Full Case Report

Case 665

Electronic Information System for Civil Registration and Administration (Bulgaria)

Bulgaria, leading the way as a model of good practice in secure eGovernment

Executive summary of the case:

Abstract
Electronic Information System for Civil Registration and Administrative Services.

This submission describes eServices provided by the Bulgarian Electronic Information System for Civil Registration and Administrative Services (CRAS). The system stores personal data for all Bulgarian citizens.

The 'Web access to stored data for government staff' service is the primary one and contributes to the seamless government without borders idea. If required by their job, Government employees can access stored personal data relating to citizens. Since the service uses the Internet for transfer of confidential personal data it is essential that the latest ICT technologies provide a secure environment for this. The main security feature implemented is the Public Key Infrastructure using digital certificates stored on smart cards.

The 'Web access to election rolls' service helps citizens check their data in the electoral rolls and find out where they can vote. This is a freely accessible public service available only immediately before and during elections.

A range of general population data is also provided for agencies and national organizations. eServices enable government employees do their jobs in a new, faster and easier way, in an environment where paperwork and bureaucracy is significantly lowered.

The CRAS system has been established as one of the most innovative projects and a leader in the field of eServices in the Bulgarian public sector.

Case description:

Background

The System for Civil Registration and Administrative Services (CRAS) is founded in 1978 borrowing experience and features from similar systems existing mostly in Scandinavian countries. The system started by developing citizen’s Personal ID schema and requiring all Bulgarian citizens to create a Personal Registration File. To do this they had to complete forms with personal data that would be maintained by employees in Local Authorities. Administrative servicing of citizens based upon these Personal Registration Files started soon after that. The supporting department that was created developed formal documents to cover change of personal data to be used when a change event occurs (birth, marriage, change of address, etc). The department developed additional methodological rules and procedures for the documents through the levels of the administrative system. With the advent of electronic computing technologies in successive years little by little more and more personal data were processed using computers. At that time, regional electronic data storages were established. In 1994, the regional data storages were unified in a National Database on an IBM mainframe computer. That database is the parent of the current Information System for CRAS.
Currently The Information System for Civil Registration and Administrative Services stores personal data for all Bulgarian citizens (about 8 000000 alive and about 2 000000 deceased people). These data are found to be valuable for all levels of the Bulgarian State Administration in their daily jobs, including:

- Tax Administration Services,
- National Social Security Institute (NSSI),
- Bulgarian Passport Services,
- National Healthcare Organization,
- National Statistics Institute,
- National Customs Agency,
- Bulgarian Law courts,
and many others besides.

Up to 2001 there was no easy, fast, reliable and cost effective way for government employees at the national, regional or local level to reach this stored information. Sharing particular data (for example by government employees outside our department in order to solve specific case) required a lot of paperwork, exchange of letters between different departments, etc. There was no possibility of getting generalized data that could support high-level government decision making.

The information in the CRAS system is maintained by more than 1000 employees scattered throughout the 265 municipalities (Local Authority offices) in Bulgaria. These employees process more than 4 000 000 documents for changes in citizen's personal data each year. Providing up-to-date information is crucial for their work, serving citizens every day.

Objectives

In the age of Information and Communication Technologies (ICT), setting out good and considered objectives is crucial to the success of any project. Short-term objectives should be as specific as possible, because usually they give direct benefits to end users. Long-term objectives are connected primarily with architectural decisions, thus they give more value to developers and solution architects than to end users. Having this in mind the list below contains our objectives, starting with the most specific (short term):

1. Providing online access to the data in the Information System as soon as possible, starting by exposing only basic functionality and then adding new features on a regular basis. Users of this service are authorized government employees at national, regional and local levels. This is a closed service (not publicly available), because personal data are confidential information, available to authorized staff only. As a prerequisite for this objective, a need for a flexible authentication mechanism, across different types of government units can be mentioned.

2. Eliminating most of the paperwork and the number of difficulties when exchanging data at all levels. Thus promoting a significant decrease in bureaucracy and outlays.

3. Response time of administration at any level to an event that changes any citizen's personal data should be cut at least 10 times.

4. The CRAS electronic system should occupy a position as primary centralized repository for personal data of Bulgarian citizens. Centralized repository open for integration with other information systems, no matter what their type and platform. Such an approach will unleash the possibilities for building a new generation of eServices. These services could query and exchange data with such a central repository, if they need personal data. The restructuring guided by these objectives should continue to support proprietary systems that already exist before starting new eServices and deploying transparently for them.

Gaining practical experience by running a real eService is important when planning for new public eServices available to any citizen, not closed to government staff only.

Our ambition is to participate actively in developing the creation of standards for electronic services.

