Chairman's Note

The Medical Technologies Centre of Research Excellence (MedTech CoRE) funded by the Tertiary Education Commission is now underway (see CMDT Quarterly Issue No 2). The CMDT partners initiated the MedTech CoRE to fund translational research in medical technologies. The research themes of the CoRE are (i) Diagnostics and Therapeutics, (ii) Interventional Technologies, (iii) Assistive Technologies, (iv) Telehealth and Health Informatics and (v) Tissue Engineering for Regenerative Medicine). These align seamlessly with the CMDT's focus to optimise commercial opportunities. The underpinning Technology Platforms and Flagship Projects supported by the CoRE can be found on our website - www.cmdt.org.nz

The CoRE awards funding for up to 12 Seed Projects per year ($50k each for 12 month projects). These are required to be collaborative projects involving at least two CoRE/CMDT partner institutions – a requirement intended to encourage the development of a medtech research network in New Zealand. Industry partners with concepts they would like to progress are encouraged to contact the CoRE to discuss partnering opportunities. The second round of Seed Project funding is at completion stage, and the next call for proposals will be in August-September. Business experts from the CMDT tech-transfer offices are providing a valuable role in helping assess these projects, working alongside the MedTech CoRE science leads, management team and Advisory Board.

Our new combined MedTech CoRE and CMDT website (www.cmdt.org.nz or www.medtech.org.nz) was launched recently, led by Dee Nolan from Callaghan Innovation working with our developer team from WORKZ4U. The website provides information about the NZ medtech scene including key people, projects and specialised equipment. Also check it out for the latest in news and events.

The NZ MedTech industry continues to make good gains in 2015. In January, Matakina Technology signed a distribution deal for its Volpara Solutions innovative breast imaging software with GE Healthcare. Another large licensing deal occurred in March between Footfalls and Heartbeats with Medi (Germany), positioning the Kiwi start up as an important new player in the smart textiles market. Also in March, IMeasureU started trialling the mobile monitoring solution for preventing running injuries they developed with RunKeeper at Westpoint Military Academy. IMeasureU and RunKeeper are launching a Kickstarter campaign shortly to raise funds for the next stage of this platform development. Finally, Stretch Sense was offered a three month placement at Plug and Play, a tech incubator in Silicon Valley.

The CMDT network would like to welcome our new industry affiliates Pictor, IMeasureU, Stretch Sense and Adept Medical and NZ Health IT. The CMDT and NZ Health IT have formed a strong working partnership in the last 6 months. The relationship with NZ Health IT is important going forward with the growing convergence of device and IT in new medical technologies. This is a space that is rapidly growing in NZ.

We would like to introduce two new faces to the community, Natalie Solomona and Lynda Mockett. Natalie is our new operations manager for the MedTech CoRE while Lynda has joined Callaghan Innovation as a project manager and will be working on several projects for the CMDT. One of these is the CMDT networking event series over the year. The first event was held in Auckland and Christchurch in conjunction with an FDA expert visiting NZ in March.

We thank Victoria University of Wellington for taking the lead on this and the last issue of our newsletter. The focus on design reminds us that to be adopted and utilised technologies need to be user-friendly.

We hope that you enjoy this issue and as always, all enquiries are welcomed. Please keep these coming through the website contact page.

Peter Hunter and Di Siew
Healthcare Meets Design at DHW Lab

A new lab at Auckland City Hospital is working to design better healthcare experiences for patients, their families, and hospital staff. The Design for Health and Wellbeing (DHW) Lab is a dynamic research collaboration between Auckland District Health Board (ADHB) and Auckland University of Technology (AUT), bringing together students and graduates, design industry collaborators, and medical professionals.

The goal of the DHW Lab is to help improve the healthcare experiences of hospital users, including those at Auckland City Hospital and Starship Hospital. The lab would achieve this by establishing and developing a community of interdisciplinary design-led research projects to provide solutions to real healthcare issues. From an academic perspective, the lab also creates an opportunity for translational research at a custom research facility.

