

Europe leads the way to secure personal information

The smart card revolution



The smart card

Credit cards, identification cards and ATM cards, typically featuring a magnetic strip, are part of our everyday lives. But a new generation of these vital pieces of plastic – the so-called ‘smart’ card – is changing the way our personal information is stored and shared.

The smartcard revolution was kick-started in the 1990s with the introduction of the French B0’ bank card followed by the progressive deployment of the SIM (Subscriber Identification Module) card used in GSM mobile phone equipment in Europe and elsewhere. Today, this relatively new industry, born 25 years ago, is booming with more than 13 billion smart cards delivered worldwide and the promise of an untapped global market offering the prospect of exponential growth. The potential for smart cards is almost limitless considering their ability to deliver secure, personalised devices to any customer worldwide – a critical differentiating factor.



revolution

So far, Europe is in the lead, but competition is fierce as market demand moves beyond the lucrative banking and mobile communications sectors into identification, pay TV, healthcare, fast ticketing in public transport, parking, road tolls and beyond.

The returns to Europe are significant – of the more than 20,000 jobs created worldwide, 60% of the employees are working in the EU. About 80% of the R&D efforts take place in the EU with 2,000 R&D engineers based in Europe. There is no scope for outsourcing in the lucrative smart card sector as security parameters call for localisation.

Cooperation wins over competition

The sector is a conducive environment for collaboration and innovation, according to Gérard Matheron, Office Director of EUREKA's MEDEA+ Cluster. For example, early EUREKA projects focused on developing common standards, the backbone of European innovation and competitiveness (DAB, ADSL were good examples of this former cooperation). Today, industry is also working together in the smart card area to develop standards for an EU citizenship card based on an IAS (Internet Authentication Service) common platform. Similar cooperation in standardisation also exists in the area of future mobile and multimedia smart card platforms.

"It was not easy to move companies from the arena of competition to one of cooperation," Matheron says. "The evolution from vertical to horizontal collaboration has broadened companies' scope to build global cooperation with a view to sharpening competitiveness not just in Europe, but globally."

"Collaborating has broadened companies scope to build global cooperation..."

Working within EUREKA's MEDEA+ Cluster has resulted in rich cooperation instead of cutthroat competition. Jean-Pierre Tual, Industrial Relations Director for the France-based Axalto company, one of the top, global smart card players, says the sector was initially "a battlefield" where it was impossible to share anything because of a raging security war. Since 2000, cooperation has nevertheless developed and resulted in standardisation and promotion of open architectures rather than proprietary solutions. In this way, the smart card industry in Europe has followed in the footsteps of the telecommunications and computer industries.

STMicroelectronics, the Geneva-based global leader in developing and delivering System-on-Chip (SoC) and semiconductor solutions

across the spectrum of microelectronics, has been active in major pre-competitive research and development programmes. "Joint projects such as MEDEA, MEDEA+ [and others] have all facilitated the development of innovative, leading edge technologies and in some cases have led to standardisation," says Jean-Paul Thomasson, Director, Industry Relations & Communications, Digital Secure Access Division.

By working with MEDEA+, companies involved in the smart card sector reached the critical mass needed in Europe to keep up the pace of advanced technology developments, explains Dominique Thomas, Director, R&D Cooperative Programmes, France/Europe, Front end Technology and Manufacturing at STMicroelectronics. →→

Industry snapshot

Smart cards are the most sold computing device worldwide. The numbers speak for themselves. In 2004, there were 2.3 billion smart cards shipped, compared to 670 million mobile phones and 183 million computers. Other key figures:

- 15 billion cards shipped worldwide over the past 10 years; 80% by European industry.
- In 2006, 2.9 billion cards are expected to be shipped worldwide.
- Industry turnover was 3.5 billion euro in 2005, a 1,000% increase over the last 10 years.
- An average growth rate of 20% is predicted for 2006 in the following market segments: telecoms, financial services, government (health), transport, pay TV, transport and corporate security.
- More than 20,000 jobs have been created worldwide.
- 60% of these employees work in the EU.
- 80% of all R&D takes place in the EU, with 2,000 R&D engineers based in Europe.

