

# Handwritten signatures...

...secure electronic documents...

One of the key targets of almost every e-government project is to minimise paper usage and related costs such as printing, shipping, scanning and indexing. Additionally, the loss of time and the potential of errors caused by media breaks should be reduced. A straight-through workflow should also achieve a higher level of automation. Thus, capturing handwritten signatures on a digitising tablet is quite a common procedure – especially in the United Kingdom and the United States.

However, most of the devices used for this purpose today do not support the capturing of signatures for providing non-repudiation. This kind of hardware and software simply captures an image of the signature. Reliable means to proof the expression of an intent and authenticity in electronic processes with handwritten signatures require a more solid approach than just capturing a bitmap image.

## Signatures offer unambiguous authentication

Unambiguous authentication in electronic processes can now be provided with the handwritten signature. The hardware suppliers, Interlink ([www.interlinkelec.com](http://www.interlinkelec.com)) and Wacom ([www.wacom-europe.com](http://www.wacom-europe.com)), teamed up with software specialist, Softpro ([www.softpro.de](http://www.softpro.de)), in a global alliance to provide the market with an aligned best-of-breed solution for trustworthy capturing and verification of handwritten signatures. Various tablets and pads of Interlink and Wacom have the capability to capture all distinct behavioural characteristics of an individual's signature – including shape, speed, stroke, pen pressure and timing information.

Softpro has implemented metrics for assessing the complexity of static characteristics and dynamic signals of a

signature in the enrolment process. This initially defined quality level of a signer's signature is taken into consideration throughout the verification process. Softpro's solutions capture static characteristics and dynamic signals of a signature that are embedded into a document, or stored in reference databases or on smartcards. SignDoc securely embeds a handwritten signature into a document, compliant to the various e-sign laws. SignSecure allows users to log-on to a PC or a network with the handwritten signature.

## Why a signature image is not enough

If a signature has to be non-repudiated, the processes of capturing, storing and verifying have to fulfil certain technical and legal requirements. Thus, the engine(s) used for signature verification must achieve an acceptable Equal Error Rate (EER). However, the verification result is highly dependent on the quality of the captured signature.

Some of the Tablets and PDAs sold today do not provide a sufficient quality level for a verifiable signature. One example is the capturing devices that courier services are using. They capture a rather pixellated image of a signature that is usually not applicable for a later verification. Signatures taken on these devices may easily be claimed to be a forgery. Non-repudiation can only be achieved when the biometric characteristics of a signature are captured too and when this information is securely bound to the signed document. The additional verification of dynamic signals offers a higher level of security.

Nowadays, a lot of companies are capturing a signature image and embedding it into documents somehow. They do not realise that this image will not allow any further verification process

if its authenticity is in doubt. Furthermore, this process is not compliant with various e-sign laws throughout the world.

## Digitising signatures in high quality

A wide range of instruments is available for digitising signatures throughout the writing process: pen pads (with and without display), special pens and Tablet PCs. They allow a gradual move from paper-based documentation to electronic processes, as well as upgrading the quality of signature verification in general. Softpro has defined a set of quality criteria for these instruments. A proper comparison of static signature characteristics and dynamic signature signals requires digitising with a sufficient amount of time signals. The capturing device also has to differentiate between various pressure levels and to provide an appropriate resolution rate. Last but not least, it needs certain robustness. These requirements are also reflected in the upcoming standard for the interchange of biometric signature data, which is currently in draft stage (ISO/IEC WD 19794-7). Some pads of Wacom and Interlink, and almost every Tablet PC that is on the market today, are fulfilling all these requirements. Most Tablet PCs



*Signing of a transaction form with online capturing of static and dynamic (biometric) characteristics of a signature*

are equipped with Wacom's components. Various producers of smart phones and PDAs are about to integrate signature recognition and verification capabilities into the next generation of their products. To assist this development, Wacom, Fujitsu Siemens Computers and Softpro are partnering in the 'Dynamic Signature Initiative'.

