A Note from the Co-Chairs

MedTech “out and about” is the theme of our foreword this quarter to highlight the many exciting events that have just flown by and also those coming soon.

NZ medtech businesses have been playing on the world stage, flying the Kiwi flag. Two recent highlights are: ARANZ Medical winning the Private Sector Excellence Award at the October World Information Technology and Services Alliance (WITSA) Global ICT Excellence Awards 2016 for its Silhouette wound management platform (Press Release by ARANZ Medical, Scoop NZ, 5 Oct 2016) and new-comer oDocs with its affordable mobile eye examination technology using smartphones being recognised at the August Talent Unleashed Awards as the best start-up with a social impact (Steve Wozniak, Sir Richard Branson award NZ’s oDocs for mission to prevent blindness by Tao Lin, Stuff NZ, Aug 29 2016).

Worth noting is that the Precision Driven Health Research Partnership between MBIE, Orion Health, Waiemata DHB and Auckland University announced in March was launched recently and is now up and running. There was a call for proposals from the research community in May in partnership with HRC. No doubt there will be more interesting things happening in this space in the months and years to come.

CMDT held its first major TIKI (Technology Innovation and Knowledge Interchange) Tour at the North Shore Hospital in partnership with Waitakitana DHB, ATEED and NZHIT. This is an innovation showcase to help our clinicians and health providers connect to NZ medtech innovations. Our goal to facilitate a conversation between clinicians/health providers, industry and researchers was definitely achieved from the buzz at the showcase and the follow-ups from the day. Watch out for the next event. Priority was given to CMDT industry affiliates due to space constraints.

As heads up, we are working with MBIE and Callaghan Innovation to progress two international partnerships – one with Texas Medical Centre, Houston and the other with the Japan the Association of Agency for Medical Research and Development. The Japanese initiative is focused on medical robotics and healthcare technologies for the elderly in the first instance. Please do get in touch if you are interested - there are plans to take delegations to Houston and Japan next year.

Finally, watch out also for the MedTech CoRE's first public outreach at Auckland’s Silo Park which will run from 27th Oct to 7th Nov. This is an exciting interactive exhibition of the CoRE’s research areas and is open to the public for a gold coin donation to charity. Check the CMDT website for booking details closer to the date. Alongside the exhibition will be four evenings of Café Scientifique type MedTalks at GridAkl from 31 Oct to 4 Nov. We have a wonderful lineup of international and local speakers on topics covering technology innovation, data analytics and healthcare, robotics in healthcare and women’s health.

Peter Hunter and Diana Siew
TIKI Tour to Waitemata DHB

The TIKI Tour showcase at Waitemata DHB was attended by eight NZ start up and emerging companies and three research projects from MedTech CoRE, highlighting the latest NZ research and innovations to the DHB staff. The theme was technologies in community health care and hospital care.

The event was attended by over 40 Waitemata DHB staff and provided a platform for discussions between industry, researchers and health providers. The feedback received was very positive, both from the DHBs and companies.

“It raised issues that clinicians have in getting new technology implemented and feedback to our system always helps us refine our product.” Susan Binks, SHI Global

The TIKI Tours will be stopping at other interested DHBs throughout NZ. Companies that match the areas of interest of the host DHBs will be invited to attend.

Virtual Medical Coaching: Training in VR

A group of friends, barbeque and beer is the perfect recipe for kiwi ingenuity. Add a radiographer and virtual reality experts, and you get Virtual Medical Coaching. James Hayes (Founder and CEO) had been looking to solve the problem of keeping up to date with the simulation machinery for teaching medical imaging when he was introduced to the virtual reality experience. For its innovative medical teaching platform, Virtual Medical Coaching won Audience Choice Award at the 2016 Healthtech Innovation & Investment Workshop. The audience were also given a chance to experience their very realistic and immersive demonstration, complete with the hand-held controllers.

