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IT-enabled Business Innovation Case Study:

CaptureStroke Software – Digital Spark Limited.

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Introduction

Company Overview

Founded in 2010 by Michael J Bell and Gavin Kipling, a core part of Digital Spark's vision is, "to bring Apple-like user interface experiences to the clinical world". Digital Spark develops data capture software that is easy to use by busy clinical staff in hospital settings. With a background in healthcare strategy, user experience and web application development, Michael J Bell and his colleagues set out to transform the way key clinical data is captured. In its first 18 months, Digital Spark has successfully developed and implemented CaptureStroke software for six hospitals in North East England. Stroke patient data, from first arrival in Accident and Emergency, through to and beyond discharge from the hospital ward, is now fully captured. Now, crucial care performance information is already being gleaned from the system, and there is great potential for other clinical care pathways to benefit from this innovative data capture system.

Market Context

For years, doctors and nurses have complained of cumbersome and unreliable clinical data capture systems. Those that had been made available via the National Programme for IT (NPIIT) or via local trust procurement, were often found to be under-utilised by staff. The extent and accuracy of clinical data capture has, until recently, been strongly dependent on users' diligence, IT competence and availability and access to static PCs. Not surprisingly, the potential benefits of such systems were never realised because staff simply didn't have time to input data. Any outputs from the systems were rendered inaccurate and often unreliable for clinical decision-making.

The UK NHS, like many large health service providers, is under-going incredible structural change with two key goals being ever-present:

1. Improving the quality of patient care;
2. Reducing the cost of delivering health care.

In the UK, reducing deaths and severe disablement post-stroke remains a key health improvement target. Clinicians in North East England have been eager to find new ways of understanding the condition so that the treatment they give victims improves the health outcomes, and also improves wider understanding of stroke prevention. Up until 2010, the stroke 'care-pathway' involved collecting data from multiple sources, using a mix of manual and automated systems and duplicate data entry. The data clinicians previously relied upon to affect service changes and track care delivery performance, was generally not available in a timely manner, required extensive effort to uncover, and was sometimes incomplete.

Responding to a call to action from North of England Cardiovascular Network and the then Deputy Regional Director of Public Health at NHS North East, Digital Spark were presented with an opportunity to revolutionise the way stroke data is captured and used. CaptureStroke was developed to meet this need. Digital Spark also set out to prove the benefits of adopting innovations in touch screen technology and intuitive user interface design, creating a system that could be used to collect data at the point of care to enhance data quality.

Digital Spark's data capture software delivers a number of key benefits:

1. Increased Data Accuracy and Interoperability – CaptureStroke draws key patient data directly from the electronic patient record systems (PAS) already in place in many hospitals. Coupled with mobile data capture capability, this means that data is both accurate, more highly available and that duplication of effort is reduced.

2. Mobile Data Capture & Real-Time Care Statistics – CaptureStroke is an application clinicians can use on either fixed desktop PCs or on ward rounds using the Panasonic Toughbook CF-H1. ToughBooks are iPad like devices, specially designed for use in clinical settings, and can withstand dropping and spillages. The devices are also manufactured to meet the exacting hygiene management standards now in place in all NHS hospitals to support infection control. This enables data capture to happen at the point of care, thereby saving time, improving data accuracy and providing trusted, real-time information on patient care.



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The screenshot shows the 'CaptureStroke' system interface. At the top, there's a navigation bar with 'Care Overview' (highlighted), 'Patient Search', 'Dashboard', 'Reports', 'Coding', and 'Logout'. A search box for 'Hospital Number' is on the right. Below this is a tabbed interface with 'Daily Assessments' selected. The main area is a table of patient records. Each row includes a hospital number, name, date of birth, time since admission, time to stroke unit, and three assessment columns (24, 48, 72 hours). Status indicators (red, amber, green) are shown in the assessment columns. A large 'Test System' watermark is overlaid on the table.

