Marie Skłodowska-Curie Actions under the Seventh Framework Programme for Research and Technological Development:

A taste of success

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RESEARCH EXECUTIVE AGENCY

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2019

Research Executive Agency
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Foreword

The Marie Skłodowska-Curie Actions (MSCA) are a series of funding schemes that support the mobility and career development of researchers. During the European Commission's Seventh Framework Programme for Research and Technological Development (FP7) (2007-2013), the MSCA received a budget of €4.5 billion and were managed by the Research Executive Agency (REA) of the European Commission. Approximately 50,000 researchers of 140 nationalities and 19,700 organisations from the public and private sectors received fellowships, making the MSCA one of the most ambitious and diverse initiatives of its kind in the world.

This document provides an overview of the great success of the MSCA under FP7, including scientific breakthroughs (such as the discovery of the Higgs-Boson subatomic particle), a series of patents, Nobel prizes and other awards. It also highlights the excellent scientists and researchers who fostered extraordinary innovation, vital to combat critical challenges and contribute to economic growth.

Today, thanks to its success, the MSCA are part of the current Horizon 2020 framework programme and the next programme Horizon Europe. In the future, it will maintain the main features of its predecessors, given its significant positive impact on researchers and institutions.

All the successful projects featured in this publication show that Marie Skłodowska-Curie – the world's most famous female researcher and still the only Nobel laureate in two different scientific disciplines – continues to be a role model and to inspire future generations of outstanding researchers.

Marc Tachelet
REA Director

List of abbreviations

CIG	Career Integration Grants
COFUND	Co-funding of Regional, National and International programmes
CORDA	Common Research Data Warehouse
ERA	European Research Area
ERG	European Reintegration Grant
FP6	Sixth Framework Programme for Research and Technological Development
FP7	Seventh Framework Programme for Research and Technological Development
IAPP	Industry-Academia Partnerships and Pathways
IEF	Intra-European Fellowships for career development
IIF	International Incoming Fellowships
IOF	International Outgoing Fellowships for career development
IRG	International Reintegration Grant
IRSES	International Research Staff Exchange Scheme
ITN	Initial Training Networks
IxF	IEF, IIF, IOF
MCA	Marie Curie Actions
MSCA	Marie Skłodowska-Curie Actions
NIGHT	Researchers' Night
R&D	Research and Development
RG	Reintegration Grants
SME	Small and Medium-sized Enterprises

What are the Marie Skłodowska-Curie Actions (MSCA)?

The MSCA are an EU funding programme that supports the mobility and career development of researchers through a series of specific schemes. The MSCA were part of the 'People' programme of FP7 that provides individual grants for the training and career development of researchers, encourages European researchers to stay in Europe and attracts researchers from all over the world to Europe. The MSCA grants provided in FP7 were available for all stages of researchers' careers, from PhD candidates to senior researchers.

Initial training networks (ITN)

The ITN action brought together universities, research institutes, as well as companies SMEs and other organisations from across the world to train researchers to PhD level. This action made research more attractive to young people by supporting networks of research training organisations in different countries that recruited early-stage researchers, especially doctoral candidates. The networks were created based on a joint research and training programme responding to clear training needs primarily focussed on scientific and technological knowledge through research and individual, personalised projects with appropriate references to interdisciplinary fields.

Intra-European fellowships for career development (IEF)

This action supported the career development or resumption of careers of experienced researchers (PhD holders or people with more than four years of research experience) at different stages of their careers. It also contributed significantly to the career development of the best and most promising active researchers in Europe to improve and maximise their contribution to the knowledge-based economy and society. It supported researchers to achieve or strengthen a leading independent position, e.g., that of principal researcher, professor or other senior position in academia or the private sector.

Reintegration grants (RG)

The Reintegration Grants were implemented through two sub-actions:

- The European Reintegration Grants (ERG), which assisted experienced researchers in their (re)integration into a research career following their MSCA experience. It provided organisations active in research in both the private and public sectors with the opportunity to benefit from the knowledge and expertise acquired by researchers during their mobility experience, while adding to the career development of these researchers at European level and contributing to improving their employability.
- The International Reintegration Grants (IRG) countered the European brain drain to third countries by encouraging European researchers who have been actively involved in research outside the European Research Area to return to a Member State or associated country to contribute to European research. As a result, they were able to transfer the knowledge acquired in a third country and to capitalise on their experience in Europe.

The RG also enabled the development of lasting international networks beneficial to future research collaboration.

Co-funding of regional, national and international programmes (COFUND)

COFUND was introduced in FP7 as an additional action to award fellowships. It supported programmes encouraging the transnational mobility of experienced researchers at different stages of their careers by broadening or deepening their competences, especially in the acquisition of multidisciplinary or interdisciplinary skills or the addition of cross-sectoral

professional experience. As a result, it helped researchers to achieve or strengthen a leading independent position, (re)integrated them into a research career in the Member States and associated countries following a mobility experience and encouraged existing or new regional or national programmes to open up and facilitate transnational mobility and strengthen international programmes. This action has had a strong structuring effect on the R&D landscape across Europe, thus contributing to a more effective European Research Area.

Industry-academia partnerships and pathways (IAPP)

The IAPP action aimed at improving cooperation between industry and academia in research training, professional development and knowledge sharing, focusing on SMEs and traditional manufacturing industries. The purpose of this action was to support long-term cooperation programmes with great potential for increasing mutual understanding of different cultural environments and the skills needs of the industrial and academic sectors. The IAPP action was carried out through staff exchanges between universities and companies.

International outgoing fellowships for career development (IOF)

This action aimed at strengthening the international dimension of the careers of European researchers by allowing them to train and acquire new knowledge in a high-level organisation active in research in a third country. These researchers then brought the knowledge and experience they had learnt to an organisation in a Member State or associated country.

International incoming fellowships (IIF)

The IIF aimed to reinforce the scientific excellence of the Member States and associated countries through the exchange of knowledge with top-class researchers working in a third country to work on research projects in Europe to develop mutually beneficial research cooperation between Europe and the third country concerned. It also encouraged these researchers to plan their period of international mobility as part of a coherent professional project and thus increase the possibility of future research collaborative links with European researchers and organisations active in research in their future research careers.

International research staff exchange scheme (IRSES)

This action aimed to strengthen research partnerships through staff exchanges and networking activities between European research organisations and research organisations from countries that have started a negotiation process for future EU membership, as well as countries covered by the European Neighbourhood Policy (ENP). The action supported research organisations to establish or strengthen long-term research cooperation through a coordinated joint programme of exchange of researchers for short periods.

Joint programmes for the transnational mobility of researchers and technical and management staff received financial support. In the case of organisations from the Member States and associated countries, mobility had to be to third country partners, and vice versa.

Staff to be exchanged had to be ‘seconded’ (i.e. maintain their salary in their home institution and have the right to return) to ensure full reintegration and positive recognition of the mobility experience, thus maximising the benefit of the action for long-term cooperation.

Researchers’ Night

This action brings researchers closer to the public to strengthen their role in society. The Researchers' Night takes place on the last Friday of September each year and has been the occasion of a public and media event at European level for the promotion of research careers. It has also ensured full geographical coverage, with the participation of almost all Member States and associated countries.

EU added value of MSCA

According to the FP7 ex post and H2020 interim evaluation of Marie Skłodowska-Curie actions study, the MSCA have played an essential role in the European Research Area (ERA), and the European added value of the programme was significant at all three levels of intervention[1]:

Individual level

MSCA offered structured training and career development for researchers during and after their PhD. Furthermore, both individual researchers and institutions built their networks, which often facilitates long-term collaboration. The IRSES 'RABOT' project is a notable example of this level of intervention. The RABOT consortium established a long-term research partnership between Chinese and EU research institutions to create an autonomous robot for rescue applications.

Project level

They provided cross-border and intersectoral mobility. The international training and supervision offered under the MSCA projects were of an extremely high standard and benefit to the training and guidance available under the national systems.[2] The MSCA not only contributed to the quality of existing training but also encouraged the development of training tailored to the needs of MSCA researchers who otherwise would not have been available. The ITN project ROBOCADEMY illustrates this point, as it established a European training and research network to expand knowledge in underwater robotics for ocean exploration.

System level

MSCA contributed positively to the ERA by helping to create a more effective EU research system, boosting transnational cooperation and competition and promoting an open labour market for researchers.

- The programme served as a delivery mechanism for the European Charter and the Code of Conduct for the Recruitment of Researchers, introducing standards and common rules that are widely adopted. All funded MSCA participants were required to apply the Charter and Code.
- It spread good practice in research training and skill development at the national level and contributed to the promotion and implementation of standards for doctoral training through the stimulation of the use of the Principles for Innovative Doctoral Training[3] (IDT). In addition, the programme contributed to the introduction of industry-relevant training to the institutional curricula.

[1] [2] Source: FP7 ex post and H2020 interim evaluation of Marie Skłodowska-Curie actions (MSCA), p. 18-20.

[3] The seven principles of IDT are research excellence, attractive institutional environment, interdisciplinary research options, exposure to industry and other relevant employment sectors, international networking, transferable skills training and quality assurance. Source: https://europa.eu/!nR39Jr

General statistics of MSCA under FP7

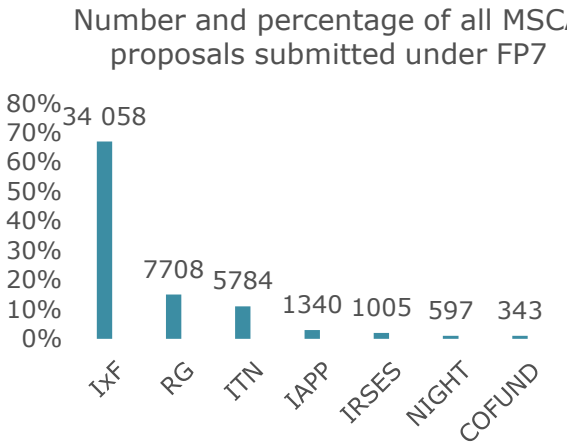
To receive funding, researchers and organisations need to apply to an open call. During FP7, 61 MSCA calls were opened. There was no IRSES call in 2007, no ITN and COFUND calls in 2009, and no IAPP call in 2010.

