Innovation in public administration – an operating e-state
13 outstandingly useful public IT solutions in Hungary
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IntroduCtIon

Hungary is a leading R&D&I actor in the Central-European region. The Hungarian industry and the educational system have been supporting the world with a vast array of inventions, ideas, knowledge and solutions for the last 100 years and increasingly since the 90’s. Hungarian innovation is a streamlined, methodology based creative work; basic research, applied research and experimental development have had a massive impact on the country’s operation during the past decades. Hungarian innovation has a very strong background as scientists like John Neumann who developed operational logics of today’s computers or Tivadar Puskás who designed the first telephone exchange. Innovation continued to be a decisive factor in Hungary, as the country still utilises technology in a novel way.

In the wake of the system change that took place in 1990, Hungary commenced a massive reorganisation of state and public administration operation. Any disadvantages can only be remedied by new, pioneering and effective solutions. Hungarian companies and foreign companies operating in Hungary are now in the focus with their willingness to reinvent, to use technology related innovations and informatics. As a result of a 20 year long process, the country has become a digitally controlled state which is well-prepared for the challenges of the 21st century.

The first phase of public administration IT projects was targeting at the slow, paper-based and inefficient systems. The objective here was to reorganise these huge structures by establishing digital background services in these institutions while taking the characteristics of Central-European societies into consideration. By now, the Hungarian state has completely transitioned to e-operation, the country is ready to provide wide-scale e-services to its citizens.

Current and recently implemented projects reach far beyond this goal; besides efficiency, a demand for monetising applications appeared, as well as the possibility of even and performance based load distribution, the opportunity for better and more precise control and more flexible rule configuration.

E-government has obtained a pretty high level by reaching tender management, taxation, document management, transportation, public administration and agriculture – all these areas have by now thoroughly incorporated innovation and digital transformation. Hungarian government ideas in many case were implemented by solutions designed in Hungary. Future oriented thinking resulted in the creation of IT based solutions which can play a key role in all typical economic and government structures. Hungarian implementation has been successful, solutions presented in this document facilitate the efficient operation of the society. These novel solutions have brought more convenient and better quality co-operation among the relevant parties, they meant new business opportunities for companies, and for the state, they ensured streamlined and more effective control.

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As far as taxation is concerned, both the institutional and the client side can cause serious issues. The large amount of hard copy documents hampers seamless institutional operation. Overly complicated administration causes problems for businesses and private individuals alike.

Electronic document management helps achieve faster and easier tax administration. Furthermore, administration related costs are significantly decreased. A major advantage of electronic databases over hard copy documentation is that integrated registries can be created, audits are faster and more effective. Advanced internal and external data provision functions can be implemented, analyses can be made at individual levels, and processes are neatly streamlined.

**Case study**

Online cash registers

The Hungarian government prioritised the whitening of the nation’s economy. As a pivotal step of this process, a decision was made in 2012 to introduce the system of online cash registers. The process was closed in September, 2014. From this date on, only online cash registers can be used in Hungary. These new cash registers are 24/7 connected to the servers of the National Tax and Customs Administration of Hungary (NTCA) and send machine operation related data over a mobile internet connection at predefined intervals. By introducing these new machines, the government wish to protect law abiding citizens and to increase state budget income.

These machines are capable of storing more detailed data then their predecessors, number of receipts issued on a given day can easily be retrieved from the system while the amount of cash in the register can be continuously monitored. This data help tax auditors, and provide guidance as to what entities should be audited.

Central element of this solution is the Tax Audit Unit (TAU) which contains tax receipts and e-registry elements which constitute indispensable parts of these receipts. This unit is a well-separated module of the cash register, and is used to store electronic data, as well as to ensure mobile data connection. TAU continuously logs cash register events, and is also responsible for encrypted data communication between the machine and central NTCA server. NTCA staff can continuously monitor and analyse data received from the registers via the Cash Register Monitoring System (CRMS).

By September, 2014, more than 170,000 new machines had been commissioned, 53 data packages (containing data of 903 million receipts) had been received. Whitening effect of these freshly introduced machines was already visible in Q4 2014 – according to NTCA figures, VAT received was 29% higher. In the first half of 2014, NTCA witnessed a 13,5% (HUF 106 billion) VAT revenue increase in the whole retail sector while food, cloth shops and second hand shops which are most severely affected by VAT fraud paid 26% (HUF 33 billion) more VAT.
Ever increasing appearance of motorised vehicles meant increasing challenges in road transportation. Most promising solutions to address these issues were introduced; such as electronic toll systems, mobile parking systems, passenger information systems and traffic control systems. Achievements are simultaneously reached in environment protection, infrastructure preservation, traffic safety and cost reduction.

In addition, there are further benefits provided by these systems such as fast, convenient, 24/7 electronic case management, payment and information services.

**Case study**

**Electronic Toll System**

In order to protect the road system, to expand financing sources and to promote equal share of public financial dues, an increasing number of countries started to introduce electronic toll systems.

It took quite a long time in Hungary to reshape the existing road toll system, the actual process, following a preparational phase spanning several years, started off in May, 2012. The objective was to establish a road toll system - in compliance with the EU regulations - based on driven distance for vehicles over 3,5 tons for a network of main highways and expressways of nearly 6,500 kilometres.

Installation and introduction of the HU-GO system was completed by 1 July, 2013 (in line with the regulations); time required for the entire process was rather short, about 2.5 months. Costs incorporated were lower than expected, and rate of return was rather high as investments were returned during the first couple of months of operation. In the course of the first six months of operations, nearly HUF 79 billion of toll was paid, 5% in excess of preliminary expectations, thus ensuring the revenue for continuous maintenance and development of the public road network, furthermore, contributing to increase the revenue from international transit. This Hungarian developed system has an open platform which enables other systems to be connected as well.

