



The French way to smarter healthcare

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France, along with Germany, has always been at the forefront of smart card technology. Following in the footsteps of the banking and telecom industries, the French Government started deploying smart cards in the healthcare industry as far back as the early 90s. Back then, the operating costs of Social Security were running high. Patients had to pay for health treatments and then apply for reimbursement. At the same time, the use of paper forms incurred heavy administration that resulted in slow processing of these reimbursements.

To solve this problem, the French Government worked to reduce the operating costs through claim processing automation. The scheme was designed as an electronic health insurance data entry system based on smart card technology, and was called „SESAM-Vitale“. An Economic Interest Group (GIE SESAM-Vitale) was created to develop and promote the program, handling all technical design, integration of third party components (hardware, software), card issuance processes, and overall piloting of the scheme.

After a pilot phase in the mid 90s, the roll-out started in 1998. Over a period of 5 years Gemplus delivered a quarter of the cards and readers (desktop and mobile range) used for the original scheme. Other suppliers include Schlumberger and Oberthur.

Today, more than a decade after the launch of SESAM-Vitale, the nationwide scheme includes 55 million patient cards, 600,000 health professional cards, 200,000 card readers, 20,000 terminals for card updating, 230 health software applications, and 25 servers handling the transaction flow and a dedicated telecom network.

Two cards working together as one

The underlying concept of SESAM-Vitale is the combined use of two cards to electronically sign claim forms: a patient data card, and a health professional card. Through the system, health professionals (i.e. doctor, nurse) can create electronic



claim forms and forward them directly to the patient's health insurance provider. The form is validated by using the health professional card and the patient card, which are both inserted in a dedicated twin slot reader. The claims are finally submitted in batches over a dedicated and secure network.

After a patient's visit, the health professional is allowed three days to submit a standard claim, and one week for a third party payer claim. A backup copy of all electronic claims is filed for a period of three months. Via e-mail, the Health Insurance Centre acknowledges receipt of successfully transferred claims. In case of unsuccessful transfer, a failure notice is sent to the health professional.

The system is simple to use, allowing health professionals to easily create and submit electronic forms using integrated solutions linked to an outsourced management centre. Dedicated software to manage their activities is available for doctors, as well as portable solutions for house visits.

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This is a Gemplus reader, designed for the French healthcare scheme. With its two reader slots it can handle both Health Professional and Patient Data Cards at the same time.

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What's on the card and why?

From a technological point of view, the patient card is a microprocessor card featuring 4KB EEPROM. Administrative data is stored inside the card:

- Identification number of the card holder
- Last name and first name of the card holder
- Compulsory health insurance coverage plan
- Insured person's health insurance processing centre
- Additional names of possible beneficiaries (children under 16)
- Supplementary health insurance
- Right to Universal Medical Coverage (when applicable)

SESAM-Vitale cards do not hold any medical information. Any changes in the insured person's status, such as a new child or a change of address, requires the card to be updated. The update can be seamlessly handled by the insuree, using his/her card with dedicated terminals and self-service kiosks conveniently located in local social security offices and pharmacists.

The cards personalization is splitted the National Health Insurance Agency's own issuing center and the card suppliers. Personalized cards are mailed directly to the insurees.

The Health Professional Card features 16KB EEPROM with a cryptographic coprocessor and 2 digital certificates. With a 2 year validity, the card is used by doctors to securely exchange both administrative and medical data using a Public Key Infrastructure (PKI). The card is used to sign electric claim forms and also to sign e-mails exchanged with other health specialists. Over 600,000 healthcare professionals are using the card on a daily basis to make electronic requests for reimbursements of health insurance expenses. Doctors request the cards from their Professional order and receive them by mail.

With over 80 million electronic claims processed each month using the smart cards, the scheme has proven to be extremely successful. Claim processing is now done much faster than before, creating a win/win situation, as insurees are refun-

ded much quicker than with paper forms, and with extra convenience (no longer need to mail the paper forms to the Social Security). Reimbursement of the insuree is now done within five days instead of 2 to 3 weeks with the former paperwork system.

Evolutions of SESAM-Vitale

The system is evolving continuously, and in 2004 it was made available to the complementary health insurance organizations, (direct reimbursement flow by the Health Care Professional to the private insurance organizations and social security institutions). The electronic claim can be sent to both mandatory and complementary health organizations in a single step.

The update of Patient Data Cards is also more convenient today, thanks to self-service kiosks installed at pharmacists.

To accommodate new features, the next generation of cards, known as „SESAM-Vitale 2“, will be deployed in 2006 Such new features include:

- The personal medical file. The Ministry of Health is implementing the personal medical file, where the doctor, in partnership with other health specialists, will centralize all medical data related to a patient, to better monitor patient health and increase overall quality of the care. The data is highly sensitive and will be stored on secure servers, with the health professional and the patient cards acting as access keys to the file, to safeguard privacy and medical secrecy. The file can be updated using the same two card mechanism as for electronic claim processing. This requires Public Key capability and space for certificate storage on the Patient Data Card.
- The dematerialization of prescriptions. In much the same way as claim submission, the idea is to move from paper-based to electronic-based prescriptions. There are several reasons for such a migration: it helps reduce mis-prescribing and prevent adverse drug reactions, especially when combined with the personal medical file. This allows the tracking of health expenditures and the prescription of generic drugs and also reduces the amount of paperwork. The prescription

can either be stored on a secure server, or inside the Patient Data Card (or both, at least the most recent prescriptions in the card). The loading and retrieval can be done using both doctor and patient cards. The number of prescriptions that will be stored on the Vitale 2 card is not yet defined. From a technological point of view, there is enough room on the card for 10 prescriptions or more, depending on the codification system used. In terms of security, it is possible to implement a validation system that will deactivate the prescription once it has been fulfilled by the pharmacist, so that the patient cannot get the medicines twice.