Hospital Number	Name	Date of Birth	Time Since Admission	Time to Stroke Unit	24 Hour Assess	48 Hour Assess	72 Hour Assess
> 516516	[REDACTED]	29/02/1908	8d 16hr 39m	0d 10hr 50m	!	!	!
> [REDACTED]	[REDACTED]	01/01/1900	17d 0hr 16m	0d 1hr 37m	✓	!	!
> [REDACTED]	[REDACTED]	11/11/1945	18d 7hr 9m	0d 4hr 30m	!	!	!
> 515515	[REDACTED]	01/01/2000	25d 4hr 54m	-	!	!	!
> 515515	[REDACTED]	15/05/1916	25d 3hr 54m	0d 1hr 15m	✓	!	!
> 514514	[REDACTED]	24/08/1948	31d 4hr 9m	-	✓	✓	✓
> [REDACTED]	[REDACTED]	01/01/1950	62d 14hr 39m	0d 1hr 0m	✓	!	!
> 511511	[REDACTED]	01/01/2000	62d 2hr 39m	0d 4hr 0m	✓	✓	✓
> 511511	[REDACTED]	01/01/1944	61d 20hr 9m	0d 10hr 30m	!	!	!
> 511511	[REDACTED]	29/02/1944	63d 5hr 54m	0d 0hr 52m	✓	✓	!
> 511511	[REDACTED]	29/02/1952	63d 0hr 39m	0d 3hr 0m	✓	!	!
> 511511	[REDACTED]	27/08/1936	63d 16hr 39m	-	!	!	!
> 511511	[REDACTED]	01/01/1950	64d 5hr 28m	-	!	!	!
> 510510	[REDACTED]	29/02/1944	66d 4hr 27m	0d 3hr 3m	✓	!	!
> [REDACTED]	[REDACTED]	01/01/1950	63d 16hr 39m	0d 0hr 1m	✓	!	!
> 1234567	[REDACTED]	05/01/1950	87d 16hr 39m	0d 3hr 0m	✓	✓	✓
> 787878	[REDACTED]	29/02/1936	87d 23hr 22m	0d 1hr 43m	✓	✓	✓

3. **Ease of Use** – From the very start of development, Digital Spark worked on the key user requirement, emphatically made by clinicians that “*the system must be easy to use!*” Gavin Kipling, Michael J Bell’s co-founder, fellow director, and award winning creative, ensures that all Digital Spark products are user-interface and design-led. CaptureStroke’s screens are characterised by big

chunky user-interface components, surrounded with plenty of white space and Red, Amber and Green colour schemes for ease of data input and visualisation. All of CaptureStroke’s user-interfaces were designed with significant clinical input and this proved invaluable in delivering a system that has both seen mass adoption at current sites and delivery of key benefits ahead of time.



The screenshot shows the CaptureStroke software interface. At the top, there's a navigation bar with 'Care Overview', 'Patient Search', 'Dashboard', 'Reports', 'Coding', and 'Logout'. A search box for 'Hospital Number' is also present. Below this, a blue banner indicates 'Filtered by: 24 Hour Assessment Due'. The main area is a table with columns for 'Hospital Number', 'Name', 'Date of Birth', 'Time Since Admission', 'Time to Stroke Unit', '24 Hour Assess', '48 Hour Assess', and '72 Hour Assess'. A 'Care Status Indicators' pop-up window is open, listing various assessment statuses with corresponding icons (checkmarks, exclamation marks, X's).