(Data: Eurosmart 2006)





Thomas, one of two ST members of the MEDEA+ technologies steering group points out that sharing the risk in R&D is another advantage of working within the Cluster: “MEDEA+ was instrumental in keeping the capability to master the technology and manufacturing in Europe. It was a catalyst to keep Europe in the leading edge. Sharing the risk helped us do that.”

The banking industry gets smart

Smart cards are revolutionising banking with tighter security and scope for myriad additional applications beyond simple debit or credit card functionality. More than 330 million smart cards were issued in 2005 for the banking industry alone. Tual says there is “tremendous potential for growth” in what promises to be a huge market.

What is a smart card?

Most plastic we carry today features magnetic strips, which are not secure. Stored data can be easily accessed and modified, putting confidential information at risk. For example, a PIN (personal identification number) or password cannot be stored securely on them. Magnetic cards also offer little protection in transactions with remote hosts, as fake cards can be easily produced, for example for PIN verification.

A smart card is a pocket-sized card with embedded integrated circuits (ICs) that allows it to process and store data in compliance with the ISO 7816 standard. The technology is a marriage of semi-conductor chip technology, hardware and software, which enables the card to function like a mini-computer. Importantly, it is personalised and more and more user controlled, which tightens security.

The value added of smart cards over magnetic strip cards:

- Smart cards can hold up to several tens of KB of data, compared to 1,000 bits, allowing for more storage of information.
- Data on smart cards can be protected against unauthorised viewing. Confidential data such as PIN numbers and passwords can be stored and processed internally, which means merchants do not have to telephone or go online to authenticate a transaction.
- A smart card can be used for several applications, for example combined e-purse, debit/credit card, ATM card, loyalty in the banking sector, national ID card and driving licence in the government sector, GSM and TV broadcast control in the mobile sector, etc.
- The life span of a smart card is longer.
- It is difficult to replicate a smart card, thereby enhancing security and consumer confidence.



Early adopters are not only reducing fraud but also offering access to additional capabilities for generating new revenues and profiting from product differentiation. Europe is leading the way with EMV smart cards, the global banking standard developed by Euro-pay, MasterCard and Visa, that ensures smart cards, terminals and compensation systems are secure and interoperable. EMV replaces the signature/swipe verification and is being introduced worldwide, with France and the UK already in massive deployment stage.

Tual expects EMV to be implemented worldwide in the next seven to 10 years for credit and debit applications. "It is more convenient, it generates more profits because of efficiency and it has the potential to boost commerce over the Internet," he says.

Trust and privacy issues are pivotal

Consumer trust and privacy issues are pivotal as Europeans move towards mobile connectivity, ubiquitous computing and ambient intelligence. Smart cards must provide secure access to services through global networks such as the Internet and mobile telecommunications systems.

Tual says consumer confidence levels are "unprecedented". Today, the level of fraud across the banking industry is 10 times lower with smart cards. "It is a question of risk management," he adds. "This is the whole rationale beyond the EMV initiative: security and interoperability."

Matheron points out that smart cards are "a personalised and user-controlled trusted device". Tual says the banking sector trusts the smart card industry dealing with their customers' highly sensitive data, proof that secure solutions have been developed and are working.

A winning blend of strong hardware and robust software is key to security, but as Tual warns, we are only as secure as our weakest component. "Security has to be built into the complete architecture. You can put the brightest software in the chip, but if it isn't secure, it can be compared to having a door reinforced with all kinds of devices, but leaving the window open."

He is confident about the level of security, but cautious about what he calls "the permanent race" among hackers, pirates and developers. The smart card chip, he points out, is still very constrained because of limited available memory, which means engineers cannot develop algorithms in the same way that system designers can. Hackers and pirates are consequently continuously monitoring the evolution of smart card developers, best practices.

Nevertheless, the content-rich but highly vulnerable pay TV sector stands to benefit from secure smart card technology. Tual foresees an increasing role for smart cards to help broadcasters monitor who is downloading content illegally, a widespread practice that can represent up to 25% of an operator's income. This issue will become even more critical as consumers move to mobile TV or Video on Demand.