It is a unique system feature at international level too that users can choose from a wide array of payment methods – there are at least thirty different service providers, a vehicle on-board unit can be purchased, and tickets can be bought at more than 1,000 locations. During the first six months of operation, 60% of the revenue was from pre-paid tickets and 40% of the revenue was paid based on vehicle on-board device data.

Nationwide, 101 fix control gates were installed at 74 locations, 45 mobile control vehicles have been commissioned and more than 60 mobile police vehicle assist in controlling.

Since its onset, HU-GO system has been tailored based on customers feedback, several convenience functions were added to the system, for example, payment with smart phone application is available since April, 2014.

**Mobile parking system**

The mobile parking system is one of the most popular parking payment methods in the world by providing a simple, fast, and user friendly way of parking fee payment. Further system advantage is that neither preliminary registration nor contract nor monthly fees are required.

The mobile parking system which is a state guaranteed independently of the market conditions continuously accessible public service has been operating in a single and unified system since 1 July, 2014. The mobile payment service provider is entirely state-owned, and acts as an integrator, mediating among parking operators and mobile service provider resellers. In contrast to the earlier, less effective system, and the different quality services, mobile parking can practically be used by anyone, on equal terms.
Currently, parking fee payment via mobile phones is available in the majority of public parking zones. The system is rather popular, on a daily basis, averagely 48,000 mobile parking payment transactions are handled by the system while on a yearly basis, approximately 13 million transactions take place. Main system advantages are simple operation and minute based fees. Parking fees can easily be paid with mobile communication devices. Motorists can pay via SMS, phone calls or the smart phone app. The system can help minimise the illegal use of parking permits, especially those issued to people with disabilities. In addition, the number of parking fee payment devices can be decreased, this is considered to be another cost effective feature. Mobile parking fee payment is currently available in the public parking areas of Budapest (10 districts and main roads), and in parking areas of 33 other cities.

Due to the implementation of the mobile parking system on the infrastructure of the electronic toll system the net investment amounted to HUF 820 million and the rate of return is expected to be 1.5 years. During the first 3 months of system operation, nearly 3.7 mobile parking transactions took place to an amount of HUF 1.6 billion.

Wi-Fi service on MÁV railway network

Based on customers’ feedback and statistical data, an increasing demand is witnessed for free of charge wireless internet services on trains as more and more people wish to spend time useful on trains with working or browsing.

To meet these expectations, MÁV-START significantly extended the pool of railway cars capable of providing free of charge internet access. On an annual basis, as many as fifty million passengers a year can have access to the internet this way. The project was implemented in 2013, and now more than 700 railway cars are equipped with free of charge internet devices.

A complex system was established to provide central system control and data management, a router is installed on each railway car with separate mobile internet connection. Wi-Fi traffic originating in these railway cars are transferred to a data centre via the cell phone network (GPRS, EDGE, UMTS, HDSPA), and user can then access the internet via this centre. In order to provide better reception, railway cars have special outdoor antennas, thus internet is accessible in locations where other mobile devices are unable to establish a connection. Maximum bandwidth of this onboard Wi-Fi access in 7.2 Mbps per car.
Regional development and urban management have a fundamental impact on people’s lives. Development plans, conceptions and programmes, as well as decision-making processes require that relevant parties, beyond financial and social attributes, have accurate information on natural elements, physical characteristics and man-made installations.

Planning and design tasks necessitate thorough analyses which are ready to examine sectoral information both locally and in a synthesized manner. Geographic information system (GIS) solutions enable the storage, display and complex analysis of local information, and provide a background for better decision-making in the future.

**Case Study**  
Regional Development, Area and Urban Management

The National Regional Development and Urban Management Information System (TelIR) is a web-based system for Regional Development and Urban Management. Regional development as well as urban management and area management data collected by the Hungarian state is made accessible by this system via a single web interface to users (central, regional and local state administration institutions, other legal entities, businesses and natural persons). Its main goal is to support analyses, data collection and preparation of diagrams, as well as to aid administrative, development, research, planning, co-ordination and decision-making processes.

The system is capable of introducing special characteristics of the nation’s population and economy, its natural and artificial environment, and in addition, the system can provide an insight into regional changes and their background. Information is used during programme management, tender evaluation and monitoring.

TelIR can be used for educational purposes as well. Its objective is to establish joint educational and research activities with economic and technical higher education institutions, and to harmonise regional development and urban management requirements of experts working in higher education.

System services are accessible via web applications, depending on the function, free of charge and registration for certain functions, while in the case of some functions, registration and payment are both required. This nationwide system was up and running by 1998, and was further enhanced to a county level by 2002. Number of public administration users is nearly 3350, while number of other users is 7,200. Students and teachers of all state accredited higher and middle level education institution are eligible for access.

**3D Data Collection and Utilisation**

Centre for Budapest Transport kicked off the development of its own 3D data collection and processing system (Road Data Collection System) in 2013 as the centre demanded continuously up-to-date geodesically accurate geographic information data for everyday operation.