The ERG and IRG calls opened in parallel in 2007 and 2008, which then continued as RG in 2009 and 2010 and in the last three years of FP7 as CIG.

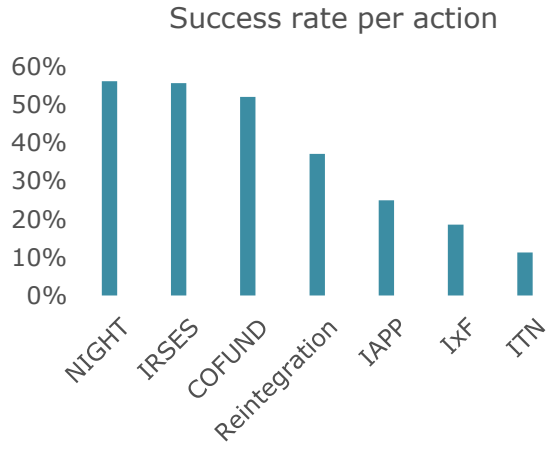
Below the detailed coverage of each of the calls:

	2007	2008	2009	2010	2011	2012	2013
ITN							
IEF							
IOF							
IIF							
ERG							
IRG							
RG							
CIG							
COFUND							
IAPP							
IRSES							
NIGHT							

Proposals and Contracts

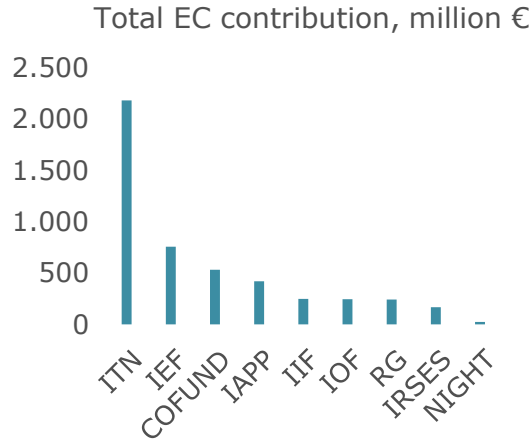


During FP7 almost 51,000 proposals were submitted to MSCA calls, representing 37% of all eligible proposals received for FP7.
The call with the most proposals was IxF (IEF, IOF, IIF), which accounted for 67% of the total MSCA, while at the same time representing 25% of all eligible proposals submitted for all FP7 calls.



The average overall success rate[4] was 21.8%. The highest success rate was for the NIGHT action (56.30%), followed by IRSES (55.80%) and COFUND (52.20%). ITN had the lowest success rate (11.3%).

Overall, 11,276 contracts were signed for all MSCA in FP7. The highest number of signed contracts was for IEF (4,037 contracts), followed by Reintegration actions (2,869 contracts) and IIF (1,326 contracts). The lowest number was for COFUND (179).



In terms of the EC contribution to signed contracts, ITN (€ 2.1 billion) was allocated the highest budget, followed by IEF (€ 0.75 billion).
Although the ITN action received most of the MSCA budget, its success rate (11.3%) was the lowest and even lower than the average for FP7 (19%).

[4] Success rate refers to the ratio between funded proposals and eligible proposals received. The lower the success rate, the higher is the competition to get EU funds

Researchers

During FP7 the MSCA supported almost 50,000 researchers of different nationalities, ages, and scientific domains.

Age

In FP6, the upper limit for the funding of individual researchers recruited under the MSCA was 35 years. This requirement changed in FP7, and there was no age limit established in order to offer equal opportunities to all researchers.

The age of 70% of IxF researchers was between 30-39 years old.

Data from the early years of FP7 are not available as the documents to obtain this data were only introduced in 2011.

However, from available data in CORDA, for ITN - as this action supports mainly early stage researchers - the average age was 27. In IAPP, it was 34.7 years and for IRSES it was 44.6 years.

Gender

The average share of MSCA female researchers was 37%[5]. It is slightly higher in some individual actions, e.g. in the COFUND action, female researchers accounted for 39.5% of all funded researchers. This fact is an achievement, as it is close to the target of a minimum of 40% women participation, as stipulated in the People Programme.[6]

Publications

As of June 2019, MSCA researchers have released 33,890 publications under FP7[7]. However, this figure is likely to increase, as some FP7 MSCA projects are still ongoing, and the release of their publications could take place after the project completion date.

Nationality

Under FP6, third-country nationals were not eligible. FP7 introduced the possibility to recruit third country nationals.

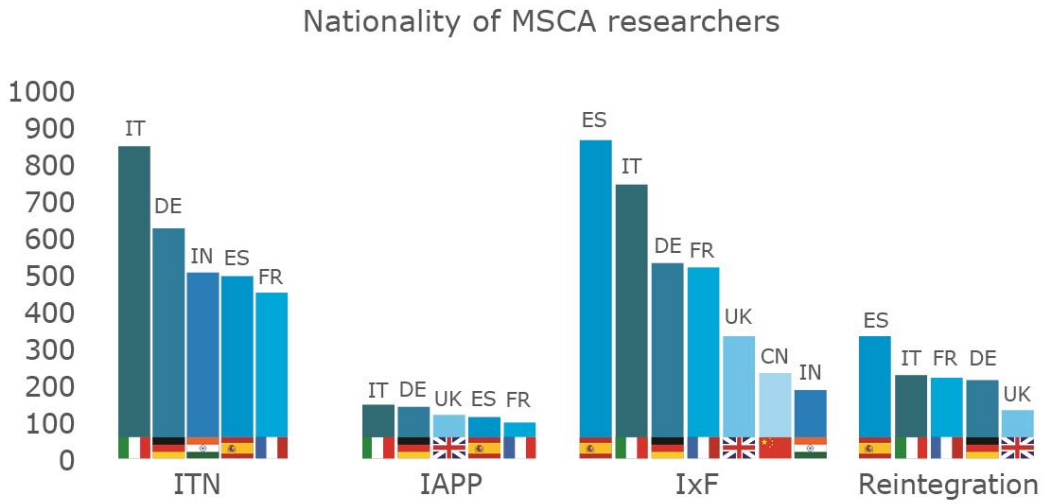
MSCA researchers came from more than 140 different nationalities. 76% came from the EU or associated countries and 24% from third countries[8]. The five nationalities most represented in the IAPP, IxF and RGs were Italian, French, German, Spanish and British. For ITN, India is the third most represented nationality of recruited early-stage researchers. For IRSES and COFUND, the data available in Corda are not representative, as the Researchers Registration Report for these two actions was not introduced until the end of the programme.

[5] Source: FP7 ex post and H2020 interim evaluation of Marie Skłodowska-Curie actions (MSCA), p. 8.

[6] Source: 'FP7 Marie Curie Actions Interim Evaluation' Implementing framework contract No EAC/50/2009: Annexes to the final report, p. 10

[7] Source: Common Research Data Warehouse (CORDA) May 2019

[8] Source: CORDA October 2018

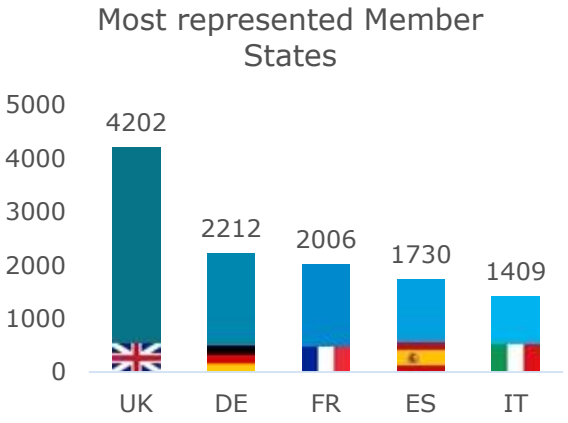


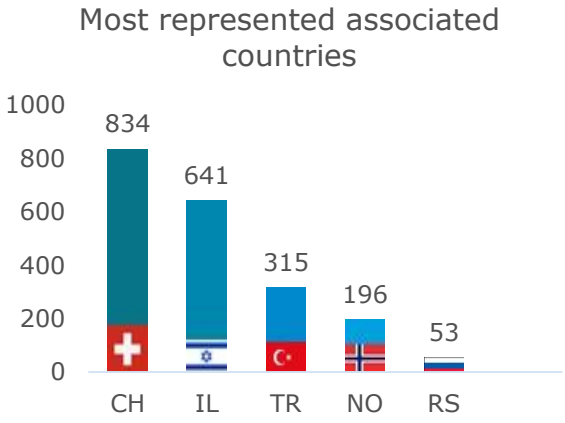
Beneficiaries hosting researchers for training and career development

There were 20 300 participations registered in the MSCA during FP7, 76% were from the public sector and 24% from the private sector.

Country participation

Beneficiaries from more than 85 different countries were involved in MSCA during FP7.





Five EU countries account for almost 60% of the total participation in MSCA. UK beneficiaries accounted for 20.7%, followed by Germany (10.9%), France (9.9%), Spain (8.5%) and Italy (6.9%).

Of the associated countries, the largest number of beneficiaries were from Switzerland (4.1%), followed by Israel (3.2%), Turkey (1.6%), Norway (1%) and Russia (0.3%).

