“The surveyor continuing to rely on pen and paper will soon be redundant – trying to compete using obsolete working practices. The digital revolution affects every part of our lives and not just social media. Efficiency and productivity at work will come from embracing mobile technology, not resisting it.”

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Executive Summary

The transition to a digital economy will mean fundamental changes in our everyday lives, both as private citizens and as industry practitioners, with far-reaching consequences for surveying and the industry as a whole.

Mobile computing, in particular, is creating new challenges – and opportunities – for professional surveyors in how they capture, manage, access and control the data that is created by the devices and applications they use. Traditional paper-based working is increasingly being augmented, and in some case completely superseded, by electronic sharing of information. Building surveyors need to keep up-to-date with current tools and technologies while also spotting emerging technology trends. For the profession as a whole, adoption and exploitation of advances in technology can also help reduce risk and protect and enhance surveying’s reputation.

Drawing on findings from a GoReport-hosted workshop held at the RICS, this paper reviews the emergence of mobile computing: the rapid adoption of smartphones and tablets, the growing array of generic apps and online tools, and the development of new surveying-specific mobile services. It highlights the productivity gains arising from using specialist report-generating software on mobile devices – seen as essential if surveyors are to meet their clients’ ever-growing demands.

However, we are still some way from a seamlessly mobile online world: the workshop highlighted shortcomings in some current technologies, and then discussed the trends that may change the work of tomorrow’s building surveyor – and clients and other industry professionals – still further.
Entering the mobile age

UK government and industry strategy initiatives such as Construction 2025 highlight that the transition to a digital economy will mean fundamental changes in our everyday lives, driving "a step change in how we build and how our built environment operates", with innovative technologies providing "asset owners with a full understanding of the performance of their assets, both during construction and throughout their design life."

Mobile computing is part of this transition, and has been an on going 'disruption' across numerous professions for some years. The surveying sector is no different, with different professionals, of different ages and experiences, affected in different ways.

Many surveying firm veterans gained their early industry knowledge and skills in an era before we routinely used computers or mobile telephones. By contrast, for recent entrants to their firms, the worldwide web and the mobile telephone have been ever-present, and – particularly since the late 2000s – smartphones, tablets and an array of associated applications and technologies have begun to change how the surveying industry captures, shares and reuses information. New professional knowledge and skills regarding the appropriate and effective use of mobile technologies are also being created, with the profession also being pressed to change by gradual pan-industry adoption of other technologies such as building information modelling (BIM) and laser-scanning.

Widespread adoption and use of new information and communication technologies is also creating new challenges in how professional surveyors manage, access and control all the data that is created by the devices and applications they use. Traditional paper-based working is increasingly being superseded by electronic sharing of information, and, with the emergence of cloud-based storage and Software-as-a-Service (SaaS), it is no longer the norm for all information even to be held within a business.

Building surveying professionals therefore need to keep themselves updated about, first, the tools and technologies that are currently available to them, and, second, emerging technology and related trends that, once proven, will affect their future working lives.

Mobile communication

It would be wrong to describe surveying or, indeed, wider construction industry professions as 'technophobic'. Take its rapid adoption of the mobile phone, for example. Until the 1980s, telephones were home or office-based devices that were used almost exclusively for voice communications. UK mobile telephone services were instituted in the mid 1980s – these first generation ('1G') analogue devices were expensive, cumbersome and had poor battery life – with 2G digital services following in the early 1990s. By this time phones were smaller, less expensive and worked for longer between charges. They had also become increasingly ubiquitous in the built environment, not least because they enabled surveyors and other professionals in mobile, geographically dispersed and often site-based roles to keep in regular contact with colleagues and clients.

Since the 1990s, the technology market has exploded as mobile providers have deployed 3G and 4G telecommunication standards, and we now routinely use mobile devices for far more than voice communication, aided by the dramatic increases in bandwidth availability and therefore

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1 Construction 2025, p.32
3 This white paper draws on a workshop held at the Royal Institution of Chartered Surveyors in December 2014. Organised by GoReport, its attendees included representatives from firms, ranging from UK-based sole traders to international property consultancies, including (in alphabetical order) ALPS Group, Broadland Housing, Capita, CPS Property, Cushman & Wakefield, GL Hearn Ltd, GVA, Savills and Sweett Group. Ensuring a good spread of opinion and experience, delegates' career stages ranged from undergraduate trainees to senior board-level directors, and included IT staff and business analysts as well as practising surveyors.
speed. For many users, phones are now used more for viewing and moving data – texts, photographs and other digital media, email, file attachments, web pages, etc – than they are used for voice conversations.

