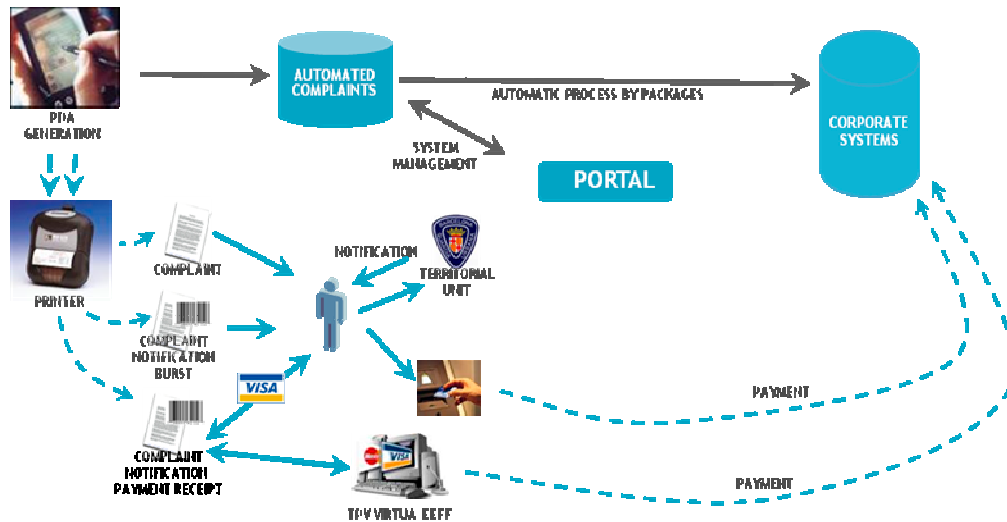
Figure 2: New System

The system is meant to give service to all the Guàrdia Urbana city police working in the street, so it is able to hold around 750 PDAs and 400 printers that will be used by 2500 officers. Nowadays, more than 1500 agents handle 400 PDAs and 200 printers.

4. Methodology

This project started as a partnership between the Guàrdia Urbana and the Municipal Institute of Informatics (IMI). The leading role was held by the Guàrdia Urbana, and the IMI acted as an innovative and technological agent.

Once the project was operative, the Municipal Tax Office (IMH) was included into the leading group to make possible an easier and faster payment of complaints. The automation brought them less data entry work, and generated error reduction and higher income.

During the project implantation, not only manager opinions have been taken into account, but the system users played an important role. Satisfaction surveys have been taken amongst them and have shown a perception of a high quality service meanwhile allowed new evolutions of the system during last year, which includes new features suggested almost entirely by the officers themselves.
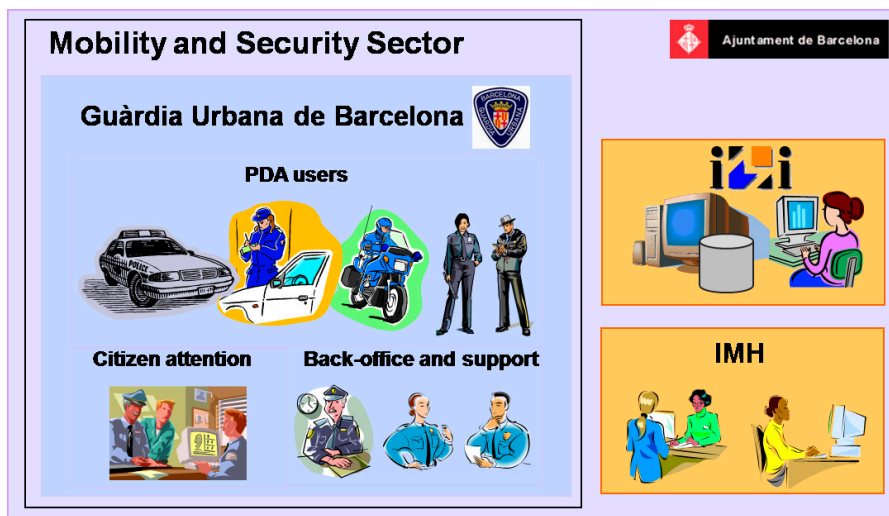

Figure 3: Partnership Model

5. Development

5.1 General Considerations

To understand the different steps of the project we must keep in mind that this is a user-focused project, meaning that it is a tool to improve the working methods of the police officers instead of just an improvement of the inner circuits.