Looking ahead

Citizens' demand for high quality, content rich connectivity anywhere, anytime, is a key driver of the smart card revolution. Also vital are government initiatives for smart ID cards, including citizen cards and passports. SIM cards continue to progress in all regions, including Russia, South America, Africa and the Middle East. The banking sector will continue to grow with EMV take-up expected to continue and an increased consumer demand for secure mobile payments. →→



© axalto



The EU Citizen card is expected to be rolled-out by 2010. E-passports, with information from the data page securely stored in the smart card chip together with biometric information, have been issued in Belgium, Norway, Sweden, Thailand, Australia and New Zealand. Several countries – the UK, France, Singapore, the US and Japan – are expected to follow suit in 2006. An e-Driving licence will soon be presented to EU Transport Ministers and several countries have already issued e-ID cards. In Belgium, for example, citizens can control the parameters of their cards allowing them to find out who accessed their data and why.

The future is bright, but not without challenges. Tual says it is critical to make identity and mobile payments a smart card success, which hinges on the security issue. “Consider the perspective that a smart card is your personal safety vault, but also the ultimate connection between you and your service provider. This connection will become more valuable as we interact in different ways with our environment.”

Tual also foresees smart card technology playing a “huge role” in digital rights management, especially in the perspective of legitimate personal copy.



EUREKA cooperation Fostering innovation and competitiveness

EUREKA branded initiatives come from industry, in a bottom up approach involving other players such as SMEs, universities and research institutes. Governments, with different political agendas and policy objectives, then decide whether or not to fund a project. Currently, there are about 10 smart card projects under the EUREKA umbrella, spread across the MEDEA+ (microelectronics), PIDEA (packaging and interconnections), ITEA (software intensive systems) and CELTIC (telecommunications) Clusters.

Clusters are long-term, strategically significant industry-led programmes, aimed at developing generic technologies of key importance for European competitiveness. They bring together stakeholders to share the benefits — and the risks — of innovation.

- The first MEDEA smart card project ended in 2000. Multi-application secure smart cards (MASSC) resulted in a system-on-a-chip card platform using an open architecture. This project provided a baseline for security mechanisms and led to standardisation, and was a launching pad for further industry cooperation.
- Enhanced smart card platform for accessing securely services of the information society (EsP@ss-IS), was a highly successful MEDEA+ project [2001-2004] that laid the foundation for developing open smart card hardware and software platforms. This provided the necessary protection to spur the growth of value-added services in sectors such as mobile telecommunications, banking and pay TV.
- A new MEDEA+ project, Smart cards systems for secure applications (Onom@Topic+) is developing complete hardware and embedded software platforms that will realise benefits from the enormous potential offered by the development of fixed or mobile e-services, such as the EU Citizen Card and mobile multimedia.

G rard Matheron, Office Director of EUREKA's MEDEA+ programme, points out that MEDEA+ brings together the leading smart card companies as well as suppliers of chips and software developers: "This combination is a very good triangle, which is why the projects are so successful."



For more information:

- A112 Multi-application secure smart cards (MASSC) 1997-2000.
- A302 Enhanced smart card platform for accessing securely services of the information society (EsP@ss-IS) 2001-2004.
- A306 Technology responses to ubiquitous security threats for e-security (TRUST-es) 2004-2006.
- 2A302 Smart cards systems for secure applications (Onom@Topic+) Just launched.

www.medeaplus.org

www.axalto.com

www.st.com

www.emvco.com





MEDEA+ Office
140bis, Rue de Rennes
F-75006 Paris
France
Tel.: +33 1 40 64 45 60
Fax: +33 1 40 64 45 89
Email: medeaplus@medeaplus.org
<http://www.medeaplus.org>

EUREKA 

MEDEA+ Σ !2365 is the industry-driven pan-European programme for advanced co-operative R&D in microelectronics to ensure Europe's technological and industrial competitiveness in this sector on a worldwide basis.

MEDEA+ focuses on enabling technologies for the Information Society and aims to make Europe a leader in system innovation on silicon.