INTRODUCTION

The announcement of the National Broadband Network (NBN) in April 2009 spurred debate across the telecommunications sector and beyond. While much of the telecommunications debate focuses on the physical rollout and politics of the project, other sectors have been more concerned about the applications that will be able to be deployed using the new network. What are we going to use the network for and what are the implications for different sectors of the economy? The growing body of evidence suggests that there is a huge potential impact across most sectors of the economy. Health is one of the most important.

Even before broadband and the NBN, the health sector was a vast generator and hungry user of information and communication. It produces massive amounts of complex, personally sensitive data, requiring a high degree of accuracy, and needing to be exchanged by many individuals and organisations, stored for long periods and often transferred over time to new or upgraded information systems. Errors in collecting, storing, retrieving, analysing and communicating can have very serious, perhaps fatal, consequences – an appointment missed, a diagnosis misinterpreted, a treatment not delivered in time, the wrong drug or dose or combination of drugs administered.

A COMPLEX HEALTH SYSTEM

As the contributed papers to this issue on eHealth demonstrate, the health sector is enormously complex. Care is delivered through an intertwined ecosystem of general practitioners, specialists and allied health professionals. The business models range from small and medium enterprises in general practice and private clinics to the large enterprises that run public and private hospitals. Stakeholders include the Federal, State and Local Governments responsible for the delivery of health and health-related services, insurers, practitioners and allied health services, research institutions, universities, patients and their families, friends and carers. Broadband technologies and services can improve communications through inter- and intra- organisational entities, but bringing the entire health sector into a seamless system is fraught with technical, organisational, financial and legal issues.

Many of the drivers for a seamless, technology-enabled health care system, however, are clear. While Australia currently enjoys one of the best health care systems in the world, the strains on the system have become very obvious. Ask anyone who has dealt with multiple points of the healthcare system, and many will complain about providing the same information several times, carrying medical images between clinics or worse,
miscommunication between different points in the system. Step forward into the future, and it is clear that the looming aged care crisis, resulting from the retirement of the baby boomer generation, will impose further stresses. For example, the number of people over the age of 65 is expected to double in the next 45 years. Chronic disease burdens are also heavily affecting the system. One in three Australians experiences chronic diseases such as coronary heart disease, stroke, diabetes, arthritis, osteoporosis or asthma. These and many other issues are creating increasing strains on the health system, and placing growing pressure on the public purse. According to the Australian Institute of Health and Welfare (2010), health expenditure in Australia has increased from $10.8 billion in 1981–82 to $112.8 billion in 2008–09. As a proportion of GDP, this equates to a rise from 6.3% in 1981–82 to 9.0% in 2008–09, and this is only expected to rise into the future.

These pressures have prompted a number of health reforms, including those relating to ICT. The introduction of health identifiers as a first step towards a Personal Controlled Electronic Health Record, and Medicare rebates for medical consultations via video-conferencing, are tangible evidence that the medical sector is embracing technologies and is moving towards a digitally-enabled future. Combined with the rollout of the NBN, and the research, development and deployment of broadband applications, we are starting to see the full potential for change in the sector, as well as the many challenges that may be faced along the way.

This edition of the Telecommunications Journal of Australia focuses on the health sector, drawing out some of the opportunities and challenges presented by the introduction and application of ICT. It explores particular applications, research into user attitudes and impacts of an ICT-enabled health sector and the rise of information-based expertise.

**BROADBAND APPLICATIONS FOR HEALTH AND WELL BEING**

High-speed broadband is expected to enable a range of new and innovative health-related applications. Technologies existing today, however, can already significantly affect health outcomes for Australian consumers. Articles in this edition explore applications and technologies that are being researched and are in use today.

The papers by Cyarto, Kuys, Henwood & Blackberry and by Smith explore the benefits of adapting widely available active gaming technologies to promote health and wellbeing, reduce falls and assist with rehabilitation. Cyarto et al focus on the use of the Nintendo Wii™ gaming platform by older people, noting the potential for enjoyment but also the need for meaningful health outcomes to be captured. Smith’s article focuses on the use of the game Dance Dance Revolution to reduce fall risk in older adults. Both articles demonstrate how the higher bandwidth that the NBN will make universally accessible will significantly increase the quality of the interactive gaming activities available to improve the health and aid rehabilitation of ageing citizens.

Greenstock & Wickham explore how people with little or no speech communicate with GPs, and the potential for high-speed broadband to help. They discuss equity and access amongst minority groups in the Australian community, an important issue that needs greater consideration in the rollout of the NBN, and well as in the development of new applications.

The use of tele-medicine in treating acute stroke is reported by Nagao & Yan. The article notes the disparities in health services between regional and metropolitan areas in Australia, and the potential use of teleconferencing to overcome the tyranny of distance and provide equitable services in stroke treatment. The research team have successfully deployed a mobile ‘Telestroke’ project in regional Australia that connects to a major metropolitan hospital. The progress of the study is reported here, including the positive impacts on health outcomes. However financial, legal and technological barriers that impede the widespread utilisation of video-conferencing in medicine are discussed, raising important policy and implementation issues. These issues are also picked up in the articles by Paterson & Jones and Heath.
The article contributed by Szucs also addresses the use of video consultations in the health care system, based on the recent announcement of the availability of Medicare rebates for specialist video consultations. Szucs explores barriers to adoption and integration of broadband enabled video conferencing into the clinical and business workflows of GPs – a point that must not be forgotten if the full potential offered by high speed broadband is to be realised. General Practice is a highly computerised part of the health system and the place where most Australians receive health care. This positions it well to lead the adoption of telehealth. On the other hand, because this ‘island of computerisation’ is essentially a collection of thousands of independent small businesses, the adoption of new systems is especially challenging.

