Implementing a Mobile Working Strategy for the Healthcare Sector

Identifying and overcoming key challenges
Executive Summary

This whitepaper highlights the changing IT landscape and how these changes affect and will continue to affect all healthcare organisations in delivering better, smarter and patient-centric care.

The whitepaper will focus on issues associated with the move away from traditional desktop computing environments and the move towards a more flexible, ‘mobile first’ model of delivering health and social care services.

The benefits of adopting this mobile approach will be discussed in detail and suggestions will be made as to possible technology options for healthcare organisations wishing to adopt a mobile working strategy. The focus will be primarily on the software strategy choices available and not specifically hardware platforms or mobile device choices.
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Introduction

For healthcare organisations, the introduction of technology (in particular mobile technology) can provide the opportunity to re-model the way in which care is delivered to patients. The term ‘mobility’ can be applied in a variety of different ways; from improving workforce flexibility, to delivering care closer to patients in a more coherent way.

Mobile technology is enabling an interaction with patients never before seen in the provision of healthcare services. The use of ‘Telehealth’ and mobile apps for monitoring patients’ conditions will become mainstream within the next 2-3 years. This will provide better care outcomes for patients who can be treated in their own homes.

Access to the right information at the right time is enabling better decision making across the entire healthcare sector. This also provides the opportunity to streamline services and introduce paper-lite processes.

The benefits of mobility are clear

The benefits of adopting a mobile strategy for healthcare organisations will vary depending on the type of services they deliver. For example, a Mental Health Trust with a large field based workforce, would have a more compelling requirement for this type of technology than a small Acute Trust with predominantly on-site care staff. However, the small Acute Trust could potentially use mobile technology in a different way, for example capturing patient observations at the bedside.

The use of mobility should also not be confined to just clinical or medical processes, as operational or logistical functions can also benefit from being mobilised. These could be processes around audits (Clinical or Health & Safety), inspection of premises, asset management (around IT equipment for example), service desk management (portering activities), facilities management (building inspection and maintenance).
Key Benefits:

The key benefits of adopting a mobile working strategy are:

- Improved care which is smarter and more patient-centric
- Reduction of risk through having the right information at the right time
- Improved data capture for the electronic patient record
- Reduction in worker downtime (e.g. travel time between patient and office)
- Cost savings derived from implementing and managing ‘smarter’ technology

Once a healthcare organisation has recognised the benefits of a mobile working strategy and made the commitment to implement this decision, they face a number of key challenges and choices:
Platform and Device Choice

With the diverse range of end user devices available on the market today, combined with the current range of mobile platforms, the choice of which device and platform to adopt can be complex.

Hardware technology evolves rapidly and new devices can appear (and disappear) quickly, so a software solution for your mobile working strategy needs to be flexible and adaptable.

New device functionality (e.g. hardware, sensors, operating system, form-factors, etc.) could offer an improvement that dramatically enhances the functionality of the software solution. Alternatively, the speed of technology change may be such that the original commissioned hardware devices may have become obsolete, unusable or no longer available.

The increased adoption of smartphone and tablet devices means that your healthcare staff may not want to carry a separate, dedicated mobile device for work use. It may also be cost-effective to utilise your workers' own mobile devices rather than incurring additional expense by purchasing unnecessary hardware for simple work tasks. This 'bring your own device' (BYOD) approach to mobile working potentially increases the rate at which new device types could be introduced into the workplace. This also increases the pressure on software solutions to remain current and viable.
Application Types

As your mobile healthcare workforce expands, it will become necessary to deliver applications for different types of user. These user types may include:-
- apps to provide a self-monitoring capability for patients in their own home;
- apps used in the treatment of in-patients within the hospital environment;
- apps provided to third party care organisations, etc.

The technical requirements for these different application types are not universal. A mobile working strategy should be capable of addressing the unique demands of each scenario without compromising on functional capabilities. An example of this would be patient self-monitoring apps, which would typically be available from consumer app stores (e.g. Apple, Google, Windows etc). These may have a requirement to submit anonymous patient data (e.g. for public participation apps). Some patient apps may also have to include a self-registration capability (e.g. via a Social Media site such as Facebook).

Engaging the User

The necessity to provide engaging and ‘user friendly’ software applications is often overlooked when implementing a healthcare mobile strategy. The consumer app market has raised expectations for healthcare professionals in this respect. If healthcare users do not find the apps attractive and easy to use, then there will be a natural reluctance to adopt and fully utilise these applications.