The first ‘smartphone’ (the IBM Simon) was launched in 1993, combining mobile phone, pager, fax machine, calendar, address book, clock, calculator, notepad, email, and a stylus-controlled touch-screen with a QWERTY keyboard. Pocket-sized personal digital assistants, PDAs, from companies such as Psion and Palm, then Microsoft Windows and RIM Blackberry devices helped grow the smartphone market. But the true turning point, arguably, was the 2007 launch of the Apple iPhone, followed soon after by the launch of the first Android smartphones. The 2010 launch of Apple’s sister product, the iPad tablet – and similar products from Android and (later) Microsoft device makers – further accelerated mobile computing adoption. Today, sales of tablets now exceed sales of laptops and desktops, though use of the latter remains high due to the large installed base and users' preference for working with conventional keyboards, etc.

Today's mobile surveyor

Nonetheless, smartphone and tablet adoption, coupled with the widening availability of high-bandwidth telecommunications, is dramatically changing the working lives of professional surveyors. They can stay in constant contact with clients and colleagues via voice, email, text, Twitter or other social media; they can share photographs, locations, documents, notes, web links and other digital content; and they can expedite the production of some of their daily work outputs (workshop participants mentioned various mobile apps they used, including Office365, maps, PDF viewers, CRM, file storage, voice recorders, barcode scanners, expense management, etc).

Previously laborious survey processes involving pen and paper, camera, voice recorder and measuring devices are now increasingly being managed using tablet-based applications, including GoReport. Information for industry standard reports, such as the RICS Homebuyer Survey, can now be collated more efficiently; templates in the reporting software prompt the surveyor to gather all the required information in a consistent way, with photographs and dictated notes automatically tagged and associated with the appropriate text (one workshop participant recalled a dilapidations report which incorporated 12,000 photographs; another described how mobile technology had not only made data collection more efficient, but also changed clients' expectations about how reports are delivered – digitally rather than paper-based, and more quickly: “they think all building surveys can be completed in five days”).

All data can be uploaded in seconds to a secure cloud-based service which can also be accessed via standard web-browsers, allowing the surveyor and business colleagues to check the data for consistency and quality assurance purposes, and then preview and edit the report prior to issue to the client.

Report data from complex, multiple site surveys involving teams of surveyors can be rapidly summarised and the results collated into digest reports. Similarly, previously separate building, mechanical and electrical, and site/environmental surveys can be more efficiently coordinated and combined as chapters in a master document, reducing both the client’s and the professional team’s risk.

Such technology helps surveyors satisfy their clients' ever-growing demands to have accurate, up-to-date, asset information in an easily assimilated format, supported by comprehensive databases of time- and date-stamped field records that can be re-used as required, or combined or augmented by other data. It may also become a key factor in risk mitigation and maintenance of professional standards, with expert use of digital technology to produce demonstrably more accurate data, a growing client requirement, and one reflected also in how the RICS, insurers and regulators assess a practice’s professional standards.
However, there is still some technological trepidation. For example, according to some participants at the GoReport/RICS workshop, some surveyors are concerned that over-reliance on software may take some of the professional skill out of compiling a detailed report, with drop-down menus sometimes not finely nuanced enough to accurately convey the surveyor's judgement (on the other hand, mandatory checklists can improve error proofing and therefore the risk of negligence). Apart from the user interface, users' experience suggests:

- integration of maps and plans into the report tools could be improved
- voice-to-text tools (e.g., Siri, Dragon, Olympus) often do not deliver the quality output required (some vendors offer human transcription services as an option); and
- Depending on the device, batteries can run down quickly.

Beyond the devices themselves, there are also concerns about:

- reliance on electronic storage (how do we ensure long-term access to historic data?)
- reliability of hardware
- the security and reliability of third-party cloud-based storage and SaaS applications
- offline availability of data
- the financial stability of vendors
- ownership of data, and
- the geographical location of some online service providers and/or their data centres (one participant was concerned that key activities might be out-sourced overseas, with corresponding impacts on service quality).

Workshop feedback suggested mobile adoption was often employee-driven bottom-up, rather than IT-driven top-down – with younger employees sometimes taking the lead, and older employees sometimes resistant to change. Surveying businesses will need to:

- ensure senior/executive ‘ownership’ of the IT vision and strategy (so that these are aligned with other aspects of the business) and awareness of the risks of non-adoption or excessive variation
- adopt an informed approach to their employees' possession and use of mobile devices (there was discussion of Bring Your Own Device versus Choose your Own Device policies, and the role of IT departments in ensuring use of preferred corporate standard applications)
- encourage and train individuals in their appropriate use
- enforce device and data security (ensuring data can be remotely wiped from lost or stolen devices, for example), and
- ensure they have robust back-up procedures in place to maintain the secure availability of corporate and client data.