The teaching institutions in medical imaging are often unable to keep up with the pace of equipment upgrades in clinics causing a significant training gap for students. The first time the students get exposed to the clinical equipment models is during clinical rotations. James explains that in a clinical environment, students can't afford to make mistakes. “Technical aspects of the job should have been learnt before they get to the department... clinic is for learning softer skills like conversation with patients, looking at pathologies, etc.”

James, together with development partners, Coveto and CerebralFix, developed the virtual reality (VR) prototype of a medical imaging laboratory simulation environment that can be used with readily available VR equipment. With some of the best artists and designers from Marvel, Pixar and Disney involved in the prototype, it was an excellent 3D replica of the simulation environment. The concept was very well received by a number of universities, clinical organisations and equipment manufacturers.

Virtual Medical Coaching aims to revisit the concept of medical teaching by developing a learning management programme as part of their product. The simulations will be designed to train students on current imaging equipment in clinics with much more freedom to explore than in reality. It provides an interactive learning experience in a radiation- and consequence-free environment where mistakes actually promote learning.

The software content can be easily customised for any equipment, application or language. James comments, “we can do anything. It’s a lovely situation to be in and we have some of the best VR artists and designers. It has been a roller coaster of fun!”
Veriphi: An innovative approach to preventing medication errors

Veriphi, a medical device company offering a unique solution to prevent intravenous (IV) medication error, was awarded the best Start-Up Opportunity at the 2016 Healthtech Week Innovation & Investment Workshop. The company is completing the development of an analyser that passes a laser beam through the IV drug to recognise the unique optical signature for each drug at a specific concentration.

The Health Quality Commission NZ estimates that preventable medication errors cost up to $158 million annually, over half of which are IV related. In the USA, medication errors are estimated to claim as many as 7000 lives per year and cost between $3.5 billion to US$5.6 billion. Veriphi’s technology is designed to verify the contents and concentration of the IV bag, IV line or syringe in the pharmacy or before administration and alert clinicians of any errors. Greg Shanahan, Managing Director/Founder adds, “The safest way to ensure the patient is getting the drug is to verify the drug itself, as opposed to the barcode label.”

The technology achieved 100% success across 40 blind trials of 10 drugs, in multiple containers at various temperatures earlier this year. Veriphi is currently working on a prototype for pharmacy trials at Auckland City Hospital before the end of 2016. One of the benefits of the system is that it is designed to work seamlessly with pharmacy compounding or administration of IV fluids to avoid potential errors, and as a result, reduce hospital costs and enhance patient outcomes.

Veriphi recently completed a successful crowdfunding campaign, raising over $700,000. Greg describes the experience of the crowd funding campaign as really exciting and rewarding. The social media activity during the campaign was a great opportunity to raise not only money, but Veriphi’s profile. Social media during the capital raising promoted connections and interests from hospital professionals not only in New Zealand but also internationally. Veriphi’s team reached out to clinician databases to increase awareness of their technology. In addition to the 170 people now investing in the company, many more clinicians, pharmaceutical professionals and anaesthetists are actively following Veriphi’s progress.

This experience has helped Veriphi communicate with their global market as they move towards commercialisation.

The capital raised from the crowd funding will be used to complete development of their current prototype and conduct validation trials at the Auckland City Hospital.

Surgical Gels from Natural Products

The polymer group at Otago University, led by Stephen Moratti and Lyall Hanton, is one step closer to commercializing their chitosan-based gel for surgical applications. Their gel has been shown to be efficacious in a wide range of surgical procedures, including ear-nose and throat (ENT), spinal surgery, brain surgery, abdominal surgery and ear surgery. Its main role is to suppress adhesion and scar tissue formation, but also positive effects on bleeding and infection. It is derived from two natural polymers, chitosan from crab and shrimp shells, and dextran. It appears to work by suppressing fibroblast proliferation on the surface of the wound, and by providing a protective layer from the environment.

