1971 - 2021

50 YEARS OF RESEARCH NETWORKS

cost
EUROPEAN COOPERATION
IN SCIENCE & TECHNOLOGY

CONTENTS

MESSAGE BY THE PRESIDENT OF COST

The European Cooperation in Science and Technology (COST) celebrates its 50-year anniversary. This publication offers an extensive overview of COST in the last half century. It is a unique opportunity to channel the voices of researchers and innovators both past and present through success stories, testimonials and key milestones.

The creation of COST at the Ministerial Conference of 22 and 23 November 1971 was a solution to key challenges that researchers in Europe were facing at the time. This date is generally presented as the official entry into force of COST and the moment at which the first intergovernmental agreements on research projects were signed.

COST was the first European funding programme at the pilot stage of experimental scientific and technological cooperation. COST has in practice demonstrated that cooperation between countries was possible on a far larger scale even if they did not all belong to the European Community. COST contributed to the successful integration of EU Member States within the European Research Area (ERA).

Until this day, COST strengthens Europe's capacity to address scientific, technological and societal challenges by providing networking opportunities for researchers and innovators. COST implements this mission through funding excellence-driven, bottom-up, interdisciplinary, open and inclusive networks in all areas of science and technology.

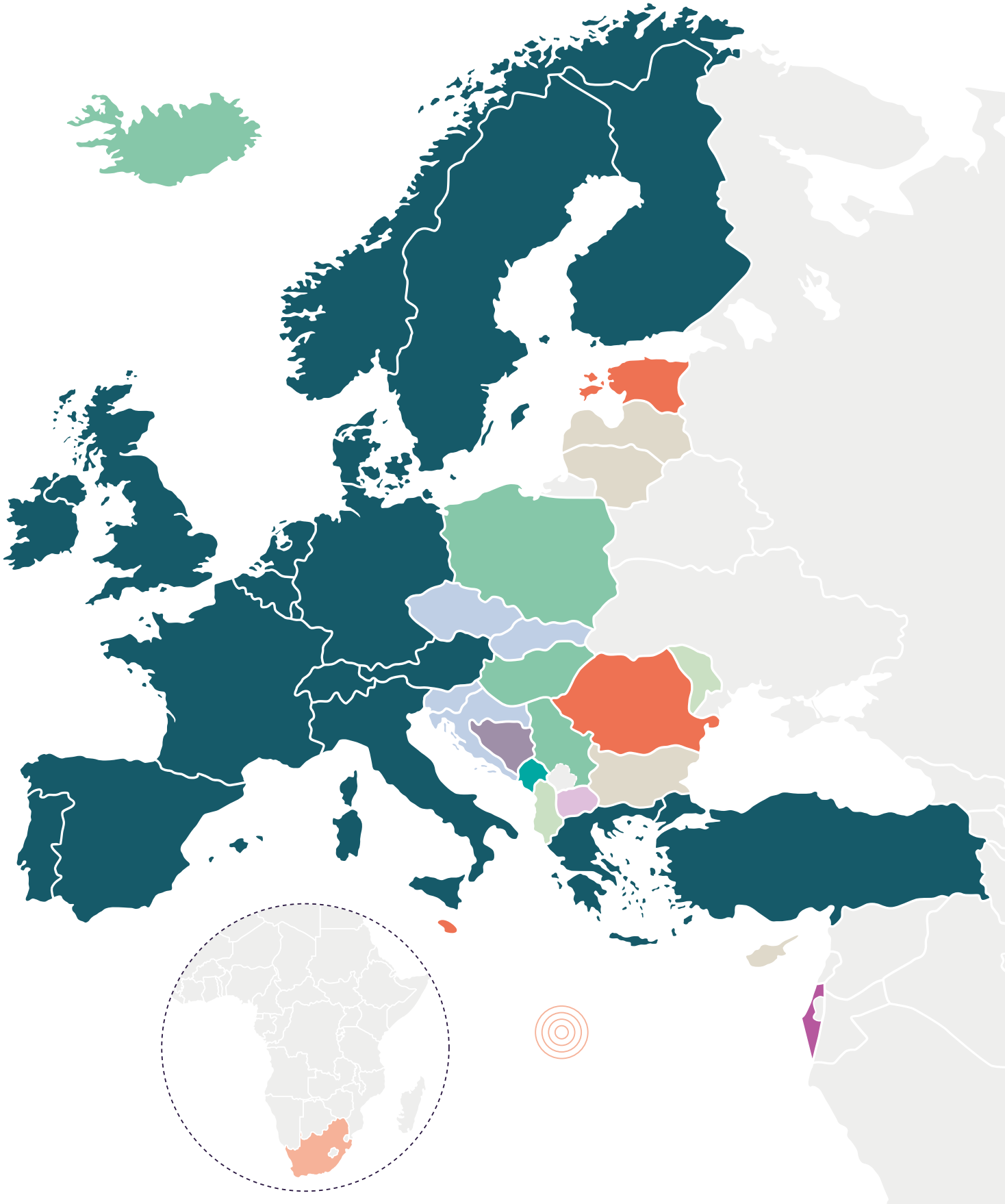
Every year, more than 45,000 researchers are involved in COST networking activities, regardless of their career stage, country of origin or areas of interest. COST provides structural support to the ERA, widening the Research & Innovation base in Europe.