There is a road network of approximately 1,000 km managed by the Centre for Budapest Transport, while about 4,300 roads are operated by the Centre. Between November 2013 and February 2014, about 800 km of main Budapest roads were surveyed. The survey used top-notch laser scanners to make pictures and 3D point clouds. Spatial data of 1.5 millimetre accuracy gathered this way enabled the Centre
Densely populated cities > sensors and high capacity servers > digital areas

More than half of the world’s population now lives in cities. Urban development and urban management can only be successfully supervised by efficient tools and methods. Info-communication solutions are gaining popularity and becoming widely used in cities by ensuring lower costs and streamlined management to better the standard of living.

Modern info-communication technologies and services can assist the very basic tasks of a city, such as public services, public transportation, healthcare, education, commerce and local organisations, to mention but a few. Inhabitants can participate in the decision making process, information is gathered in a structured manner and intensification digital competencies means a significant advantage on the labour market. Simultaneously, town management can expect massively decreasing costs while the new services can boost revenues and can help to retain active population. A well-established info-communications strategy and high level digital competencies make the city an attractive target for external investors. In order to achieve all this, smart, modular and ready-for-integration urban management systems are required.

The database not only contains data on spatial location of objects but on their technical and management properties as well thus making its use crucial for designers, road management experts and museologists. The system has become indispensable for proper city management.

The system minimises time required for on-site surveys, for administrative tasks, and measurement data are more accurate and less mistakes are present in the process. This solution massively simplifies city management tasks, decreases operation related time and costs, and as such, broadens the horizon for further development. The system enables Budapest to make a detailed annual technical registry, and ensures that road network condition survey and road reconstruction monitoring take place accurately, without getting delayed for several months. Because the system not only gathers geodesic data about roads but about buildings and green areas, urban management will also benefit from this unique solution.

Case study

Public bike-sharing scheme (BUBI)

The public bike sharing scheme is a novel and unique alternative means of public transportation which provides access to push bikes deposited in major traffic hubs and key city locations.

Info-communication solutions play a fundamental role in the public bike sharing system: users can locate the nearest docking station via the internet or a smart phone application, they can get real time information about system load and bikes currently available, and rental fees can be paid via the internet or smart phone applications.

These pioneering systems have beneficial environmental and health effects by providing a time and cost effective solution to cover relatively short distances in a matter of a couple of minutes.

Equipment required to establish a public bike sharing scheme:

**at the deposit hubs**
- docking station: technologies implemented (RFID) (radio frequency identification)/electro-magnetic lock or code lock/cell phone;
- information terminal: bank card/smart card/chip card reader, printer – PIN pad, touch screen computer;
- security system: CCTV, chip (a chip card installed in bike frames as an anti-theft device);

**bicycles**

**informatics systems to ensure proper operation**
(logistics, maintenance, customer service and payment).

Out of 75 Budapest deposit stations 30 terminals enable bank card payment and have touch screen interface. There are 1,100 bicycles ready for rent from 1,506 docking stations in total. Bike pick up and return are done at the deposit hubs in a self-service manner. The bikes can be returned at any location in the network as the system ensures equal distribution of bicycles over the entire network.
Passenger information and traffic control system

Autumn 2014 saw one of the most important public transportation development of the decade in Budapest. An integrated public transportation system was established which provides real time traffic information by fully replacing the current, diversified and multi-fold public traffic information systems.

The Traffic Control and Passenger Information System (in Hungarian FUTÁR) was commissioned on 1 October, 2014. The system aims to help people reach their destinations as fast as possible. The system is expected to provide continuous supervision, to maintain scheduled traffic and fast reaction in case of emergencies.

FUTÁR displays located in bus and tram stops give real time information when a particular vehicle is due to depart. Via internet enabled devices, passengers can connect to the FUTÁR network. This one and only browser independent trip planning solution is ready to provide „door-to-door” guidance with a map module. The application is capable of displaying static network maps and real time vehicle positions as well as of giving immediate customer information.

FUTÁR enables the service provider to ensure uninterrupted and scheduled service without delay, in case of an emergency, faster and more focused intervention is possible, so in general, the system greatly contributes to better public transportation services. Not only the system shortens travel time but it saves money for the service provider.

Complete FUTÁR budget amounts to HUF 6.7 billion partially funded by the EU with HUF 4 billion. Centre for Budapest Transport hired several companies to set up the system.

Public lighting optimisation

Experience confirms that public lighting constitutes a major item in local government budget, and its financing has always been a tantalising task. Modernisation can lead to significant cost reduction, and sustainable development can gain higher impetus. Instead of the earlier, unified way, public lighting system modernisation in the town of Szolnok follows a complex and intelligent system.

Utilising benefits of smart control, all network elements can be operated individually or in small groups. Impressive cost reduction can be achieved by smart operation of second class road lighting and light intensity control. A feature dependent, immediate 25-30% cost reduction can be achieved without jeopardising town inhabitant comfort levels.

The system is capable of controlling conventional and electronically triggered lamps alike. Integrated measurement and communications functions ensure that actual status of all system elements is known at all times, and any performance losses, as well as parasitic currents can be easily localised and repaired (e.g. by replacing faulty system capacitors) without strikingly high costs. Data can be displayed on an interactive map, and a supervisory/ emergency system can be set up on this data. Based on this information, targeted maintenance structures can be established. As a result, system element life span will increase and operating costs will plummet.

Energy Management

Increasing energy prices, the demand for efficiently operating facilities and strict environmental protection regulations require that institution managers substantially decrease energy consumption and related emissions and costs.

Optimal Energy Management solution commissioned at Szolnok is a universal energy supervising scheme which provides complex services: its objective is to ensure continuous monitoring of energy utilisation, to explore where savings can be achieved and how energy efficiency can be improved, as well as how costs can be minimised in multiple steps.