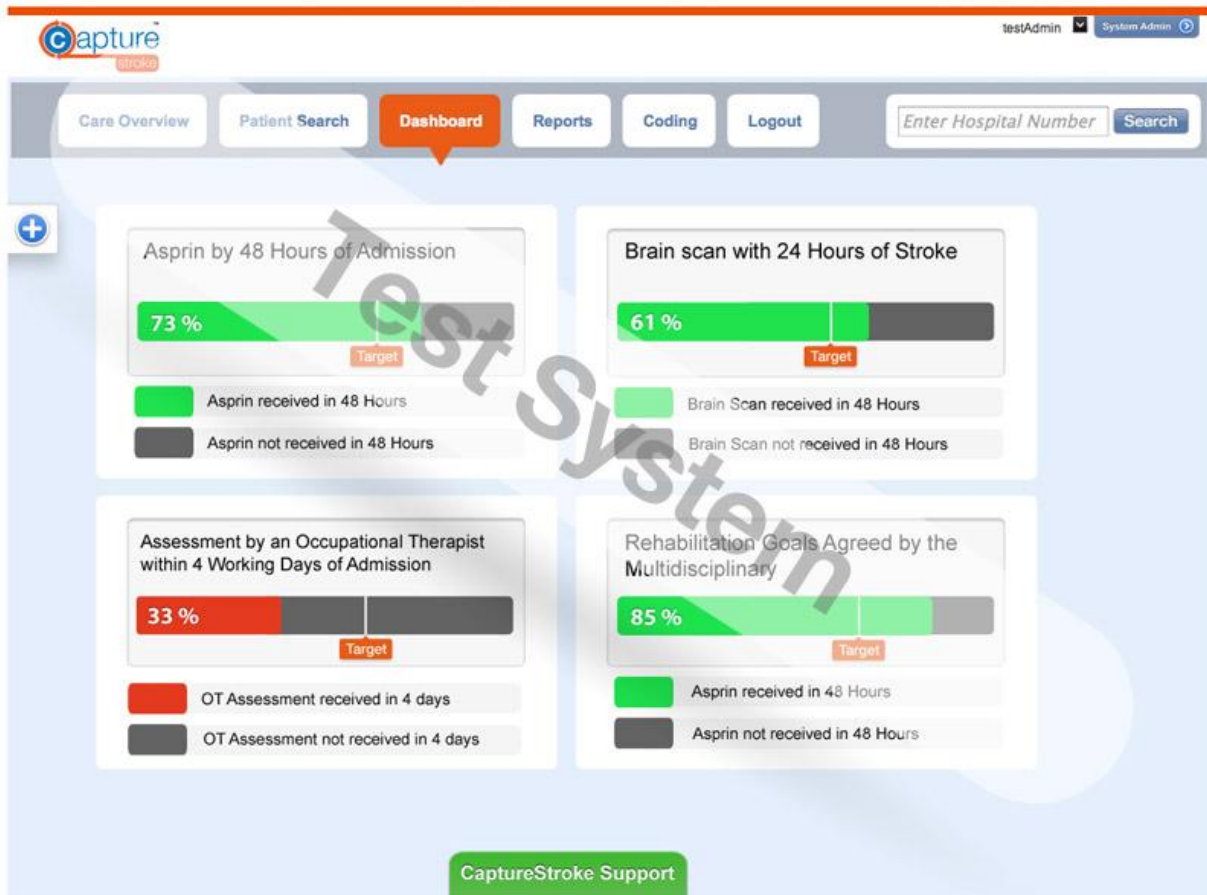
Hospital Number	Name	Date of Birth	Time Since Admission	Time to Stroke Unit	24 Hour Assess	48 Hour Assess	72 Hour Assess
908			8d 16hr 41m	0d 10hr 50m	!	!	!
900			17d 0hr 18m	0d 1hr 37m	✓	!	!
945			18d 7hr 11m	0d 4hr 30m	!	!	!
000			25d 4hr 56m	-	!	!	!
915			25d 3hr 56m	0d 1hr 15m	✓	!	!
950			62d 14hr 41m	0d 1hr 0m	✓	!	!
952			63d 0hr 41m	0d 3hr 0m	✓	!	!
936			63d 16hr 41m	-	!	!	!
950			64d 5hr 30m	-	!	!	!
510510		29/02/1944	66d 4hr 29m	0d 3hr 3m	✓	!	!
		01/01/1950	63d 16hr 41m	0d 0hr 1m	✓	!	!
787878		11/07/2011	92d 16hr 41m	-	!	!	!
		01/01/1950	92d 16hr 41m	-	!	!	!
		02/01/1950	93d 12hr 41m	-	!	!	!
		01/01/1950	97d 16hr 41m	-	!	!	!
513513		16/10/1943	-	-	!	!	!

Care Status Indicators (Close)

- ✓ Assessment complete or CQUIN target achieved
- ! Assessment or CQUIN target status unknown
- ! Assessment or CQUIN target status unknown and respective timeframe elapsed
- ✗ Did not meet CQUIN target
- ✗ Assessment complete or CQUIN target achieved with exception (no, but)

4. **Clinical Team Organisation and Care Delivery** – CaptureStroke is used by a range of staff, both clinical and administrative – with ease and consistency. When shifts change, and when staff come and go, the dataset remains constant and can be interpreted easily by someone taking over the care of a patient, without having to spend time briefing and de-briefing on hand-overs. Crucially

the clinicians who are now using CaptureStroke to monitor and evaluate their patients' progress trust the system and the data they are working with. They have reduced their reliance on paper-based systems and have increased their time efficiency.