As COST President, I am very proud of this programme which connects top performers including European Research Council grantees and even Nobel Prize winners. COST maximises the production of new knowledge, breakthrough discoveries and works towards an even better circulation of both ideas and people across Europe and beyond. I hope you will enjoy reading about COST's successes, which demonstrate that Together we are stronger.

In a rapidly changing Europe, joint research represents our best hope for answers and COST continues to be at the forefront.

Prof. Paulo Ferrão
President of COST

COST MEMBERS' HISTORY



Timeline

1971 — COST has 19 Members: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, Turkey, United Kingdom, Yugoslavia.

1991 — 5 Members join COST. Serbia, Hungary, Iceland, Poland and Czecholslovakia (one country Czech and Slovakia).

1992-93 — 4 Members join COST. Croatia and Slovenia, Czech Republic and Slovakia.

1997 — 3 Members join COST: Malta, Romania, Estonia.

1999 — 4 Members join COST. Bulgaria, Lithuania, Latvia, Cyprus.

2000 — Israel becomes a Cooperating Member.

2002 — The Republic of North Macedonia joins COST as a Member.

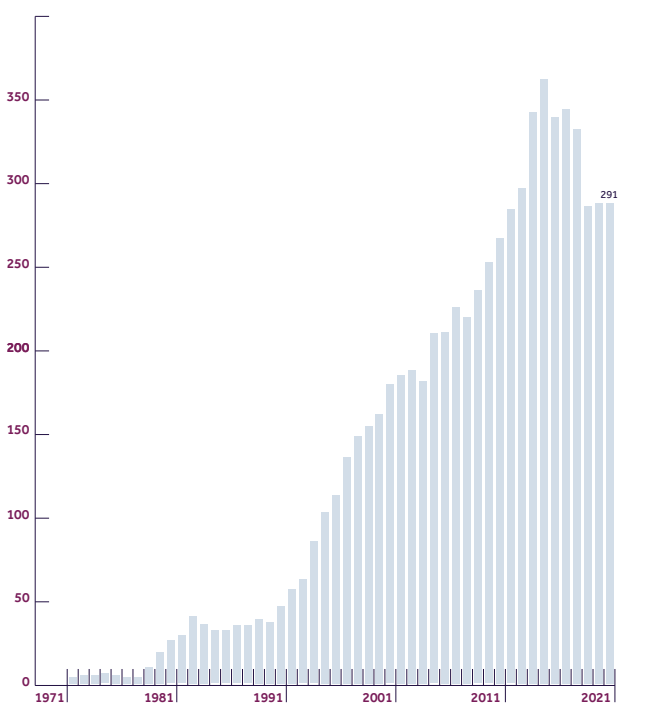
2009 — Bosnia and Herzegovina joins as a COST Member.