Optimal Energy Management solution incorporates an Optimal Monitoring System whose data can help to promote energy control to reach the following objectives:
A major advantage of Optimal system is that it operates independently of the measurement devices, i.e. any measurement network device can be integrated into this solution. In addition, it can connect to existing smart facility management and safety systems.

The objective is to minimise time required to deal with official matters and to alleviate the burden caused by dealing with hard copy documents. Electronically stored documents can easily be tracked and retrieved, customer management is not place or time bound, hence, e-administration is much simpler and faster then conventional methods where appearance in person was required.

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**Case study**

**Building Control Authority approval process**

Building Control Authority Documentation system introduced on 1 January, 2013 is a public e-service which enables e-administration, filing requests and submitting plans in an electronic way. The system supports elementary Building Control Authority processes and assists legal remedies for public processes to be initiated electronically. It supports internal administrative procedures both on the authority and the client side by motivating clients or anyone initiating construction related processes in Hungary to get in touch with the authority via a web-based interface.

The procedure is fully electronic. Request and report can be submitted conventionally, however, the Building Control Authority has access to e-documents. Any documents created during the course of the process are generated electronically, hard copies or certified hard copies are available upon request. The Building Control Authority Documentation system runs on a central server with which applicants and government users can connect via a web-based browser. Procedure data are not stored locally, such data are only stored on the central server.

Full project budget amounted to HUF 1.1 billion. During the first three quarters of its operation, the system received nearly 70,000 requests, nearly 1,500,000 documents were processed, and number of documents uploaded by users was in the ballpark of 600,000. In harmony with preliminary expectations, average time required for a process to be completed can be decreased by 20-25% while an annual saving of HUF 5 billion can be achieved in the building administration sector, from which official post expenditure is HUF 1.5 billion.

**Controlled e-management services**

In contrast with the earlier centralised, IT centred approach, renewing Hungarian electronic public administration is characterised by easy-to-use, client centred and service controlled approach. New regulations helped the emergence of several new services which make electronic administration cheaper and more convenient.
The previously used, centralised system was replaced by the new regulations, and the new system incorporated the concept of controlled electronic administrative services. These services can be considered as pivotal points of e-administration – they are indispensable services and background systems which can provide a solid ground to generate e-versions of the most complex case documentation as well. In order to run complex services it is of utmost importance to have bidirectional, certified document based communication among institutions in the system. To this end, a secure electronic document forwarding service (BEDSZ) and a secure file movement service (BIÁSZ) have been established. These systems, in the background, send, receive or forward documents to the client. Documents signed electronically can be accessed externally, from outside the official portal.

Immigration informatics services

Development launched by the Office of Immigration and Nationality is to elaborate evaluation methods and progress measurement indicators, alignment of policies and measures, alleviation of co-ordinating activities for comparative studies, development of statistics systems collecting data on individuals coming from third world countries, and finally, support for the creation of IT systems necessary to implement community legal tools in terms of external borders and visas. The project, which is aimed at the development of migrant specific databases and migration statistics system databases, placed huge emphasis on compliance with integration indicators set forth by the Zaragoza Declaration.

The main system concept is to implement unique and system level statistics queries on registry data via a single migration statistics/information interface.

Base concept of data storage establishment purely serves statistical data collection and querying of defined data pools on the basis of specified break-down criteria. The system incorporates database content of the following enforcement bodies into its own data storage:

- Aliens Registration Office
- Registry of individuals with the freedom of right to move and to live
- Central National Visa System
- Personal Data and Address Registration System
- Alien Data and Address Registration System
- Travel and Residence Ban Registration System
- Alien Reporting System, Registry of Enforced Measures

Statistics system interface shows which data is queried, the interface allows the setting of what data is included in summaries, calculations and selections, and what data defines query results.

6. Tender management

Large amount of tenders > e-administration > effective resource utilisation

The increasing number of national and international tenders pose a significant challenge for state administration and applicants alike. From the state administration point of view, priority shall be given to streamlined and simplified evaluation processes, and to the uniform, efficient and quick assistance of projects to be implemented. All this shall be achieved in parallel with providing continuous client information services. Applicants appreciate simple and transparent systems which make tender related data continuously available and accessible from basically anywhere.

This demand can only be addressed by e-administration effectively. The point of IT systems established to serve this goal is that tenders and related documentation are submitted via an on-line interface, and all the processing is done in digital systems. This initiative makes administration fast and convenient. Tender data are constantly available remotely, institutions interested in the process can actually see all information centrally. This helps work organisation, the elimination of frauds, resource allocation and any necessary intervention.

Case study

Family and normative support

It has been a great challenge in allowance and support management how simple and more efficient administration could be achieved. In order to meet this demand, the Hungarian government strove to develop a solution which would provide a single digitalised framework for tasks in connection with requesting, accounting and controlling of registration for data required to ensure family support, financing, public education and social services. To this end, a HUF 1.6 billion development was implemented by the name of Support Life Path Base Data (SLPBD) to ensure e-administration of assistance provided to Hungarian citizens.
The new IT system introduced on April 1, 2013, gave a single framework to manage assistance paid to Hungarian citizens by the Hungarian State Treasury. SLPBD provides a uniform platform to start individual applications, to execute preliminary calculations and to evaluate criteria. This, in general, helps institutional and private clients co-operate in a unified on-line system.

All system elements have browser-based user interfaces, all are based on modern technology foundations, and all take infrastructural and technical characteristics of co-operating organisations into consideration. Furthermore, through accurate and up-to-date data provision, the system gives efficient support to execute national and international information and analytic services. A major system benefit is that it can easily and dynamically adjust itself to changes in the legal environment.

