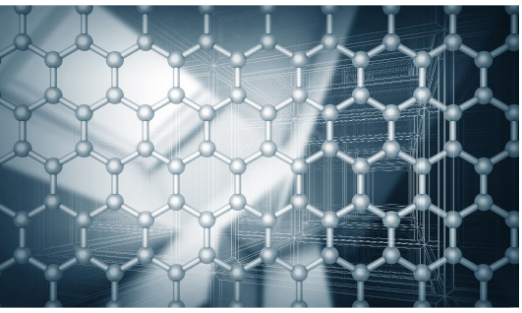
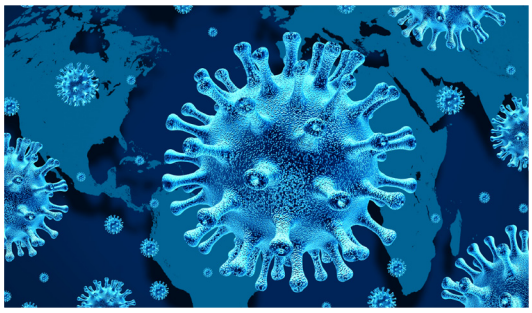
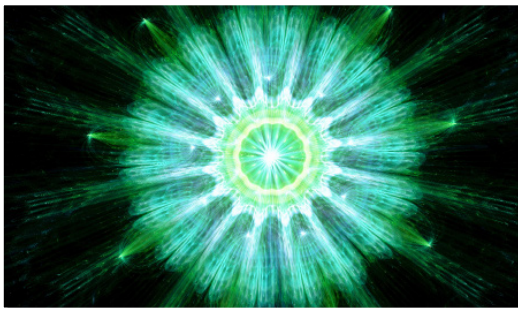
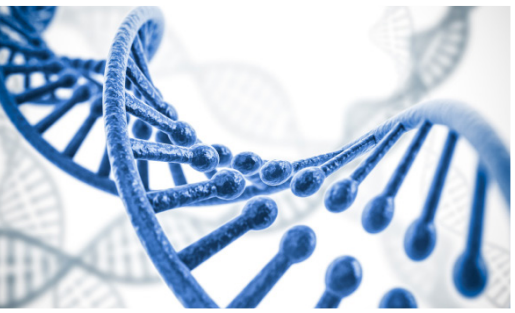
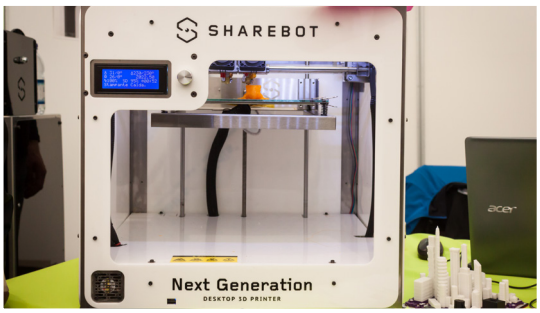
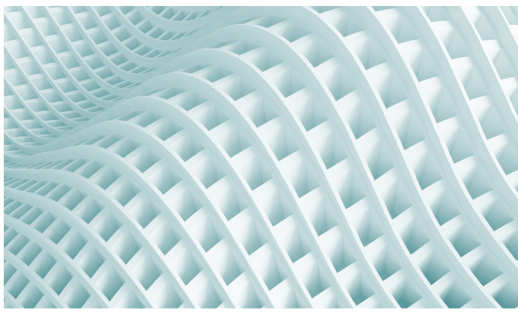
SCIENCE|BUSINESS
INNOVATION BOARD

NEW TECHNOLOGIES FROM THE EUROPEAN RESEARCH COUNCIL

BRUSSELS, 4 JULY 2014



European Research Council
Established by the European Commission

Meet the ERC's Proof of Concept grantees

A by-invitation event organised by the Science|Business Innovation Board

The Proof-of-Concept Grant (PoC) is a new funding option that was launched in 2011 to offer existing ERC grant holders the possibility to establish the innovation potential of their ideas.