To obtain a better acceptation of the project amongst the Guàrdia Urbana collective, the implantation plan started by presenting a support system to the mobility platform, that was common to all users and mobile applications and gave answer to the usual needs of mobile informatics. In order to create this software, the functional needs of the agents were analyzed when designing the pilot version. The following step was to outline the new improvements included regarding to the ones the operative test formerly had. Then, new functionalities were analyzed with special focus on the officers' most needed tools, like the expansion of the types of sanctions they could mechanize, or the connection with the Council Incidences System (IRIS) and decree violation reports. After that, an integrated mobility solution for municipal agents that work at street-level was created from functional needs detected and analyzed with the Guàrdia Urbana as well as client applications and connectivity systems necessary to its functioning.

Before its final implantation, an operative test was run amongst a reduced group of agents. This test was the key in defining mobility strategies, such as the solution ergonomics or the right mobile devices to be used, according to the Guàrdia Urbana's functional needs. Another step was the impact analysis that a project of this magnitude would have in the daily work of the police officers as they changed their working tool from a notebook to an electronic device.

Finally, the pilot was useful to analyze the different technologies involved (communication, replication and development) as well as the cultural impact the change of tool would have on the officers. Another objective that was achieved was studying the impact of mobile applications on internal circuits and protocols. Volumes, activities and costs were also analyzed with this tool.

Due to needs detected and objective to be achieved, the development was divided into:

- A mobile office, which included a personal agenda, e-mail and alarms.
- Interactive urban guide with access to city infrastructure, visualization systems and location by exact address or crossroad.
- Access to corporate information, incidence's reception and sending or actuation request. Integration with other corporate systems allows remote management.
- On-line reporting of accusations and incidences, attaching photos, that will be managed by a central service locating them territorially.

5.2 Final Planning

The development of the project can be described by these different steps:

1. The project started as a pilot on 2005, with 30 PDAs used by 100 policemen during three months. The PDAs had access to a reduced topology of complaints, and the officers could notify the complaints manually.
2. Next step was the project development, on July 2006, which involved the enlargement to all complaint types. Besides, the fine ticket was replaced by the printing system. During this actuation of the project, a special focus was made on training users and helping them to adopt the system change in order to reduce the cultural impact which can cause reluctance facing change.
3. During 2006 and 2007, the number of PDAs increased to 400, achieving the amount of 1500 users. The final system got integrated with the Council Incidences System (IRIS),