Resources
The project started in 2000 by building almost everything from scratch. Whilst working on the project, we set up:

1. One RISK machine HP 9000 N4000 for database server.

2. Internet infrastructure servers, that include:
   a. Firewall,
   b. DNS,
   c. Internet Mail,
   d. Web Server,
   e. SSL secured Web Server,
   f. Active Directory Domain controllers.

3. 10 development workstations.


5. 3 test lab computers.

6. 50 office desktop computers (staff on-site and regional units).

7. Fast Ethernet communication equipment for LAN.

8. Bulgarian Government Network access point (also used as fast Internet connection).

9. Line printers for printing election rolls.

The RISK machine runs HP-UX 11.0 and Dynamic Informix as RDBMS, all other servers run Windows 2000 Server. Additionally we set antivirus protection at gateways and workstations. For all the equipment and system software $600 000 were spent.

Ten system architects, developers and system administrators were engaged as project IT staff. Primary development environment is Microsoft Visual Studio 6.0. We also used the following programming languages and technologies:

- Visual C++ for critical components.
- 4GL for Informix database programming.
- Active Server Pages and Server Side JavaScript for web sites.
- Client Side Java Script.

Globally three core technologies helped bring about the success of the project:

- Internet. Although Internet is not always seen as one technology it has become a synonym of open standards, web site building, global connection to any place, availability for anyone, platform independence and many, many others.

- Public Key Infrastructure - PKI. The PKI is a technology which is growing in use and enables digital trust, security, data protection and so on in the Age of the Internet. PKI Digital Certificates provide:
  i. Authenticity.
  ii. Confidentiality of exchanged information.
  iii. Integrity.
  iv. Modern standardized technology.

Certificates are installed on the server and with the client, thus providing their secure mutual authentication.

- Bulgarian Government Network high speed optical network, connecting 90% of the government buildings in Sofia (the capital city of Bulgaria) and largest regional centres like Plovdiv, Varna, Pazardjik, Blagoevgrad. The network allows data transfer at 622 Mbps in the backbone and 155 Mbps in other segments. Our building has its own access point to this network.
Activities

In this section we will discuss only implementation details of eServices that we provide currently. Implementation details of the whole IS could extend far beyond the scope of this submission because part of the system is only supporting and provides no real eServices. Some parts support data exchange with proprietary systems, while others deal with areas where eServices still cannot be delivered.

As was noted in the objectives section we faced the problem of choosing flexible and secure authentication scheme that can serve across different types and different levels of government units. Evaluating different schemes we decided to implement PKI because of its security, wide software support and platform independence. The development team tested and evaluated products from various providers. The conclusion was that implementing our own highly secure PKI for a relatively small department is too resource consuming, however we can start by using certificates from a government approved issuer (for Bulgaria Information Services Ltd. and Bulgarian Industrial Association). Additional requirement is set: issued certificate must be stored on smart card. Storing certificates on a disk is considered insecure, since you will exchange confidential data concerning the private life of Bulgarian citizens through the public network. We do approve of smart cards provided by Utimaco Safeware, ActivCard and Gemplus. Using certificates issued by a third party organization does not mean that any government employee with a digital certificate can access our eServices. The employee must apply for access to our department and provide the public part of his or her certificate. The application is evaluated according to Bulgarian law and his or her agency's needs. Then access would be (or not) allowed only to parts of personal data, stored in the database that are relevant to the job. Here additional explanation is needed of what we mean under "personal data". These are the data gathered by the national enquiry in 1978 and almost unchanged up until now: citizen's personal ID, names, addresses, education, marital status, death, parentage, passport, nationality and relatives, children, brothers and sisters. Previous states of address, marital status, nationality and names are also maintained.

An important architectural decision was whether to implement client-server application (probably using leased lines and/or VPN) or a real web application. We gave preference to the latter one because of its easier support, platform independence, fast and easy centralized deployment and high level of scalability.

Here we present two real and currently running eServices:

1. Web access to data in the CRAS Information System for government staff.

2. Web access to election rolls for every citizen.

The first service is the main one. It is available 24x7 and provides a bunch of functionality, which is described below. To access the service an employee needs a browser, supporting SSL and digital certificate on a smart card. SSL is a publicly available standard and almost all of the browsers support it. SSL and digital certificates provide the needed mutual client-server authentication, data encryption and confidentiality. Using PKI authentication web servers allow the configuring user access to a particular page or set of pages. The need for more granular user rights configuration forced us to develop customised components complementing the main authentication scheme. The custom components use an additional security database with rules restricting access for a user to only part of personal data. For example, allows access to a citizen's residence address and prohibits access to parent's data (or only display their names without IDs). These changes were made not only to increase the eService security and data confidentiality, but also to meet the requirements set by the Law of Personal Data Protection enforced in January 2002.