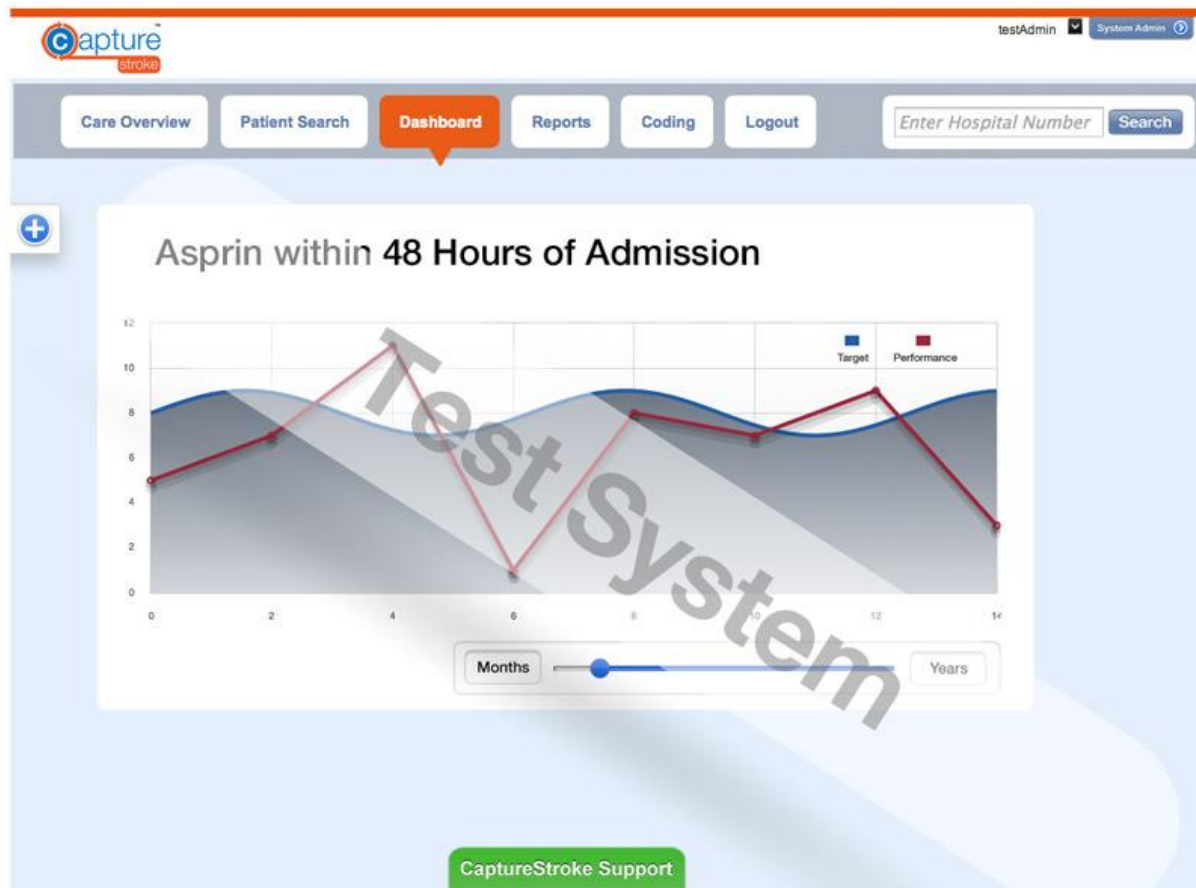
Innovation Drivers

Digital Spark is growing at a time when a number of key factors are converging to make this health innovation possible:

- **Mobile Touch Pad Technology** – The ubiquitous adoption of iPad like devices in everyday life means that most users are already familiar with the touch-pad user-interface and can quickly understand and use Digital Spark applications.
- **Preventative Health Care** – Part of the transformation of health care in the NHS is about finding new ways of preventing common conditions, including strokes.
- **Clinician/User-Led** – The drive for innovation in available technology

has come from the key users themselves. There is a compelling desire to transform improve stroke care and the very doctors and nurses involved in treating patients have demanded new software. In the new era of clinically-led health care commissioning, CaptureStroke is an early example of a successfully procured service.

- **Cost and Service Delivery Benefits** – Only 2 months following delivery, benefits are being realised by all key stakeholders, including: clinicians; patients; and the fund-holders concerned with cost versus delivery. Under the current NHS financial model, another compelling driver is the ability to confidently demonstrate evidence of positive health outcomes following episodes of care for stroke patients. This is crucial in hospital trusts to both raise their profile and receive necessary financial payments from central NHS funds.



All of these factors have combined to result in an idea successfully and widely applied, with clear evidence of benefits delivered.

Enablers of the Innovation

Michael J Bell identifies a number of factors that have enabled the wide and successful adoption of CaptureStroke:

1. **Visible Senior Sponsorship** – Having senior clinical and executive leaders on board with the development and delivery of these projects has been key. Senior clinical consultants and NHS Business Managers have worked in partnership with Digital Spark from the outset in scoping out the planned-for benefits. They have also been invaluable door-openers and drivers of change where some user communities showed signs of resistance. Such drive from the top, and keeping a close link to the strategic goals of these health service organisations, has been closely maintained throughout all of the installations in hospitals to date.
2. **Overcoming Resistance** – Much-publicised deficiencies of the NPfIT and other large-scale Government IT projects left some users very cynical

about any new attempts to install 'IT' per se. This was particularly evident when Digital Spark started working with hospital trusts where hospital staff were very dismissive of the benefits that CaptureStroke intended to bring. Digital Spark's response was to spend as much time as possible, visibly on-site, listening to concerns and gradually garnering support from the most vocal cynics. It might have been tempting to walk away at the first sign of resistance but the Team knew that if they weathered the storm and could build sufficient trust, the benefits would come. And they did. It was hard work but some of these ardent resisters are now some of the most vocal and enthusiastic proponents of CaptureStroke.

