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- Examples of ERC 'Proof of Concept' Grant projects 2014 -

The simple blood test for detecting breast cancer

Breast cancer is the most common cancer in women, with 1.4 million diagnoses worldwide every year. Prof. Eiliv Lund has been awarded an ERC 'Proof of Concept' Grant to commercialise a cheap blood test that can be used to diagnose breast cancer.

The project draws on Prof. Lund's ERC research into gene expression in the peripheral blood and tumour tissue of breast cancer patients. This inventive new blood test can be used to detect the disease either alone or in combination with traditional diagnostic tools, and will help reduce the rate of false positive tests and overdiagnosis. As the test is simple to use, the blood samples can be transported without refrigeration, and a centralised lab with standard equipment is sufficient for testing, it also presents a particularly advantageous option in low income countries. The results of this blood test will also allow clinicians to distinguish between different stages of breast cancer. Prof. Lund will use the grant to establish the test's suitability in different scenarios and health care systems, verify its safety, organise events for industry experts and investors, and prepare for the product's out-licensing. This is the first time an ERC grantee based in Norway will receive a 'Proof of Concept' Grant.

ERC grantee: Prof. Eiliv Lund

Host institution: University of Tromsø, Norway

ERC projects: A Gene Expression Test in Blood for Breast Cancer (BLOBREC);

Transcriptomics in Cancer Epidemiology (TICE)

ERC funding: Proof of Concept 2014, €150,000 for one year (BLOBREC); Advanced Grant 2008, €2.3 million for five years (TICE)

3D photography with your smartphone

Almost everyone has a camera on their smartphone nowadays. But imagine if we could use our mobile devices to take photographs in 3D. With an ERC 'Proof of Concept' Grant, Prof. Marc Pollefeys plans to give anyone the ability to capture the world in 3D with their existing smartphone or tablet, anywhere, anytime.

During his ERC-funded research, Prof. Pollefeys studied how to extract 3D measurements from camera recordings. Building on the findings, he will now commercialise a technology that will allow anybody with a regular consumer smartphone to save 3D images of anything they want, without need for any additional hardware or the internet. The technology could pave the way not only for 3D event re-living and greater opportunities for 3D printing, but also opens the door to full-scale crime scene reconstructions in courtrooms and the possibility to send a 3D image of a rash or swelling to your doctor for diagnosis. The project will focus in particular on developing the tool for use in capturing 3D human measurements, including 3D



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faces. This means we could soon visit an art gallery, hold a smartphone camera to our favourite sculpture, and return home with a 3D representation of it to show friends and family. The image could also be uploaded to a cloud service, which would merge it with others of the same object to form an even more comprehensive representation.

ERC grantee: Prof. Marc Pollefeys

Host institution: ETH Zurich, Switzerland

ERC projects: Mobile 3D Modeling (M3M); 4DVideo: 4D spatio-temporal modeling of real-world events from video streams (4DVideo)

ERC funding: Proof of Concept 2014, €150,000 for one year (M3M); Starting Grant 2007, €1.8 million for five years (4DVideo)

Watch a video about the project here: <http://cvg.ethz.ch/mobile/>

Artificial blood vessels inspired by marine sponges

Prosthetic vascular grafts are the tiny synthetic channels used to redirect blood flow during surgery. In the course of his ERC-funded research into potential new biomaterials, Prof. Werner E.G. Müller unexpectedly found that certain polymers have potential to make a new generation of narrow vascular grafts based on the minute biosilica structures found in marine sponges.

With a 'Proof of Concept' Grant, he plans to build on these findings to introduce innovative, extra narrow vascular grafts on the market. The materials currently used work well for grafting large-diameter vessels but are inappropriate for small-diameter vessels required for coronary artery bypass grafting, for example. The new artificial vessels, designed by Prof. Müller, improve existing options because they can be better adapted to the needs of individual patients, are able to prevent thrombosis, have adjustable degradation rates, and can be easily fabricated. The 'Proof of Concept' Grant will support the team in safety standardisation, market analysis, preparation of a business plan, and in their efforts to scale-up the production process prior to clinical studies. This is the second 'Proof of Concept' Grant awarded to Prof. Werner E.G. Müller following his research into biomaterials, the first being obtained in 2012 to support production of biosilica-based scaffolds for bone regeneration.