However, this may not always require a big in-house IT investment – today's IT directors are increasingly taking a strategic view of their data needs and, rather than building an expensive hosting capability, are often outsourcing the management of their data to specialists (with strict service level agreements in place to ensure optimum levels of speed, availability, security, regulatory compliance, disaster recovery, etc).

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“Workers work in the system. The job of the manager is to work on the system and improve it with their help.” (Myron Tribus)
What will the future bring for building surveyors? As mentioned, the GoReport/RICS workshop identified various shortcomings with existing surveying applications; as these are addressed by the hardware and software developers we can expect, for example:

- improved location services (maybe automatic recording of weather, temperature, etc.)
- better voice-to-text dictation
- longer device battery life
- improved device security
- better integration of software so that enterprise and/or asset data is more easily shared between devices and relevant applications, and
- increasing adoption of SaaS

But what other technology shifts might we expect?

**Interoperability** - Stand-alone 'point solutions' will become increasingly redundant as more tools in the surveying IT 'eco-system' become capable of sharing data. Integration and data interoperability help avoid duplicate entry of information into different systems, 'joining up' interactions both within a business – finances, customer relationship (CRM), and project management, for example – and between the surveying business and its clients and external supply chain partners involved with built assets.

**BIM** - Building information modelling processes will be increasingly important, helping designers, constructors and owners and operators focus on open, shareable asset data requirements relating to the whole-life of an asset. And BIM will not just be about new-build; it will also be used to collaborate on existing built assets, with surveyors and other professionals using laser-scanned 'point-clouds' to quickly and accurately capture information and then augmenting this data with additional, often mobile-gathered, information.

**Intelligent objects** - A growing number of building components, systems and equipment items now have RFID (radio frequency identification) tags or QR (quick response) identification codes. These are machine-readable, linking to data in another application (typically a website page, though ‘augmented reality’ applications were also mentioned), giving, say, the item's serial number, manufacturer, date of installation, etc. so that the information can be easily captured by a surveyor alongside an assessment of its condition.

**'Internet of things'** - Building management systems monitor their constituent heating, lighting and ventilation elements, with smart meters and environmental sensors constantly streaming real-time data about energy use, temperature, humidity, etc. Such data will be invaluable to the owner/operator in ensuring efficient facility operations, and a fertile source of data for surveyors.

**Not ‘wearables’** - Will tomorrow’s surveyor be wearing their technology? Attendees at the GoReport/RICS workshop were almost universally sceptical about 'wearable' innovations such as Google Glass, but there was more enthusiasm for integrating hardware that accurately measures distances and areas, or gives dampness, light or noise level readings.

**'Drones'** - For aerial surveys of properties, there was even interest in flying drones equipped with cameras and laser scanners.

**'Big Data'** - And looming over all these developments was an appreciation that surveyors and their clients are in a transition from being document-centric to being data-centric, with 'Big data' another IT disruption.

**A strategy for the future**

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4 The UK Government has a clear requirement for all public sector projects: “open, shareable asset information” (ie: not data locked into proprietary software formats)
It is clear that recent technological disruptions have begun to change the daily work of many building surveyors, and emerging trends in adoption and use of mobile IT mean that these changes are likely to continue. As 'early adopter' businesses incorporate new technologies and deliver client projects more quickly, more accurately and more cost-effectively, their rivals will have little option but to seek the same productivity improvements. Staying ahead of the competition, though, will be more than a technology battle.

Building surveying businesses need to develop appropriate strategies to capitalise on their strengths (and minimise any weaknesses – a key part of risk management). This will require a holistic view of external political, economic, social, environmental and technological trends, and an internal appraisal of a business’s people, skills and knowledge, its processes and structures, and its technological capabilities.

As the property market expands again and embraces more digital working, client demands are also becoming more wide-ranging (requiring sophisticated financial skills or environmental expertise, for example). Recruiting and training adaptable and IT-literate but ‘non-cognate’ entrants can help broaden both businesses’ and the profession’s skills base, while also bridging the current ‘skills gap’ faced by many organisations.

The successful building surveying firms of tomorrow will be the ones that effectively combine their current and future people, their processes and their technologies to efficiently meet the changing demands of clients in the 21st century.