The 178 projects so far selected for funding through peer review evaluation treat topics ranging from innovative drug therapies and new biomaterials, greener and cheaper industrial chemical substances, as well as many other technological and social innovations. This event presents some of the projects. The ERC is the first pan-European funding body for blue skies research. It was set up in 2007 under the EU's Seventh Framework Programme for Research (FP7, 2007-2013) and since then, some 4,500 projects have been selected for funding from more than 43,000 applications. The total budget allocated to the ERC for the period 2014-2020 is € 13.1 billion.

09:30 Welcome by Jean-Pierre Bourguignon, President, European Research Council

09:40 Panel discussion: How to get economic value from frontier research?

10:30 The 'elevator pitches'. A first group of five ERC grantees give 3-minute descriptions of the technologies they want to commercialise

11:15 Coffee break

11:45 The second group of five elevator pitches

12:15 Group discussion on the next steps and challenges for the researchers and the programme

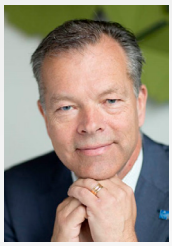
12:45 Lunch

FEATURED GUESTS

Jean-Pierre Bourguignon

President of the European Research Council as of 1 January 2014

Professor Jean-Pierre Bourguignon was the Director of the Institut des Hautes Études Scientifiques (IHÉS) from 1994 till 2013. This international research institute located near Paris, France, was built as the European counterpart of the Institute for Advanced Study in Princeton. He was also the first ERC Panel Chair in Mathematics, for Starting Grants.
A mathematician by training, he spent his whole career as a fellow of the Centre National de la Recherche Scientifique (CNRS). He held a Professor position at École polytechnique from 1986 to 2012. From 1990 to 1992, he was President of the Société Mathématique de France and President of the European Mathematical Society from 1995 to 1998.



Peter Gudmundson

President, Royal Institute of Technology, KTH

Peter Gudmundson is a professor of Material Mechanics. He took up his appointment as President of the Royal Institute of Technology (KTH) in November 2007. He has a Master of Science degree in Engineering Physics and a doctoral degree in Solid Mechanics, both from KTH. Between 1993 and 2005 he led the work of the Department of Solid Mechanics at KTH. He worked as a researcher at Brown Boveri in Switzerland followed by a period as a consultant at a smaller scale consultancy company in Vaxholm during the 1980s. The period 1989-1993 was spent as CEO of the Swedish Institute of Composites in Piteå. He is a member of the Royal Swedish Academy of Engineering Sciences (IVA).

Richard L. Hudson

President, Science|Business Innovation Board

Richard co-founded Science|Business in 2005 with Peter Wrobel and Malcolm Laws. He has been a leading science and technology journalist in Europe for more than 30 years.
As managing editor of The Wall Street Journal Europe from 1997 to 2003, he helped lead a redesign of the title in 2000. He is a graduate of Harvard, and a former Knight Fellow at MIT. In 2004 he co-authored a book with Yale/ IBM “fractal” mathematician Benoit Mandelbrot: The (mis)Behavior of Markets: A fractal view of risk, ruin & reward. Basic Books 2004.

Laura Montagna

Director, SKF Engineering & Research Centre

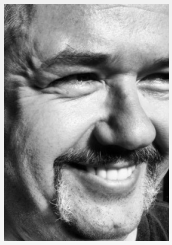
Laura Montagna is responsible for the SKF Engineering & Research Center, where fundamental and applied research is undertaken by more than 150 experts in different disciplines like material science, modelling, engineering, physics. The unit has offices and laboratories in different locations in Europe and Asia and cooperates with highly ranked Universities. She started her career in SKF in 1995 as programme Manager Lubrication for the SKF R&D, lead the development of new lubricants and surface treatment for the SKF product portfolio. Before SKF, Montagna was researcher and project manager in the R&D center of an Italian chemical company, later acquired by Solvay, in the expertise of perfluorinated products, where she developed new polymers, lubricants and surface modifier for different applications.