Transition to the new IT system meant the conversion of the entire family support administration process, data of 4.5 million citizens and 3.3 million cases was transferred to the new system to the use of which more than 500 staff members were trained. SLPBD introduction was a tangible advantage for the clients as less data was required to apply for assistance, forms were streamlined and amount of documents to be attached decreased by 50%. A further objective was completed since the number of centralised data centres for individuals eligible for assistance was to be decreased from 28 to 1, and it was a goal to reduce paper-based document traffic among relevant public administration organisations to 60% of the entire traffic, and to decrease average time spent by case officers from 0.5 hours to 0.3 hours.

In the wake of the development, treasury administration methods and assistance allocation changed, client data were migrated to a single database. As a result of these changes, a new data management method helps to screen out ineligible applicants, and as such, provides a valuable means to the public administration to operate cost effectively as an economic analysis prepared by the treasury indicated that payment to ineligible parties amount to HUF 6 billion annually.

European Union funding

Following the EU accession, it was necessary to create an electronic interface to manage community fundings and related decision making processes. The Integrated Monitoring and Information System (IMIS) is a user-friendly interface which provides a fast, effective and convenient way to channel EU funding resources to applicants.

IMIS helps throughout the entire application and project implementation process. The system is fully on-line, and creates remarkable cost and time savings for the users by eliminating printing and postal expenditure. In addition, it ensures quick information service by publishing the decisions shortly after they have been made. IMIS has all applicant related data, available, independently of geographical limitations. The interface logs all events, it shows deadlines, persons participating in the process, and also has a mailing module.

During the 2007-2013 programming period, slightly more than 130,000 applications were received by IMIS, and nearly EUR 17 billion of funding was paid.
E-document management systems not just simply eliminate incoming and outgoing mails but implement management logics all throughout the entire organisation, however, using stored data, masses of new document images can be regenerated or printed. A properly configured document management system decreased the time spent with document management by at least 30%. Migrating hard copy documents to digitalised form is important from the point of sustainable development as well; to approve a three-page proposal submitted by a State Secretary earlier required the printing of 1,500 pages.

Case study: Migrating hard copy documents to digitalised form

As a key element of e-communication in Hungary, a HUF 3.25 billion investment was made to develop a hybrid delivery and conversion system. Its purpose is to provide certified delivery services which enable both electronic and hard copy document delivery. The system is a certified hybrid delivery service which enables the sender to choose whether to create documents only in an electronic form and to request their electronic certification and delivery, or to opt for printing the electronic content and to request normal certification and conventional delivery.

The hybrid delivery and conversion system aims to channel all communication between the authorities and the client to a purely electronic form while maintaining the option to choose the conventional communication methods. The implementation of the hybrid delivery and conversion system results in a 40-50% decrease in costs in comparison to conventional postal services.

The system is capable of processing 1,000,000 A4 sheets daily, and has a storage capacity of 100 terabytes. The system can produce 500,000 regular packages daily and 250,000 registered packages.

Case study: Electronic signature

Electronic signature allows the creation of official documents in an electronic way. The signature itself is electronic data inseparably and logically assigned to the document for identification purposes. Electronic signature is practically a special coding operation where the code structure created confirms the authenticity of the document. Signatures allocated to individual documents are different even if the same person signed all of them. In order for the signature to be complete, a signature creating private key is needed.

e-Szignó is a tested and certified software to create electronic signatures. It carries out complex encrypting tasks required to implement multi-level control of signatures, and organises data into files with metadata attached, furthermore, it can publish time stamps and verisign, can create and check electronic delivery receipts, and can support qualified archiving. Its built-in scanner application enables immediate signing of e-documents. The software supports formats used in public administration, and is capable of counter-identification as well.

Experience shows that the introduction of systems based on electronic signatures can mean high savings in the short run as investment costs are vastly exceeded by direct and indirect savings.

Security

Elimination of hand-writing and paper usage, it has become a key matter in informatics to implement data security and authenticity. Solutions which can guarantee secure and authentic data transfer, communication and identification have by now become accessible for private and state stakeholders alike. Solutions like this are electronic signature, certificates and time stamping.

A cornerstone of IT security is proper logging and analysis of inter-organisation activities. Log management is one of the oldest method of uncovering security incidents. Users with elevated rights, e.g. system admins should be checked as stipulated by all international standards as in most cases unwanted attackers get access to company data by using their credentials.
In the wake of solution introduction, direct and indirect savings (working hours, manpower, power bills, postal and storage costs, human intervention, etc.) can be in the neighbourhood of 70-90% which amount to several hundreds of millions of HUF annually.

Certificates

Signature-creating data is required to sign a document electronically. So that others can identify and accept the signature, so-called signature certificates are necessary. The certificate allows for the creation of the e-signature which enables the certification of private documents providing full evidence. A stronger certificate, to create advanced security signatures, also exists. Number of certificates issued in the Hungarian state sector to certify electronic signatures was 5 in 2005 while in 2013 it was 1,158. Number of certificates issued to certify high security documents was 391 at the end of 2013, and 864 clients contracted for certification services in 2013.

MicroCA is a certificate issuer and management certificate authority software which provides a full array of services. It supports all operations aimed at changing certificate state (suspension, restoration, withdrawal, renewal), furthermore, the system provides information on actual certificate status by giving on-line certificate status responses.