ERC grantee: Prof. Werner E.G. Müller

Host institution: Mainz University, Germany

ERC projects: Morphogenically active blood vessels (MorphoVes-PoC); From gene to biomineral: Biosynthesis and application of sponge biosilica (BIOSILICA)

ERC funding: Proof of Concept 2014, €150,000 for one year (MorphoVes-PoC); Proof of Concept 2012, €150,000 for one year (SI-BONE-POC); Advanced Grant 2010, €2.2 million for five years (BIOSILICA)

Ethical sourcing of tropical timber

Many of us have mahogany or teak furniture in our homes, but can we be sure of its origin? An estimated 50% of the tropical timber that enters the European market is illegally harvested. It may have been taken from a protected area or species, extracted



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without permission or with corrupt means of access. Dr Pieter Zuidema intends to create an efficient forensic tool for tracing the origin of tropical timber.

Awarded an ERC Starting Grant in 2009, Dr Zuidema conducted research into the long-term climate change effects on tropical tree dynamics. In the course of the project, his team established a database of 300,000 timber tree-ring measurements and 4,000 isotope measurements from more than 20 tropical timber species across three continents. With a 'Proof of Concept' Grant he will now use this data to develop a tool, *Timtrace*, to verify the claimed origin of tropical timbers, thus helping to minimise the illegal trading of this wood. The 'Proof of Concept' Grant will also enable Dr Zuidema to evaluate the tool's commercial potential. *Timtrace* could benefit customs and inspection authorities, furniture manufacturers whose customers are increasingly conscious of ethical sourcing, and organisations that certify sustainable forest management.

ERC grantee: Dr Pieter Zuidema

Host institution: Wageningen University and Research Centre, Netherlands

ERC projects: Tracing tropical timber (TIMTRACE); Tropical forests and climate change: understanding links to predict future responses (TROFOCLIM)

ERC funding: Proof of Concept 2014, €150,000 for one year (TIMTRACE); Starting Grant 2009, €1.7 million for five years (TROFOCLIM)

Optimised *in vitro* alternatives to animal testing

A new tool developed by ERC grantee Dr Roisin Owens could provide a fascinatingly clear insight into events occurring in cells as they happen. The more accurately we can observe cells *in vitro*, the less drug discovery and diagnostics are dependent on *in vivo* methods such as animal testing.

Dr Roisin Owens has been awarded a 'Proof of Concept' Grant to commercialise a device which monitors human cells *in vitro* with unprecedented sensitivity. Whereas current test tube experiments are often found to be expensive oversimplifications of the real-life systems they try to mimic, the device developed by Dr Owens is low-cost, more sensitive than other technologies, and can monitor sub-second variations in tissue more dynamically. This tool is a result of Dr Owens' ERC-funded research, which led to creating a new way of detecting minute changes in observed cells. By commercialising the device, this project will facilitate earlier disease diagnosis, provide a vehicle for fundamental research in life sciences, and develop new *in vitro* cell models for use in toxicology and drug screening.

ERC grantee: Dr Roisin Owens

Host institution: ARMINES – Association pour la recherche et le développement des méthodes et processus industriels, France

ERC projects: Exploitation of Organic Electrochemical Transistors for Biological Sensing – Proof of Concept (IONOSENSE-POC); Exploitation of Organic Electrochemical Transistors for Biological Sensing (IONOSENSE)

ERC funding: Proof of Concept 2014, €150,000 for one year (IONOSENSE-POC); Starting Grant 2010, €1.5 million for five years (IONOSENSE)