A suitable space – described by DHW Lab staff as lively and experimental – was identified at Auckland City Hospital in early 2014. The lab was set up in such a way that its users could adapt it to their needs. This flexibility also meant that the lab could be easily moved and was not dependant on a specific location. A strong online presence encouraged interest in the lab, with staff and students posting updates on live projects and concepts for future work.

Dr Stephen Raey, senior lecturer of Industrial Design and Innovation at AUT and co-founder of the lab, says the DHW Lab is a valuable real-world learning experience for AUT students.

“The opportunity to work in New Zealand’s largest public hospital provides an authentic experience for our students that isn’t easily achieved in an academic setting. The students who have been part of the DHW Lab to date have really embraced this opportunity. I am incredibly proud of their work as it will improve the experiences for all users of healthcare.”

Projects currently underway at the DHW Lab include the redesign of bespoke apparatus used for cancer treatment, an analysis of patient privacy and a fresh look at hospital uniforms.

Case Study

Surgical Instrument Sterilisation Tray Redesign by Charlotte Dickson, Final Year Undergraduate Product Design Major Project

Charlotte’s project looks at possible ways to reduce the risk of contamination in surgical instruments, a dangerous and often wasteful occurrence in the hospital. An average of one surgical procedure a month is delayed, or even cancelled, due to contamination at Auckland City Hospital. Approximately 55,000 surgical procedures take place per annum at the hospital, and while the number of delayed or cancelled procedures is small, Charlotte’s sterilisation tray redesign is an example of ongoing attempts for a zero failure rate. A number of lean interventions have been introduced to the central sterilisation area to improve the process, and her project supplements these. The current tray design has sharp edges that often tear the cloth protecting instruments from contamination. Charlotte’s more streamlined design is made from a single sheet of metal which eliminates weld points.
Challenging global trends and exciting developments in technology are reshaping the way we design medical devices. A move towards home healthcare – hastened by an ageing population, increasingly crowded hospitals, and more affordable and accurate sensor technologies – will allow clinicians to care for patients remotely and patients to monitor and care for themselves, saving time, money, and even lives. These exciting developments come with big design challenges.

Technology for sensing the human body is rapidly progressing. We can measure heart rate, breathing rate, skin conductivity, brainwaves, neuronal activity, chemical composition of body fluids, muscle activity, weight, body-fat percentages and many other physiological aspects of ourselves. The “quantified self” movement, whereby all of this data is tracked using smart devices and shared online, is a key indicator of the ubiquity of this technology. This technology also has implications for home-based healthcare.

Home-based healthcare can give patients independence as well as an increased responsibility for their own treatments. When patients are away from medical practitioners, they need devices that provide clear, relevant health information so that they can maintain their own care and treatment. One of the biggest challenges in home healthcare is how to engage people who have chronic conditions with their therapies. ‘Gamifying’ healthcare, using interactive design principles, is one approach with great potential for giving people the appropriate data to make informed decisions about their health.

One group that is exploring these possibilities is the Smart Interactions Design group (SID), which takes a human-centered approach to the design of medical devices. Currently in its second year, with six PhD students and eleven Masters students, SID is fully engaged in the Medical Technologies territory, and is rapidly growing, bringing together industrial designers, media designers, clinicians, engineers, psychologists and sociologists.

SID excels in the area of physical rehabilitation and prehabilitation, as shown by their first spin-off company, Swibo. Led by Benjamin Dunn, Swibo is a graduate start-up that is studying the use of games for rehabilitation in high-performance athletes. Physiotherapists have reported that adherence to rehabilitation exercises are a key cause of lacklustre rehabilitation progress. In response, Swibo have designed a customised balance board, the Swibo “Switchboard”, that controls a suite of digital games to make rehabilitation and pre-habilitation exercises fun and engaging.

The Switchboard has a robust metrics and analytics system that, as well as allowing athletes to track their progress, allows trainers and physiotherapists to remotely monitor the progress of athletes. The system incorporates social competition via online leaderboards, further encouraging participation in the games.

