Deos: delivering faster and better mobile medical screening

The turnaround time of 14 days for women to receive breast cancer screening results has not changed since the day the national breast screening service opened in 1988.

Mobile medical screening involves the collection of digital images and their physical transportation to a centre where they can be processed and viewed.

Taunton-based Deos Consultancy and its partner WH Bence Coachworks, of Bristol, have developed a new mobile screening service based on digital communication that could speed up mobile screening for breast cancer and other diseases.

Viv Barrett, director of Deos, said, “We can get images back to the hospital in three minutes. It massively improves the turnaround of clinical information. It also improves the security of the information as it reduces the number of people processing it.

“It speeds up the results and frees up time for staff to do more screening. Patients can get their results quicker. If it is bad news, they get their treatment quicker.

“It also reduces that period of anxiety between a test and a result. You could have somebody sitting at the end of the line reporting the results live before the patient has left the van.”

Viv, a radiographer, used to run Nuffield Health’s nationwide mobile breast screening programme. In 2015 she set up Deos to work with WH Bence, a builder of specialist vehicles for health and emergency services, on developing mobile communications for breast screening services.

WH Bence Coachworks provides the trailer and added satellite technology so that results can be sent digitally to the receiving hospital.

Deos was initially based at the European Space Agency’s Business Incubation Centre in Harwell, Oxfordshire, where it worked with the Satellite Applications Catapult on its satellite-based connectivity.

Four NHS customers have been using mobile communication systems developed by Deos and WH Bence for more than five years.

Deos and WH Bence have now, with the support of an Innovate UK grant, developed a safe, secure and reliable mobile screening service that sends images back to the hospital and can integrate with hospital communication and patient systems. It is based on cheap 3G and 4G technology, and satellite communications where necessary, and can be applied to any screening service.

Viv added, “It was obvious Innovate UK wanted us to be successful. They

helped us to keep fully focused, on target and on budget. I've learnt a huge amount about planning a large-scale project.

"We are now looking to roll out what we have developed to more screening services rather than just breast screening. We are looking at CT scanning units for lung cancer, retinal screening and possibly MRI scanning."

Gravitricity

Edinburgh company Gravitricity is developing a system that uses mine shafts to store and supply energy to the National Grid.

The system is the brainchild of serial inventor and technical director Peter Fraenkel. Peter previously worked with Gravitricity's chairman Martin Wright when developing similarly innovative work for Marine Current Turbines.

Managing director Charlie Blair joined Gravitricity in 2015 after leaving the Carbon Trust. He was looking for a low-carbon innovation to help lower emissions more directly.

Charlie said: "Using gravity to store energy is already commonplace in pumped hydro, but using a solid weight has many advantages. There are a few companies out there that are using weights, but Peter is really great at simplifying things."

Peter Fraenkel's innovation was to hoist and suspend weights over disused mine shafts then use the power generated by lowering the weight inside the shaft to rebalance supply quickly.

Charlie added: "We're responding to second-by-second or minute-by-minute imbalances on the Grid, which is more valuable. Our system has a lot of versatility, focusing initially on power."

Independent analysis by Imperial College London supported the company's claim that gravity energy storage was more cost-effective than current alternatives as well as being cleaner and having greater longevity.

Like many heavy engineering projects, Gravitricity has a timeline of five to six years before it can begin to recoup cost. The initial grant of £175,000 from Innovate UK solidified the concept in 2017.

"We had put a patent in, but there wasn't really any push to do anything," said Charlie. "The funding from Innovate UK enabled us to employ a couple of people and get moving."

More mechanical engineers led to further innovation, including the development of a multi-weight concept that increases the flexibility and power of a single system.

Project development manager Chris Yendell started working for Gravitricity after the second Innovate UK grant of £650,000 was awarded in 2019. His work is currently focused on the company's scale 250kW concept demonstrator, which will be installed in Edinburgh; later he will begin developing a full-scale prototype.

Chris said: "Working at Gravitricity, we're really motivated by the cause. It's more than 'just a job'. The end goal is something we all believe in."

The company has also built a strong working relationship with Dutch company Huisman Equipment BV to help Gravitricity develop its winches. Gravitricity is also building relationships in Eastern and Central Europe, and South Africa. Partnering with countries who still have working mines enables the company to work with mining specialists, which gives them an indication of where Gravitricity might go in the long term.

"The initial plan is to deploy in existing mine shafts," said Chris, "but we've done feasibility on sinking new shafts and deploying where it's needed, which includes right in the middle of a city or near a wind farm. We'll carry on doing R&D work on that and hopefully work with Innovate UK to achieve it."

PyroGenesys

Nearly two-thirds of the world population's without electricity access lives in sub-Saharan Africa. Sub-Saharan African communities can use solar power, but it is expensive and many people who live here cannot afford a solar home kit.

Clean energy start-up PyroGenesys is developing low-cost, environmentally-friendly technology to transform the way off-grid communities in Nigeria receive electricity with its innovative PyroPower technology.