Leveraging Historical Investments

In many situations the legacy systems that provide the operational and administrative backbone for a healthcare organisation do not translate easily onto a mobile device. They may not offer the simple and intuitive interface now expected by the application user.
Nevertheless, these systems could represent a significant long-term investment by the organisation. They are often the providers of key clinical and operational information, and also the repository of data captured at the point of care.

When implementing a mobile strategy, it is vital that all the required functional elements (and data) of the back-end systems are available to mobile workers. The mobile strategy should be seen as a natural extension to existing legacy systems and not as a standalone element of the organisation’s IT and communication culture.

**Offline Working**

Whilst it could be assumed that healthcare workers will always be connected (via Wi-Fi, or 3G/4G), in reality this is not necessarily the case. Mobile data coverage is improving, but there is still inconsistency (‘black spots’) throughout the UK. This is compounded by public Wi-Fi hotspots which are often unreliable and unsecure. Mobile workers will inevitably encounter periods when they are offline and unable to access and submit data. During these periods they will still require the ability to carry out their job functions.

Tailored mobile applications built upon clearly defined clinical and operational processes can help mobile workers in situations where connectivity is variable. These applications can guide the user through the task in hand, simplify the data capture procedure and improve the user experience.

**Application Development Process**

With the move away from traditional software applications and the move towards leaner, more agile process-driven mobile apps, healthcare organisations can now rapidly re-define their mobile application development process. This provides the organisation with the freedom to design, deploy and manage mobile apps that are tailored to their specific requirements.
It is advantageous if the healthcare user could effectively contribute to this application development process. Having the ability to build mobile software solutions that truly deliver the required benefit to the organisation can only be achieved if these key user ‘stakeholders’ are involved. They can provide invaluable input into the functionality, process flow and general ‘usability’ of the mobile apps.

Developers and designers of the mobile apps should be able to include this input from these user stakeholders and incorporate it into the app development process. This customisation may be undertaken by the contracted software author or by using an organisation’s in-house development team, if a mobile app development platform is being used.

Utilising the skills of an in-house development team can prove difficult for some organisations when considering a bespoke approach to application development. Often the development of new software components and controls to address changing operational needs will require the input from the software author. This introduces time delays and additional cost, but also reduces participation and weakens commitment from the in-house team.

Ideally the existing skill-set of an organisation’s own developers should be aligned with the mobile application framework, i.e. they should be able to change and amend the application without the need to undertake a full re-write by the contracted supplier.

**Speed of Deployment**

Moving to a mobile working environment increases the expectation that changes to existing apps, or the creation of entirely new apps, can be achieved more rapidly than via traditional development methods. This has been driven by the experience from the consumer app market. This demand for ever shorter delivery times is compounded by the accelerating development and availability of new devices and technology.

Where possible the mobile application development strategy should encourage the re-use and recycling of software components and controls. This will support a more agile and flexible delivery approach to mobile app development.
Adequate Skilled Resource

The increasing demand for rapid application development and deployment will require an investment in skilled technical and operational resources. This could be outsourced, but where an organisation believes that it can provide a better quality service and exert a greater degree of control, then this approach should be adopted.

Utilising a single mobile device platform across the entire organisation is increasingly difficult to enforce. With an ever changing device culture, having the adequate skilled resource to develop apps for a range of mobile platforms can be a real challenge. It is important that the organisation recognises that investing in native development expertise across multiple platforms represents a significant financial commitment.

Interoperability

Healthcare mobile apps are of most value when they integrate directly into the organisation’s operational systems and data infrastructures. Strong back-end data integration is therefore a key requirement for the delivery of an effective mobile strategy.

Integration with a wide range of core systems is critical to the relevance and impact of mobile applications. Data captured at the point of care will also need to be fed back into these systems. To encourage consistent application use, reference data from multiple sources may also need to be uploaded to the mobile device (e.g. patient record data, patient feedback questions, shift hand over details, etc).

It is vital that all healthcare apps are designed to include a comprehensive, homogenous integration capability which can easily be extended should new clinical systems become available.
Data Management & Manipulation

The simple, intuitive mobile app that the healthcare user expects to see may need to convey very complex clinical or operational processes. This is particularly relevant where access to data is from multiple sources (i.e. two separate databases) and combined to support a single process. Alternatively this is also relevant when a process requires data to be distributed back to multiple databases and systems.