Swibo are currently piloting their product with a number of high-profile Wellington sports teams, and look to expand nationally by the end of the year. Swibo were featured in Idealog in November 2014: http://idealag.co.nz/tech/2014/11/balance-board-or-spaceship.

SID also works in the area of mental health. Empathear, a recent postgraduate project designed by Sarah Mokhtar, gained much media attention. Empathear aims to help the friends and family of people who hear voices in their heads, such as through schizophrenia, to understand what the experience is like. The wearable device includes a scarf or jewellery-like necklace with embedded electronics and earphones that present voices as similar as possible to those that a voice-hearer experiences. The device reacts to environmental noise and the wearer’s stress levels, adjusting the voices accordingly. The wearer is able to stop its use if the voices become too distressing, therefore eliciting empathetic concern without personal discomfort. The device allows for physical interaction through a gesture-based feedback system: the wearer can answer questions about their level of empathy by gesturing with the scarf.

SID is currently perfecting their “smart splints” project. The smart splints system 3D-scans a person’s injured limb, then processes the scan to produce an individualised splint. A game controller is also produced, based on clinicians’ input. The splint and the game controller are 3D-printed with embedded sensors, allowing the patient to follow their rehabilitation through playing exer-games, which supports engagement with their therapy.
Fast-tracking Innovation in Health Technology

Health technology development in New Zealand faces some big obstacles, including the expense and length of time it often takes to identify clinical expertise and recruit patients for studies. This makes it difficult for industry and researchers to gain access to end-user groups and trial populations for fast early-stage validation studies of technologies.

Callaghan Innovation’s MedTech Cluster is proposing to develop four Standing Trial Populations (STP) where clinical access has been identified, patients recruited and generic ethics approval gained for multiple trials of defined technologies over a fixed period. This pilot will help determine whether innovation in health technology can be fast-tracked. Firms and researchers will be able to access the service for a fee. If successful, the programme will be marketed internationally to develop New Zealand as a trial bed for specific new areas in health technology.

The four proposed STPs are in the following areas:

- Elderly and community care
- Rehabilitation and assistive devices focused on neurophysiological injuries (stroke, spinal cord injuries and traumatic brain injuries)
- Rural and remote community care
- Healthtech Design Labs for firms to design, develop and assess new medtech technologies in their working environments (hospital, urban and home).

Callaghan Innovation plans to roll out the first STP, elderly and community care, at the end of June 2015, and is in discussions with a potential partner.

The STP populations all offer different value propositions to innovation, and are in areas where 85% of New Zealand firms and researchers are active in technology development.

The STP concept is supported by Medical Technology Association NZ, NZ HealthIT and the Consortium of Medical Device Technologies.

Designing for best practice

Every institution in the medical world is battling with the ravages of superbugs. In an attempt to stop their spread the medical community are enforcing procedures that aim to alter the behavior of doctors and nurses. However, when under pressure we flawed humans will make mistakes regardless of training. With superbugs, just one mistake is enough.

What if instead of drilling behavior change into medical staff – a costly and time consuming venture – we designed our delivery of treatment in such an intuitive way that cross contamination became a very difficult thing to do?

This user-centered angle is exactly where Christchurch based sisters Julia Rouch and Karen Lake have focused their attention. Their ‘wound care management system’ comprised of a rack and dressing tray are supported by software that has been designed to guide even those with zero medical understanding through an uncompromised wound care process.

Designed and tested at workSpace, Otago Polytechnic’s commercialisation and design studio, this product has the potential to reduce infection and reinfection of wounds, improve health and healing times, reduce the opportunity for cross infection, and through its intuitive design they can guarantee that the kit will remain fully equipped for use.

Strategic director of workSpace, Eva Gluyas said “We are seeing a shift from primary research driven initiatives to commercially focused innovations driven by end user eeds”. It is certain that we’ll need more of this kind of development from experts within our medical institutions if we’re to truly tackle the problems that face the world’s medical sector.
Do you have a story for our Newsletter?

If you would like to contribute to the quarterly CMDT Newsletter or have a story you would like to share, please email the details to: Lynda.mockett@callaghainnovation.govt.nz