



eHealth Solutions in Europe – Slovenian Experience

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The health insurance card (HIC) system, introduced by the Health Insurance Institute of Slovenia (HIIS) in 2000, furnished the Slovenian health care system with an electronic insured person's document and established data interconnections between all insurance providers and health care service providers. The HIC system, which effectively combines the smart card technology and network services, consists of the following technological components: insured person's cards, health professional cards, health care service providers' data processing environment, and an on-line network of self-service terminals.

Introduction of Slovenian health insurance system

Slovenian health insurance system is a combination of compulsory health insurance, which covers all inhabitants of Slovenia, and voluntary health insurance. The compulsory health insurance is funded through contributions by employers, employees and other obligors. These contributions are collected by the Health Insurance Institute of Slovenia. Compulsory health insurance covers health care services in full only in the cases of children, preventive and emergency condition treatment and certain diseases. All other health care services involve cost-sharing through co-payment. The difference to the full price of health services is to be paid by the patients themselves. These co-payments might be very high, but may be avoided by entering the voluntary health insurance scheme. Currently there are 3 voluntary health insurance companies in Slovenia, which offer full coverage of co-payments. Almost entire adult population participates in voluntary health insurance scheme which is financed through private insurance premiums. So there are practically no cash payments necessary at those health care service providers, who operate under contracts with the HIIS.



Technological components of the HIC system

The health insurance card is the only document applicable in the implementation of the compulsory and voluntary health insurance rights in Slovenia. This electronic document was issued to all persons covered by the compulsory health insurance in Slovenia, i.e. to the entire population of close to 2 million. A person is to present the card when visiting at the doctor's and at all other occasions of implementing the rights deriving from health insurance.

The card holds visible data as shown in Fig. 1. The card further stores electronically recorded information:

- card holder details (name and surname, address, sex, date of birth);
- insurance contribution obligor details (registration number, firm name, address);
- compulsory health insurance details (date of confirmation, insurance validity);
- voluntary health insurance details (type of insurance policy, insurance validity);
- selected personal physician details (ge-

- neral physician/paediatrician, dentist, gynaecologist);
- issued technical medical aids;
- voluntary commitment to donate organs and tissues for transplants;
- issued drugs – pilot in region of Nova Gorica started in June 2005.

The HIC is a microprocessor card (with 16 kB EEPROM, 32 kB ROM, 1280 RAM and a 16-bit CPU).

Reading data from or writing to the HIC can only take place through a card reader, in the presence of a health professional card (the Health insurance card, Fig. 1), which is a microprocessor card with 8 kB EEPROM and serves as an access key to data on the HIC (using symmetrical cryptography and PIN codes). The card is issued to all professionals in the health care sector and health insurance sector (doctors, medical nurses, reception desk administrative staff, pharmacists, physiotherapists and other health care workers, and to the authorised officers of the health insurance companies). HIC holders are classified into several different

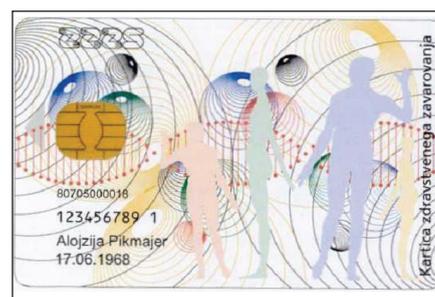


Fig. 1: The Health insurance card.

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Fig. 2: The desktop reader is used at the doctor's office, pharmacy...

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groups; groups have different keys on HPC and consequently different access rights to data on the HIC.

Slovenian health care service providers use three different types of card readers (Figures 2 and 3): desktop, integrated into the keyboard and portable. They all comprise a key-pad for typing the PIN, LCD display for messages and two card interfaces, one for HIC and the other for HPC.

Self-service terminals (SST, Figures 4 and 5) are designed for the updating of the validity of health insurance and other card data directly from insurance providers' data servers. A self-service terminal is fitted with a card reader to read data from the card and modify them. It is also fitted with a touch screen, which allows the user to interactively browse through information, help and services. An audio explanation of the procedure is enabled for the blind and weak-sighted.

The self-service terminals are on-line non-stop. Most of the terminals are installed indoors, in health care facilities (such as hospitals, pharmacies, insurance



Fig. 3: The portable reader supports the use of health insurance card in the field work and work at locations not fitted with a desktop workstation and the required software.

company branch offices...), while some are adapted for outdoor use. Today, the number of self-service terminals available for card data updating, approaches 300. The choice of terminal locations is based on a number of criteria, such as the frequency of visits to particular health care facility, territorial dispersion, accessibility to handicapped persons etc.