2015 — Montenegro joins as a COST Member.

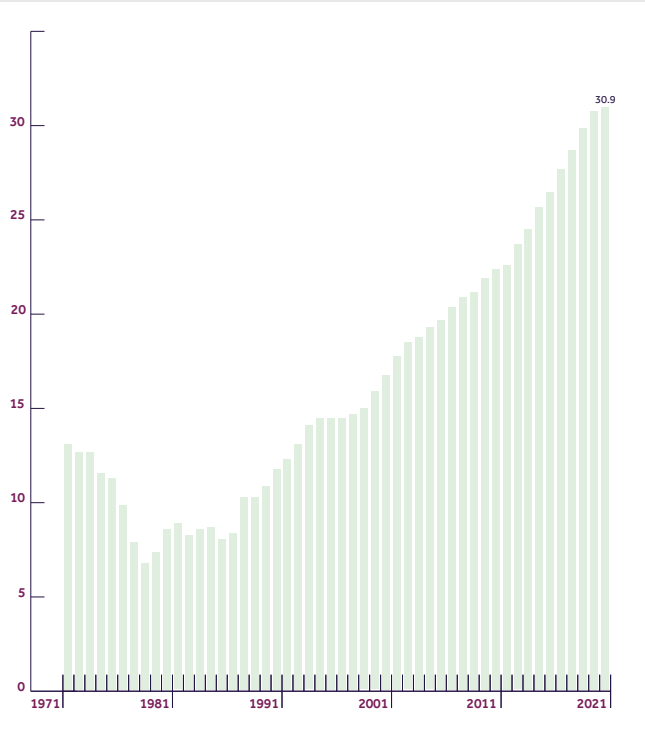
2018 — Albania and Moldova join as COST Members.