USER ATTITUDES AND IMPACTS OF AN ICT-ENABLED HEALTH SYSTEM

As discussed in the paper by Szucs, the user attitudes and impacts of ICT enabled health care are important as perceived or real barriers to adoption of eHealth. Patients need to understand eHealth systems if ICT is to be successfully adopted. This is particularly true from a legal perspective. The article by Paterson and Jones summarises legal issues arising from the use of ICT in the health sector, focusing especially on collaborative healthcare plans involving more than one practitioner, and the implementation of electronic health records. The author discusses privacy and security and the way negligence claims may arise and be dealt with.

The article by Wilson, Ambrose & Braithwaite provides insights into perceptions of video and other tele-health technologies amongst health professionals and patients. The authors report a relatively low understanding of the benefits, particularly for video conferencing, and discuss issues associated with this including the lack of awareness of the full potential of ICT in the health sector. The article raises the need for greater attention to be focused on implementation strategies if uptakes of technologies are to be high.

Tucker & Lodders discuss the importance of interdisciplinary research as a means to bridge the gaps between the appropriate configuration of network technologies, the development of e-health applications, the clinical deployment of new treatments, and methods for driving user uptake. The article focuses on case studies of multi-disciplinary work underway at the Institute for a Broadband-Enabled Society at the University of Melbourne, including stroke rehabilitation, mental health, and education and training in the health sector.

THE ROLE OF INFORMATION

Many of the articles discuss, and in some cases demonstrate, how the use of broadband-enabled technologies in the health sector changes the way health information is handled. The move away from paper-based information storage to a connected and seamless health system has the potential to transform healthcare outcomes by providing easier access to information and reducing repetition while enabling better monitoring of patients’ health. Martin-Sanchez & Gray argue that the discipline of health and biomedical informatics has a substantial role to play in ensuring that strategy, technology, accountability and usability are properly integrated in the design, implementation and evaluation of broadband enabled healthcare.

A more connected healthcare system can also mean that the consequences of error or inappropriate disclosure are magnified. Heath compares aspects of the 2010 Healthcare Identifiers Act to the Australian Law Reform Commission (ALRC) Unified Privacy Principles, warning that there are broader societal impacts from the use of identifiers that are not always immediately apparent. The use of patient health information by secondary entities such as data brokers, medical research and healthcare administrators has real implications for patients. More research into consumer expectations is needed to provide inputs to upcoming Government initiatives in eHealth and privacy.
Bennett discusses the experience of BT in the rollout of eHealth technologies in the UK and Hungary, calling for greater interoperability between different parts of the health system and a standard set of interfaces. The author notes the lack of companies with relevant experience in this area, and the need for a greater understanding of the interrelationships between standards. Although the interaction between patient and clinician and the needs of operational managers are very similar in any country and setting, technical solutions always require contextualisation to the country’s legal, financial, economic, demographic, geographic, technological and cultural landscape. There is no ‘one size fits all’ solution, but experience and lessons learnt are always reusable, especially in the areas of reliability, security, confidentiality and safety of information.

This same theme is drawn out by Hillard, who discusses the complexity of combinations of processes involved in the delivery of health care. He argues that the health sector can learn from other complex industries that have tried to integrate information across activities and processes. The result of the information revolution is a new paradigm: the “information-driven enterprise”, as opposed to the process-driven organisation.

CONCLUSION

The twelve papers in this issue of TJA have identify many of the opportunities and challenges faced by a broadband-enabled, connected healthcare system.

The potential offered through applications like interactive gaming and video conferencing point to the need for faster, ubiquitous broadband, particularly in regional areas. Not all applications, however, need to be high bandwidth. Many valuable low bandwidth applications can be made available and used today. Given the timeframe for the completion of the NBN, their maintenance and development will remain an important priority.

Several contributing authors have raised issues relating to uptake of technologies in the health sector. The patient has to be central to any technology implementation. To be successful patients have to see tangible improvements in health outcomes, whether that comes from simpler interactions with the health system, a better understanding of their health issues or better health outcomes. At the same time, patients need to be aware of the implications of an ICT-enabled health sector, and especially the electronic health record, for their own privacy.

Health practitioners must also see tangible benefits from the deployment of technologies in their workplaces. Incentives to drive uptake and force change in the health care sector must be carefully considered if the full potential of an ICT-enabled health sector is to be realised. Digital literacy amongst health professionals, including gaining an understanding of the possibilities offered by technologies, must also be key to transforming the health system.

The articles presented in this issue demonstrate that there is a lot of work to do to achieve an ICT-enabled health sector, but also an enormous opportunity for innovation.

REFERENCES