FEATURED GUESTS

Bill Magill

Director of Science Entrepreneurship, INSEAD

Bill Magill is the Director of Science Entrepreneurship at INSEAD, where he also teaches courses in technology commercialization, fundraising, and private equity. He manages the Sci-Tech Commercializer Program on the Fontainebleau campus, which was awarded the 2012 Innovation of the Year by the Association of MBAs. Bill has been working with technology companies internationally for more than 25 years. As a partner in the Silicon Valley venture fund TeleSoft Partners, Bill has invested in photonics-enabled companies in the US, Europe and Israel. He's also been a senior equities analyst with Banc of America Securities and market analyst at RHK and ElectroniCast. Bill started his career building laser systems at TRW and later Livermore National Labs.



Gilbert West

Microsoft Innovation Center Boostcamp

Gilbert West is a web-developer-turned-web-entrepreneur who has seen more than his fair share of startup presentations. He enjoys getting complex technical ideas over to a non-technical audience and will help you pick the most appropriate features to highlight to your audience whether it's a potential customer, partner or an investor.
Gilbert also spends his time at the Microsoft Innovation Center Boostcamp. He provides training on introduction to PR and publicity for startup founders, with a strong emphasis on how to maintain a steady stream of positive PR through thought leadership and content creation rather than going for "one off" press coverage about product and features.

Robert-Jan Smits

Director-General of DG Research and Innovation, European Commission

Before becoming Director of DG RTD, Mr. Smits was Deputy Director-General of DG JRC where he was responsible for Programmes and Stakeholder Relations, Resource Management, and three Institutes, being the Institute for Energy, the Institute for Environment and Sustainability and the Institute for Prospective Technological Studies.
Before that Mr. Smits was Director for the European Research Area: Research Programmes and Capacity at DG RTD, where his responsibilities included: Joint Programming, coordination of national research programmes, cooperation with intergovernmental research organisations (EIROforum, EUREKA, COST), Research Infrastructures, Regions of Knowledge, Research Potential and the relations with the European Investment Bank (EIB).

PROOF OF CONCEPT GRANTEES

Alberto Broggi

Professor, Università di Parma; President, VisLab, the Artificial Vision and Intelligent Systems Laboratory

Project summary

The proof of concept project involved the realisation of a low-cost 3D sensor for outdoor applications and was derived from one of the results of the previous ERC project (i.e. perception for autonomous vehicles). 3D sensing is becoming more and more popular; for indoor applications, many solutions derived from entertainment and gaming (i.e. Kinect) are available at a low cost. On the other hand 3D perception for outdoor applications, including indoor when sunlight might be present, requires more expensive systems like time-of-flight cameras or stereo vision. Within the proof of concept project, a new low-cost sensor for 3D sensing was designed and realised, and the first prototypes are now available for testing. Based on a SoC for processing, the system provides distance estimation and volume monitoring in real-time (30 frames per second) and can be used in many surveillance, robotics, and industrial applications. The system has already been tests on board of vehicles, rovers, robots, and also on elevators, doors and automatic gates for home automation. The potential of this sensor is very high due to its low cost and reduced size.

Biography

Alberto Broggi received the Dr. Ing. (Master) degree in Electronic Engineering and the Ph.D. degree in Information Technology both from the Università di Parma, Italy. He is now Full Professor at the Universita di Parma and the President of VisLab, the Artificial Vision and Intelligent Systems Laboratory. As a pioneer in the use of machine vision for automotive applications and on driverless cars, he authored more than 150 publications in international scientific journals, book chapters, and refereed conference proceedings. He served as Editor-in-Chief of the IEEE Transactions on Intelligent Transportation Systems for the term 2004-2008; he served the IEEE Intelligent Transportation Systems Society as President for the term 2010-2011.