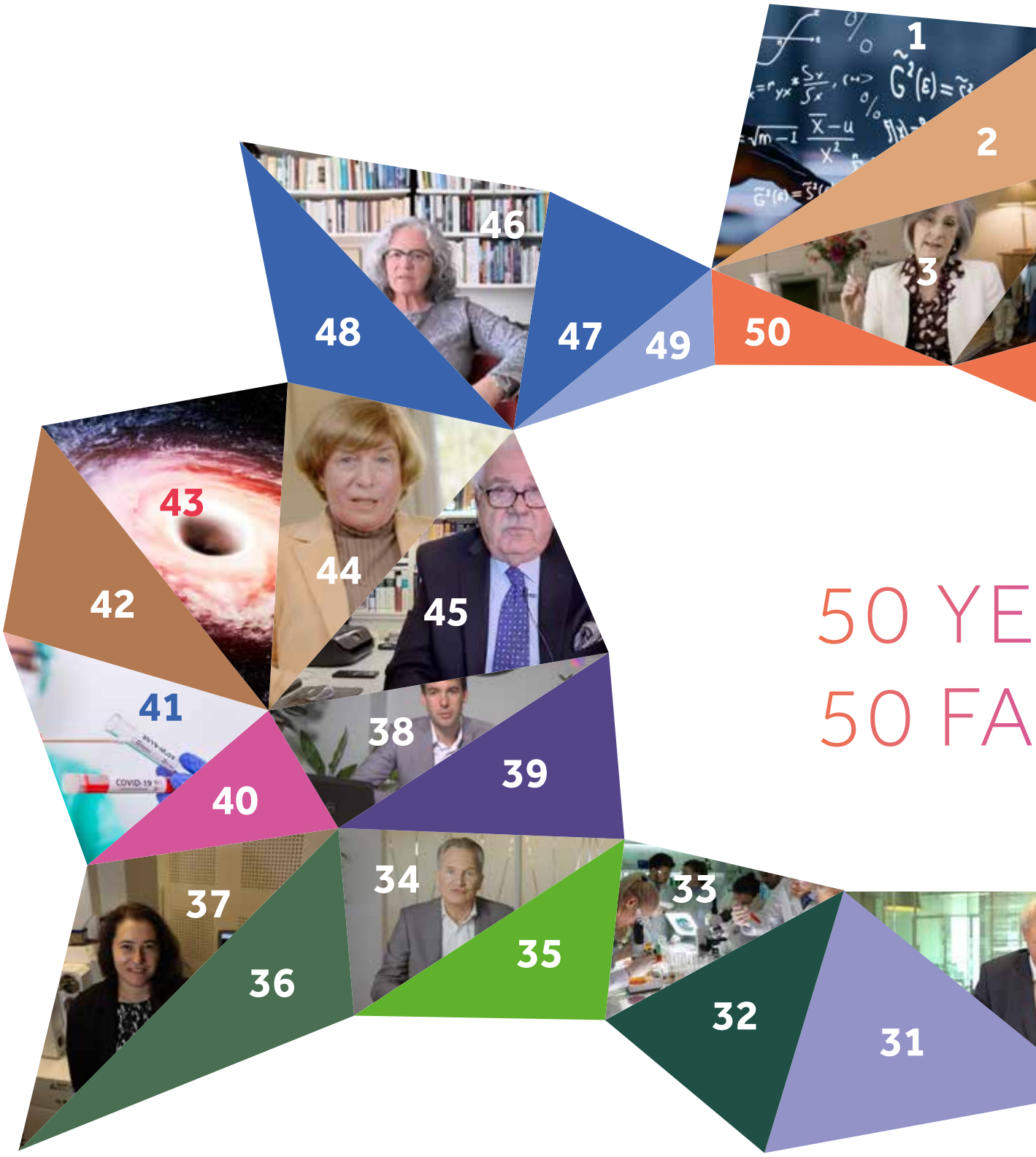
2019 — The COST Association welcomes the Republic of South Africa as its first COST Partner Member.

NUMBER OF RUNNING ACTIONS SINCE 1971



AVERAGE NUMBER OF COUNTRIES PER ACTION SINCE 1971





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'MATH-A-THONS' FIND SOLUTIONS FOR COMPANIES AND SOCIETY

10 MAY 2020

A COST Action has helped deliver innovative solutions to 80 organisations through the power of maths. Study Groups in MI-NET gave companies ways to increase production and showed non-profit bodies and governments how to better use resources.

Mathematics drives science and technology. With good access to maths experts, organisations can improve their processes and better use their resources. Enter COST Action 'Mathematics for Industry Network' (MI-NET), founded in 2015, to remedy this lack.

In addition to the workshops, short-term scientific missions and training events typical of COST Actions, mathematical scientists in the 32-country MI-NET network held 21 European Study Groups with Industry (ESGIs) across Europe.

The approach used in these groups was developed in the United Kingdom in 1968. During week-long meetings, maths researchers work on problems together with companies, NGOs and government authorities, such as ways to save materials or to better distribute health care.

Overall, MI-NET worked with 80 non-academic organisations. "*Maths can be applied to any real-life challenge,*" explains Dr Katerina Kaouri of Cardiff University in the

"There is a lot of untapped potential in these Study Groups for companies. COST significantly increased the number of ESGIs and the range of real-life challenges they addressed."

Dr Katerina Kaouri,
Lecturer in Applied Mathematics,
Cardiff University, UK

Mr Costas Sisamos, CEO and founder of ENGINO Toy Systems

UK and lead organiser of two MI-NET ESGIs held in her home country Cyprus.

Experienced mathematicians screened problems submitted by businesses and organisations. "*This allowed us to choose challenges with value for organisations and for researchers,*" says Kaouri.