PyroGenesys' chief executive officer, Simon Ighofose, said: "PyroPower turns agricultural waste materials into renewable heat and electricity using an advanced thermal technology called pyrolysis, meaning no more fossil fuels.

"Waste agro-residues are converted into biochar smokeless fuel briquettes for cooking, replacing firewood and wood-derived charcoal use, a cause of severe deforestation and human health issues."

Nigerian-born Simon had the idea on a visit to Nigeria in 2011 after experiencing the electricity supply issues. An Aston University research paper on the effectiveness of pyrolysis as an energy conversion technology using agricultural waste inspired Simon to study chemical engineering to create an affordable, sustainable solution.

Now, PyroGenesys leads a consortium that includes the University of

Leicester, African Agricultural Technology Foundation (AATF), Mobinet, Babban Gona Farmer Services, ICMEA-UK and Koolmill Systems.

Simon said: “Working with the consortium, we’ll test the case for installing our first PyroPower pilot plant in Nigeria, using satellite geo-spatial data analysis to identify suitable locations for future PyroPower installations.

“We’ve set an initial target of installing 100 commercial systems to generate clean, low-cost electricity over the next two years. We’re also looking at selling electricity using Mobinet’s SIMPAY mobile payment system in Nigeria for cashless transactions.”

In 2019, PyroGenesys won a £46,342 Innovate UK grant as part of Energy Catalyst Round 6. The total grant to the consortium was £224,697. PyroGenesys has also submitted two Round 7 applications for a feasibility study to evaluate site deployment in Ethiopia and Liberia.

The company is in discussions with a major blue-chip Nigerian PLC to roll out the PyroPower technology to 100 sites across Nigeria. They are also working with Koolmill to provide off-grid high-quality rice milling.

Simon said: “The Innovate UK grant allowed us to work with our manufacturing partner ICMEA-UK to redevelop the technology to fit waste conversion and power generation inside one container. Containerisation means that we can put it on a ship and send it anywhere in the world, so it’s quick and easy to deploy.

Highview Power

The worldwide commercial potential of a novel liquid air energy storage system developed by London-based Highview Power convinced Sumitomo Heavy Industries to take a £35 million minority stake in the company early in 2020.

That investment from the Japanese-owned global industries group has allowed Highview Power to press ahead with ambitious plans to build 20 liquid air bulk storage plants of 100MW.

It is eight years since the business received its first grant from Innovate UK, just under £20,000 towards a proof-of-market study. Further grants from Innovate UK have helped to accelerate growth and development of the company’s liquid air energy storage technology, now called the CRYOBattery.

The grants included £1.87 million to help convert a 5MW demonstrator into the world’s first commercial-scale full liquid air energy storage system, capable of rapid response and qualifying as a supplier to the National Grid. This allowed Highview Power to gauge the commercial benefit from such an arrangement as well as the demand for similar systems and services around the

world. It also reinforced investor confidence.

Highview's cryogenic energy storage technology sprang from engineer Peter Dearman's liquid air engine, which he invented some 15 years ago. Working with researchers at the University of Leeds, Peter developed the concept of using air as a form of energy storage, once compressed and liquefied at -196ºC.

Energy Research Accelerator (ERA), an energy research hub, also funded by Innovate UK, and made up of eight internationally-renowned Midlands universities, played a key role, too: its institutions helped pioneer the large-scale energy storage technology that is now being scaled up by Highview Power.

Highview Power now employs 45 people at its Charing Cross Road headquarters, plus six staff in its New York office and another in Spain. This year the company will begin construction of its first truly commercial-sized liquid air energy storage plant at a site yet to be announced.

Edward Scrase, project engineering manager at Highview Power, said: "We are actively developing projects in the UK and the US. The Sumitomo investment has helped to move those along quite considerably."

SHI's technology centre will become a hub for the CRYOBattery business, expanding the technology's footprint in Europe, Asia and the Americas.

Increasing use of renewable power opens up a big market for the CRYOBattery, which is emissions-free. If hooked up to a wind farm, it can become more viable in periods of low or fluctuating demand. Liquid air is stored in a large insulated tank until there is a demand for that stored energy.

When the call comes, the process uses stored waste heat from the electric compressors to turn the refrigerated air back into gas at an even higher temperature. The 700-fold expansion in volume is used to drive a turbine and generate emissions-free electricity for up to five hours.

Highview Power's innovation lies mainly in the way that waste heat generated in the compression process is managed for reuse in the eventual discharge of the stored energy.

DWP improves complaints handling

The old complaints service involved two tiers and put the responsibility on the customer to escalate their complaint if they were not satisfied with how it was handled at tier one.

The changes mean that from 9 July 2020 a new centralised team, made up of experienced complaint handlers, will triage the complaints and prioritise those that are the most serious or from vulnerable claimants.

As is the case now, if someone is still not satisfied they have the option of escalating their complaint to the Independent Case Examiner and then the Parliamentary Health and Service Ombudsman.

More information about this new process can be found on the complaints procedure page

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Published 10 July 2020
Last updated 10 July 2020 + show all updates

1. 10 July 2020

   First published.