Scientific results

MSCA projects in FP7 have been a brilliant example of the scientific results obtained by the researchers recruited or seconded. The number of success stories over the years is impressive, and this document cannot describe all of them. Therefore, this section compiles a small selection of successful and excellent MSCA projects.

A project with intergalactic results

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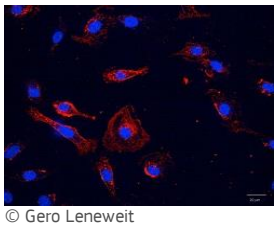
GraWIToN | ITN-2013-606176

In 2017, researchers from the ITN GraWIToN project detected gravitational waves after the spectacular collision of two neutron stars. This discovery attracted worldwide attention and received the Nobel Prize in Physics 2017. This project marks the dawn of a new field of research: multi-messenger astrophysics.

A new drug delivery system in the human body



© Gero Leneweit

Decent AID | IAPP-2012-324275

The project aimed to develop and analyse an improved drug delivery system using specific centrifugal technologies and new asymmetric nanocapsules. The results of the project provide significant steps towards the functionalisation of nanocapsules to minimise adverse immune reactions. This project is a distinctive case of intersectoral collaboration in R&D, including mechanical engineering, pharmaceutical technology and immunology and cancer research.

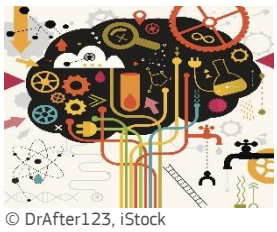
Improving roofing slates through research

© iStock

TOMOSLATE | IF-2013-623082

This unprecedented EU initiative sheds light on the slates used in building construction to help Europe's roofing slate industry, builders and architects better understand their products. It also suggested improvements to existing roofing standard tests and revitalised the economy of European slate-producing areas.

How does our brain control behaviour?



© DrAfter123, iStock

CELLSYNCIRCUITS | CIG-2013-618525

CELLSYNCIRCUITS focused on synapses to understand the transmission of information in the brain and the way synaptic dysfunctions can lead to behavioural disorders such as autism or schizophrenia. Their findings provide an important insight for discussion on social policies. For instance, researchers found evidence that interaction in the early stages of life between mother and baby is a critical aspect of social development, which provides an essential perspective for future discussions on maternity leave issues.

What happens when you do not get enough sleep?

© Photographee.eu, Shutterstock

Sleepneed | CIG-2012-322050

Sleepneed researchers conducted behavioural, electrophysiological, and pharmacological experiments to investigate behavioural, cognitive and sensory changes resulting from sleep deprivation. The results of this project have broadened knowledge about sleep deprivation and how behaviour is impaired.

Uncovering the human impact on the food webs in the ocean

© Richard Carey, Getty

BIOWEB | CIG-2011-303534

The BIOWEB project set out to study how human and environmental factors have an impact on ecosystem health and food webs. As a result, the study provided the knowledge needed to predict the cumulative effects of human and environmental influences on ocean ecosystems. The result is significant for shaping EU policies in the area of blue growth and the maritime ecosystem.

Preserving cultural heritage for future generations

© Artemis Georgiou, Maria Iacovou

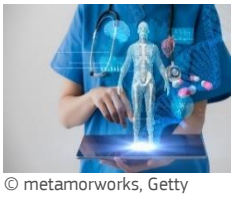
ARIEL | CIG-2012-334271

This project investigated archaeological remains in the area of Palaepaphos (modern village of Kouklia) dating from the Bronze Age (around 2400-1050 BCE). It made significant advances in the understanding of prehistoric Mediterranean polities, such as ancient Paphos. The project was a great professional development for the researchers and had high visibility in the media throughout its duration.

MSCA researchers who started their own business

Fostering entrepreneurship is not a specific goal of MSCA, and therefore, the average number of businesses initiated by MSCA researchers is quite low[9]. However, some MSCA researchers have managed to commercialise the resulting technologies of their work.

MLPM2012 | ITN-201



© metamorworks, Getty

Cristóbal Esteban started an SME Cambrian Intelligence SL. The goal of the company turning state-of-the-art machine learning into real-world products, with an emphasis on biomedical applications.

Stardust | ITN-2012-317185

© Petrovich9, Getty

Researcher Kartik Kumar started the company Satsearch.co. It aims to build the first global marketplace for space, providing the digitalisation of the global space supply chain. The company has developed an independent parametric search engine for space products, services, and technologies.

PEPMIP | ITN-2010-264699

© Gorodenkoff Productions OU, Getty

The start-up SME, SureCapture Technologies AB led by the former PEPMIP early stage researcher, Celina Wierzbicka is exploiting the technologies developed during this project. The company will market a range of products originating from the project that aim to diagnose and treat cancer at an early stage.

SusPhos | ITN-2012-317404

© iStock

Mark Bispinghof, a researcher in this ITN project, is CTO and co-founder of Lumendo to valorise his patented knowledge. He has developed a portfolio of innovative, light-active medical fillers, which can form implants in any cavity inside the body – for example in orthopaedic, dental and neurovascular applications.

NEMOH | ITN-2011-289976

© Ron Sanford, iStock

Alejandro Martì, trained under NEMOH at the Barcelona Supercomputer Centre (BSC), and was appointed senior researcher. He is the founder and CEO of a spin-off of BSC, MITIGA-SOLUTIONS. The company provides commercial solutions to forecast and mitigate the impact of volcanic eruptions on the aviation industry. The company was established in February 2018 and has already received several awards.

[9] Source: Marie Curie researchers and their long-term career development: A comparative study, p. 73.

PicoSEC-MCNet | ITN-2011-289355


© sankalpmaya, Thinkstock

Pawel Modrzynski co-founded two SMEs in Wrocław, Poland:

- Nanores offers R&D materials on science and nanotechnology services for both academia and industry in two areas: new technologies for diamonds and the upgrade of the beam profile in FIB microscopes and micro x-ray sources that made first proof of concept works. The company is now working towards securing Venture Capital funding to develop the technology.
- Silencions has four people working towards the launch of a commercial version of the technology for cancelling acoustic and mechanical vibrations.

ENERGY-SMARTOPS | ITN-2010-264940


© Thinkstock

Dionysis Xenos founded Flexciton based on his training and experience as an MSCA researcher. It has already grown into a company with about ten employees. Flexciton is building the world's most potent production planning and scheduling tool for manufacturing using Artificial Intelligence and world-leading optimisation algorithms.

Mag(net)icFun | ITN-2011-290248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Michela Puddu (co-founder and CEO) started Haelixa as a direct result of her PhD work. This company, operating in the field of least invasive medical fillers worldwide, has won several awards and was broadly covered in the news. Ms Puddu is one of the winners of the 2019 EU Prize for Women Innovators, which aims to raise awareness of the need of more innovation and women entrepreneurs, to recognise women's success in innovation and to create strong role models.

REPRO-TRAIN | ITN-2011-289880


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Claudio Attardo Parrinello founded DONOVO, a company linked to the Repro-train subject –reproductive biology. The company started a few months ago to offer IVF treatment to patients coming from other countries, so far mainly from Italy. The company makes use of existing assisted reproduction clinics in Spain.

BioMaX | ITN-2010-264737


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- Malte Kühnemund is one of the founders of a spinout company, Cartana, that maps gene expression in brain tissue via In Situ Sequencing (ISS), the 4th generation of sequencing technologies.
- Matteo Cornaglia is a co-founder of Nagi Bioscience, a spin-off project of the Swiss Federal Institute of Technology in Lausanne (EPFL). Nagi Bioscience introduces the first Organism-on-Chip technology, which combines the use of a simple yet complete organism for in vivo testing with the first technological platform for its fully automated in vitro handling, culture and analysis. Venturelab selected Matteo for Venture Leaders Life Sciences 2018.

IANES | IAPP-2011-286083


©iStock

- Dominik Wachholder has co-founded a company that develops a corporate performance management platform called flink, which provides decision support through predictive control and forecasting.
- Florian Strecker has co-founded Act'n'Connect by developing and disseminating the Internet of Actors based partially on his experiences with the results of IANES.

EURO IMPACT | ITN-2010-264697


© Kacso Sandor, iStock

Martin Loučka has established a successful NGO, the Center for Palliative Care, which aims to advance the evidence base and availability of palliative care in the Czech Republic. The organisation has quickly built trust and cooperation with various stakeholders, including the Ministry of Health, hospice and palliative care representatives from across the country, academics, private donors and the public. The Centre also cooperates in national and international research, being the first and only research organisation in the country to focus specifically on palliative care.

ACID | IAPP-2013-609691


© ACID

Dr Guillermo Vidal started his own very successful start-up company FIT in 2015 to develop and commercialise SESI (Secondary Electro-Spray Ionization) systems to expand the applicability of mass spectrometry in the clinical arena.

M+VISION | COFUND-2011-291820


© yodiyim, Getty

Carlos Sánchez Mendoza founded a start-up in September 2015 called Asana Weartech, in which he developed a smart undergarment for scoliosis treatment and monitoring the daily posture of individuals. In addition, he was also selected 'Innovator Under 35 Spain' in 2016.

MSCA researchers as (co) inventors – registered patents

In a number of MSCA projects, the participating organisations achieved patents or trademarks of commercial interest. Researchers hired or seconded directly as part of the project have participated in many of these inventions. Some of these patents include:

TANGO | ITN-2012-316654


© TANGO

Application number: EP3104078.
Title: Thermoacoustic precursor method and apparatus.
Description: it is an early warning system for gas turbines to prevent damage from combustion dynamics.
Researcher: Driek Rouwenhorst.