"*There is a lot of untapped potential in these Study Groups for companies. COST significantly increased the number of ESGIs and the range of real-life challenges they addressed,*" she adds.

ACCESS TO EXPERTISE

The Cyprus Study Groups are testament to this potential. For example, an SME, Engino, asked the island's first ESGI how to automatically generate toy assembly instructions to reduce costs and increase its product range. According to Kaouri, the research team quickly published their innovative approach in an academic journal and are discussing follow-on development of the concept with Engino.

In the second ESGI in Cyprus, one team worked on improving innovative medical testing and air filters and another on reducing tugboat fuel consumption in ports. A third identified barriers to women in science, potentially harming Cyprus' competitiveness. "*This generated an important discussion in Cyprus,*" Kaouri says.

Links with EU projects such as SciShops extended the maths-society collaboration. And to expand the use of ESGIs, MI-NET held 12 modelling weeks to train young researchers in industrial mathematics. It also created handbooks on how to set up ESGIs and modelling weeks, along with a challenge case-study booklet.

Non-academic organisations pay to take part in ESGIs, with SMEs and NGOs paying low or no fees.

"*We wanted to provide R&D to organisations that would not otherwise have access to academic expertise,*" Kaouri explains. "*We activated this kind of academia-industry collaboration in parts of the world where this had not been done before.*"

Further information
View the Action
View the Network website

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MOVING MEDICAL RESEARCH INTO THE MARKET

Ensuring excellent research outcomes translate into commercially successful products is a big issue for EU science policy. But an Irish medical researcher, one of the youngest ever leaders of a COST Action, seems to have found the key to success. Martin O'Halloran was Vice-Chair of COST Action Development of a European-based Collaborative Network to Accelerate Technological, Clinical and Commercialisation Progress in the Area of Medical Microwave Imaging and has since been awarded five European Research Council (ERC) grants.

Martin O'Halloran had just completed his PhD at the National University of Ireland at Galway when he first got involved with COST. "*My doctorate was on the use of Microwave Imaging (MWI) to detect early-stage breast cancer,*" explains Martin. "*And in 2010-2011 I was exploring how to get involved with international groups and in particular how to move my research outcomes into the clinic or the commercial marketplace.*"

He was shocked to find that little medical device research moved into actual clinical testing and even less resulted in commercial devices. "*There was a massive translational gap out of the lab and into the market,*" says Martin. "*So, rather naively, with a colleague in Lisbon University - Raquel Conceição - I wrote a COST application to bring together researchers to disseminate knowledge and accelerate commercialisation.*"

"*To be honest neither of us knew much about COST at the time and we later found out that we were the youngest ever applicants!*" continues Martin. "*But we ended up leading a group of 180 researchers across Europe on commercialisation aspects of MWI technologies.*"

CAREER BOOST

This was an important career boost for Martin. Every six months the Action brought together all the leading experts in his field to talk about their translational experiences involving all parts of the innovation chain from basic research to manufacturers, finance providers and device users. The Action resulted in several MWI devices coming to market.

With this success Martin started to look at other medical applications and clinical needs outside breast cancer. "*Currently in my group I have 23 active medical device projects with almost 60 researchers,*" says Martin. "*All of this work is based on learnings from the COST Action.*"

"It is essential that research moves out of the lab and into the market, but to be a successful entrepreneur takes a special type of person," claims Martin. *"However, through the COST Action we learnt that there is a process, and it is repeatable."* Last year he was granted six patents – all of which are commercially licensed.

"Currently in my group I have 23 active medical device projects with almost 60 researchers."

Martin O'Halloran,
Researcher at National University of Ireland,
Galway, Ireland

HUGE IMPACT

Martin sees one of the great values of COST being the huge reach of its learnings and their practical use. *"COST events take the best, most useful parts of international conferences and gives them focus so you only get the really relevant stuff,"* says Martin.