3. **Constant User Involvement** – Following AGILE methodology principles, Digital Spark have gone to great lengths to involve users in system interface design all the way along. Users have benefited from being fully involved in designing the core dataset to be captured, and giving regular feedback on the user interfaces as they developed. When systems have



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gone live, there has been an almost immediate increase in productivity and widespread adoption.

4. **Benefits Led** – Digital Spark have adopted key elements of the Benefits Management methodology used in some NHS IT projects. The Team establish benefits plans from the outset and also get actively involved in conducting benefits reviews with the clinicians and key sponsors. This approach is starting to be more widely accepted as CaptureStroke is presented in 'Benefits' terms to others considering adopting it.
5. **Continuous Improvement & High Visibility** – Digital Spark have put considerable time and energy into ensuring that their people are on customer sites every single week of a project. This is part of the Company's core ethos and they have set out to differentiate themselves by their high level of visibility 'in-person'. As a result they have been able to demonstrate continuous improvement week-on-week, building confidence and trust amongst users that CaptureStroke will deliver the benefits intended.
6. **Sharing Best Practice** – North Tees and Hartlepool NHS Foundation Trust and Gateshead Health NHS Foundation Trust have become reference sites for CaptureStroke, and both are strong advocates of the system, and of Digital Spark. This is excellent exposure for all concerned and showcases the innovations that have been achieved to date, widening the spread of an idea successfully applied.
7. **Strategic, Trusting Partnerships** – Digital Spark have been clear from the start that their own business strategy would be built on tremendously strong partnerships with trusted people and organisations. The strong focus on delivering through people, on customer sites, means that Digital Spark only recruit employees who embody this approach. They place as much importance on people and influencing skills as they do on technical capability. A high standard to maintain but one that is crucial to the integrity of the Digital Spark brand and product portfolio. The strategic partnership with Panasonic's ToughBook division is also built on a trust relationship and around complementary business offerings.

Future Innovations

Enquiries about CaptureStroke are growing rapidly and with recent showcasing at key medical conferences, it looks like the system is destined for wide adoption across NHS trusts. Digital Spark are constantly innovating with their products and services and a number of exciting developments are on the horizon:

- **Extending the Scope of CaptureStroke** – Diagnoses made and treatments given during the first 3 hours after a person suffers a stroke are crucial in determining the best health outcomes. There is an intention that CaptureStroke is extended to draw useful information from key systems in operation by the North East Ambulance Service. E.g. Paramedics already routinely gather certain patient information that would effectively start the data collection and care process prior to the arrival at AGE. The intention is also to include routine data collection via community health practitioners, enabling a complete, end-to-end picture of care to be acquired, driving further benefits and supporting better patient outcomes.
- **Patient 'Self-Monitoring'** – In future it may also be possible for patients to monitor their own health data using so-called 'tele-medicine'. Mobile apps and everyday smart-phone technology can be leveraged to enable the capture of crucial data.
- **Future Health Innovations** – The database that has already been created is beneficial to so many stakeholders and, in time, this data set may be used by clinical researchers to conduct longitudinal studies with stroke patients. This may in turn enable new breakthroughs in medical science and knowledge about stroke conditions. CaptureStroke data may eventually enable doctors to predict and prevent strokes in some parts of the patient population.
- **New Health Care Pathways** – Already Digital Spark is working with clinicians to explore the potential to develop other applications that replicate CaptureStroke in other healthcare pathways including cardiology and psychiatry.
- **Health 'Infographics'** – The interpretation of data sets in meaningful and accessible formats is key. Digital Spark is also developing innovative ideas to incorporate infographic principles into its core clinical applications so that doctors and patients can easily mine and interpret the true meaning of the vital data collected.

As leading thinkers in the digital technology fields often say, *'Data is the new oil'*. Digital Spark looks set to be one of the leading innovators in this field, bringing IT-enabled innovation to benefit in some of the biggest health challenges of the 21st Century.

More about Digital Spark can be found at <http://www.digitalsparkltd.com/>



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