GlaCERCo | ITN-2010-264526


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Publication number: WO2015011737
Title: Heat-insulating porous glass-ceramic material in slabs and process for producing such material.
Description: the invention aims to provide a heat-insulating glass-ceramic material with macro-porous structure, made from non-dangerous material, and recycled glass.
Inventors: Bernardo Enrico, Caldirola Marcello, Ferraris Monica.

SMART-E | ITN-2013-608022


© VLADGRIN, Getty

Publication number: WO2016207855
Title: Pneumatic device for actuating organs.
Description: it is a device of resilient material similar to McKibben type artificial muscles.
Inventor: Syed Taimoor Hassan Shah.

VitriMetTech | ITN-2013-607080


© Breuckmann gmbh

Application number: DE102015208870A1.
Title: A process for producing a laminated core.
Description: ribbons of a magnetic metallic glass were stacked together and co-rolled for adhesion. The composite was then stamped to the desired shape (transformer core).
Researcher: Dr Attila Szabo.

AD-WINE | IAPP-2011-286052


© Eric Hood, iStock

Patent number: ES2541078B1.
Title: Reactor for wastewater treatment.
Description: the invention is a reactor for the treatment of wastewater from the production of wine and other agri-food products, and its application in the food and drink industry.
Owner: Agua, Energía y Medioambiente Servicios Integrales S.L.U (Spain).
Inventors: 10 of the 15 researchers who participated in the project are co-inventors.

AngioMatTrain | ITN-2012-317304

© Kateryna Kon, Shutterstock

- **Invention Disclosure Form:** technology number (Tech-2016-050) with the Technology Transfer Office at the National University of Ireland, Galway.
  Title: Synthesis and characterization of ROS-scavenging hollow collagen micro- and nanospheres for the treatment of oxidative stress.
  Researcher: Dr Christos Tapeinos.
- **Invention Disclosure Form:** technology number (Tech-2017-043) filed at the National University of Ireland, Galway.
  Title: Elastin-like Recombinamers Hydrogel for the Treatment of Myocardial Infarction.
  Researcher: Paolo Contessotto.
- **Application number:** EP18196891A8.
  Title: Treatment of Myocardial Infarction.
  Researchers: Paolo Contessotto, Mark Da Costa., José Carlos Rodríguez-Cabello and Abhay Pandit.

USART | ITN/EID-2012-317132

© AlexRaths, Shutterstock

A feature developed in the USART project (segmentation of the left atrium) was a part of the 2019 release of the General Electric Vivid E95 scanner.

- **Application number:** US9622724B2.
  Title: Ultrasound imaging system and method for tracking a specular reflector.
  Description: it clearly identifies and visualises interventional tools such as catheters in an ultrasound image.
  Researcher: Raja Sekhar Bandaru.
- **Application number**: US20170086781A1.
  Title: Ultrasound imaging system and method for detecting position and orientation of a coherent reflector.
  Description: it identifies the position and orientation of interventional tools in an ultrasound image.
  Researcher: Raja Sekhar Bandaru.
- **Application number:** US20170100091A1.
  Title: Ultrasound system and method for use with a heat-affected region.
  Description: it measures heat within tissue user ultrasound to monitor therapeutic ablation.
  Researcher: Margot Pasternak.
- **Application number:** US9763646B2.
  Title: Method and systems for adjusting a pulse generated for ultrasound multi-line transmit.
  Description: An idea to generate ultrasound pulses in a safer way for faster imaging speed.
  Researcher: Pedro Santos.

p-net | ITN-2010-264864

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- **Publication number:** WO2015140160A1.
  Title: Micellar nanoparticles containing antitumoral glycosides.
  Description: the invention is a process for the preparation and uses of micelles that comprise nanoparticles.
  Inventors: Hugo Groult (ESR), Fernando Herranz Rabanal Jesús Ruíz-Cabello, Alfonso Fernández-Mayoralas, Manuel Nieto Lorenzo Romero, Isabel García.
- **Patent number:** EP2977463A1.
  Title: Methods and agents related to lung diseases.
  Description: it covers lung diseases diagnostics and therapeutics, particularly in Acute Respiratory Distress Syndrome (ARDS) and Diffuse Alveolar Damage (DAD).
  Inventors: Pablo Cardinal-Fernández, José Ángel Lorente and Antonio Ferruelo Alfonso.
- **Publication number:** US20150050217A1.
  Title: Ultrafine nanoparticles as multimodal contrast agent.
  Description: a novel way to use ultrafine nanoparticles as a diagnostic or therapeutic agent.
  Inventors: Yannick Cremillieux, Andrea Bianchi, Sandrine DUFORT, Jean-Luc Coll, François Lux, Olivier Tillement.
- **Patent number:** EP2719771A1.
  Title: Marker for assessing the risk of developing acute kidney injury.
  Description: an in vitro method to determine the risk to develop Acute Kidney Injury (AKI).
  Inventors: Pablo Cardinal-Fernández, Antonio Ferruelo and José Ángel Lorente.

SECENTIS | ITN-2012-317387

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- **Patent number:** US9811668B2.
  Title: Multi-context exploit test management.
  Description: security testing for software applications.
  Researchers: Antonino Sabetta, Luca Compagna, Serena Ponta, Stanislav Dashevskyi, Daniel Dos Santos, Fabio Massacci.
- **Patent number:** US20170109534A1.
  Title: Dynamic Analysis Security Testing of Multi-Party Web Applications Via Attack Patterns.
  Description: its objective is to assess the vulnerabilities and security of computer systems.
  Researchers: Luca Compagna, Avinash Sudhodanan, Roberto Carbone, Alessandro Armando.
- **Patent number:** US20170300701A1.
  Title: Secure and compliant execution of processes.
  Description: a computer-implemented method for secure and compliant execution of processes associated with in-memory database.
  Researchers: Serena Ponta, Luca Compagna, Daniel Dos Santos, Silvio Ranise.

Projects leading to an exceptional career path for researchers

The projects funded under the 'People' programme have made a substantial contribution to the career development of the researchers who participated in them. For example, 92% of researchers supported by ITN assessed the impact of MSCA on their career prospects as 'very good' or 'good'[10]. This is an important aspect given that ITN researchers are at the beginning of their research careers and that MSCA can play an essential role in their future possibilities. Many of them have held important positions in various R&D institutions and have remained in the field of research. Some of these projects are:

GlaCERCo | ITN-2010-264526

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- Harshit Porwal is a Business Unit Manager (Materials and Advanced Technologies Group) at LMK Thermosafe Ltd. He developed a new product based on graphene composites, which will be commercialised soon. The work also resulted in one patent.
- Shuo Cui is a Senior Research Engineer at Saint-Gobain North America in Boston, United States.
- Kevin Bourhis is a Production Manager at Argolight in France.
- Anastasios Toulitsis is a Materials Engineer at Rolls-Royce Bristol, UK.
- Yaroslav Shpotyuk is an Assistant Professor at the University of Rzeszow (Poland).
- Peter Tatarko got a prestigious position in the Scientific board of the Institute of Inorganic Chemistry at the Slovak Academy of Sciences
- Salvatore Grasso is a Professor in Ceramics at South West Jiaotong University.

LASSIE | ITN-2008-238258

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- Demian Marchione, early stage researcher at HWU, won a prestigious NASA JPL Fellowship. He is on a career pathway to return to an Academic position in Italy in one or two years.
- Sameera Chamil Wickramarachchi Millawalage won a JSPS fellowship in 2014 and is now an Assistant Professor at Hokkaido University, Japan.

Nano2Fun | ITN-2013-607721

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- Laura Gemini got a permanent position at Alphanov in Bordeaux, France.
- Davide Blasi is a Product Development Scientist at Sinerga SPA.
- Luca Calatroni received a 3-year contract as a research fellow in l'École Polytechnique financed with a Hadamard grant from the Fondation Mathematique Jacques-Hadamard.
- Antonio Ardizzone is a Product development chemist at Henkel

[10] Source: PPMI, 2013

Adhesives.

- Cristiano Mastrodonato received a research position at Dipharma.
- Dzmitryi Ushakou is a Research and Teaching Assistant at the Institute of physics of the Pomeranian University in Slupsk.
- Dmitrii Perevoznik got a research position at Leibniz University in the Institute of Quantum Optics.
- Siarhei Kurhuzenkau is a Technical Writer in the product management department of ActivePlatform, an IT company in Minsk, Belarus.
- Somananda Sanyal is currently a post-doc researcher at the Department of Chemistry and Polymer Sciences at Stellenbosch University, South Africa.
- Domna-Maria Nikolaidou is post-doc researcher at IMEM-CNR in collaboration with Bercella SPA.

ENERGY-SMARTOPS | ITN-2010-264940

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- Bart van Parys is a lecturer in operations research and statistics at the MIT Sloan School of Management.
- Alejandro Fernandez Gomez is the team leader of the Hardware and Software Department of CREADIS Sp. z o.o., Krakow, Poland.
- José Gregorio Ferreira is Chief Specialist on innovative technologies at ABB.
- Víctor Hugo Jaramillo Velásquez is Assistant Professor at the Engineering School of the University of Antioquia in Colombia.
- Cristobal Ruiz Carcel is a research fellow at the Through-life Engineering Services Institute, Cranfield University.
- Matteo Cicciotti is Head of Technical Disciplines, Engineering and Maintenance Hub Italy at BASF SE.
- Esperanza Barrera-Medrano is a Consultant in industrial research projects at Imperial College Consultants.
- Dionysios Xenos is co-founder and chief technology officer of Flexciton.
- David Dorantes Romero is an R&D Engineer, ABB - Digital Design Services and Products.
- Matteo Biondi is currently a PhD Student at the Chair of Production Management at the University of Mannheim.
- Sara Budinis is Research Associate at the Sustainable Gas Institute of Imperial College London.
- Hubert Hadera is a Project Engineer for large capital projects at BASF SE.
- Dragoljub Gajic is an Operations and Technology Consultant in Gajić Associates.
- Robin Cartoux works as a Software Engineer at Mettler-Toledo International in Switzerland.
- Giampaolo Torrisi is a Consultant in Bain & Company.