The polymer gel is very well tolerated and is quickly absorbed by the body. It has been tested on over 300 patients in ENT operations with excellent results. The incidence of post-operative adhesions drops from almost 25-30% to less than 5%, and the resulting sinus cavities are much bigger and healthier. While only animal tests have been done for other procedures, it is hoped some preliminary human trials might start next year.

A company, Chitogel, has been recently set up, with shareholding by the University of Otago, private investors and the inventors. It has started production of the gel at a specially built facility at the Gracefield science centre in Lower Hutt. Initial distribution will be in the US, and a US company has been contracted for the packaging. The regulatory process is well underway, with a 510K submission to the FDA which is expected to be approved by the end of the year. The project has been very well supported by both MBIE and the Universities of Otago and Adelaide.
actigaze™ : Click better with your eyes

The University of Auckland spin off actigaze™ won the 2016 Healthtech Award for Best Translational Research Opportunity at the Medtech CoRE Day in June. actigaze™ uses existing commercial eye trackers to enable users to browse and click the computer screen with their eyes. The technology analyses webpages to offer new interaction possibilities based on eyes alone. The co-founders, Dr. Gerald Weber and Dr. Christof Lutteroth, developed actigaze™ over 8 years of research to understand the principles of gaze tracking and then created a solution that is fast and can be easily implemented.

Their proof of concept using Wikipedia browsing was recently exhibited at MOTAT Auckland and was received with a lot of enthusiasm from the public. The technology creates a new interaction paradigm for users and their devices, with tremendous scope for applications in healthcare and other areas.

In healthcare, it can enable device communication for professionals in situations where use of hands may not be feasible. An important application area is for individuals who suffer from agility impairments that restrict their ability to use touchscreens or mouse.

The key offering of actigaze™ is the ability to unambiguously differentiate between various possible clickable objects. “Gaze is not always precise,” explains Gerald. “There are medical conditions that make it difficult, and you don’t know always exactly know where a user looks.” To solve these limitations, the software establishes a colour coding of the clickable objects in the vicinity of the estimated gaze and allows the user to select their choice. This greatly enhances the accuracy of the gaze input.

The actigaze™ team is looking for Venture Capital funding, and partnerships in multiple sectors to incorporate their gaze tracking into products for consumers to use. Gerald is confident that most of the devices in the future will be both touch and gaze enabled. Meanwhile, keep an eye out for actigaze™ demonstrations at science and technology exhibitions around NZ!

Mind Control

A drone rises from the ground, hovers then sinks slowly to the ground controlled only by the brain waves of a person sitting on a nearby bench. The stuff of science fiction? Not any more, as a result of Brain Computer Interface technology being developed by Associate Professor Zhiyi Huang and a team of fellow Computer Science and Psychology researchers. The researchers have a number of outcomes “in mind”.

“We have external funding from a few Chinese companies who initially wanted video game controllers using EEG [electroencephalographic] technology, reading brainwaves and translating those into commands then sent to the game via Bluetooth,” Huang explains. “But this work has a number of medical applications also – for people who have limited mobility or those suffering from mood disorders.”

While standard diagnostic EEG readers extend over the whole head and read 32 channels, the Otago researchers (together with the Chinese companies) have developed a narrow band that fits around the forehead and reads only one channel. The headband records the EEG readings with a built-in amplifier that sends the signals to a small computer via Bluetooth technology, which then processes the brainwave patterns and translates them into instructions sent via WiFi to the drone or video game.