The terminals are linked, through the network, to the central location in Ljubljana (the capital of Slovenia), from where the central transaction-communication server supplies the particular terminal with data from the HIIS and voluntary insurance company data servers, with the transfer speed of 64-256 kbps.

Self-service terminals functionality

1. On-line updating of HIC data (Figure 6) – The health insurance validity is updated by the card holder through the SST. The updating of insurance validity also updates other card data from the central data servers. In 2004 there were 6.316.296 HIC updating transactions (once updated, the insurance data on the HIC is valid for 3 months), which means, that on average each HIC was updated 3 times.
2. By touching the screen, you can invoke the display of "Information" concerning the card system operation, the compulsory and voluntary health insurance, public health care service providers and concessionaire private practitioners, health advice. There are more than 400 pages of information available, which are regularly updated. Video and sound are also enabled. The statistics show that information about health care service providers are amongst most visited ones. By touching the „Help“ screen button, one gets instructions for the self-service terminal operation and explanations in cases of errors or disturbances related to either the network or one's HIC.
3. An example of "Services" is ordering of European Health insurance cards and convention insurance certificates. The EHIC and convention insurance certificate warrants the insured person to implement urgent medical services



Fig. 4 and 5: Different types of self-service terminals used in the Slovenian HIC system.

when staying abroad. To simplify the procedure for insured persons, HIIS introduced ordering through the self-service terminal network, with the HIC serving as access key and source of personal data. This service is free of charge. The ordered EHIC and certificates arrive by mail within 3 working days from ordering, to the address recorded in the card memory (Figure 7).

4. We use the self-service terminals network for adding new applications and functions on the HIC. The HIC memory is divided into files, which are already in use, files prepared for future applications and some space is left free for files, which are not yet determined. Each file contains a record of which of the 14 different types of professional card may access its data. Secure Messaging process is used for downloading new files on the

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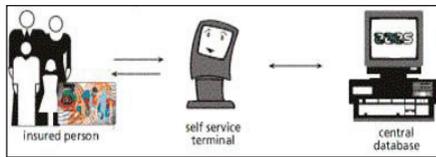


Fig. 6: Online updating of HIC data.

HIC and for changing access rights of the existing files on the HIC. To ensure adequate security of this procedure end-to-end communication between security server and HIC is applied.

Function enhancements of the HIC system in progress

The HIC system has established infrastructure (technology, know-how, experiences) and given rise to initiatives for functional enhancements and incorporation of emerging new technologies. The major projects in progress include:

Recording of Selected Medical Data, to be implemented in 2005

The HIC will store its holder's stable medical data, those that are relevant in emergency medical aid situations. We are about to implement the data set of stable medical data on the HIC, which comprises data on life threatening allergies and over-sensitiveness to medicines in the beginning of 2006. Later we will include data on relevant vaccinations and health risk factors. Another project in this group is the recording of the card holder's voluntary commitment to donate organs and tissues for transplants (this project already started in a pilot region in March 2004). This declaration of one's humanitarian will is securely recorded in the card memory and accessible in controlled

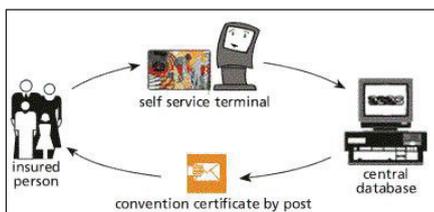


Fig. 7: Ordering of EHC and convention insurance certificates through self-service terminals.

settings (Figure 8). Another major project in progress is recording of issued medicine and on the HIC – the pilot project started in June 2005.

PKI and electronic signature, project start in autumn 2005

The main current technological enhancement of the HIC system is the progressive establishment of the public key infrastructure (PKI). Comprehensive activities have already been launched, and first, the health professional card will be upgraded. The reliability of the identification/authentication tools residing on the patient's and health professional's card will facilitate citizen's trust in privacy protection when his/her health data are to be made available to him/her and authorised health professionals through the Internet.

The PKI infrastructure, which is almost entirely set up, will significantly enhance the functionality of HIC, which will become the access key to different data servers and will itself carry only limited number of emergency medical data.