- Emergency medical data. In the case of an accident, the access to emergency data, securely stored inside the Patient Data Card (blood type, current treatment, allergies, name of the doctor) can increase the quality of care provided to the patient. This requires specific security mechanisms, as well as extra storage space to ensure that only emergency doctors can access the data (and not the entire card content).

Technically speaking the card will feature a microprocessor with 32K of EEPROM with Public Key technology and IAS mechanism (Identification, Authentication, Signature), a cryptographic protocol compliant with European Union specifications on digital signature.

Built for the future

The card will also be able to accommodate the future needs of interoperability across the European Union member states, as part of the scope of the European Health Identity Card (EHIC) project, known as „Netc@rds“. The aim of this project is to simplify access to health services across the European Union. With E111 and E128 paper forms, European citizens do not need to pay for emergency healthcare in other European Union countries. The paper forms entitle them to free treatment, which will be invoiced by the local Social Security body to the Social Security department in their country of residence. In 2004, these paper forms were replaced by plastic cards, which pro-

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vide a stronger interoperability (a unique layout across the EU). By 2009-2010, the project will move to smart cards, because of the extra convenience and security that it adds to the scheme. The Economic Interest Group SESAM-Vitale is one of the promoters of Netc@rds, and Gemplus the sole provider in France of the EHIC personalized plastic card.

One of the main threats of the current SESAM-Vitale scheme is the patient card sharing fraud, where people unlawfully gain access to free care by using someone else's card. There are today 55 million cards in the field for 50 million insurees, according to the Caisse National de l'Assurance Maladie (the National Health Insurance Agency). This gives you an idea of the fraud potential, especially since current Patient Data Cards have no expiration date. To eliminate fraud, Social Security has implemented revocation lists for lost and stolen cards, and the validity for the new cards is planned to be at least 5 years. To further strengthen the scheme, the Ministry of Health has decided that the new Patient Data Card should feature a picture of the insuree. The picture will be printed on the card and possibly stored inside the chip as well, to reach a maximum level of security.

Picture perfect

Adding the picture on the card is a more challenging task than one might think. Not in terms of the picture per-

sonalisation in itself, but regarding the way to obtain an electronic version of the insuree picture. The Social Security must write to the insuree, asking to mail back a picture together with a pre-filled form (to help link the picture with the insuree). If the insuree does not answer, the Social Security must write back. Once the picture has been received, it must be processed. This usually implies high volume scanning equipment, given the 50 million pictures required for the scheme, as well as database capabilities. This is generally handled by third party companies, in much the same way like the processing of paper claims. Gemplus for example offers such digitalisation services, with highly scaleable equipments for picture acquisition.

Another issue, currently under evaluation by the French Government, is around the choice between Black & White and Colour picture. It seems that Black & White appears to be the appropriate choice for the SESAM-Vitale 2 scheme, as well as for most other healthcare schemes. From a quality point of view, Black & White and Colour are very similar. From a security point of view, both are suitable for the basis purpose of identification of the cardholder. The advantage of Black & White is from an economic point of view: it does not require consumables (colour printing requires ink and protection overlay) and the output of the personalization equipment is higher than colour. This has a direct impact on the cost of the personalized card, and therefore on the price

paid by Social Security. Given the budget constraints of the healthcare program, this is the most suitable and cost effective solution for such a scheme.

Conclusion

France has been operating a high-end smart card-based healthcare system for a long time, and is currently planning the migration to the next level. There are many lessons to be learned from such an experience; one is that a smart card solution proves efficient to reduce operating costs. Similarly, other smart card-based healthcare schemes (Belgium, Germany, Slovenia) show successful results.

Another lesson is that migration from one smart card-based solution to another one is sometimes more difficult than migration from a paper-based to a smart card-based solution. Consequently, technological evolutions and backward compatibility require careful analysis and planning. This emphasizes the need to select reliable partners with strong experience in the field of smart cards and healthcare, to deliver the most effective solution while controlling time and budget constraints.

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Description of the project	An electronic health insurance data entry system based on smart card technology, to reduce the operating costs through claim processing automation.
Description of the project region	Nationwide project
Range of the project Number of institutions, physicians, hospitals, drugstores and patients	50 million patients 500,000 health professionals 23,000 drugstores
Start of project	1993
Roll out	1998-2003
Project organization	The Economic Interest Group GIE SESAM-Vitale and the Public Interest Group Health Professional Cards GIP-CPS handle the cards roll out.
Project coordination	Handled by the National Health Insurance Agency in cooperation with the GIE SESAM-Vitale
Industrial partners	Cards and personalization services: Gemplus, Schlumberger/Axalto, Oberthur. Card readers: Gemplus, Sagem, Schlumberger/Axalto, Ingenico, Xiring.
Technical demands	Patient cards: 4KB EEPROM microprocessor card Health Professional cards: 16KB EEPROM & Public Key microprocessor card Dual slot desktop and mobile readers
Timeline and future planning	New patient cards to be issued starting in 2006, with more EEPROM, Public Key capability and the cardholder picture.