NEMOH | ITN-2011-289976

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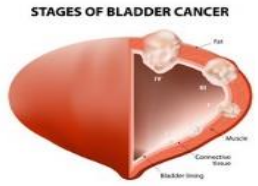
- Alejandro Martì trained under NEMOH at the BSC - Barcelona Supercomputer Centre after being appointed senior researcher. He initiated a spin-off of BSC, the MITIGA-SOLUTIONS of which he is CEO, focused on providing commercial solutions to forecast and mitigate the impact of volcanic eruptions to the aviation industry. The company was established in February 2018 and has received several awards since then. In his role as CEO, Alex became group leader for Natural Hazards and Risk Analysis at BSC.
- Samantha Engwell trained under NEMOH at INGV Pisa, and received the Geological Society of London President's Award 2015 while still being a NEMOH researcher.
- Damien Gaudin, who trained under NEMOH at the National Institute of Geophysics and Volcanology (INGV) in Rome, received the IAVCEI George Walker Medal 2019.
- Antonio Capponi received the Bulletin of Volcanology most cited paper 2017 award, for an Early Career Researcher. Antonio received his award at the conference Cities on Volcanoes 10 in Naples on 7 September 2018, for his paper 'Recycled ejecta modulating Strombolian explosions'.

BCMolMed | ITN/EID-2012-317450



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Maria Frantzi (BioMedBC-752755) and Agnieszka Latosinska (PCaProTreat-800048) are now part of the prestigious MSCA Society and Enterprise Panel. Both researchers are highly active in the field of translational research in the context of the implementation of clinical proteomics into routine clinical practice, reflected by editing of the special issue of Proteomics Clinical Applications Journal entitled 'Clinical Proteomics on the way towards implementation' released in April 2019.

p-net | ITN-2010-264864

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- General Leung works at St Michael's Hospital in Toronto Canada. He is a lecturer at the Department of Medical Imaging. He received a tenure track position.
- Magdalena Zurek continues her scientific career as Senior Scientist at AstraZeneca in Gothenburg, Sweden – where she pursued her ITN ER research and training. She is an excellent example of how industry-academia collaboration can lead to a career in the industry.
- Andrea Bianchi moved from academia to industry. He got his PhD at Bordeaux University. He continues a successful industrial path (one at Boehringer Ingelheim, now at Marketing and Strategy Department of Philips Medical System in France). Apart of his number of papers and quality of papers published during this ESR period, Andrea moved to two industries (pharmaceutical and medical imaging manufacturing company such as Philips to initiate a very successful industrial track career.
- Dominique Corteville finished his doctoral studies at Heidelberg

and moved to academia. He is currently teaching Physics and Math at the Monchsee Gymnasium in Heilbron.

- Felix Horn got his PhD at Sheffield University. He continues a successful industrial career at Siemens as regional head of Collaboration Management for Western Europe where he develops and supports Industry-Academia collaborations between Siemens Healthineers and Universities in the context of Magnetic Resonance Imaging.
- Ämsund Kjortad continued his scientific career, first at the Department of Neuroradiology at the University Medical Centre of Hamburg, before moving to a software company specialised in CT imaging data analysis.
- Flavio Carinci is now working for Siemens in Germany. He is the co-author of several patents currently under exploitation by Siemens.
- Pavla Francova moved back to the Czech Republic. She is now a scientist at the MRI/MPI Centre for Advanced preclinical Imaging.
- Pablo Cardinal completed his PhD at University Complutense Madrid. He was doing a post-doc in the USA (Genetic Department of the Weill-Cornell Medical College) and is now holding a senior position in a private HM-Hospital Madrid institution where he runs different public and private clinics. He also conducts research, teaching and medical assistance duties there.
- Hugo Groult continued an academic path. He is currently a post-doc at CNRS at the Université de La Rochelle.
- Alessia Ferrarini continues her scientific career now as a postdoctoral associate with the Spanish Cardiovascular Research Centre and after a post-doctorate at Georgetown University in Washington DC.
- Shama Naz continues her scientific career. She was postdoctoral at the Department of Medical Biochemistry and Biophysics of the Karolinska Institutet in Sweden and currently is at the Department of Chemistry and Biochemistry at Concordial University in Montreal (Canada).

EURO IMPACT | ITN-2010-264697

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- Natalie Evans wrote the application for the European Innovation Partnership on Active and Healthy Ageing Reference Site for the municipality of Amsterdam (awarded three stars). She was lead writer of two successful H2020 applications (EnTIRE and VIRT2UE) and led a WP in the EnTIRE project.
- Katrien Moens is a scientist for the Belgian Scientific Institute of Public Health funded by the federal government and by the National Institute for Health and Disability Insurance.
- Winne Ko was one of the participants in the European Health Parliament's 2017-2018 project, funded by stakeholders such as J&J, Google, Politico and the European Patients' Forum, where young professionals interact with the Commission, academia, among others., to present policy recommendations to 'make health excellent again!'.
- Sandra Martins Pereira is currently working as a postdoctoral

research fellow at the Instituto de Bioética, Universidade Católica Portuguesa. In 2016, she received a three-year research grant from Fundação Grünenthal and Fundação Merck, Sharp and Dohme to implement the project entitled 'InPalIn: Integrating Palliative Care in Intensive Care' (2016-2019). She was also involved in a successful grant application (Fundação La Caixa and BPI) to implement a project on Psychosocial Support in Palliative Care in Portugal. She has been a Screening Editor and Member of the Editorial Board of Palliative Medicine (SAGE) since 2016. She has signed a contract as Principal Researcher in the field of sustainability and ethics with a mainstream palliative care research at the CEGE-Research Centre in Management at the Faculty of Economics and Management of the Universidade Católica Portuguesa in Porto.

- Elene Janberidze defended her PhD at NTNU in Norway and returned to Georgia, where she started working as a researcher in the Department of Gerontology and Palliative Medicine at Tbilisi State University. After two years, she became a chief researcher in the same department. She is currently leading a 5-year project granted by the Georgian Ministry of Education and Science under the project title: 'Descent life till the end' - For the identification of social, medical, ethical problems and elaboration of recommendations for a national program on geriatric palliative care. She is an assistant professor at the University of Georgia, where she teaches palliative care to medical students. She is also a part-time clinical oncologist at MediClubGeorgia. She was also a postdoctoral research fellow from 17 Sep 2018 to 17 Mar 2019 at the Third Faculty of Medicine, Department of Psychiatry and Medical Psychology of Charles University, Prague, Czech Republic. The work was about the impact of palliative care consultation team in the inpatients' hospital setting.
- Martin Loučka received the Fulbright Schuman scholarship to work at Mount Sinai hospital in New York after the MSCA grant. It was a US-EU partnership programme. After the scholarship, he returned to the Czech Republic and began working as an assistant professor in one of the medical schools of Charles University in Prague. He also established the Centre for Palliative Care, an NGO that aims to advance the evidence base and availability of palliative care in the Czech Republic. A significant part of his success in getting research money (e.g., he received a €300,000 research grant for junior postdoc researchers, from the Czech Science Foundation) is due to his EURO IMPACT experience.

MOMECODE | CIG-2013-618444

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Simon Hippenmeyer established a dynamic and highly productive research team. Besides, the researcher received an HFSP programme grant, an NFB grant and an ERC consolidator grant. He also established a specific teaching programme and created an entire class for the graduates at the host Institute of Science and Technology Austria. He also received a prize for teaching excellence.

TRANSMIT | ITN-2010-264476


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- Joe Kinrade is currently working with the Hubble Space Telescope and Cassini satellite mission observations of Saturn's auroras and magnetosphere. He is a senior research associate in the Space and Planetary Physics group at Lancaster University. He also received a 3-year contract renewal to work on observations made during Cassini's Grand Finale orbits. He headed to South Africa in august for a short fellowship with the South African National Space Agency (SANSA), funded through the National Research Foundation of South Africa (NRF), the Department of Science and Technology (SA Government) and the UK-SA Newton Fund.
- Melania Susi initially worked as a Global European Satellite System (GNSS) test specialist at Topcon Tierra in Italy, one of the world's leading manufacturers of high-precision GNSS receivers. In October 2017, she joined the European Commission's Joint Research Centre (JRC) based in Ispra, Italy, where she is working on the design and development of Galileo. Her research activities involve one of the services of Galileo, the Commercial Service, which will offer high-accuracy capabilities and will be of particular value for the professional segment of the market.

EUVIRNA | ITN-2010-264286


© Frank van Kuppeveld

- Cristina Dorobandu became an EMBO fellow at INSERM U1110 in Strasbourg after concluding her ITN training at Utrecht University. She is now a project leader at the company ViroClinics Biosciences.
- Ina Karen Stoeck is an associate editor at Springer Verlag, Heidelberg. She obtained her PhD magna cum laude through the EUVIRNA training.
- Ilane Hernández Morales did her PhD training at Janssen Infectious Diseases and Vaccines. After her PhD training, she took up an academic position at Universidad Nacional Autónoma de México as a research professor.
- Lorenzo Subissi is an ECDC fellow at the Belgian Scientific Institute of Public Health. After obtaining his PhD in molecular virology as an MSCA researcher, he received an additional MSc in epidemiology at the London School of Hygiene and Tropical Medicine. After this, he did several missions as a WHO consultant, mostly on Zika and Ebola outbreaks. Within his ECDC fellowship, he combines molecular virology with epidemiology. It is unusual to find a person with all these types of expertise.
- Pietro Scaturro is already a senior research scientist at the Technical University of Munich, only two years after obtaining his PhD through the EUVIRNA training.
- Iuni Trist trained in Cardiff and after a postdoctoral period at Siena University, she quickly became a Principal Scientist at the company Aptuit SRL for Integrated Drug Design and Discovery.
- Lyre Espada Murao trained as an experienced scientist (ER) at

Okapi Sciences, a small Belgian company. Directly after her EUVIRNA training, she became an associate professor at the University of the Philippines Mindanao in the Philippines, her home country. She is currently leading various researches on viral zoonosis and epidemiology. She also heads the Philippine Genome Center Mindanao Satellite Facility in the same university, where she is actively promoting and training local researchers in the field of omics.