When implementing a mobile strategy it is important to incorporate a comprehensive integration capability that extends process workflows into the data integration layer. This will improve the relevance of captured data for the organisation and enhance the overall operational efficiencies.

Data Synchronisation

When working in an offline scenario (i.e. where no networking connectivity is available), captured data will need to be stored locally and synchronised when connectivity is re-established. If the organisation is using ‘intelligent’ apps, then reference data will also need to be available to the mobile worker (e.g. care pathways, medication history, policies, etc). All updated reference data that is captured on the device when offline, will also require a back-end synchronisation mechanism when connectivity is restored.

This offline synchronisation capability has to be incorporated into the fundamental design of an effective mobile strategy. It will need to be invoked either manually or automatically.

Multi-lingual Capability

Even though it may not be immediately relevant to your organisation, it may be worth considering how you would deliver multi-lingual apps. As your mobile community expands (e.g. to include patients, patient carers, medical suppliers, etc), multi-lingual support may become an essential requirement. Retrofitting a multi-lingual capability to an existing app will be a difficult, time-consuming
and costly exercise. If the organisation has a requirement for multi-lingual capabilities, these must be addressed at the start of the application design process.

Infrastructure

Depending upon specific circumstances, a healthcare organisation may want to deploy their mobile strategy either locally or via a cloud-hosted infrastructure. In this case the mobile app solution would require support for server virtualisation. It would also need to be scalable in terms of user numbers and incorporate load-balancing, clustering and high availability capabilities.

Security

A healthcare organisation may have already embraced the concept of cloud computing as part of their mobile strategy. While this model of data availability delivers some compelling benefits, it also presents some significant challenges around information governance. This is particularly relevant when addressing the problem of providing secure access via the mobile device to cloud based resources. Usability and security concerns are also increased when clinical and operational processes are extended beyond the core workforce and out to contracted service providers. This may be for specific purposes where a clear financial or operational benefit to the healthcare organisation can be achieved. Ensuring that mobile applications are easily accessible to all stakeholders, without jeopardising the integrity of your corporate infrastructure is a key security consideration when formulating a mobile strategy.

The transmission of data using HTTPS and the device’s own encryption facilities provide a secure environment for mobile working. However, a solution using real-time intranet access to back-end systems could provide an unsecure window into the organisation’s infrastructure. An effective mobile solution should provide a secure, SSL encrypted connection between the device and server. This will eliminate the risk of data breach while in transit.
How To Approach Mobile Software Deployment?

Healthcare system suppliers may offer point solutions to extend the functionality of their systems into the mobile space. However, this approach can enforce an overly rigid tie-in with the system supplier and force the organisation into a ‘silo’ approach to data and processes. This in turn could potentially restrict the opportunity for efficiencies from a mobile strategy.

When deciding on a mobile software deployment approach (as part of a broader mobile strategy), organisations have a number of options that could be considered:

Make It Yourself

For those organisations that require bespoke mobile software solutions, the most obvious choice for mobile software deployment would be a ‘do it yourself’ approach. This would be achieved by using native development methods. For organisations with a multi-platform hardware strategy, this approach would require the software to be re-developed for each target platform. Development skills in a range of native development languages would be required for this approach.

Investment could be made in development expertise for each target platform: Objective-C for Apple iOS, C# for Windows Phone 8, or Java for Android. Although this approach does have some benefits for the organisation, the required development resources may be:- expensive, in short supply, challenging to recruit and difficult to retain.
Leverage Industry Standards

An alternative to taking the native, ‘do it yourself’ approach would be to implement a HTML5, Cascading Style Sheet (CSS) and JavaScript model of software development. This approach would enable single source applications to be developed and deployed across a range of contemporary mobile devices (e.g. Apple iOS, Android, Blackberry OS10 and Windows Phone 8). This would provide organisations with a ‘write once-deploy to many’ development capability for their mobile software requirements. This model is particularly relevant for organisations with a diverse range of mobile devices and organisations which promote a BYOD mobile culture.

However, the successful implementation of a mobile healthcare strategy is more than just an ability to develop cross-platform mobile apps. A wide range of additional issues need to be addressed both on the back-end (i.e. cloud or on-premise infrastructure) and also the front-end (i.e. the device). These include:-

### Backend
- Data Storage
- User management
- Security
- Synchronisation
- Integration
- Connectivity
- Deployment
- Versioning
- Scalability

### Frontend
- Security
- Caching
- Synchronisation
- Hardware
- Connectivity
- Application Logic
- Styling & UX
- Logging
Taking The Platform Approach

The natural extension of the industry standards approach to application development would be the utilisation of a Mobile Application Development Platform (MADP).

