

White Paper

Digital pen and paper in health and social care – streamlining processes and speeding up response around the world

To meet ever-increasing demands, while keeping a lid on expenditure, health and social care authorities are looking to technology to deliver more for less, and help them respond more quickly to changing circumstances.

In an environment where paper is still the key medium for capturing information, Digital Pen and Paper technology is winning over a growing number of health and social care authorities worldwide by offering excellent usability that helps streamline processes and speed up response to patients' needs.



HOW DIGITAL PEN AND PAPER WORKS

Anoto Digital Pen and Paper technology works by remembering what has been written or drawn on paper printed with the unique, almost invisible Anoto dot pattern, and transmits this data back to a PC or server. The digital pen writes like a normal ballpoint pen, but has a tiny infrared camera at its tip. Any paper can be used with a digital pen if the Anoto dot pattern is added to the layout at the time of printing. The dot pattern consists of a number of barely visible dots that can be read by the digital pen. The pen reads the pattern and registers what and where the user writes. The Anoto dot pattern can be generated using a standard printer. The technology is ideally suited for forms-based processes such as those commonly used within education, health and social care and facility management.

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Digital pen and paper enables doctors, nurses and caregivers to fill in forms on the move without the need to type them up later. In essence, the solution digitizes handwritten text and can convert it into standard key-strokes that can be stored electronically. Once a doctor or nurse has completed a patient assessment form, for example, the pen data can be transferred instantly to a mobile phone or laptop – using Bluetooth® or a docking cradle – and then forwarded on to a central server. Alternatively, users can wait until they return to their desk to dock the pen to transfer the information to a PC.

By eliminating the need to type up case notes electronically after a visit, digital pen and paper avoids duplication, increases accuracy and reduces the amount of time clinicians and social workers have to spend on administrative tasks. This means that more of their time can be spent focusing on the patient.

As data can be transferred in real time via mobile or wireless networks, reports and test results can be validated and, if necessary, acted on immediately. As details of patient visits are recorded simultaneously in both written and electronic form, a paper copy of the record can be retained alongside the digital copy. It can serve as a back up, to meet regulatory requirements or to keep patients and their families informed of the treatment provided.

MAKING THE RIGHT TECHNOLOGY CHOICES

One of the major concerns with introducing new technologies is the associated capital, training and operational costs, along with issues of effectiveness and usability.

A study by industry analysts Quocirca¹, suggests that technology can sometimes be thrown at problems in the healthcare sector without full consideration of the underlying processes or the needs of clinicians and carers.

This is alarming given that healthcare is one of the top IT growth markets globally, set to expand by 2.2% to US\$88 billion this year, second only to utilities' IT spending².

While the Quocirca study shows that laptops, PDAs and smartphones have a high penetration in the healthcare sector, it also reveals that these devices can be tricky to write on single-handedly or while standing up, difficult to clean, easily damaged and prone to theft and loss. All of this hinders their effective use and drives costs upwards.

A 2008 pilot study in Germany that compared a variety of electronic data capture (EDC) methods revealed digital pen and paper to be significantly more user friendly, quicker and more accurate compared with using a keyboard, tablet PC or PDA to capture data³.

Experience shows that, on average, it takes around 15 minutes to learn how to use digital pen and paper, which minimizes the need for training and, in most cases, the technology can be integrated into an existing IT infrastructure.

The digital pen can store a few hundred filled-in forms, or up to around 40 fully handwritten A4/Letter sized pages, before it needs to be docked for downloading and battery charging, and it has been shown to be more robust, portable and durable than a PDA or laptop.

By ensuring secure, high-quality information capture, the digital pen obviates many of the checking regimes traditionally needed for making sure that records have been transcribed accurately. By not having to re-key and then double- or triple-check medical notes, healthcare staff are more productive and provide better care to a greater number of patients.

Field staff like doctors, community nurses and home care workers don't need to carry a laptop or PDA, as the digital pen is small, lightweight and easy to use (and is unlikely to be a target for thieves).

As the following examples from around the world show, digital pen and paper requires very little set-up and training before it starts streamlining health and social care processes and helps deliver care faster and more effectively than before. In addition, digital pen and paper systems have been shown to be more cost-effective compared with other mobile technologies.