including an access to the web browser, in-situ introduction of the incidences and immediate resolution. A new service offered was to report peddling, with the consequent object confiscation and notification to the offender. This notification could be printed in-situ. Another feature the system included was the option to pay the fine via credit card and get a printed pay receipt. The last new feature was the vehicle information request from the central database.
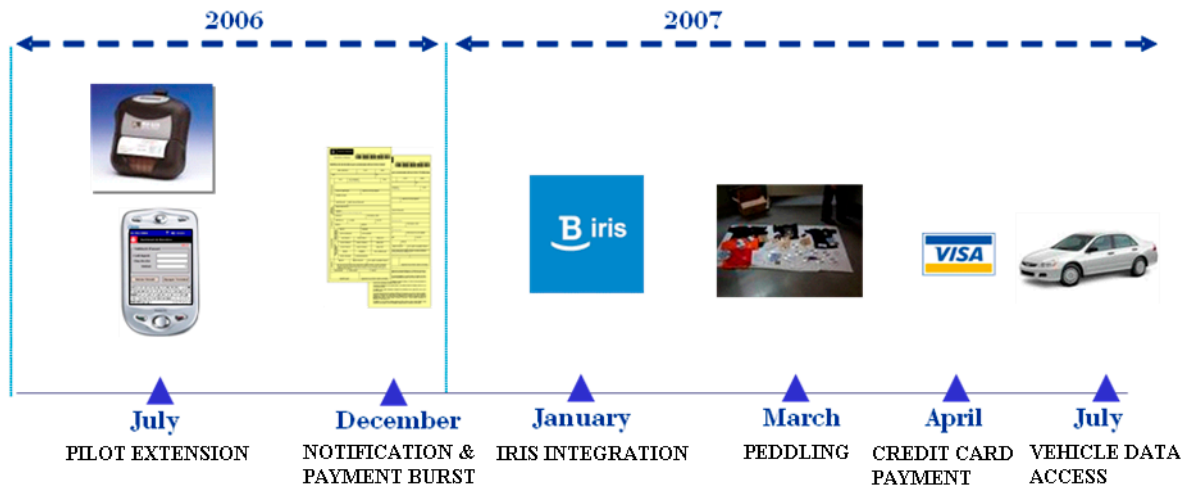

Figure 4: Process Development

6. Results

The introduction of PDAs in the Guàrdia Urbana officers' daily life has reduced their amount of work and the errors that were made. Nowadays, about 64% of formal complaints are made via PDA. The 100% is not reached yet because there are not enough handheld devices for all agents. As a measure of comparison, the percentage of formal complaints treated through PDA was of 33% during the pilot project.

The new system was rapidly adopted by the Guàrdia Urbana agents, requiring the acquisition of spare batteries to avoid stopping the working rhythm of a 24 hour day. Exchange and charging areas in the police station (as for patrol radios), have been created.

The new features included in the workstations are really appreciated by the users. On one hand, the officer can access to more information, making his daily job easier; on the other hand, there is a reduction of administrative burden, as shows the fact that around 33% of complaints are notified at the same moment. This percentage is not higher because the officers need to check some information with the offender and they are not always there.

The total investment needed was approximately 2 million euros, including the infrastructure building as well as maintenance cost and GPRS/GSM traffic bills. According to a pessimistic approach, the Return of Investment (ROI) should be achieved in two years. This rapid investment recuperation makes easier to renew the devices more frequently, keeping the handled computers up to date with the latest technology.

7. Business Benefits

The use of PDAs and printers represents a combination of benefits and improvements for the Guàrdia Urbana police:
- Improvement of the capacity of response, efficiency and effectiveness of the activities carried out at street-level by means of the use of mobile technology.
- Access to corporate information and other systems when and where necessary, and therefore the consequent global improvement of the service.

- Immediate introduction of information from the street to the City Council systems so as to speed up data management and to reduce the time of response.
- Introduction of in-situ notification to the offender allowing the legal guarantee of the actions and optimizing the sanctioning process.
  For the City Council, the benefits are:
- Increase in the quality of data entry for future claims.
- Reduction of administrative burden and general administration costs (data entry, sending notifications, executorial procedure, delivery and handling).
- Reduction of time and risk of sanction prescription.
- Better management of denounces and notifications, which means lower cost for the Council, reporting more benefits per fine (33% in-situ notifications).
  The citizen can also recognize some benefits:
- More facilities to pay on the voluntary period, that is, the period comprised between the complaint notification and the start of the legal actions against the offender.
- Citizen's vision of Guàrdia Urbana services changes because of the officers' new tools.
- It means an efficient use of the public expense.

