Introduction

The MSCUI programme, developed by Microsoft and the NHS, was born out of the need to standardise display elements to promote patient safety and clinical efficiency. It creates guidance and controls designed to increase patient safety and clinical effectiveness through consistent interface treatments.

The MSCUI patient journey demonstrator is founded on MSCUI patient safety principles (Box 2) and combines outputs from the MSCUI programme with clinical functionality, excellence in user interface design and new Microsoft technologies to offer enhanced visualisation, understanding and engagement with clinical data. The demonstrator looks to the future, is speculative and is designed to promote ‘the art of the possible’.

Assimilation and interpretation of clinical data, often from multiple sources and in different forms, underpins the clinical decision-making process. In creating the demonstrator, we are also taking advantage of modern technological visualisation capabilities.
and offering clinicians holistic and enhanced ways of accessing and assessing patient data.

**Box 2** MSCUI patient safety principles

1. The correct identification of a patient and the matching of patients to their care elements.
3. Assuring medication accuracy during the giving of care to a patient.
4. Performance of correct procedure at correct body site.

The MSCUI patient safety principles, created in partnership with the NHS, are derived from the World Health Organization patient safety initiatives, the National Patient Safety Agency, the Joint Commission 2008 National Patient Safety Goals and the Agency for Healthcare Research and Quality.

**Method of development**

The demonstrator describes an end-to-end journey or care pathway through a specific clinical scenario. A male patient with a history of essential hypertension visits his general practitioner with chest pain. The consultation is recorded along with observations, the patient’s clinical history is assessed and he is referred on to the hospital where an angiogram and angioplasty (taking a picture of and then removing the obstruction in a coronary artery) is performed. This scenario allowed us to show a complete care journey and illustrate a proposal for an integrated care record which is patient-centric and in which the transitions between care settings are seamless. Data can be accessed and input from all care sources at any point along the patient journey. The demonstrator is structured in three sections – administration (see Figure 1), primary care (see Figure 2) and secondary care (see Figure 3) – each of which illustrates the activities associated within the setting relevant to our scenario.

An important aspect of our method is the choice of a tightly controlled dataset. As we were working in a hypothetical situation, we were able to craft our data
Figure 2 Primary care demonstrator

Figure 3 Secondary care demonstrator
to tell a very clear and aligned clinical story. This supported our design and innovation approaches in illustrating format and content contextualisation of patient data, such as the ‘consultation dock’ and ‘patient charts’.

We held ongoing workshops and reviews with clinicians in primary and secondary care to ensure development remained focused on clinical functionality, which we delivered in technologically innovative ways. With the help of a small team of user experience and technology experts, we adopted an agile, iterative design and development process that allowed us to be highly responsive and productive.

**The technology**

The demonstrator is built in Microsoft Silverlight 2, a cross-browser, cross-platform and cross-device plug-in designed for delivering the next generation of media experiences and rich interactive applications for the Web. We also incorporated its ‘deep zoom’ functionality, which allows users to magnify data extremely quickly at high visual resolution.

The features of the demonstrator which are attracting clinical interest are as follows:

- **Primary care – consultation dock.** Working in conjunction with a configurable timeline of consultations, clinicians can drag individual or groups of consultations into a docking area for fast and easy cross-consultation comparison, facilitating tracking of conditions or comparing observations from different consultations over time.

- **Primary care – patient charts.** Observations such as blood pressure measurements are presented in chart form, overlaid with related medication and other observations such as cholesterol levels. Clinicians and patients can quickly see a medication’s impact over time. Includes a scalable timeline, table view toggle and the ability to show or hide and reorder the data shown.

- **Primary care – MedsListView.** Medications management is a key focus area of the MSCUI programme and this available control embodies verified and accepted guidance. The MedsListView control presents medication lists that can be sorted, grouped, filtered and reordered.

- **Secondary care – deep zoom.** Deep zoom is used to explore and analyse electrocardiogram data. This allows users to very quickly see an overview of all data output and then to zoom into any detailed view, while maintaining high visual resolution.

- **Secondary care – angiogram.** The demonstrator presents a selection of angiogram videos to allow multiple views into an angiogram procedure. These are aligned with a 3D model of the heart to indicate the angle from which the angiogram video is taken. Traditional video player controls, including a drag-and-drop scroll bar, are incorporated as well as a magnification and measurement viewer.

- **Care pathways.** Building on well-received work from previous care pathways demonstrators this offers the opportunity to manage an entire pathway through a consistent interface.

**Discussion**

The demonstrator successfully indicates how future clinical user interfaces might appear.

**Implications for practice**

As this is a provocative technology demonstrator and not an application prototype, there has been no *in situ* testing. We are seeking a balance between implementation of MSCUI design guidance, subject to rigorous testing and evaluation, and the presentation of new and emerging concepts yet to be exposed to the same levels of exploration and scrutiny.

Initial feedback from the online community indicates advantages in areas such as rapid understanding and sharing of a person’s medical history, clinical data analysis, trending and training. We are particularly interested in receiving feedback from this journal’s readership on implications for practice.

**Comparison with existing interface design**

The demonstrator is a graphically rich interface compared with existing clinical interface design, much of which is entirely text based.

**Limitations of the method**

Our small team and very tight timescales meant that some aspects of the demonstrator received more attention than others. Some of the limitations of this approach include:

- We did not illustrate the full end-to-end journey but only a selection of vignettes of key innovations.
- We aggregated and integrated data in a way that has wider implications for software infrastructure.
- We worked with a small, crafted data set.
• We relied heavily on a small number of clinicians and want to engage a wider group for input.
• A full analysis of existing clinical software systems was not performed in this case. Instead, we relied on primary research and input from those who have experience with multiple clinical systems.
• We worked with one specific clinical scenario. It is not clear whether this demonstration would be suitable for other clinical care settings – clinicians may require different data displays for different clinical contexts.³

Call for further research: next steps

We are currently planning the next stage of the demonstrator project and are evaluating potential problems and real-life scenarios to build this upon. Feedback from the clinical community will be invaluable in helping to conceptualise and create new ways of using technology to support safe and efficient care.

Graphical display of clinical information is not a new concept and much existing work is available for investigation.⁴,⁵ Since writing, the MSCUI programme has released new guidance⁶ on the display of graphs and tables which we are now incorporating.

As the demonstrator is designed as a provocation piece and not conceived as an actual clinical system, full usability and evaluation has not taken place. Prior to clinical use additional evaluation would be required using established techniques.⁸–¹¹

Conclusion

As an initial experiment, the MSCUI patient journey demonstrator has successfully attracted interest from the clinical and technical communities. Innovative features such as the ‘patient charts’ have inspired new areas for guidance within the MSCUI programme and are being refined into downloadable, customisable controls for clinical software companies, and anyone else, to incorporate into their software.

We are moving towards presenting the next generation of MSCUI guidance in areas such as medications administration, medication management and clinical noting. We welcome all feedback and input either via our discussion forum¹² or directly to the project mailbox.¹³

ACKNOWLEDGEMENTS

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CONFLICTS OF INTEREST

None.

ADDRESS FOR CORRESPONDENCE

Kirsten Disse
c/o Microsoft Campus
Thames Valley Park
Reading
Berkshire RG6 1WG
UK
Tel: +44 (0)7903 183 949
Email: mscui@microsoft.com
The MSCUI guidance and controls are freely available for all to use from www.mscui.net
The MSCUI Patient Journey Demonstrator is available at: www.mscui.net/PatientJourneyDemonstrator/
Further information about the Microsoft Health Common User Interface can be found at: www.mscui.net