¹ Quocirca Ltd, 'Light touch, firm impression. Switch from paper systems to IT but keep to the business process script', April 2009 (<http://bit.ly/3At73x>)

² Gartner Inc., 'Dataquest Alert: Utilities, Healthcare and Government Lead IT Spending Growth in Challenging 2009', February 2009

³ Boldt R, Raasch J, 'Analysis of current technologies and devices for mobile data capture. A qualitative usability study for comparison of data capture via keyboard, tablet PC, personal digital assistant, and digital pen and paper', University of Applied Sciences, Hamburg, 2008

PORTSMOUTH HOSPITALS NHS TRUST SEES SAVINGS OF £220,000

Portsmouth Hospitals NHS Trust, which employs over 6,000 staff and provides a range of acute services mainly across two sites, including Queen Alexandra Hospital and St Mary's Hospital, is predicting estimated annual savings of £220,000, following the roll out of Anoto digital pens and BlackBerry smartphones in combination with the PaperIQ solution from DevelopIQ.

The midwifery team is using the technology, the first department at the Trust to complete a rollout. Midwives use the digital pens to take notes during consultations with pregnant women in the community, which are then transferred to encrypted BlackBerry smartphones via Bluetooth, and then onto the PaperIQ platform installed at the Trust. The solution has been deployed to 130 midwives who work across four hospitals and is integrated with the maternity unit's patient records system.

Following a wider rollout to the midwifery department, Portsmouth Hospitals NHS Trust is planning to extend the use of the PaperIQ solution and Anoto digital pens to the hospital's accident and emergency department and community nursing.

RAPID ENTRY AND ANALYSIS OF PATIENT DATA FOR GERMANY'S LARGEST AIR RESCUE SERVICE

Every year, ADAC-Luftrettung gGmbH, Germany's largest air rescue service, takes off on thousands of rescue flights. Every ADAC air rescue operation must be documented in detail – with an emphasis on speed, precision and efficiency. Information such as location, time and patient data, including vital signs, must be carefully recorded.

The information is needed for follow-up treatment in the hospital after rescue operations, for administration purposes and to settle charges with the various service providers, such as health insurance funds and insurance companies. Previously, everything was done manually, which meant a lot of time and effort was spent on filling out forms and capturing accurate data.

Various electronic data entry devices, including PDAs, tablet PCs and a solution based on Anoto Digital Pen and Paper technology, were tested. The digital pen and paper solution from Diagramm Halbach was the most convincing choice due to the ergonomics and practicality of the technology.

The company developed a digital emergency doctors' log – 'dotforms® rescue' – in collaboration with ADAC-Luftrettung and the German army hospital Bundeswehrkrankenhaus Ulm. Verification software with handwriting recognition was also developed. The solution met one of ADAC's main requirements – the need to graphically illustrate and digitally analyze the correlation between different medical factors during the period of a patient's medical treatment.

The dotforms application now means fast, accurate data entry without any additional effort, as well as the ability to retain paper forms, which accompany the patients to the hospital. Data capture with 'dotforms® rescue' is now 4-5 times faster than when it was being done manually.

ADAC-Luftrettung has now decided to use the application at all of its 33 centres across Germany.

SPEEDING UP BREAST CANCER TREATMENT IN FRANCE

In a recent French study, digital pen and paper technology helped shorten waiting lists for breast cancer screening. In France, women aged between 50 and 75 are offered breast screening every two years. Results have to be interpreted twice: once by the examining radiologist and again by a second expert. Traditionally, their handwritten notes had to be entered manually by administrators.

After introducing digital pen and paper to eliminate the lengthy, error-prone manual entry of data, the time required to analyse mammograms shrank from up to three hours to less than 30 minutes. Furthermore, less than 5% of digital forms had to be checked, giving the digital pen and paper system over 95% data accuracy. No working routines had to be changed and the system has proved to be very robust.

Screening centres using the pens were also able to meet government deadlines for delivering results to patients more easily, and they could move to the next stage of the national 'Plan Cancer' programme earlier than other screening centres. The only reported problem was that clinicians sometimes forgot to use the digital pens and used their own – highlighting the familiarity that digital pen and paper offers users.

FREEING UP FAMILY CASEWORKER TIME IN COLORADO

Jefferson County, in the US state of Colorado, is home to more than 538,000 residents. The Division of Children, Youth, and Families (CYF), part of the Department of Human Services provides protective services to children and youth who are at risk or are victims of child abuse or neglect.

After performing a workload analysis of its caseworkers, Jefferson County CYF discovered that they were spending nearly half of their time in front of a computer entering data from their case reports. This led to diminished returns in supporting the department's overall objectives as a human services agency.

After conducting a pilot test with Anoto partner PenData Solutions, Jefferson County CYF rolled out a digital pen and paper system. 180 digital pens are used in the field for completing the agency's Report of Contact form, which caseworkers are required to fill in every time they have contact with someone in a case.

They simply complete the form as normal and have the client use the pen to sign off the form. When caseworkers return to the office, they place their pen in the USB docking station. All notes are automatically transferred to their PC or laptop and then sent for processing on the County's central server.