Alfio Quarteroni

Professor of Mathematics, EPFL and Politecnico di Milano; Director, ATHICSE and CADMOS, EPFL

Project summary

The MATH2WARD proof of concept project investigated the feasibility and potential economic impact of a light, smart platform for everyday clinical practice which, upon receiving and elaborating a patient's characteristics, can provide, in real-time, quantitative output, based on numerical simulation, improving clinicians' knowledge about a specific patient and driving their decisions. The mathematical engine that sits on the device can run algorithms very quickly and provide elaborations of multiple and meaningful inputs. The domain of intervention is that of cardiovascular diseases and the final users are cardiovascular surgeons. MATH2WARD focused on prediction/assessment of the risk of aneurysm formation in the ascending aorta through computation of the viscous wall forces and vessel wall stresses exerted by the blood flow. The potential benefits include: helping clinicians make decisions, for example, in detecting those patients who have to undergo surgery; improving the quality of communication - between the clinician and the patient - thanks to clear and meaningful visualisations provided by the device itself; enhancing knowledge management and facilitating the exchange of expertise among clinicians.

Biography

Alfio Quarteroni is Professor of mathematics at the EPFL and at the Politecnico di Milano and director of MATHICSE and CADMOS at EPFL. He is author of 20 books and 300 papers. His research field is the numerical approximation of partial differential equations and its applications to medicine, sports, the environment, and technology. His research group has carried out the numerical model and simulation for the twice winning America's Cup sailing yacht Alinghi in 2003 and 2007.

PROOF OF CONCEPT GRANTEES

Andreas C. Fischer

Researcher, Department of Micro and Nanosystems, School of Electrical Engineering, KTH Royal Institute of Technology

Project summary

We propose to explore viable approaches to develop and commercially exploit 3D printing tools for manufacturing of silicon micro and nanostructures, specifically for optical, photonic and NEMS components. Such 3D printing tools will make it possible to design and implement silicon photonic components and micro-sensors in low volumes at affordable costs. No resource intensive semiconductor clean-room infrastructure will be required anymore to design and implement MEMS, NEMS and photonics components. A 3D printer for silicon nano-structures is made possible by a novel additive layer-by-layer manufacturing process. This process is based on alternating steps of chemical vapour deposition (CVD) of silicon and local implantation of gallium ions by focused ion beam (FIB) writing. As the ion implantation provides an etch selectivity towards the non-implanted silicon, the written 3D structures can be released by a wet etching process. The feasibility of the technology has been demonstrated by forming simple 3D structures with layer thicknesses of 40 nm and lateral dimensions as small as 30 nm.

Biography

Andreas C. Fischer received the diploma degree in microsystems engineering from University of Freiburg, Germany, and his Ph.D. degree in microsystem technology from KTH Royal Institute of Technology, Sweden, in 2008 and 2013, respectively. Andreas is currently working as a researcher at the Department of micro and nanosystems, School of Electrical Engineering, KTH Royal Institute of Technology. His research is focused on the development of novel integration and fabrication techniques for 3D micro- and nano-devices, heterogeneous integration of MEMS and IC technology as well as advanced wire bonding technology.

Yaakov (Kobi) Benenson

Assistant Professor, Swiss Federal Institute of Technology

Project summary

Benenson's lab at ETH Zurich is working on rational design and construction of gene circuits and networks for programmable control of cell physiology. One of the potential applications of this research is in the development of next-generation anticancer treatments that incorporate recently acquired knowledge on the complexity of cancer-related regulatory pathways, tumour development and differentiation, and the rise of cancer clones resistant to standard therapies. These new treatments are necessarily more complex than small molecule drugs, yet they are within reach of latest tools developed in gene therapy and they hold the promise of much higher efficacy and lower toxicity as well as robustness to the emergence of resistant clones. Thus our approach could be of great potential for treating metastatic and primary malignant tumours. We have already shown an engineered circuit that selectively detects and eliminates specific cancer cells in vitro. We have designed an even safer and more selective circuit that can serve as a starting point for pre-clinical and eventually clinical testing. In this proposal we describe proof-of-concept experiments that will show feasibility of our approach in a mouse model. Successful demonstration will pave the way to large-scale translational R&D financed by private investors, and eventually to the deployment of these new therapies in the clinic.