Contribution of MSCA to the EU's research challenges

One of the main characteristics of MSCA projects is their bottom-up approach that allows applicants to submit applications freely, in any field of research covered by the EU treaty. In practice, MSCA projects include all societal challenges, represented by individual scientific panels, with life sciences as the most prominent one.[11]

Health, demographic change and wellbeing


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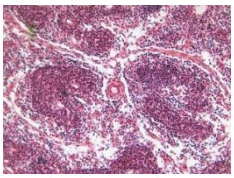
PHOQUS | ITN-2013-608133

The PHOQUS project trained a new generation of scientists to develop and apply novel techniques combining photonics, nanotechnology, advanced spectroscopy and new spectral regions with the latest advances in imaging and diagnostics technology. The project successfully implemented high-resolution STimulated Emission Depletion (STED) microscopy that allows for the observation of fluorescent structures beyond the diffraction limit. Most of the 13 researchers have already submitted a thesis or passed a PhD, and are on the cusp of promising research careers.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LIVERNCODE | CIG-2013-618154

This project took place at the Institute of Cancer Research – Royal Cancer Hospital (UK). It explored the role of non-coding RNAs (ncRNA) in primary liver cancers. The knowledge generated in this project was transferred into other forms of solid tumours, such as pancreatic cancers, and has provided evidence for the prognostic and predictive value of non-coding RNAs in this disease.


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EpiBrain | CIG-2013-630843

This project has provided tools to improve the diagnosis and outcome predictions of patients with brain tumours. In addition, regarding finding/developing new biomarkers, the researcher used DNA methylation profiles to build a classifier, MethPed, which accurately classifies unknown brain tumours to one of the known nine diagnoses. Therefore, the MethPed classifier will allow brain tumours to get a 'methylation profile diagnosis', which will enable patients to get on the correct treatment protocols, which has not always been the case before.


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HELICOMARK | IOF-2013–627794

The project identified antibody signatures to Helicobacter pylori infection and tumour proteins as serological biomarkers for early gastric cancer. The researcher found ways to assess stomach cancer risk in blood samples using the body's immune response as a tool and patented the method.

[11] Source: FP7 ex post and H2020 interim evaluation of Marie Skłodowska-Curie actions (MSCA), p. 134-135


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ncRNALungCancer | IRG-2008-239308

This project made discoveries in a gene that could be important in cancer research. The researcher has already made connections with industry to translate his new findings into potential drugs. Data generated in NCRNALUNGCANCER will provide a basis for future discovery of the markers and active players in lung cancer and metastasis. Since metastases are the most frequent cause of cancer-related death, these findings are essential for effective therapy.


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SIHI | IIF-2010–276147

'Stress-Induced Hypertension and the Role of the Neuroimmune System' provided new information on the central and peripheral mechanisms that cause inflammatory diseases such as hypertension. It also gave an insight into the link between the negative impacts of stress on hypertension and cardiovascular disease development.


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Respire2 | COFUND-2012-600368

The Respire2 fellowship researched respiratory diseases in children and adults, including asthma, cystic fibrosis, lung cancer, and sleep-related respiratory disorders. Respiratory diseases impose a global burden affecting hundreds of millions of people. The research projects involved in Respire2 contributed to advancing knowledge and understanding in many critical illnesses, with benefits for clinicians, patients and broader society.

Food security, sustainable agriculture and the bioeconomy


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METCAFOS | IEF-2014-625278

METCAFOS paved the way to improving the quality of food security projections towards 2050. As a result, the researcher was able to make policy recommendations that target more support of national research and development investments in sub-Saharan Africa, as well as on building research capacities and infrastructure, training qualified labourers and focusing on land-augmenting technologies.


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SLUDGETREAT | ITN-2014-611593

The SLUDGETREAT consortium developed a dewatering system capable of reducing the water content in sludge to increase its dry solids content and prolong its life cycle. It also investigated new nanomaterials and environmentally friendly coating techniques to minimise anode corrosion.


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PASTORALMOD | IEF-2014-622344

The researcher behind PASTORALMOD studied more than 5 000 years of human settlements in the Sahara desert to understand an effective strategy for food security in marginal environments: pastoralism. This strategy has been crucial in many parts of the world that are unsuited and is a relevant issue today due to global warming. The project helped generate a policy-oriented model for the pastoral exploitation of arid and semiarid lands.

Secure, clean and efficient energy


© Tilman Ehrcke, Shutterstock

SAFEMILLS | IEF-2014-622617

The SAFEMILLS researcher set out to discover how to mitigate the impact of wave action on the pillars supporting offshore wind turbines. The results of this project have helped find alternative structure bases for these turbines, as well as providing an insight into hydrodynamic slamming problems, strong wave impact, and the hydroelasticity of ships and offshore structures.


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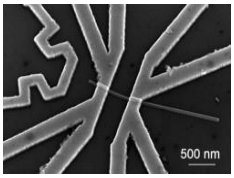
ICOMFLUID | IRSES-2012-312261

The ICOMFLUID global network of researchers, integrated by EU and non-EU countries, created an innovative mass of research efforts towards a greener future. They found ways to improve fluidised bed technologies, which can reduce pollutant emissions and the carbon footprint of energy production.



© PHD4ENERGY

PHD4ENERGY | ITN/IDP-2014-608153

Through collaboration between students and the industry at Lund University, researchers on this project led the way to more efficient and sustainable photovoltaic systems and light sources using nanowires. The use of these tiny and highly controlled structures will increase efficiency and reduce the cost of energy produced.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SCANERGY | IAPP-2013-324321

This innovative project introduced a system that supports trade between energy producers and consumers in urban areas. As a result, it enables individual users, neighbourhoods and cities to cooperate, coordinate and communicate to achieve common energy management objectives.

Smart, green and integrated transport


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MINI-CHIP | IAPP-2013-611693

MINI-CHIP researchers created a support tool that reduces fuel consumption on ships. Today's shipping industry has a significant environmental impact on the oceans and accounts for about 3.3% of global greenhouse gas emissions. The results of this project are crucial for the implementation of greener shipping operations and contribute to the shift of Europe into a low-carbon economy.


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MOTORIST | ITN-2014-608092

MOTORIST aimed to improve the safety of two-wheeler users by fostering rider behaviour and protective equipment. The project established training to enhance riders' skills by thoroughly analysing accident data and investigating rider behaviour during emergencies. As a result, the researchers were able to pinpoint the parameters to predict the response of riders in emergencies and help reduce road accidents.


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ALPES | ITN-2013-607911

One way to reduce the environmental impact of aeroplanes is to make lighter aircraft that burn less fuel, which is a difficult task, yet is strong enough to withstand any force, such as a gust of wind, they may encounter in flight. The ALPES project researchers addressed this issue by developing new techniques that enable fast and accurate predictions of burst loading. The results of this project have made a difference in aviation, and the work of ALPES continued in AEROGUST (636053).

Climate action, environment, resource efficiency and raw materials


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RABOT | IRSES-2012-318902

The 'Real-time adaptive networked Control of Rescue Robots' (RABOT) project took place between July 2012 and July 2016. It developed a research partnership between Chinese and EU research institutions to create an autonomous robot for rescue applications and produced four patent applications, including one for a hybrid leg-wheel four-legged robot, which received several European and Chinese awards. The consortium received further funds from both China and EU and laid the groundwork for a long-term, sustainable international consortium in intelligent robotics for rescue and recovery operations.


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CLIMBING | IEF-2012-330249

CLIMBING provided evidence that climate change affects different components of biodiversity (taxonomic and functional) at the continental and local scale. The findings indicate the need to implement measures to mitigate the effects of climate change and to reduce the nutrient load on lakes. These results may have an impact on the Water Framework Directive Strategy and the EU Biodiversity Strategy to 2020.


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LINC | ITN-2011-289447

This project set out to train 12 young researchers in interdisciplinary fields and to promote long-term international research collaborations, particularly between the academia and the private sector. The project findings helped to enhance the understanding of relevant climate phenomena, propose novel early-warning indicators of critical transitions, and identify hydrodynamic communities to help design marine reserves.


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ITARS | ITN-2011-289923

This initiative developed Europe-wide training for a new generation of scientists in academia and the private sector. It also improved the understanding and measurement of aerosol and cloud processes at atmospheric levels. Project efforts helped raise public awareness of climate change and its potential impact and fostered close cooperation between academia and industry. The researchers presented their results at the Meteorological Technology World Expo in Brussels, where they discussed their plans with industry leaders.

Europe in a changing world - inclusive, innovative and reflective societies


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AMORE | IEF-2014-625364

AMORE studied migration policies and administrative practices that regulate access to citizenship and residence permits, focusing on binational families that consist of an EU citizen and a third country national. The project's findings improved the understanding of the impact of political and administrative factors on the lives of binational families.


