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Mobile Access to eHealth Information Using Entertainment Technology

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Abstract

One goal of the National Health Service (NHS) Care Record Service (NCRS) is to increase secure accessibility to vital patient data. This pilot demonstrated how Java™ 2 Platform MicroEdition (J2ME™) software could be applied to provide secure mobile access to eHealth information. Since J2ME™ became commercially available, it has mainly focused on the entertainment industry. Widespread availability is due to the lucrative games market and it is currently installed in most picture-enabled mobile phones and some personal digital assistants (PDAs). Sun Java™ Studio Mobility 6(2004Q3) authoring software was used with J2ME™ to create multimedia-based care record elements on a PDA, including both text and non-x-ray digital images. The creation of multimedia records was possible but, as J2ME™ is primarily used for entertainment, it was quite cumbersome. The devices necessary for this application are presently limited to mobile phones and mobile players as the main target devices. Once CLDC (Connected, Limited Device Configuration) and NCRS-specific MIDP (Mobile Information Device Profile) standards are adopted by the NHS, secure access to the NCRS will be ensured. By developing J2ME™ applications in healthcare and applying these standards, secure mobile access could play a key role in meeting future challenges in eHealth.

Introduction

Since the National Programme for Information Technology (now known as the NHS Connecting for Health programme) launched the National Care Record Service and entered the software design phase, much discussion has followed concerning the implementation and roll out of clinical functionality and secure user access across England. The aim of the NCRS is to provide uniform access, including wireless, to vital patient information across all care sites in England.^{1,2,3,4}

The authors have previously discussed the aspects of access to and security of the NCRS as well as multimedia-based rollout of an electronic medical record involving Motion Picture Expert Group Standards (MPEG-4 and MPEG-21) and possible implementation using computers with low bandwidth connectivity.^{6,7,8,9}

The purpose of this paper was to look at connectivity for mobile devices enabling access to the care record which would allow

interactivity comparable to that of a desktop computer at a health care site.

Since Java™ 2 Platform Micro Edition (J2ME™) became commercially available in 1999-2000, this operating system (OS) software has mainly focused on the entertainment industry.¹⁰ It is currently installed in nearly all picture-enabled mobile phones and some Personal Digital Assistants (PDAs) and this widespread availability is due to the lucrative games market.

The authors felt that the National Health Service could profit from the use of this J2ME™ software as well, because it would allow a relatively small OS to be deployed on a device (usually up to 500KB) with security based on the Connected, Limited Device Configuration (CLDC) and NCRS-specific Mobile Information Device Profile (MIDP) which is currently being developed.^{11,12,13}

Methods

In this independently-funded eHealth study, J2ME™ software was used to successfully create and deploy multimedia-based care record elements on a PDA device, including both written text and non-x-ray digital images. Sun Java™ Studio Mobility™ (Edition 6 2004Q3) authoring software was used in this application.^{14,15} This was selected because to build J2ME™ from scratch is very time consuming and best left to Java Programming experts. Still, even with the authoring software the development was difficult, because there is no solid support on Windows™. This was also true for PDA software such as Windows Pocket PC™.

In order to create these care record elements, several hurdles had to be overcome. The main hurdle was the fact that the user needed to know how to create Java applications in order to understand if the newly created MIDP application was complete. To be complete, the application would have to contain small application components or classes such as a MIDlet class which requires a functioning pair of execution files (Java Archive Descriptor or JAD files) and attribute files (Java Archive or JAR files).

Secondly, the crucial aspect of the authoring software was the possibility to test the created MIDP and MIDlet classes by using emulators for different small mobile devices on the desktop computer without the necessity of having to test MIDP and MIDlets on a number of different real physical PDA devices and mobile phones.

Results

It was found that, in reality, the Sun Java™ Studio Mobility 6 authoring software provided only a small number of emulator devices which were mostly mobile phone emulators with relatively small screens. There were only two emulators for PDAs or PDA-related devices (i.e. Palm™ operating system based devices and Symbian™ operating system based handhelds personal computers, mobile phones, and PDA related devices, including BlackBerry™ devices).

At the time of this study, there was no development in progress for Windows Pocket PC™ PDA based emulators. There were also no functioning emulators available that were being recognized by the authoring software as

a valid emulator to be added to the emulator database.

A further problem involved the inclusion of video sequences, because although Java-framed applications exist to include video players, they are mostly not updated and do not match to recent player applications.¹⁶ Therefore, quite frankly, at the present time they do not work.

Discussion

The creation of a limited multimedia-based care record was possible in this study but, as J2ME™ is primarily used for entertainment, it was quite cumbersome. The devices necessary for this application are presently limited to mobile phones and mobile players as the main target devices.

More development would be needed in order to improve the authoring software to be fit for use as a routine procedure of every day practice in health care. There are many advantages to making those improvements to the authoring software for application in the NCRS. These advantages are centred around the small size of files required with J2ME™ based applications, which are up to 1000 fold smaller than comparable, non-J2ME™ based applications. The J2ME™ client software on the devices also requires up to approximately 60 to 512KB and, when installed on a PDA would give enough space for even complex elements of the electronic medical record, including additional security software applications (i.e. identity checks) for the remote device user.

However, once the J2ME™ based PDA application is harmonised with the Web-based Common Information Portal Project for the NCRS access in England and suppliers within Care Record Service clusters and access through web-enabled services such as Sun's Web Services™ and Microsoft's .NetTechnology™, a seamless care record access to devices could be easily provided.

Conclusion

Once both the Connected, Limited Device Configuration (CLDC) and NCRS-specific Mobile Information Device Profile (MIDP) are adopted as standards by the NHS, these will guarantee a secure access to the NCRS on a need-to-know basis. It is hoped that recent developments with both Sun Microsystems and

Microsoft being engaged in the NCRS common portal project, that the attention will be focused on applications for small devices to harmonize as well. Portable, wireless communication devices such as PDAs will be extremely useful in many NHS applications such as home health, emergency services, disaster response, and chronic disease management, just to name a few. By developing the use of Java™ 2 Platform Micro Edition in health care and applying the standards that are currently in place, secure wireless mobile access could play a key role in meeting future challenges in eHealth.

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