From the user's point of view, the service is SSL secured web site allowing them to:

- Query for personal data on any Bulgarian citizen.

- Query and edit National Address Register, all the valid residence addresses in the country. Retrieve reports based on it.

- List, query, and obtain new Personal IDs from the Personal ID Register.

- Create, edit, and run reports providing generalized and or statistical data based on stored personal data.
- Access User Management section; regional managers can manage their employee's passwords and access rights.

- See help and Frequently Asked Questions sections.

Large governmental units, supporting partial copies of citizen's personal data on their Information Systems can keep them up-to-date with a special functionality that provides the opportunity to retrieve changes made in a certain period.

User interface design of the service does not respect the principles of usability everywhere, because we focused our efforts on a simple solution that helps specialized government employees to do their job as quickly and easily as possible. We can give many different examples as to how these employees make use of the provided eService: the law courts send summons to citizen's current address, NSSI stops paying pensions to dead people, etc.

The service has been available since April 2001. This is the first government service using PKI and digital certificates. The total development time was about a year, followed by a short period of testing and initial deployment, server setup, evaluating security risks and changing the firewall configuration.

The second service is available only immediately before and during elections and referenda. It is a public service for all Bulgarian citizens. Since the service is open to anyone only the web server is authenticated through SSL, client authentication is not required. The service helps citizens to find the exact place where they should vote. The service started for the first time in October 2001 for the Presidential Elections. For service implementation an additional Microsoft SQL Server is used with data relating only to the elections, and a new web site designed specially for this purpose. The service uses standard layered three-tier architecture and is implemented as a web application:

- Database layer. As mentioned above the additional server has a partial copy of the real data to increase the security. The database is redesigned and physically implements part of the next layer as stored procedures.

- Middle layer. This layer represents the business logic of the web application in the form of generalized operations independent from the physical design of the database. The layer is implemented by SQL stored procedures and VBScript procedures in the UI layer. Real business logic components on the application server are not used, targeting decreased response time and improved performance; therefore, this layer could be treated as virtual in our implementation.

- User Interface (UI) layer. Communicates with users and provides functionality based on operations implemented by lower (middle) layer. The site is targeting a wide audience and incorporates in its design the latest innovations in the field of usability and UI design, including:
  - Flat interface (like Microsoft XP product line) with no pop-up messages and windows.
  - Web wizards, i.e. entering data step by step in simple forms.
  - Well structured site with features grouped by functionality.
  - Information area in the site explaining current election law and terminology.
  - Custom implementation of error messages matching the design of the site.

The layer is implemented using Active Server Pages (ASP) technology on Microsoft IIS 5.0. However, the good UI had its cost: client browser should support Cascading Style Sheets (CSS). This is required for consistent interface keeping site load time lower.

Through the development and administration of the service, we also followed published security best practices and incorporated some security features in the core site components. Examples of such features are the extended logging subsystem (hacking attempts, web site internal states, etc.) and component monitoring.

The total site performance is very high despite the use of relatively old machines in peak days servicing about 15 000 hits per day. At national level, this is good number, since in 2001 only 15 per cent of population used the Internet.
Currently the two eServices presented here are in their support phase. Two new eServices are now underway, planned for launch by the end of the year. The Change of address and real time government-to-government communication (our long-term objective to become central repository of personal data).

These eServices are on the list of on-line performed basic public administrative services adopted by the European Commission as indicators for the development of eGovernment. They will use a centralized authentication scheme and will closely integrate with the Bulgarian eGovernment portal service and other eServices scheduled for launch at the same time.

Output and Results

Back in 1999 when there was no connection to the Internet, the department was communicating with its regional units using leased lines, and most of the computer hardware was old, only few people had the vision to make CRAS system one of the most innovative and fundamental government systems. Looking now the results even exceeded these optimist's expectations. More and more government agencies use our eServices, even agencies that we did not consider as potential clients. In one day, more than 10 000 requests are serviced. This was impossible to handle using the traditional paper-based system. The significance and success of the project is proved by the facts:

1. Our primary short-term objective has been realized at 100 per cent. Authorized staff at any government unit have on-line access to stored personal data. The only one-time obligation is the Digital Certificate Application.

2. Eliminating paper work. The staff that used to do this (one third of our department) are now available for other activities.

3. Lowering the Total Cost of Ownership (TCO). We don't need expensive WAN connections and leased lines. Only an Internet connection is required.

4. Stored data are updated every day, thus giving a 14 times decrease in administration response time compared to 1999. An employee (and all other clients) can see the changes he or she has made on the next day.