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DIVID | IEF-2015-627982

This project studied and highlighted the benefits of multiculturalism to help overcome prejudice and ethnocentrism. This research is crucial in today's most interconnected world for many reasons: the emergence of right-wing extremism, new anti-immigration policies in the US, and entrenched fear in societies that feel threatened by immigrants. The project results found that ethnic and religious diversity at the national level was associated with better health and well-being. Therefore, it is an essential contribution to challenge ethnocentric and anti-immigration discourse across the world.


© Kilav, Getty

iCARE | ITN-2014-607139

The Improving Children's Auditory Rehabilitation (iCARE) project focused on enhancing oral communication in children with hearing impairment through the development of novel methods, training skills and procedures. It successfully reached this goal, iCARE created a multidisciplinary consortium of partners from academia, industry and socio-economic agencies, which allowed a comprehensive training of researchers and enabled them to become 'communication experts' whose knowledge and skills are interdisciplinary.


© ITN-DCH

ITN-DCH | ITN-2013-608013

ITN-DCH created a cost-effective system to document, conserve, protect and visualise all aspects of European cultural heritage to make it more comprehensive and accessible. They documented cultural heritage using drones, 3D laser scanners, 360-degree cameras and ground-based multi-spectral devices. Then, they uploaded the recorded data onto a platform and into the EU digital platform for cultural heritage Europeana. UNESCO and other international organisations will soon adopt this methodology for the digital documentation of archaeological sites and monuments. During the European Year of Cultural Heritage (2018), the project won the 'Best Innovation Award' at the 'Fair of European Innovators in Cultural Heritage' event, and the Coordinating Institution received the UNESCO Chair and the EU ERA Chair on Digital Cultural Heritage with a € 2.5 million budget.


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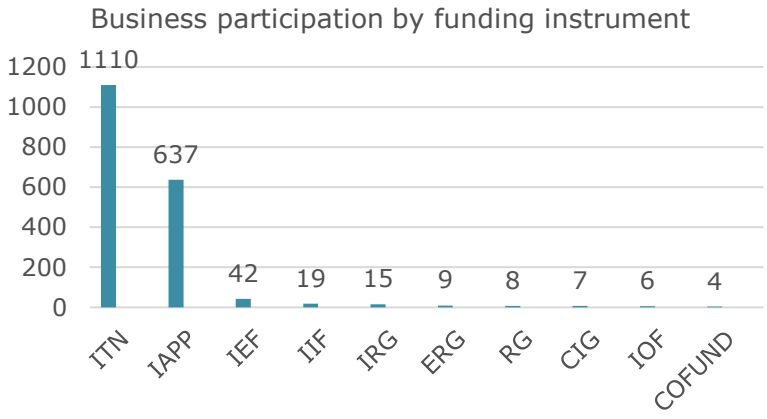
4D-CH-WORLD | IAPP-2013-324523

This project developed tools for the cost-effective creation of 4D digital maps in cultural heritage, which have been exploited in the restoration of the Holy Aedicule of the Holy Sepulchre Church in Jerusalem. Moreover, 4D-CH-WORLD and ITN-DCH joined forces to form project Mosul and virtually restored the archaeological artefacts that DAESH destroyed in 2015 by reconstructing and modelling them from images available online.

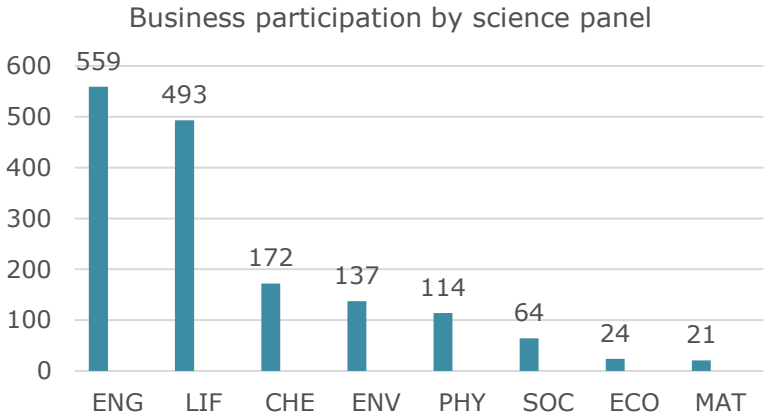
Business participation in MSCA

Approximately 24% of MSCA FP7 participants came from the private sector/industry. Business participation proved valuable to the companies, which appreciated the access to highly skilled researchers, expertise and infrastructure from academia, and were able to strengthen international collaboration. The researchers themselves also valued this aspect and had an impact on the consortia in which they participated and on the European economy.



Businesses participated mainly through IAPP and ITN actions. The first allows participating companies to build the curriculum of doctoral students. The second offers the possibility of attracting highly qualified researchers to enhance the research capabilities of a company.

CORDA data: FP7 (2007-2013)



The highest industrial participation was in information science and engineering (30.2%) and life sciences (26.7%). The science panel was not indicated in 265 participations, including 51 from the COFUND instrument.

[12]CORDA data : FP7 (2007-2013)

The most significant number of business participation came from Germany, followed by the UK and the Netherlands, while Croatia, Latvia and Lithuania had the fewest.[13]

Around 47% of beneficiaries from businesses indicated that thanks to their project, at least one new full-time job had been created in their organisation[14]. Moreover, 89% of businesses started to collaborate with at least one new academic organisation[15]. In many cases, the private sector beneficiary later recruited researchers involved in the project. Industrial participation in a project

[12] Chemistry (CHE), Economic Sciences (ECO), Information Science and Engineering (ENG), Environment and Geosciences (ENV), Life Sciences (LIF), Mathematics (MAT), Physics (PHY), Social Sciences and Humanities (SOC).

[13] [14] [15] Source: Study of business participation and entrepreneurship in Marie Skłodowska-Curie actions (FP7 and Horizon 2020), p. 10, 27, 57

had a significant positive impact on researchers' progress, produced a higher number registered patents compared to the FP7 average.

Individual fellowship in a promising Swiss SME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UltraTune | IIF-2009–251276

The project 'High-power, low-noise, ultrafast tuneable laser sources using supercontinuum generation' ran for 24 months between 2010 and 2012. It allowed an experienced German researcher to return to Europe after spending many years in the USA and join a Swiss SME to work on ultrafast lasers. The project developed a novel pulse laser for use in biomedical applications, and by exploiting the latest developments in solid-state lasers alongside recent advances in fibre technologies, a compact, affordable ultrafast laser source that is both high-power and low-noise. The beneficiary decided to put the technology on the market, and the prototype allowed researchers to achieve promising results in a non-linear microscopy application for obtaining in-depth, three-dimensional optical images of living cells.

Building the future of maritime and underwater robotics research


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ROBOCADEMY | ITN-2014-608096

ROBOCADEMY established a European training and research network to develop key skills and expand knowledge in underwater robotics for the exploration of the oceans. It did so through a close collaboration of leading research institutes, SMEs in robotics and marine technology. This project brings this community together to advance the current state-of-the-art underwater robotics, train specialists in underwater technology, and to gain ground against competitors in North America and Asia.

Exceptional industrial contribution in diabetes


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GOCARB | IAPP-2011-286408

This IAPP project helps people suffering from diabetes to define the optimal prandial insulin dose by simply taking two pictures of their plate of food with a mobile phone. A software analyses the carbohydrate levels in the different food items, and gives an advice on the medicine to take. The project has a high impact on EU healthcare systems and policy, through the improvement of the quality of life of patients, with clear socio-economic benefits to society.

Transforming industrial agri-tech research


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NexGenAgriChem | ITN-2014-607466

This programme is unique in the UK and the EU, as it breaks down boundaries between the Physical sciences and Agri-sciences. Leading researchers from academia and industry supervised the multi-disciplinary and intersectoral PhD projects involved. The programme trained a new generation of researchers to develop new tools and technologies to shed light on agrochemicals.

Technology transfer fellowships in COFUND


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TTF | COFUND-2013-609395

The TTFs aimed to bring researchers from across the world to universities and SMEs in Belgium and encourage technology transfer, stimulate innovation and develop careers in a range of sectors key to economic growth - including aeronautics and space, agro-food, biotechnology and chemicals. Eighty-five researchers are now engaged in the programme from more than 30 countries, including European countries, the US, China, India, Australia and Chile. The impact of industry participation on research training is significant.

Significant industrial participation in an initial training network


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EMVEM | ITN-2012-315967

This project developed the techniques and technologies needed to assess energy efficiency in commercial products. The team helped move the sector's design approach from one driven by performance and capacity to one focused on energy efficiency. The group also developed robust simulation and experimental validation methodologies to support the increased prevalence of virtual design and prototyping. Thanks to the work of EMVEM, many young researchers were trained in the thematic analyses and methods of the project. Therefore, researchers will be well equipped to contribute to a growing and potentially lucrative field.

Addressing bone and joint disorders


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Fibrogelnet | IAPP-2013-324386

This project brought together a team of researchers and engineers representing both academia and industry to contribute to the development of a groundbreaking implant that promotes bone and cartilage regeneration combining high-performance materials, living cells and advanced nanotechnology.

Researcher reintegrated in IBM


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GraphRules | RG-2009-249146

The host institution, IBM Research GmbH, has patented and presented to clients the results of this successful Reintegration Grant. Several pilot projects within the institutions have used the results of the project. The results of the project could be used to develop pilot projects covering more extensive geographical areas.

International dimension and mobility in MSCA

The mobility of researchers across countries and sectors is at the core of the MSCA. Researchers from 140 nationalities and organisations from more than 90 countries participated in the MSCA projects. The mobility promoted by the 'People' programme has contributed to enhancing international networking and collaboration and to attracting research talent. Nearly 34% of all MSCA-funded researchers were nationals from third countries (including short-term exchanges under the IRSES scheme).[16]

83% of MSCA beneficiaries agreed that the programme provided attractive international mobility opportunities for researchers in their organisations and to attract researchers to their organisation from abroad. 81% agreed that the programme has helped create new collaborations with academic organisations or business enterprises.[17]

The international scope of MSCA was higher in IRSES and IOF/IIF actions due to their direct relationship with third countries.