Time stamps

Time stamps confirm that a document existed in a certain point in time. If a document has an electronic signature and a time stamp as well, not only the fact that the document was signed by the person whose certificate is in the signature is certified but also the fact that the document was signed before the time indicated in the time stamp, and the document has not been altered since. As far as time stamps issued by service providers in the Hungarian state sector, the number of time stamps skyrocketed during the past 9 years: in 2005 barely more than 1.06 million stamps were issued by service providers, in 2013 nearly 10.93 million state sector time stamps were issued.

MicroTSA is a software capable of creating standard time stamps. The system can receive time stamps requests and issue time stamps via http and https protocols by user name or certificate based authentication.

A census is the only time when the entire population of a country is registered. It is a complete snapshot of the nation which covers the entire population and refers to a pre-set date. Censuses are usually held every 10th year.

Modern censuses collect unique data to give a chance to introduce and to summarise building and population data of a given time period. Information gathered this way provide background for better founded decisions on national level economic, healthcare, educational, welfare and cultural development issues.

Case study

Census data collection

2011 Hungarian census was a combination of hard copy forms, e-forms and interviews. More than 40,000 survey agents participated in the census, and nearly 5,000,000 households were included in it. It was the first time that forms were able to be submitted electronically.

Census Data Collection Support System (CDCSS) helped people working in the implementation, and enabled querying a daily status report of the census. The system used an architecture which, besides special data and system security, can ensure error-free task execution even when huge workloads are present by servicing tens of thousands of users via a web interface.

Population register system in Vietnam

Vietnam is one of the fastest growing country in Asia. Having left a tough past behind, this country with a population of 89 million is now striving to develop its informatics systems, in order to meet 21st century challenges.

Current registration is supervised by the Ministry of Interior, paper based archives are stored at local police departments. This system is not only obsolete but also fails to meet the challenges, and it also lacks some major data security functions. Several consortia participated in the loan tender supported by the EU in order to find a proper solution based on experience gained so far.
Hungarian businesses compete with Japanese, French South Korean and Israeli companies to win the contract.

There are several pilot projects under the umbrella of this tender; the Hungarian consortia is responsible for digitalisation of the personal address and name registration system for Hai Phong, a city with a population of 1.7 million.

Minimum 50% of this EUR 10 million project is cofunded by Hungarian suppliers.

Independently of the results of the tender for nationwide extension, the system established in Hai Phong will be integrated into the national population register.

Population register, in fact, means to register people’s names and residential addresses. By replacing the paper-based solution currently used, this system will later become the basis of an Office of Government Issued Documents based structure. Main project objective was the establishment of an electronic architecture and the registration of 17 types of data unique to each town inhabitant, as well as system establishment in a way to handle basic processes such as address change, marital status change, etc. This pool of data will be used as a basis of all population related administration, starting from passports through IDs and driver licences.

Main objectives:
- Building reconstruction and hardware installation operations, purchase and installation of supplementary equipment, purchase of necessary hardware and related licences, and their installation in two data centres (Hanoi and Hai Phong) for more than 500 workstations.
- Development to be implemented in pilot locations: establishment of proper infrastructure;
- Software development: design and implementation of a population registry software tailored to Vietnamese demand, on the basis of Hungarian experience;
- Data collection and digitalisation: Population data collection of Hai Phong with a specifically designed software (100 data registers);
- Knowledge transfer: user training in Vietnam and Hungary and system operation (hardware + software) for three years.

10. **Student loan**

The objective of the student loan system is to give a chance to all students to participate in higher education, independently of family financial status. The government wish to make certain in the long term to establish a sustainable higher education system accessible to large amount of people in order to boost the nation’s economy.

**Case study**

**Student loan system**

The Hungarian government, by involving the necessary state institutions and state-owned organisations, and by establishing close co-operation among student loan organisations, in 2001, set up and since then has been operating the student loan system, including its resource generation, loan application and loan payment processes.

The Hungarian model set up in 2001 adopted elements from a wide array of internationally acclaimed student loan systems, and matched these with the unique characteristics of the Hungarian educational system and demographic features. Based on experience gained so far, the initiative has proven successful. Both research and feedback received from the public confirm that the student loan scheme
serves its purpose well. There are two loan structures available: one can be freely used while the other type can only be used for definite purposes.

Clients contracted with the Student Loan Centre are eligible to use e-services, i.e. Student Loan Direct as well. This special service supports client management in a free-of-charge manner.

The system allows for convenient administration and management via the internet. User friendly Student Loan Direct interface greatly simplifies contract related processes. This service save money and time for the clients. It provides clear and easy-to-use tools to track loan amounts. Replacing the previously used method which relied on conventional postal services, this system enables the client to report data changes via a new medium. The centre sends emails and documents to the clients thus they are informed of actual to-dos and contract related matters in a timely manner.

Student Loan Direct is available via a free-of-charge smart phone application. This application helps the clients access their messages, to check on the loan status, to check the current balance and dues, to monitor transfer progress and history, to search the nearest client contact points which are easy to find with a map application.

The Centre, between 2001 and December 31, 2013, awarded student loans to nearly 349,000 students. The Centre, between 2001 and December 31, 2013, awarded a total loan amount of HUF 267 billion.

**Case study**

Registration, data procession and information management

In harmony with relevant EU regulations, farming and food safety systems developed for the Hungarian authorities offer unique animal movement tracking, animal registration, animal identification solutions tailored for individual species. Softwares designed to manage agricultural and regional development funding track funding requests from their submission to bank transfers, and support administrative and on-site audits, as well as satellite image analysis. These systems provide a platform to register domesticated animals and lifelong tracking in line with EU food safety regulations. Similarly, these systems enable the management of official breeding registries, as well as crop forecast assisted by satellite imaging.