Huang says the Brain Computer Interface can also be used to control a mouse, allowing people with limited hand or arm movement to use their computers more easily. “In the near future we will also be looking at the technology’s potential to identify mounting levels of anxiety or depression in people with mood disorders and to activate remedial outputs.”
UltraD3: Ultrasonic diagnostic devices for dentistry

Funding from MBIE Targeted Research is being used by the UltraD3 team, headed by Prof Warwick Duncan of Otago University's Sir John Walsh Research Institute and Paul Harris, Principal Research Scientist for sensing and automation at Callaghan Innovation, to develop instrumentation for the early diagnosis of gum diseases using ultrasound. The combined teams bring together leading expertise in dental research, 2D array ultrasonic transducer technology, electronics and materials science. Currently gum diseases can only be diagnosed once considerable destruction has already occurred. The UltraD3 approach will build on pioneering work for diagnosis of breast cancer, where disease is detected by measuring changes in tissue elasticity using ultrasound. High frequency ultrasound provides a fast and accurate method for detecting subtle changes in the gum at early stages of disease. Early diagnosis will reduce patient discomfort and avoid the expensive surgery associated with gum disease that goes undiagnosed for too long. Two innovative prototype devices have been designed and built by Callaghan Innovation, utilising simulated jaws and soft tissue designed and built by the Otago University team.

At Otago University, phantom jaw modes were designed for prototype device testing, integrating biological structures (animal jaw and teeth) with biomaterials (impression material with acoustic properties matched to human mucosa and gingiva – gum tissue). Otago University have also pioneered a new animal model for validating the prototype devices. Testing in an animal model is an essential step to demonstrate efficacy and equivalence of the novel ultrasound device with current examination techniques, as well as safety, prior to testing in human subjects and ultimately proceeding to market. The current animal model for gum disease around teeth and dental implants is the dog model, which is ethically difficult and not available in New Zealand. We have developed a new model in sheep which appears as valid as the dog model without some of the ethical issues. This is a world first; the characterised model will be published in a peer-reviewed international journal in 2017 and is a critical step towards validating the ultrasound detection device. Future work will involve the validation of the prototype ultrasound devices using the animal model, before the team move onto pilot studies in patients.

Institute of Healthy Ageing: Standing Trial Population Centre

The standing trial population centre at Institute of Healthy Ageing has been set up to streamline early phase validation studies for innovative technologies targeting older population for hospital to home care continuum. The centre aims to:

♦ Provide easy access to end-user groups and trial populations
♦ Provide access to clinical champions and health professionals for evaluation of technologies
♦ Provide real world testing and validation with recommendations for enhancement, development and commercialisation; and
♦ Accelerate the development and commercialisation of new and existing medical technologies or digital health solutions.

To access the centre for your technology, for more information, please email standingtrials@waikatodhb.health.nz

For information on other Standing trial population centres, visit www.standingtrialpopulations.nz
Upcoming Events

MedTech Outreach Project @Silo6

MedTech CoRE and the TestPod are collaborating to celebrate innovators in medical technologies and inspire young New Zealanders. The ten day event feature interactive exhibits, MedTalks and networking opportunities from Friday, 28 October to Sunday, 06 November, 2016.

The exhibitions will be open from 10:00 AM to 5:00 PM at Silo Park, Auckland Waterfront with a range of exciting hands on activities for everyone! The evening talks will be hosted at GRID-AKL.

For more information, like their Facebook page, and stay updated here.

Look out for the D4 Conference

Diagnostic|Drug|Device|Discovery

Meet up with a key theme on medical care and point-of-care technology solutions in Otago on 23-24 November, 2016. For more information, visit www.otago.ac.nz/d4

MedTech in Christchurch

The Centre for Bioengineering at the University of Otago, Christchurch is hosting “MedTech in Christchurch - 2016” on Wednesday, 7th December 2016. It will be an open Bioengineering workshop held at the Christchurch School of Medicine.

To register, please email: peter.hilton@otago.ac.nz with name and organisation.

Just for fun...

Let us know what you think...

For any feedback or story you would like to contribute to our quarterly CMDT newsletter, please email: Jyoti.Chugh@callaghaninnovation@govt.nz

We would love to hear from you!

Don’t forget to keep an eye out on what’s happening at cmdt.org.nz or follow us on twitter at @medtechnz