IRSES

The IRSES action produced over 30 000 secondments of research staff during FP7. In total, 65 countries from five continents hosted seconded staff through this action, making it a leading programme under FP7 in terms of stimulating knowledge transfer and in sharing research. The three main third countries participating were China (with over 10% of the total secondments received), the United States and Russia, showing a significant interaction between Europe and major research actors at the global level. From the EU side, the UK, Italy, France, Germany and Spain each hosted over 1 000 secondments, and in total, the 28 Member states hosted over 13 000 secondments from third countries.

IOF-IIF

Around 1 800 researchers conducted their research at third country organisations via the IOF action to receive specific training and bring the newly acquired skills back to a European institution. However, while researchers were free to move to any non-European country, the vast majority ended up going to English-speaking countries, with 83% of those researchers going to North America (73% to the US and 10% to Canada) and 10% to Oceania (8% Australia and 2% New Zealand). The remaining 7% were scattered across Africa, Asia and South America. The UK (17%), Spain (16%) and France (15%) were the three main European destinations for the researchers when they returned from their outgoing phase.

The IIF action also enabled around 1 300 researchers from around the world to come from a third country to an EU Member state or FP7 associated country to transfer knowledge to the receiving host organisation. In total, researchers from 75 different nationalities came to Europe under this action. The nationalities most represented were China (15%), the US (13%) and India (10%), while the UK was the leading destination by a large margin (40%), followed by France (10%) and Germany (8%).

[16] Seventh FP7 Monitoring Report 2013, p. 30.

[17] PPMI 2013.

Photo: © iStock

International awards for MSCA researchers

FP7 MSCA researchers established companies, patented their inventions, advanced their academic and professional careers, and received awards for their outstanding discoveries and accomplishments. From the discovery of the Higgs-Boson subatomic particle to a Breakthrough Award for a world-renowned expert on neurodegenerative diseases, these are some of the researchers who have received international awards and recognition.

Discovery of the Higgs Boson subatomic particle

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Six of the 17 researchers associated with the ITN project ACEOLE (211801) were directly involved in the revolutionary discovery of the Higgs Boson subatomic particle, which the European nuclear research facility CERN claimed on 4 July 2012. A group of MSCA researchers was part of the team that presented, back in 2012, evidence on Higgs' theories, who 50 years ago predicted the existence of a particle that holds the Universe together. This groundbreaking discovery later led to the awarding of the 2013 Nobel Prize in Physics to the Belgian physicist François Englert and British physicist Peter W. Higgs.

MSCA researcher supervised by Nobel prize laureate James Rothman

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Dr Abdou Rachid Thiam, a French researcher supported by the IOF project BFLDs (299292), has been part of the team of Nobel Laureate James E. Rothman for two and a half years. Prof Rothman was one of the three researchers who received the Nobel Prize in medicine and Physiology in 2013 for discovering how cells accurately transport material. He identified proteins embedded in the vesicles of cells, which act as a docking mechanism, meaning that the cargo (molecules such as hormones and enzymes) is released in the correct location as it moves around cells.

Two FP7 projects received MSCA Awards

NANO-HOST (ITN-215193) won the 'Sharing Excellence' category, while Beware Fellowships (Marshall Fellowships-COFUND-600397) won the 'Innovation and Entrepreneurship' category at the MSCA Presidency Conference in Bucharest in June 2019. The annual conference brings together researchers, European and Member State officials, policymakers and stakeholders from across Europe and focuses on the impact, current challenges and new trends of the MSCA.

ITN supervisor winner of the Anna Lindh Award

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Dr Nathalie Tocci, supervisor of the ITN researchers in the EXACT (238447) project, was the winner of the Anna Lindh Award for the study of European Foreign Policy in 2008. Since the completion of the EXACT project, she has become honorary professor at the University of Tubingen, Special Advisor to Federica Mogherini, the EU High Representative for Foreign Affairs and Security Policy, and more recently Director of the Italian Institute of International Affairs.

Very successful research team as a result of a CIG


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Dr Bing Hu, a researcher of the CIG project OralStem (618930), was recognised for the success of the project's research team. His students have won crucial research awards, including twice the Unilever Poster Prize, and the prestigious CPD RSci Awards from the UK Science Council. This significant progress has helped Dr Hu secure two major research grants from the EU and the Biotechnology and Biological Sciences Research Council (UK), as well as other smaller grants, the total value of which exceeds £1.5 million. Dr Hu has published many papers and filed two patents. He has established collaborations with more than 20 national and international universities and five industry partners. The EU Marie Curie CIG Fellowship has enabled Dr Hu to build his research career and to become an authority in global oral biology and cancer research.

Fields Medal in mathematics in 2014 awarded to MSCA senior scientist


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BREUDS (318999) was an IRSES project from the 2012 call and a partnership between leading European and Brazilian research groups in dynamical systems, a prominent subject in mathematics. One of the senior scientists involved in the project was Professor Martin Hairer, winner of the prestigious Fields Medal in 2014 for his outstanding contribution to mathematics. Professor Hairer was seconded in the BREUDS project from the University of Warwick to the National Institute for Pure and Applied Mathematics (IMPA) in Rio de Janeiro, Brazil.

Working with top researchers leads to a successful career


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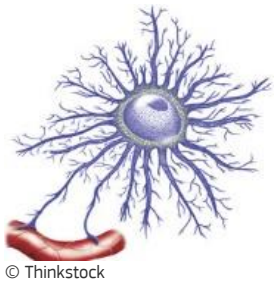
Professor Sean Hartnoll of the Stanford Institute supervised Dr Goutéraux (IOF researcher on the project HOLOLAND (624054) in Theoretical Physics. Professor Hartnoll was the 2014 winner of the 'New Horizons in Physics' award, given as part of the 'Breakthrough Prize in Fundamental Physics', and the 2014 'Presidential Early Career Award for Scientists and Engineers' (PECASE). During the return phase, Professor Konstantin Zarembo supervised Dr Goutéraux's work at the Nordic Institute for Theoretical Physics (NORDITA). Following his success with the HOLOLAND project, he received a five-year assistant professorship at NORDITA (2016-) and a permanent position at École Polytechnique, France, as well as an ERC Starting Grant (2017) on 'Hydrodynamics, holography and strongly-coupled quantum matter'.

IRG researcher winner of the NRJ-fondation de France Prize in 2011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Dr Séverine Boillée, a researcher from the IRG project MICROGLIA IN ALS (230978), is currently an associate professor at INSERM and head of the 'ALS causes and mechanisms of motor neuron degeneration' team at the Institut du Cerveau et de la Moelle épinière (ICM) in Paris. Before joining INSERM with IRG funding, Dr Boillée held a post-doctoral position at UC San Diego in the lab of Professor Don W. Cleveland, winner of the 2018 Breakthrough Prize in Life Sciences and a world-renowned expert on neurodegenerative diseases. Since her return to Paris, Dr Boillée has won the NRJ-fondation de France Prize in 2011 (which recognises each year a scientist in the field of neuroscience). She also became a

member of the scientific advisory board of the Thierry Latran Foundation (European ALS association), the ARSLA (French ALS association) and the scientific programme committee of the annual meeting of ENCALS (European Network for the cure of ALS).

Exceptional ITN researcher awarded the EAPC Early Researcher Award


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One of the researchers recruited under the ITN project EURO IMPACT (264697), Lara Pivodic, received a prestigious prize and two fellowships:

- European Association for Palliative Care (EAPC) Early Researcher Award in 2017.
- Postdoctoral Fellowship of the AXA Research Fund in 2016 (awarded to 27 researchers worldwide and across disciplines).
- Postdoctoral Fellowship of the Research Foundation-Flanders in 2017 (most important postdoc grant funded through public funds in Flanders).

MSCA researchers compared to other researchers

The 2014 study 'Marie Curie researchers and their long-term career development: A comparative study'[18] compared responses from over 1400 MSCA researchers with those of over 1500 researchers who had not taken part in the programme. According to the study, the MSCA yielded positive results on the careers of MSCA researchers in terms of employability, career drivers, professional output, mobility, achievements and gender gap.

Career drivers and employability

MSCA researchers were able to access high-quality research facilities and laboratories, expand their network and enhance their interdisciplinary skills. In many instances, the host institution employed researchers at the end of their fellowship.

Mobility of researchers

Geographical, cross-sectoral and cross-disciplinary mobility of MSCA researchers increased in FP7. MSCA researchers also proved successful in supporting the return of European researchers, as well as attracting non-EU researchers.

Professional output

MSCA researchers are more successful in gaining access to highly competitive European Research Council (ERC) grants following their fellowship and in obtaining teaching degrees more frequently than other researchers. Besides, they publish more articles in influential journals and have better citation records. Furthermore, the proportion of patents for MSCA researchers is significantly higher in all phases of the patent cycle.

Employment status and career achievements

MSCA researchers achieve professorship titles more frequently than other researchers do, enjoy better employment contracts and are more satisfied with their job.

Gender gap

Female MSCA researchers have a 13% greater probability of obtaining high profile awards later in their career than non-MSCA researchers, probably due to their better familiarity with moving in an international research environment. The MSCA fellowships also had some impact in closing the gender gap when it comes to resuming an interrupted career (e.g. for maternity), an increase in the number and quality of publications, more access to international research funds and opportunities to being appointed as Associate Professor, Professor or Principal Investigator.

[18] Source: Marie Curie researchers and their long-term career development: A comparative study

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Alessandra Luchetti

REA Head of Department A – Excellent Science

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