Jefferson County CYF estimates that the solution has helped free up US\$560,000-worth of caseworker time and salaries annually. Employees can now focus on supporting families instead of doing data entry, and there has been a significant improvement in audit scores.

MULTI-AGENCY BENEFITS FOR ENGLISH COUNCILS

After a successful trial, North Yorkshire and Selby county councils implemented a Digital Pen and Paper technology solution from Ubisys to improve procedures in assessing the care needs of elderly people under the UK Government's Single Assessment Process (SAP). SAP had been introduced in 2002 to ensure care requirements are captured thoroughly and accurately, without duplication by different agencies.

120 health and care professionals across the NHS, social care and housing agencies in North Yorkshire are now using the pen to collate handwritten information on assessment forms. Once captured, data is securely transferred to a shared database, where the information is made available to other agencies.

The Yorkshire healthcare workers found that the digital pens allowed them to spend more time with patients enabling a more comprehensive assessment of their needs. As a result, medical staff can focus more on the job and rather than spending time on administration; managers are able to allocate resources more efficiently; and patient data can be processed more quickly – saving time and money.

SPEEDING UP PRIMARY CARE PATIENT REGISTRATION IN FLORIDA

Florida, USA based Brandon Health Care has been seeing primary care patients for 30 years. Until recently, when patients arrived at the doctor's office, they were asked either to complete new patient paperwork or to update their existing paper records. The nurse would then document vital signs and patient complaints on paper, to which the doctor would add handwritten notes about the patient's condition and treatment.



With the implementation of Rover Technology Fusion's innovative solution based on Anoto Digital Pen and Paper technology it is now much easier and faster to document each patient's complaint and treatment. As front office personnel no longer need to spend valuable time manually entering patient data, new patient registration now takes less than two minutes, compared with up to 18 minutes previously. An additional 10–12 patients can be seen every day by each doctor, while medical records can be kept more up-to-date and errors reduced.

On arrival, patients fill out appropriate check-in information on a pre-printed form using a digital pen. The completed form and the pen are returned to the front office, where a staff member docks the pen. All handwritten information is instantly downloaded to the computer, where it is accessible to the doctor who will meet the patient.

As doctors examine their patients, they are able to view all relevant information, including medical history, notes, test results, medication and other vital data, just by entering a patient's name or ID number. The doctor also makes exam notations using the digital pen. This information is downloaded after the consultation and sent to a central system for further processing, such as matching it with billing codes.

ACCELERATING ANAESTHETICS DATA ANALYSIS IN MÖNCHENGLADBACH

Traditionally, anaesthetists at the Städtische Kliniken Mönchengladbach in Mönchengladbach, North-west Germany, had to fill in log forms with a ballpoint pen, and this information then had to be entered manually into the hospital's computer systems for further processing. Not only was this process labour-intensive and time-consuming, it was also prone to errors. Another drawback was that it was extremely difficult to evaluate the data because of its sheer abundance, as a typical operation lasts around four hours.

Diagramm Halbach's dotforms® intensive application was deployed across the clinics of Mönchengladbach as part of a comprehensive intensive care system at the Städtische Kliniken. The solution is based on Anoto Digital Pen and Paper technology and the application consists of a digital pen and paper that has a unique dot pattern printed on it, in addition to the usual log content. It is used to capture and convert the handwritten information from anaesthetists' logs into digital format, eliminating the need to type them up after surgery. The pen data is downloaded to a centralized Hospital Information System. Because the technology has not changed the way staff take notes during surgery, the documentation processes have remain unchanged – while still helping to boost productivity.

As notes no longer have to be handed over to be typed up, a complete paper file can now remain with patients throughout their stay at the hospital. Having this file accessible at all times means that every staff member – from the ward to the operating theatre – can see at a glance which treatments the patient has received. Compared to clinical systems where data is only kept

electronically, there is no need to pull up the patients' electronic files before making decisions. Furthermore, extensive patient data and analysis options are available throughout the hospital at any time.

The Städtische Kliniken is now able to create and send core data quicker and more efficiently to the DGAI (German Association of Anaesthetics and Intensive Care), an association that evaluates anaesthetic data from hospitals around Germany for quality assurance, to optimize processes and for research purposes.

BETTER PALLIATIVE CARE IN SWEDEN

An academic study headed by Lili Lind PhD at Department of Biomedical Engineering at Linköping University, Sweden, tested the innovative use of Digital Pen and Paper technology in the care of terminally ill patients in their homes. The application developed by Anoto enabled palliative care patients to use a networked digital pen to keep a 'pain diary' and register facts about their condition several times a day. This information was communicated to medical staff via mobile Internet, leading to more precise and timely pain management.