Biography

Yaakov (Kobi) Benenson is a tenure-track Assistant Professor at the Swiss Federal Institute of Technology (ETH Zurich), Department of Biosystems Science and Engineering. After completing his PhD studies at the Weizmann Institute for which he was awarded Kennedy Prize, he became a Bauer Fellow at the FAS Center for Systems Biology at Harvard University and led a research team there between 2005-2010. He is a recipient of ERC Starting Grant and a member of Swiss National Center of Competence in Research (NCCR) in Molecular Systems Engineering.

PROOF OF CONCEPT GRANTEES

Thomas Crouzier

Researcher, Bioengineering/Biomaterials, Grenoble Institute of Technology

Project summary

In orthopedics, five per cent of fractures do not heal properly. Currently, bone graft is still the standard technique to repair these non-unions. However, it is limited to small size defects, has only approximately 30% of success and presents several drawbacks – including donor site morbidity and pain. Besides this, implants – made of metals, polymers or ceramics – are used to treat bone fractures and to repair bone defects. A major challenge is to boost bone regeneration at the implant surface. Currently, the chemical/physical modifications or the deposit of ceramic coatings can at best render the surface osteo-conductive. However, the only way to achieve osteo-induction (i.e. induction of bone growth) is to deliver bioactive proteins, called bone morphogenetic proteins (BMP). BMP-2 and BMP-7 are already used in clinics but at very high amounts (few mgs) and with a strict limitation to collagen sponges or paste. We have engineered a thin coating made of biopolymers, which can trap BMP proteins and be deposited on any type of implants, thus rendering the surface of these implants osteo-inductive in order to induce bone regeneration.

Biography

Thomas Crouzier is a researcher, experienced in the fields of biomaterials and assembly of biopolymers. He has authored over 20 publications and holds several patents. His most recent experience involves a 3-year postdoc at MIT, where he was a Marie Curie Fellow. There, he served as President of the MIT postdoctoral association and developed an interest for entrepreneurship and the translation of academic findings to innovative startups.

Janusz Bujnicki

Professor, Biology, IIMCB in Warsaw and Adam Mickiewicz University, Poznań

Project summary

The ERC proof of concept project “eRNases” focuses on the development of novel molecular biology tools: enzymes able to recognise specific nucleotide sequences in RNA molecules, and cut these RNA sequences with high site specificity. Because of astonishing rise of interest in RNA science in recent years, there is a growing need among researchers to obtain tools for manipulating RNA molecules, and this scientific need can be turned into a commercial opportunity. Currently available methods of creating RNA molecules have many limitations (including high cost, labour intensity and insufficient quality). The research part of the project involved the development of two prototypical classes of ‘RNA restriction enzymes’: an engineered version of RNase H that cleaves RNA in RNA/DNA hybrids and an engineered RNase that cleaves double stranded RNA molecules. We demonstrated that these enzymes can be used to produce RNA molecules that have the same functionality as RNA molecules synthesised commercially by existing methods. In the business part of the project we investigated the market opportunity for this technology and developed an appropriate strategy for its commercialisation.

Biography

Janusz Bujnicki is Professor of biology, and head of a research group at IIMCB in Warsaw and at Adam Mickiewicz University, Poznań, Poland. He is an author of over 250 publications, which have been cited over 4,200 times. He has received numerous awards, prizes and fellowships, including EMBO/HHMI Young Investigator Programme award, won the national plebiscite “Poles with Verve” in the science category, and was awarded with the Knight’s Cross of the Order of Polonia Restituta by the President of the Republic of Poland.

