FINGERPRINT CARDS USING BIOMETRICS

Organisation	Hampf Industrial design
Trigger	• Brief from client, Fingerprint Cards.
Objectives	• To develop examples of the application of biometrics that could demonstrate clearly the complex technology. • To meet the needs of potetential customers for security, usability and convenience.
Tools/techniques	• Use of different design briefs to capture a range of applications and design criteria. • Feedback from representatives of Fingerprint Cards.
Enablers	• Technology already developed. • A large market for the products is anticipated.
Tensions	• Demonstrating complex technology in a simple manner. • Ensuring that new technology is used by customers.
Impact	• Range of attractive and easy to use examples developed to show potential customers. • Further testing of the examples is planned.
Lessons	• Designers can faciliate the marketing process by helping to clarify and improve design features, as well as creating examples to show potential customers.

Synopsis

Biometric technology is based on identification of a person by their physical characteristics. With the market estimated to grow considerably over the next ten years, the Swedish company 'Fingerprint cards' has developed a verification system where the fingerprint is used to identify a person or verify a person's identity. Fingerprint cards are used to address problems of unauthorised access to buildings and computer systems, as well as electronic fraud. The company's embedded verification system is used in place of PIN-codes and passwords on products such as door-access systems, mobile phones and systems for e-commerce and computer access. In order to present and market different product concepts in a way which takes into account how the technology has been implemented, the Swedish company Hampf Industrial Design was engaged. Focusing on issues such as security, usability and user convenience, the design team has developed a range of application examples used by Fingerprint cards to market the company's verification system. This case shows how designers can have a key role to play in marketing technologies that increase both security and convenience.

Background to Fingerprint Cards

The Swedish company, Fingerprint Cards, is located in Gothenburg in the southwest of Sweden and has technical operations in Trondheim, Norway, Linköping, Sweden and Delft, the Netherlands. The technical solutions used in the company's current systems are based on patents granted in the early 1980s. The idea was to eliminate the need for PIN-codes in credit cards by integrating fingerprint identification. Through further development and evaluation of the patents granted, the company Fingerprint cards was formed in May 1997. The company's development and design of sensors, microprocessors and algorithms involves about 30 in-house and contracted engineers. The business aim is to develop technology based on fingerprint verification systems and then sell licences to companies marketing products in which personal user verification is an integral part. The company believes that:

“Biometrics is the only way of uniquely identifying a person while at the same time increasing security and convenience for users. Use of technology will become increasingly widespread throughout society, occurring in a number of everyday situations beginning with the replacement of PIN-codes, passwords and keys” (Company brochure).

The market for Biometric technology, which has a wide range of applications, is estimated to grow from $59 million in 1999 to $590 million in 2003 (International Biometric Group, 1999).

In order to develop and market a number of application examples where the Fingerprint technology could be used, the company employed an industrial design agency, Hampf Industrial Design. The design company, located on Särö outside Gothenburg, was founded in 1969 by Jan Hampf. As well as being the designer and director of the company, Jan Hampf is professor in Industrial Design at the School of Design and Crafts at the University of Gothenburg. The company, which employs 5 people, has worked with companies in Scandinavia, Europe and in the US, with key clients including Saab Marine Electronics, Volvo Car Corporation and Telia Systems AB. This case study is based on interviews in Sweden with Jan Hampf, Manager, Hampf Industrial Design and Bengt Bern, Technical development, Fingerprint cards. It was chosen because of the importance of increased security in ecommerce.

Design Process

Concept

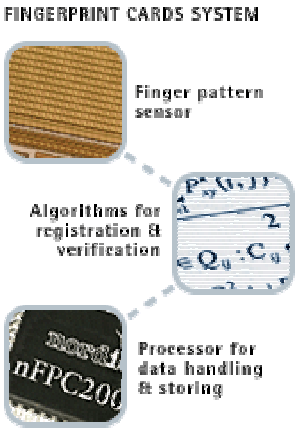
There are several reasons why traditional methods of verification in electronic communication and e-commerce systems may be considered unsafe. PIN-codes and passwords are easy for the user to forget, they can easily fall into the wrong hands and are often vulnerable to computer hackers. The use of Biometrics technology means that there is an effective way of avoiding the security risk associated with these traditional systems. The question addressed by the design team was ‘how should systems know whether the person using a specific PIN-code, password or access card is the rightful user?”

Biometric technology may be used in various ways to identify or verify a person's identity. The technology is based on recognition of the unique patterns in an individual's eye, voice, palm or fingerprint.

The methods used by Fingerprint cards focus on fingerprint-based technology, since this is considered the most secure. The systems based on voice recognition are less safe by comparison, since the human voice is easy to imitate and might be affected by physical factors, such as a temporary disease like a cold. Even though eye recognition offers a high level of security and is already being used in military environments, it is seldom used in civil environments, mainly because the technology scans the eye pattern and is therefore thought unpleasant by some individuals.

Technology Applications

Fingerprint Cards has developed its own embedded verification system based on three main components: the finger pattern sensor, the algorithm for registration and verification and the processor for data handling and storage.