This approach would leverage all the cross-platform benefits of HTML5, CSS and JavaScript and also provide a framework that would overcome many of the challenges associated with front-end and back-end integration.

By adopting the MADP approach, healthcare organisations could potentially have a fully functional, fully scalable and fully manageable environment for all their mobile software strategy requirements. The MADP could be used for the design, deployment and management of mobile software across the entire organisation.

Key Benefits of a MADP

• An environment that facilitates the rapid development of applications that will work across different mobile platforms

• A portfolio of tools that enable the interoperability and collaboration between clinical systems and disparate data sources

• A mechanism for the management of apps, users, devices and infrastructures
What To Look For In A Mobile Application Development Platform?

The MADP approach to mobile software development presents some clear and compelling benefits. For those organisations looking to implement a multi-platform, multi-function mobile working strategy, the MADP route may represent the most flexible and cost effective solution.

Key Requirements When Evaluating a MADP

1. Does the MADP support the development of single source applications using open standards that can be deployed across all contemporary platforms?

2. Does the MADP support the development of apps for the following scenarios: Organisation to Patient, Organisation to Supplier and Organisation to Public?

3. Does the MADP support distribution via an enterprise app store, third party app stores and Mobile Device Management solutions?

4. Does the MADP provide a framework for good UI/UX design to create attractive and user friendly applications?

5. Does the MADP enable organisational stakeholders to effectively contribute to the application development process?

6. Does the MADP support open technologies, enabling developers to leverage their existing skill-base rather than learn new native development languages?

7. Does the MADP enable developers to produce new software components and controls for re-use?
8. Does the MADP provide analytical and debugging features to support effective software versioning control and auditing?

9. Does the MADP support offline as well as online working capability?

10. Does the MADP support flexible deployment options: cloud (i.e. public, private or hybrid) and on-premise?

11. Does the MADP support open integration methodologies to mobilise legacy and cloud based enterprise systems?

12. Does the MADP support the management of data to facilitate the interoperability of multiple clinical systems?

**Conclusion**

The increasing adoption of a ‘mobile working’ culture is re-defining the way many healthcare organisations are delivering health services. An effective mobile working strategy can facilitate positive change in the way healthcare organisations interact with their staff, their patients and general public.

Unlike the traditional PC-based model of working, healthcare organisations now have the opportunity to re-define how their staff deliver services in the field, by embracing mobile working. This brave new world of ‘mobile’ has also changed attitudes on how technology (ie. hardware devices and software apps) is used and accepted within the organisation.

This whitepaper has set out to identify some of the key challenges and issues that will be faced by healthcare organisations who are implementing an effective mobile working strategy. The challenges are applicable, either in part or in full, to all health and social care organisations.
Key challenges and issues to consider when defining a mobile working strategy include:-

- Breadth of device choice
- Application types
- Engaging the user
- Leveraging historical investments
- Offline working
- Development process
- Speed of Deployment
- Adequate skilled resource
- Integration
- Data management & manipulation
- Data synchronisation
- Multi-lingual capability
- Infrastructure
- Security

The whitepaper has also identified a number of mobile software application development options available to healthcare organisations. This is particularly relevant to organisations which are planning to implement a cross-platform, multi-application model of mobile working. These software application development options are:

- **Make It Yourself** – Native platform development
- **Leveraging industry Standards** – Utilising standard HTML5, CSS & JavaScript
- **Taking The Platform Approach** – Creating a complete mobile software framework
About CommonTime

CommonTime have been at the forefront of enterprise mobility for over 15 years, supporting early innovators and adopters such as: The Health Informatics Service (Healthcare), Carillion (Construction), EDF Energy (Utilities) and TJ Maxx (Retail).

By using our mobile application development platform, mDesign, CommonTime have helped countless organisations to leverage the power of mobile working and make their mobile working strategy a reality.

About mDesign

The mDesign platform is a powerful, feature-rich, drag-and-drop development environment that can be used to create mobile software applications up to 5x faster and 80% cheaper than native development methods.

mDesign leverages HTML based cross-platform functionality with access to the native device capabilities. This hybrid approach ensures that all software applications developed on mDesign can be rolled out to the widest possible mobile audience.

Get in touch

If you would be interested to explore the challenges of mobile working further, or would just like some friendly advice please get in touch

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