5. In October 2001 during the Presidential Elections about 6 800 000 voters had the ability to find online where their voting place was, and check on their data in the election rolls. This represents a step toward greater democracy in our country.

6. More than 60 local authorities implemented access to our eServices. Actually they are among the biggest as their employees serve more than 4 800000 citizens or 60 per cent of population.

7. The CRAS Information system gradually and irreversibly establishes itself as a central repository, storing citizen's personal data. Our department recently joined a new pilot eGovernment project where our system will play a central role providing data to other basic eGovernment services using XML schemas.

Attached file figure01.jpg shows the number of documents processed per year by our system illustrating the dynamics of personal data change. The expected number for 2003 is about 4 100000. The temporary increase in this number in 2001 was due to a passport change campaign to match European standards. Attached files figure02.jpg and figure03.jpg illustrate the client authentication process for our primary eServices. Files figure04.jpg, figure05.jpg, figure06.jpg, and figure07.jpg demonstrate the service user interface and some of its features since its web site is closed to government staff only and interface language is Bulgarian. File figure08.jpg is a picture of the Access to Election Rolls service.

An additional indirect benefit for citizens is that this system saves them time when they change their personal data. For example a citizen changing his or her address only needs to declare the new one in the local authority. A citizen does not need to contact an NSSI representative or Tax Administration Service of the change, the whole administration will be notified automatically.

The feedback we receive is very positive. Official reports we have received from the Foundation for Local Government Reform speak of the great value Local Authorities get from our primary eServices. The following extract from an e-mail sent by a citizen: "I want to express the good impression your site made to..."
me. I couldn't believe my eyes, the information for my voting place I found so fast and easily. Very useful.”

A look at other governmental Information Systems in Bulgaria highlights the innovations and modern design used, the CRAS IS is not only the first IS providing eServices using PKI and digital certificates but is still the only one deployed in the public sector.

Lessons and conclusions

This project helped us to be distinguished among other government agencies as an innovative department, leading in the field of eServices in Bulgaria. The Council of Ministers invited us to join a new pilot eGovernment project. We have received official letters from the Bulgarian Industrial Association (www.bia-bg.com), Bulgarian Association of Information Technologies (www.bait.bg) and Hewlett-Packard Bulgaria stating that the CRAS Information system is occupying a leading position in the public sector. IDG Bulgaria awarded Mr. Ventsislav Hristov, our IT director the accolade of, “IT Manager of the year 2002”.

The popularity of our eServices rose last year. Some Local Authority offices started projects targeting one-stop shopping using integration with these eServices. We will assist them with experience and knowledge gained in the last three and half years.

Every project has its own implementation and deployment difficulties. The most significant difficulty we faced was in rolling out the PKI infrastructure and smart card deployment. Supporting the process of issuing and re-issuing of digital certificates and evaluating service access applications needed more resources than we had expected. Our IT staff had to lead courses, training end users. This distracted our people from the development work. But providing such a service that transmits confidential data through the Internet requires a very high level of security that only PKI now can deliver. Thus PKI should be considered a necessary, although cumbersome task. Keeping the overall security level high requires highly qualified IT staff running 1-2 steps ahead.

Although now the project is considered platform independent this assertion concerns only access from PCs, new alternative platforms are not supported. Examples of such platforms are interactive TV, mobile phones and PDAs. Providing accessibility features and support for these platforms is important to deliver real public eServices.

The next step toward is to provide programmatic access to our eServices, something we failed to cover up to now. Programmatically accessible eServices enable application level integration between IS as never before. Eventually the need for such eServices will arise, so we recommend at that all new eServices launched should provide programmatic access as well as UI access. For current ICT standards, programmatic access is possible using Web Services based on SOAP and XML.

Entering the area of public sector eServices is not always valued and recognized immediately. It takes time to establish and popularize.

References and links

Primary eService site
https://nbd.grao.government.bg/

The site is in Bulgarian, contains confidential data and is closed to government staff only. If you require access please contact us to demonstrate. Attached pictures demonstrate the site idea. Of course at the conference session we will provide access.

Election rolls eService
www.grao.government.bg/Elections01/

Username: EUAwards
Password: e-govAW03

The site is open specially for the eGovernment conference and contains the president elections 2001 data. UI is in Bulgarian and we can provide assistance if needed.
Contact Information
Organisation: Department of Civil Registration and Administrative Services, Ministry of Regional Development and Public Works
Name: Ventsislav Hristov
Address:
   16-20 Alabin Str, fl. 3, room 303
   1000 Sofia
   Bulgaria

Telephone: +35929863486, mobile +35988215
Fax: +35929860895
E-mail: vhristov@grao.government.bg