Besides supporting objectives, the Single Registration and Identification System (SRIS) serves to provide solutions for animal health, breeding and other agricultural demand, while taking unique breed characteristics into consideration. Authorised users can access system data whenever necessary.

Automation is gaining space in agriculture, however, legal framework calls for an intensified use of e-systems. A perfect example of this is a simple, convenient and easy to access support system which provides management, payment and information services, all in one. This solution, besides its obvious advantages, requires the management and handling of large amounts of data, nevertheless, security, health and safety, as well as environment protection is prioritised.
Establishment of the new system, on the one hand, makes the job easier for all actors in the risk management scheme, and on the other, it provides reliable electronic connection among organisations participating in the damage mitigation process. Data collected enable the analysis and enhancement of the risk management system, as well as well-founded preparation of government decisions which are supported by the statistics and reporting system developed for the database as well.

Seed, Fertiliser Supervision and Plant Experimental System, in co-operation with the central database – in terms of seed production, considering the entire country a single region – creates a nationwide network in which origin of all seeds can be thoroughly tracked through the entire process.

Damage mitigation

The Hungarian government prioritises the alleviation of farmers' exposure to weather risks, and the mitigation of damage occurred. The most significant risk for the agriculture includes elements which cannot be influenced by humans. Unfavourable weather conditions cause an annual loss of HUF 100 billion for the Hungarian agriculture. One of the key government objectives is to find a solution to manage risk associated with agricultural activities, to mitigate damage and to make the system more transparent and simple.

The new agricultural damage mitigating system was launched in 2012, two pillars of which are constituted by damage mitigation fund and insurance fee support. In order to promote this goal, a Complex Agricultural Risk Management System has been established. Project objective was to implement an IT development which fully satisfies all requirements of the damage mitigation system resting on these two pillars. The project also aimed to better the quality of services provided to private individuals and businesses, to alleviate administrative burden of farmers and intermediate bodies and to this end, enforcement of deadlines, in parallel with minimising procedural errors in implementation processes.

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The project of HUF 1.25 billion was started in 2013 and closed in June, 2014. The system has been available to farmers and authorities since November, 2014. As a result of this novel feature, farmers can submit their damage mitigation claims electronically, in addition, an up-to-date database is accessible for the authorities for audits and payments.

In the wake of development implemented in the project, administrative load of farmers currently in the system are expected to decrease remarkably. Current hard copy based procedures are replaced by a modern system supported by leading IT solutions. It will be possible for farmers to give
Project objective is to support emergency care services by integrating resource registries of healthcare service providers, and to establish a GIS database for branch emergency service at National Public Health and Medical Officer Service (NPHMOS). This integrated data service has been made accessible as necessary to businesses and private individuals as well.

An electronic connection between National Public Health and Medical Officer Service (NPHMOS) and technical data providers has been established. As far as epidemic care, chemical safety and radioactive safety are concerned, the solution greatly alleviated related risks and reduce internal administrative load.

An electronic connection with fellow authorities organised around the central emergency centre became available which reduces response times in emergency situations and harmonises co-operation among sectoral state actors. Internal and external registries as well as technical databases were opened to the public thus significantly boosting trust in the organisation, open and multilateral relationships were established among public sector players and citizens, citizens now more actively participate in decisions and public matters, and the initiative sets a brand new direction for healthcare service development.

It was a major step forward that by implementing the system, the National Public Health and Medical Officer Service (NPHMOS) and through this organisation, other state organisations as well, became able to comply with EU health commitments, and to participate in the work of the international network.

E-HealthConnect

E-HealthConnect is a widely used tele-medicine system to support the following functions:

- electronic patient data management;
- remote patient guidance and treatment;
- connection with emergency care;
- GP access;
- monitoring of vital parameters;
- management of medical forms;
- communication organisation among telecare actors;
- interfaces for telecare measuring devices;

E-HealthConnect can be used in all disease groups where home care and remote supervision is possible and justified, for example, people with diabetes, Alzheimer patients, patients with circulation system problems or sportsmen.

E-HealthConnect replaces the costly time spent in hospital, and also saves time and money for patients.
Patients are to measure, track and submit their vital parameters (blood oxygen level, blood pressure, ECG values) and weight data via a wireless device.

Events transmitted are prioritised by the flexibly configurable system rules on the work schedule of supervising staff thus greatly assisting the activities which require a high amount of attention. Data registered during the continuous monitoring, including any potential discrepancies and list of medications taken daily, is channelled to the centre via a digital device (tablet, smart phone or computer) where a team of experts will evaluate results necessary for efficient treatment.

If measurements indicate a critical patient condition, the GP and the referring physician receive an immediate notification via the e-HealthConnect system. If necessary, the rules mentioned earlier can trigger an automatic alert for the active ambulance station. Doctors have direct and non-stop access to data which is stored in the electronic patient files.

Clinical information system

There were several diagnostics and administrative systems running in parallel thus creating heaps of data which was not properly interconnected. Complete patient history or identification of similar diseases was only possible through expensive integration projects.

Systematic storage of large amounts of data generated by modern diagnostics devices, and allocation of this data to individual patients further amplified the complexity of the matter.