PROOF OF CONCEPT GRANTEES

Kyle Jamieson

Senior Lecturer, Department of Computer Science at University College London

Project summary

UCL ArrayTrack is an indoor location system for mobile devices. From conversations with potential users including museums, convention centres, and retailers, we have learned that five to ten metre accuracy does not suffice for the applications these users want. Major retailers and brands are interested in providing location-based content and targeted offers to users shopping in stores, with a reliable location fix at the aisle level or better. The ability to provide a location fix with less than one metre accuracy will enable these applications, and also open up exciting new platforms such as augmented reality on wearable glasses. ArrayTrack disentangles the reflections and obstructions that are prevalent indoors from an accurate location estimate. The result is highly accurate and highly responsive mobile device location from the existing wi:fi infrastructure. Our research prototypes have so far have demonstrated a location accuracy of 23 centimetres (median) and one metre (worst-case) in a working 40 by 60 metre, non-line-of-sight indoor office environment.

Biography

Kyle Jamieson is a senior Lecturer (tenure-track Associate Professor) in the Department of computer science at University College London, and principal investigator on the European Research Council-funded CHAOSNETS and SmartTap projects. His research interests are in building real-world wirelessly networked systems that cut across the boundary of digital communications and networking. He has published well-cited works including the ArrayTrack indoor location system (NSDI 2013), the Collection Tree Protocol (SenSys 2009), and the SoftRate wireless bit rate adaptation protocol (SIGCOMM 2009).

Pascal Jonkheijm

Adjunct Professor, MESA+ Institute for Nanotechnology, University of Twente

Project summary

Multiplexed microarrays (high number of different biomolecules) are attractive for rapid screenings - such as early detection of cancer and farm animal diseases and multitoxin screening of ecosystems. Conventional array production methods lack in quality or multiplexing abilities. Moreover, technologies like dip-pen nanolithography require intensive training of personnel, which seriously limits the potential user groups. MULTICHIP enables easy, cheap production of multiplexed arrays by stamping biomolecules. Extensive re-use (over 75) of stamps is possible and MULTICHIP can be used to stamp a wide range (10 kDa – 1 MDa) of biomolecules. MULTICHIP can also stamp on soft surfaces, which is of particular importance for tissue engineering, and reconstructive medicine. These factors greatly enhance application potential. Conventional stamping techniques use hydrogels for storage of biomolecules in the stamp reservoirs, but this limits lifetime, re-use capability (max four), range of biomolecules (max 150 kDa) that can be stamped and is only feasible on hard surfaces. In MULTICHIP, robust macroporous polymeric networks are used for biomolecules storage, creating a breakthrough in multiplexed microarray production. In this project, a business case is developed for MULTICHIP, covering different markets, and routes for market introduction. Results of market analysis (market size and segmentation, expected sales and financing needs) are combined with science-based technology comparison into comprehensive documentation for discussion with potential industry partners.

Biography

Pascal Jonkheijm has been appointed at the MESA+ Institute for Nanotechnology and the University of Twente as adjunct professor and is heading the Laboratory of Bioinspired Molecular Engineering. He received various innovation grants (VENI, VIDI) and the Young Investigator Award of the biomedical materials programme, a starting ERC grant and an ERC proof of concept grant.