The digital pain assessment method was considered effortless by patients in spite of their state of health. It helped that the digital pen resembles an ordinary pen and is familiar and easy to use, even for fragile or elderly patients.

Patients experienced an improvement in the contact with their caregivers and felt that they were participating more in their own care. The technology enabled patients to combine the comfort of being cared for in their own homes with real-time monitoring and control of their pain levels.

ENHANCING ELDERLY CARE IN SOLNA

In the Stockholm suburb of Solna, with its 65,000 inhabitants, the local council has deployed the Mobipen Care solution, developed by Swedish company Catrell using Anoto Digital Pen and Paper technology to improve many of its health and social care systems. Solna council's home care workers use the digital pen to log visits to elderly patients in the community. The information recorded using the pen includes when the patient was last bathed or showered, how well the patient was feeling at the time of the visit, what they had been eating and how regularly. Furthermore, the pen records the exact time of a carer's arrival and when they leave

– ensuring that the council pays only for time spent caring for its elderly residents.

Handwritten forms are signed and left in the home, reassuring family members, if necessary, about the level of care being provided. This, of course, is particularly important in cases where an elderly patient has dementia, and might be unable to remember whether or not care assistants have visited.

The electronic records are transferred to Solna council's central computer system, giving an instant account of the level of care being provided. This enables care managers to confirm correct procedures are being followed, adequate time is being spent with each patient, and that care time is being accurately recorded and paid for.

Solna council estimates that the digital pen and paper solution is saving it around 12 million Swedish Crowns (around US\$1.7 million) per year. In fact, 40% more care is now delivered at 10% lower cost, and the success of the application has led to more than 40 other Swedish municipalities adopting similar solutions.

SIMPLIFYING EMERGENCY CARE DOCUMENTATION

For physicians in the emergency department, getting patient information into the computer system quickly and accurately is critical. At Suburban Hospital in Bethesda, Maryland, USA, eBC, a digital pen and paper-based system developed by Bartcharts LLC and PSR, has helped simplify this process significantly.

Consultants print off the appropriate forms at the start of their shift, which they then complete with the digital pen when examining patients. Periodically during shifts, they dock their pens, and the complete documentation is uploaded to the hospital's IT systems, where the data is checked for completeness and cross-referenced with billing information and quality-of-care markers.

Physicians took less than 15 minutes to learn how to use the digital pens and the department was able to realise substantial savings compared to traditional solutions.

IMPROVING QUALITY OF CARE IN NURSING HOMES

A leading cause of discomfort for bed-ridden patients and the most common medical problem in nursing facilities is the development of pressure ulcers, better known as bedsores. Early detection of symptoms can prevent pressure ulcers.

In nursing facilities in California, North Carolina, Arizona and Wisconsin, medical staff are now equipped with an innovative solution developed by Digital Pen Systems. Certified nursing assistants (CNAs) and wound care nurses complete daily and routine documentation using nothing more complicated than a paper form printed with the Anoto dot pattern and using an Anoto digital pen.

The digital pens record and store the data, and when the clinician docks the pen, the data is transferred into the facility's database via secure Internet connection. Clinical reports are then available and reviewed by nursing and dietary staff who monitor the patient's status i.e. signs of trouble or potential risks.

Before the digital pen and paper solution, many of the observations were lost in the paper shuffle used primarily for medical history, rather than prevention. Now 1,500 patients have a better chance of avoiding pressure ulcers at these 16 facilities thanks to the implementation of this uncomplicated solution.

In addition to reducing 30% of the pressure ulcers and subsequent treatment, the digital capture has also significantly reduced paper handling which included numerous Federal Express packages on a weekly basis. 250 digital pens have now been deployed in 16 nursing facilities around the US with other commitments planned to be deployed in the future.

CONCLUSION

When introducing technology to critical healthcare and social services, the first consideration should be the needs of the end-users and their work processes. Often a relatively simple solution such as digital pen and paper can yield better results than more 'sophisticated' solutions that users find hard to get along with. That said, whichever technology an authority opts for, it is critical to take a holistic approach: only when the front-end technology can be tightly integrated with records databases and other systems can it deliver the greatest benefits.

FURTHER INFORMATION

You can see a two-minute video explaining how the Homecare services in the Kristianstad municipality in Sweden is using digital pen and paper to streamline elderly care services here:

<http://www.youtube.com/watch?v=tou6TadXtS8>

Further details of all the applications included in this document, and others, can be found on Anoto's website:

<http://www.anoto.com/?id=533>