There have been numerous integrated clinical systems operating in Hungary which not only provide solutions to individual institutions but cater for the demand of interconnecting such entities in a seamless network. Web-based implemented solutions along international standards enable the establishment of virtual clinics which are physically or operationally not connected to each other.

e-MedSolution used in several hospitals is a fully web-based application, it is highly capable of implementing the virtual hospital model. Unlimited use is combined with unrivalled mobility both internal and external to the institution. It uses mobile devices and technologies to enable users to access life saving data at a push of a button. Just as patients need expert physicians, physicians need seamlessly operating clinical structures to facilitate efficient work. High standard healthcare can only be provided by economically healthy medical institutions which is virtually impossible without a proper IT background. In order to achieve this goal, e-MedSolution is integrated with all widely used financial
Postal service is a classic one, which has been effected by two major sides by the evolution of technology. In one hand, many of its functions are morphed into digital platforms, numbers of mails and messages dropped drastically. In the other hand significance of package delivery and hybrid services have gained in through the evolution of e-commerce. Today’s postal service is a serious challenge of system operation and organization, where costs have to be decreased while efficiency should reach previously unthinkable levels. Many times post offices have to be ready for unpredictable changes and hectic market behaviour.

Case study

Integrated Postal Network

The Integrated Postal Network (IPH) is the core postal technology system of the Hungarian Post Office Ltd. The system that features computer-based special postal peripherals has replaced the earlier manual technology in post offices. This new technology, however, not only aims at easier delivery of post office services, but also provides a facility for fast and easy adoption of new forms of postal services through its flexibility and extension capability.

The replacement of the previous, mostly manual process by integrated IT solutions has started in 1999. The delivered solution enabled to serve the increased traffic, and supply the business and the customers with daily information, with the purpose of pursuing efficient operation and providing fast and cost-effective business function building. Further aspects of design were solving the challenges of current infrastructure coverage, e.g. the capacity and reliability of the data network coverage.

Over 5,000 workstations and more than 35,000 of other equipment have been installed in post offices so far, and considering the number of workstations and transactions performed on them, as well as the versatility of the application, the IPH system can be labelled as an outstanding IT development in the region during the past decade outstanding IT development in the region during the past decade.
A special challenge was the fact that the set of mostly unique peripherals used for postal technology, the personal computers, as well as the application were to be implemented where the infrastructural environment as well as the IT culture were below average. Easy manageability, strict “guidance” of operators and cautious fault management were core requirements.

Another important feature of the system is that it does not require local management. Application updates can be controlled centrally in terms of rollout and going live, and data are backed up and reloaded fully automatically, with the use of data mirroring on local machines. There is no need to have any IT staff present in post offices.

Individual post office networks are connected to a central server farm, which, in addition to catering for contact between post offices, ensures accessibility of all postal data files at a single location. This facilitates fast data supply for central data inquiries, statistics, management information systems, as well as protection of data of post offices also in disaster situations.

**Main business functionalities:**

- Shipment recording (letter, package, EMS, forms, postcards, etc.)
- Voucher recording (cash transfer: KM, EKM, BPU, International money transfer)
- Commercial activities (postal and financial commodity; commercial goods, lottery tickets)
- Banking services (securities, deposit, POS, External System Integration)
- Other cash flow services (money exchange, money supply, special vouchers, guaranteed cheques etc.)

Next to the customer service the postal operation design and support, administration, tracking are also main components of the system.

Important system features are flexibility and easy extension capability, which provide a facility for the Post Office to enhance utilisation of the postal system for launching new services and for involving business areas that has so far been outside postal activities. In practice, it is represented in the form of further applications that have been developed using the core components of the IPH system, which support the Post Office’s activities of mail management, mail forwarding and delivery.
MVM NET Telecommunications Service Provider Ltd., as a member of the MVM Group, is a modern, high capacity and extremely reliable telecommunications service provider.

MVM Hungarian Electricity Ltd’s telecommunications activity is originating from their support of the electrical power system management activities. The increased demand in capacity in this area made it necessary to upgrade the telecommunications network. As a result of these developments, a modern system was put in place consisting of passive (optical backbone) and active (transmission and IP equipment) components with considerable surplus capacity. The system, which perfectly fulfils the telecommunications requirements of the transmission and system management authorization activities, fully meets market expectations. Since the launch of the National Telecommunications Backbone Network (NTG) at the end of 2012, MVM NET has been providing telecommunications services to state institutions. The company utilizes the free capacity of its telecommunications backbone network, providing telecommunications services to its government and business clients.

By now MVM NET operates the 2nd largest, 6600 km long OPWG optical fiber backbone network connecting to more than 10,000 endpoints in Hungary. Its network guarantees excellent performance, stability, security, extreme reliability and competitive pricing.

The operational model of the 100% state owned telecommunications subsidiary, MVM NET is based on the following pillars:

- Electricity system related telecommunications activities
- Government related telecommunications activities
- Telecommunications services offered for wholesale and enterprise customers

The Company uses: Seamless MPLS; IPv6; Multicast; Traffic Engineering; SyncE and PTP IEEE 1588v2 solution; Legacy services over MPLS (from E1 upto STM-4); QoS.

A wide range of telecommunications services can be provided on its network: Transparent L2 Ethernet services; Direct Internet access; Internet transit for partner ISPs; Wavelength (upto 100Gbps); Dark Fibre; IP VPN; Voice services; IPTV; Electricity reselling.

MVM NET Ltd is a full member of the Frankfurt-based DE-CIX (Deutscher Commercial Internet Exchange), the world’s leading and most significant provider of premium IX services.

As a constantly growing and developing company they are focusing on the following projects:

- Developing 450MHz frequency band network for Smart Technologies
- Implementation of Ethernet-VPN (RFC 7209)
- Next Generation Multicast VPN services (RFC6513)
- 100Gbps MPLS SuperCore
- R&D projects SDN and NFV for service provider networks.

www.mvmnet.hu