### Signatures: individually different

Softpro is the official partner of Microsoft for the capturing and verification of signatures. The company's products, SignDoc and SignSecure, won the first contest for Tablet PC applications, as well as being recognised as 'Best Biometrics Application' in the worldwide Tablet PC developer contest, 'Does your App Think in Ink', in 2004. Verifying signatures is the comparison of a typical behaviour. The variations that are within the typical bandwidth of a particular signer are detected by Softpro's verification engine.

### Patient documentation in a hospital

Ingolstadt Hospital replaced its paper-based forms with a solution based on Microsoft Office Professional Edition 2003 and deployed on Tablet PCs. This reduces the amount of time spent for tasks that are not billable under the new law.

Patients' data is now captured on a Tablet PC in the emergency ward at admission, thus avoiding media break costs and delays. Most of the existing paper-based forms of the hospital are already standardised at all stations and institutions, and were replaced during 2004 with electronic documents using Microsoft InfoPath 2003 SP1. Data is exchanged via XML to existing sub-systems in the hospital. Real-time examination results (eg. x-rays, blood tests, ultra sounds) for doctors and hospital staff are available on their Tablet PCs. Clearly structured information is accessible whenever and wherever required, so that there is more time for diagnosis and treatment. Medical personnel will enjoy an extensive reduction in administrative tasks and a sustainable increase in productivity.

The DENA application includes the option to capture and verify handwritten signatures (including their biometric characteristics) with a Tablet PC. Handwritten signatures are now providing integrity and proof of authenticity for documents in patient files. Signature capturing and verification is integrated using SignDoc. Thanks to Tablet PCs and the integration of SignDoc, Ingolstadt Hospital is no longer required to print forms for signing purposes. "This closes the last gap in a fully electronic process." Dipl.-Ing. Thomas Kleemann, CIO of Ingolstadt Hospital, sums up: "We clearly prefer the handwritten signature to ensure the authenticity and integrity of documents. Signing a document is a process doctors, hospital staff and patients are familiar with, and which does not have to be explained."

According to the experience of Mr Kleemann, there exists a lack of acceptance for solutions that use either chip cards, passwords or physical biometric characteristics (such as the fingerprint) for authentication. In the sensitive environment of documentation in a hospital, the handwritten signature is by far the most appropriate method of authentication.

### e-Authentication System in Saudi Arabia

Trips to government agencies – along with the associated time and inconveniences – are now a thing of the past in Saudi Arabia. The e-Authentication System of The Council of Saudi Chambers of Commerce and Industry (COSCCI) now enables registered users to write, sign and get documents attested by government agencies or private organisations from the comfort of their office or home via internet around the clock. They simply have to use a writing Tablet, pen pad or Tablet PC. Wacom pads are interacting with Softpro's signature verification technology.

The initial step for subscribers of this service is to enrol their signature biometrics, along with personal data, in the presence of an authorised person in those locations. Their signature biometrics are captured by a pressure sensitive pen pad and stored in the central reference database. The system



**Online capturing of static and dynamic (biometric) characteristics of a signature with a Tablet PC using SignDoc to secure authenticity and integrity of electronic documents**

uses an Oracle database and a J2EE compliant application server on a Linux operating system, providing high level encryption for dynamic and static signature verification. An electronic stamp within the barcode on each document ensures the authenticity of the data beyond commonly accepted security standards.

With the system being in place, it is almost impossible to pass a document with a forged signature as it is impossible for two people to have the same signature characteristics. At authentication, static features (such as upstrokes, line crossings and curves) and dynamic characteristics (such as the speed of signing and the pressure applied when writing) are captured and verified. e-Authentication is about to be implemented at COSCCI's offices nationwide, making it one of the first public entities in Saudi Arabia to offer secure authentication in e-government services.



Joerg-M. Lenz  
Manager PR

SOFTPRO Group  
Wilhelmstrasse 34  
71034 Boeblingen  
Germany

Tel: +49 (0)7031 66 06 55  
Fax: +49 (0)7031 66 06 66

jle@softpro.de  
www.signature-verification.com