He sees COST as an excellent entry point for researchers with ambition to engage with larger EU projects: opening doors and enabling you to meet the *"real doers – the crucial handful of people you need to know"*.

Since the COST Action, Martin has gained five ERC grants: one starter grant and four proof of concept awards covering areas such as women's health and chronic pain, but all based on the fundamentals covered in the COST Action.

"The COST Action helped us to recognise patterns in the innovation chain," concludes Martin. *"To see what investors need and understand the common strategies for success."*

Further information
View the Action

3 DR ÁNGELES RODRÍGUEZ PEÑA

Interview with Dr Ángeles Rodríguez Peña, President of COST 2010 - 2017.

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COATINGS NETWORK FIGHTS AGAINST FUTURE PANDEMICS

23 APRIL 2020

In a globalised world where long-distance travel can quickly spread infectious diseases like COVID-19, innovative germ-killing coatings for hospitals could save lives. AMiCI, a COST Action, has developed a database that helps regulators, manufacturers and healthcare providers to safely introduce the technology, while a COST Innovators Grant is supporting scientists to commercialise bug-beating breakthroughs.

Millions of people worldwide catch infectious diseases from hospitals and other healthcare settings – over 4 million people each year in the EU alone, according to the European Centre for Disease Prevention and Control. These sometimes-lethal infections are mainly transmitted via surfaces such as beds or tables, which are also a source of infection for viruses like COVID-19.

"We have to be prepared. This will not be the last pandemic."

Dr Minna Keinänen-Toivola
Satakunta University of Applied Sciences, Finland

Anti-microbial coatings (AMC) are a possible solution. Active ingredients like copper or special chemical compounds protect walls, bed curtains and other surfaces, killing or repelling bacteria and viruses.

The COST Action "Anti-Microbial Coating Innovations to Prevent Infectious Diseases" (AMiCI) is making it easier for manufacturers and hospitals to make full use of these coatings. The network of over 60 institutes and companies from 33 European countries has developed a database of active ingredients in AMCs, an overview of current European research, and advice on designing safe products.

AMiCI has also identified issues with testing methods and approval processes in Europe and prepared guidelines for combining the coatings with best cleaning practice to optimise hospital hygiene.

"*Before COVID-19, [hospital-acquired infection] was an urgent issue. Now, sadly, more people are waking up to it,*" says the Action Chair, Dr Minna Keinänen-Toivola of Satakunta University of Applied Sciences in Finland.

The environmental scientist explains that in severe cases of viral disease like COVID-19, patients can develop secondary bacterial infections in their lungs. She believes that lessons from COVID-19 will include better use of microbe-resistant coatings: "*We have to be prepared. This will not be the last pandemic.*"

AMiCI could make a real difference to pandemic-readiness. The network will present its results to Members of the European Parliament (MEPs), after they are published in the respected Journal of Hospital Infection. The information can then spread out to national and EU regulators, the gatekeepers who ensure that AMCs are safe for humans and the environment and do not create antimicrobial-resistant 'super bugs', says Keinänen-Toivola.

AMiCI could also help to improve testing standards, for more effective products. For example, in one project, a researcher created a new testing model that mimics hospital conditions more closely than existing conditions, giving researchers a better idea of how well a coating will work in real life.

Finally, the network's guidelines for designing and using coatings provide a short-cut to researchers who want products to be easy to clean, cost-effective and durable – essential for busy, cash-strapped hospitals.

Many of these concrete results are thanks to input from producers, suppliers and potential users of AMC, standards organisations and EU research funders.

"*The Action was based on science, cooperation and discussion on how the Action relates to real life, to bring innovation to the market,*" says Keinänen-Toivola.

AWARDED A COST INNOVATORS GRANT

Although AMiCI ended in April 2020, many of the Action members have formed a group which has won a COST Innovators Grant. The aim is to develop an online platform to help researchers commercialise anti-microbial innovations.