PROOF OF CONCEPT GRANTEES

Garrett D. Cole

Co-Founder, Crystalline Mirror Solutions GmbH

Project summary

The invention of the laser ignited a revolution in the fundamental sciences and impacted untold industrial applications. Today, researchers at the forefront of laser science are mastering the world's most precise measurements of time and space. The potential impact of modern laser-based precision sensing technologies is manifold. For example, using optical atomic clocks as timing references in broadband communication systems would immediately increase the data rate by orders of magnitude. Additionally, employing this technology in satellite-based global positioning systems enables millimeter-scale positioning accuracy. Unfortunately, a major technological roadblock has emerged during the preceding decade, in the form of thermo-mechanical noise, limiting further advancement and miniaturisation. Born of fundamental quantum optics research at the University of Vienna, we have developed a game-changing mirror technology that is redefining laser-based precision measurement. Our product is based on a proprietary manufacturing process (international patents pending) that exploits the excellent optomechanical properties of semiconductor heterostructures. These monocrystalline coatings eliminate the excess noise generated by sputtered multilayers, enabling unprecedented improvements in ultrastable interferometers. Other emerging applications include the development of high performance mirrors for mid-IR power-buildup cavities and high-energy pulsed lasers.

Biography

Garrett D. Cole obtained his Ph.D. in materials science and engineering from the University of California, Santa Barbara in 2005. Since completing his doctorate, he has held positions ranging from the first employee of a high-tech startup (Aerius Photonics LLC, now FLIR Electro-Optical Components), to a postdoctoral position at Lawrence Livermore National Laboratory, a Marie Curie Fellow of the Austrian Academy of Sciences, and most recently an assistant professor in the faculty of physics at the University of Vienna.

Armagan Kocer

Assistant Professor, Department of Neuroscience University Medical Center Groningen

Project summary

The clinical use of most conventional therapies is limited either by insufficient therapeutic drug concentrations at the target tissue or the severe toxic effects of the drug on healthy tissues. The encapsulation of the drug into a carrier and its selective delivery to the affected area is one of the solutions. Among different carriers "liposomes" have received the most attention. Several liposomal drug formulations have been approved as anticancer therapeutics; however, their clinical significance has been limited by the slow, passive release of the drug at the target site, resulting in only a modest increase in antitumor activity. The Sense and Release technology makes use of an engineered ion channel as a sensory-release valve in stealth liposomes. These channels stay tightly closed until they sense a target-specific trigger. Upon triggering, they form temporary holes in the liposomes and allow the flow molecules up to six kDa. The unique advantage of this system is the ability to make liposomes responsive towards a signal with a sensitivity that is not possible to reach with current available systems.

Biography

Armagan Kocer studied Biology at the Middle East Technical University (Turkey). In 2011, she joined BiOMaDe Technology Foundation as a research scientist, during which she specialized in synthetic biology and electrophysiology. Between 2002 and 2007 she worked at BiOMaDe as a senior scientist. At the end of 2007, she received two prestigious personal development grants from The Netherlands Organization for Scientific Research Innovational Research Incentives Scheme Grant (NWO-Vidi) and European Research Council ERC-Starting Grant and launched her own research group at the University of Groningen.

NOTES

The Science|Business Innovation Board

The Board is a not-for-profit association founded in 2009 by INSEAD, ESADE and Science|Business with support from Microsoft and BP, and late joined by Imperial College London, SKF, Aalto University and Sanofi. It commissions original innovation policy research from its university members, organises high-level roundtables and conferences on innovation topics, and supports innovative start-ups from Europe's universities.

Alan Begg, Senior Vice President, Group Technology Development, SKF
Maria da Graça Carvalho (Guest Member), Former Member of the European Parliament
Pat Cox (Guest Member), Former President of the European Parliament
Jean-Philippe Courtois, President, Microsoft International
David Eyton, Group Head of Technology, BP
Anne Glover (Guest Member), Chief Scientific Adviser to European Commission President José Manuel Barroso
Sir Keith O'Nions, President, Imperial College London
Maya Said, Vice President, Strategy, External Innovation & Science Policy, Global R&D, Sanofi
Alfons Sauquet, Dean, ESADE Business School
Tuula Teeri, President, Aalto University
John Wood (Guest Member), Secretary-General,
Association of Commonwealth Universities
Peter Zemsky, Deputy Dean, INSEAD

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