The introduction of the Health Insurance Card system paid off

The analysis of the acceptance of the HIC among users has shown that both

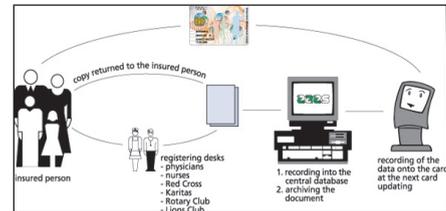


Fig. 8: Recording of data of a voluntary commitment as donor for transplants.

the insured persons and the health care workers have positively accepted the HIC System.

There are many benefits from the HIC system. The data on the HIC are up to date and accurate. The protection of insured person's data is enhanced significantly. Through the HIC system, responsibility and care for one's own health are promoted. The health care personnel is allowed more time for quality professional tasks, since the HIC cuts down the time-consuming paperwork. Through the HIC system use, the IT literacy among the health care staff is raising. Closer control over financial flows is possible.

All these benefits combine in advancing the quality, efficiency and transparency of the health care services and communication between all actors (insured persons, health service providers, insurance companies) is facilitated.

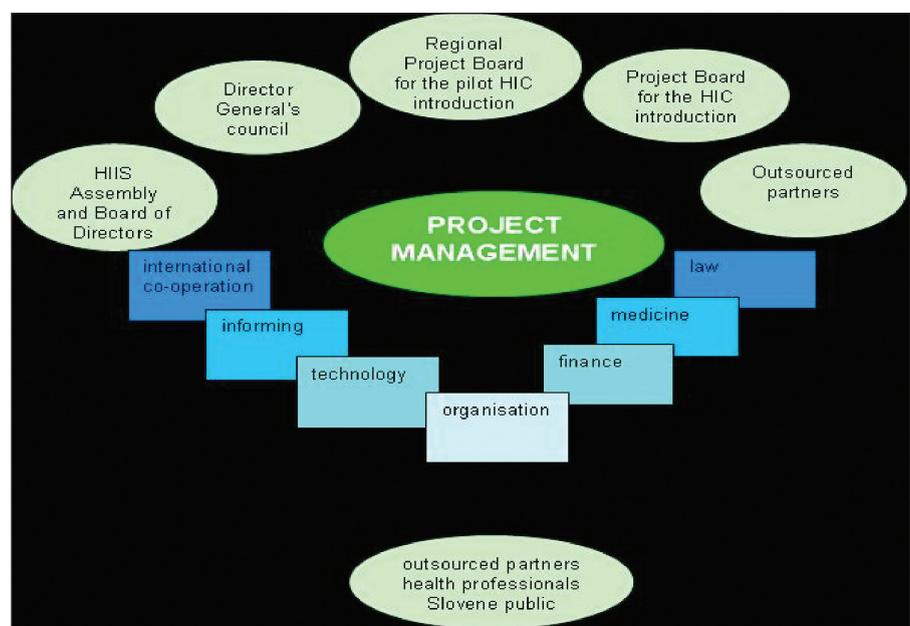


Fig. 9: Project organisation



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HIC System in numbers:

Health Insurance Cards: 2.006.518
 Professional cards: 19.253
 Card readers:
 desktop – 4.980, portable – 890,
 integrated into keyboard – 230
 Self-service terminals: 296

Contact

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Aim of the project	To furnish the entire Slovene health care system with an electronic document serving to attest health insurance – the health insurance card – and a virtual network interconnecting health insurance providers and all the health care service providers.
Description of the project region	The entire Slovenia
Number of institutions	Health insurance institute of Slovenia, 3 private health insurance companies, 26 hospitals, 61 Health centres, 102 Pharmacies, 1187 Private practitioners,
Start of project	1995 - Launching of the project, 1998 - Implementation in the pilot region, 2000 - National scale introduction
Roll out:	October 1999 - June 2000 (Introduction of the system by regions)
Project organisation	See fig. 9 (Project organisation)
Project coordination	Health Insurance Institute of Slovenia
Industrial partners	Gemplus – cards and card readers, Siemens – self service terminals and central transaction server, Logina d.o.o. – self service terminals, SST SW, NIL d.o.o. – self service terminal network, Telekom Slovenije – telecommunication infrastructure, Metra inženiring d.o.o. – API, Health care service providers' SW houses – upgrading of the local application SW
Technical demands	High security level of the system (3DES), access to HIC only with HPC
Timeline and future planning	Recording of issued drugs on the HIC – pilot started in June 2005, national scale introduction in 2006, Introduction of public key infrastructure to the HIC system – 2005 – 2007, ePrescription – 2005-2008
Specials	