8.   Success Key Factors

How to introduce a good change management plan, in order to reduce the impact on the Guàrdia Urbana Police organization, has been the most critical factor of the project.
   The key ideas used to this effect are the following:
- It is an "Everybody's Project", for this reason participation at all levels was requested (direction, intermediate commands, agents, logistics responsibles ...).
- Motivation, attitude and implication of the Guàrdia Urbana Police.
- The use of educational and communication channels of the Guàrdia Urbana Police, such as training using didactic tools and participation in periodic meetings, monographs on internal magazines, intranet, etc.
- Progressive deployment by territorial units with in-situ monitoring of the team project.
- Total replacement of the manual fine ticket by the printed one.
- Constant and centralized support for all service shifts including the night ones.

   Another key factor has been the previous work done by means of different provisional programs. The group of agents that worked on them played a very important part not just in the application trial but also in the internal promotion, explaining the competitive advantages of the project to the other workmates.

   It is remarkable to mention that the user support has been very important. It is a personalized and continuous 24 hour service that was extended during the first two months after the launching in order to guarantee the success of the deployment.

   These forces are used to work with rules and commands. This fact facilitates this kind of projects, as long as they are validated by the commands.

9.   Transferability

As this is a dynamic and adaptable project, this experience can be useful for other mobile groups inside the Council in different ways.

   On the technology side, we have created a model of infrastructure and mobile technology architecture, which can be reused by other collectives and services. The extension of this model as a philosophy can have a great impact on the efficiency of any group that does not work indoor, such as work inspectors or firemen.

This project with the Guàrdia Urbana becomes a model to continue with future deployments of mobile offices. We cannot forget that 66% of the services offered by the Council are developed at street-level.

10. Lessons Learnt

The introduction of eGovernment does not just involve technological improvements; it also means changes in the internal processes and in the organization culture.

The corporate applications mobilization must be aligned with usability aspects and be as user-friendly as possible. In our case, the Council Incidences System has been integrated in the PDAs as a natural evolution of its use. It is also important to adapt the best technological option to the kind of service that will be offered.

Due to a successful change management, we were able to completely renew the working tools of a working group, keeping its productivity and efficiency. Other key factors that made us experience a rapid transition to the daily use of handheld devices were a suitable formation and the Guàrdia Urbana's enthusiasm.

We also learned that the Guàrdia Urbana is more eager for new technologies than we would have imagined. This propels the research into the direction of the technological solutions, expecting a similar welcome in other ambits.

To achieve a profitable solution, the focus must be on an intensive and non-personal use of the technological devices, in order to fit more users in the same device and increase their working rhythm. In a future situation, when a bigger amount of devices and working groups will be implied, a management platform will be needed. As the investment can be recovered in such a short time (ROI), the system can be continuously evolving and it also allows a constant hardware renewal.

11. Conclusions

This project has had a great impact on the organization, which made a qualitative leap forward from manual procedure to PDA use. The incorporation of technology to street-level work implied changes within the organization's daily processes and had a significant impact on people.

Access to corporate information during street operations improves services and minimizes errors. Information is available whenever and wherever necessary and without delay to the City Council in order to be managed.

Thanks to the ITC and the staff's new technical skills, it is possible not only to get efficacy and efficiency improvement, but to strengthen the Guàrdia Urbana's presence on the street reassessing the citizen's point of view.

The constant growth of this project allows us to see future improvements. Renovation to update PDA devices and software to the leading edge technology is already planned within a short time. There will also be an expansion of features which will allow the connection of the Guàrdia Urbana with other forces such as the Traffic Department or the towing service. The new PDAs will be able to connect to Wi-Fi networks as well as GPRS/GSM. They will also be used as a backup communication channel in case the radio fails. Another interesting complement they will include is the possibility to locate the officer via GPS to store the address of the complaint. One extension people will notice is that the new fine tickets will be printed out in three languages: Catalan, Spanish and English.

Due to the great success achieved, we are considering extension to other areas. The municipal services of Urban Planning, Tax Office, Public Highways, Maintenance and Fire Brigade may benefit from what mobility has to offer. The response capacity, efficiency and effectiveness of the municipal services provided at street-level will all be improved.