The verification system can be used in a number of different applications:

- *Mobile phones* – biometrics can replace the use of PIN-codes, by a fingerprint sensor attached to, or integrated into, the handset. In 1998 Fingerprint Cards developed an accessory unit together with Ericsson Communication Systems. The unit, named Fingal, was attached to an Ericsson mobile phone, replacing the use for PIN-codes. In the case of mobile phones, the use of biometrics might increase security to the user and the service provider using mobile systems for distribution.

- *Access systems* - used to access secured systems in buildings etc, biometrics might replace the need for PIN-codes and passwords and may be used together with magnetic cards, proximity (RF) cards and smart cards. The Fingerprint-based verification system might in this case be used as an integrated part of the smart card or it might be a finger device only.

- *Computers and ecommerce* - fingerprint systems replace the need for passwords to access terminals. Even though optical readers have already been on the

market for some time, these demand considerable processor capacity. Fingerprint cards has therefore developed a unit that is separated from the terminal, containing the embedded verification system. The unit is also offered as an integrated part of the keyboard of the terminal.

Industrial Design

In 1999, Fingerprint Cards decided to develop special production concepts in order to give shape to their Biometric solutions. The production concepts, or application examples, were required since the company had to present alternative applications of the technology to potential clients. An industrial design agency, Hampf Industrial design, was engaged, the brief being to develop the production concepts using Fingerprint technology.

The process of development initially focused on the actual needs of Fingerprint cards, which was primarily to have something to show to their customers, as the product incorporates complex technology. This was progressed using different design briefs, where the design team aimed to identify the needs and requirements of the product examples, based on feedback from Fingerprint Cards representatives. Hampf Industrial Design aimed to present the technology in a way that would be easy to understand for the user and focused on creating examples that would offer a high level of security, convenience and usability. The usability was also important as advanced systems might be misused or unused.

Based on issues identified through the design briefs, initially focusing on factors like brand strategy, brand identity and Fingerprint cards' knowledge of design issues, the design of the different product examples were then based on issues like security, technology, safety and competence. By looking at and comparing with existing systems on the market, the designers wanted to create examples with a 'gentle language of design' and a more 'gentle' interface to the user.

The choice of material and colouring of the different examples were also important. The user should feel that the different examples felt inviting to use. At the same time, the different products should give a vision of products offering a high level of technology and security. The various examples where therefore developed and presented with a grey metallic surface in order to reflect the high-technology thinking. The choice of the metallic surface should also acts as a deterrent against misuse and damage to the system.

According to Jan Hampf, the design team had a free hand in developing the different examples. Since the products were intended for purposes of illustration, rather than being launched as completed products, their construction was less important than the overall design. The products were not tested in focus groups or product clinics.

Final Design

At the 2000 and 2001 CeBit exhibitions in Hannover, Fingerprint Cards presented the following application examples, all designed by Hampf Industrial Design. These were as follows:

USB unit for computer access *RF-access unit* *Door-access unit*

All units contain the technology needed for the use of the Fingerprint Cards verification system, namely the finger pattern sensor, the algorithm for registration and verification and the processor for handling and storage.

Impact

Through the collaboration with Hampf Industrial Design, Fingerprint cards increased its awareness of the prospects for using Biometric technology and had access to a range of concept examples. The examples are based on the specific design criteria and potentially help clients visualise applications of this complex technology. One application predicted to provide a large market in the future is e-commerce. The rapid growth in the usage of electronic based transactions for goods and services will require more methods for creating safe and reliable systems for payment and verification. One of the greatest threats to the development of e-commerce usage is the current perceived lack of reliability among users (Worrall, 2000). Further market testing is planned to help develop specific applications.

Lessons Learned

This case study illustrates the benefits of design in helping companies articulate and present the qualities and benefits of their products. It also shows how designers can help with the marketing of product concepts by developing examples which use crime technology appropriately, i.e. without inconveniencing the user or making designs unattractive. Practical examples clearly help clients visualise the application of products for manufacture and potentially sale.

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References, Related Case Studies and Further Reading

Fingerprint Cards (2000) *Annual report.* Fingerprint Cards. Sweden.

Fingerprint Cards (2001) *Promotion brochure.* Fingerprint Cards. Sweden.

Fraud prevention website http://www.dti-mi.org.uk/
Covers market failure and the need for academics, small and medium-sized companies and large companies to come together to develop security systems against fraud etc.

International Biometric Group (1999) Market Report. Fingerprint Cards. Sweden.

Worrall, L. (2000) *The Potential Impact of Ecommerce on Learning and Brokerage.* Report from the IDIEL/ADAPT Project. University of Salford.

Classification Index

Ekblom's crime classification	Mishandling
BCS crime classification	Fraud
DAC	Transaction/communication protection
Primary motivation	Improve marketing
Type of designer	Industrial/engineer
Approach	Identification of echnology
Sector	Ecommerce
Location	Mobile phones, computers, smart cards
Author	Lisbeth Svengren/researcher

DAC – fingerprint cards