The platform includes information and scientific mentoring on potential coatings that can be tested and how to get these to different markets. It also explains how to register an invention, access financing and scale up to mass production through new field and pilot tests.

"*Great science is being done but people don't know how to turn it into products,*" Keinänen-Toivola says.

In particular, the platform will target young researchers, researchers from less-research-intensive countries and women from AMiCI, followed by a call on social media. It will also publish lectures and videos on YouTube and social media that will be available to all.

Keinänen-Toivola adds that the COST Action will shortly release a YouTube video of some of its young researchers' achievements and is looking forward to future successes. "*The Grant doesn't just maintain the AMiCI network, it expands it.*"

Further information

View the Action

View the Network website

5 PROF. ELENA DUMOVA-JOVANOSKA

COST Action participant, Prof. Dumova-Jovanoska, works at Ss. Cyril and Methodius University in Skopje, in the Republic of North Macedonia.

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TESTIMONIAL BY PROF. MILAN DADO

"A very important time for me personally was when the former Czechoslovakia joined the COST Programme in 1991. We participated from the beginning in collaboration with, mainly, my colleagues from Prague. After the splitting of the former Czechoslovakia in 1993, we became as researchers and scientists full COST members from Slovakia.

Another significant time was in the nineties when I participated in 3 COST Actions (239 - Ultra-High-Capacity Optical Transmission Networks. Chair: E. Le Coquil, France, 241 - Characterization of advanced optical fibres for the photonic network. Chair: P. Di Vita, Italy, and 240 - Modelling and measuring advanced photonic telecommunication components. Chair: G. Guekos, Switzerland) focused on different areas of optical communication networks, photonic integrated circuits and systems. It was the springboard for my future career as professor of telecommunications.

The same happened to many researchers in Slovak universities and at the Slovak Academy of Sciences. There is a strong correlation between activities in COST Actions and a successful career as researchers at home institutions. I see many positive examples at universities in Slovakia and at the Slovak Academy of Science. The participation in COST opened doors for them to the world of internationally recognised research.

Additionally, I would like to recall COST Action 231 - Evolution of land mobile radio, in which the frames of the GSM mobile systems were defined for further standardisation of these systems. It was in my view one of the most important contributions to the development of new mobile communication era. In parallel to that, COST started with COST Action 244 and 244bis - Biomedical effects of electromagnetic fields; Chair: Z. Koren, Croatia, which was also needed to support GSM development and to decrease concerns about adverse effects of electromagnetic fields of mobile networks generally.

Finally, I would like to mention that Prof. Guekos (COST Action 240) was the first person at COST who started (around 1998) a serious discussion about new challenges in basic research of nanomaterials as a very important field of interdisciplinary science for the future."

Prof. Milan Dado
COST Committee of Senior Officials for Slovakia,
University of Zilina

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EMMY AWARD FOR COST ACTION CHAIR

29 OCTOBER 2019

Professor Touradj Ebrahimi, who has been involved in 5 Actions, accepted the Emmy on behalf of the JPEG Standardisation Committee.

On 23 October 2019, The Television Academy based in Los Angeles, announced the 6 winners of the 71st Engineering Emmy Awards honouring an individual, company or organisation for developments in broadcast technology.

The Joint Photographic Experts Group, JPEG, were recognised for their ground-breaking and game-changing work of lasting value to the television industry, creating standards for still image compression and processing.

The standard was introduced in 1992 by an international collegium of engineers and has been universally adopted to preserve high-quality imagery in television production and tangential workflows.

Professor Ebrahimi said of the award "*This Emmy award recognises the longevity of an exceptional standard in a field which is known for its rapid pace of change in applications and their underlying technologies.*"

ACTION PARTICIPATION

Professor Touradj Ebrahimi has participated in 5 COST Actions, including acting as Chair for European network on quality of experience in multimedia systems and services, Qualinet, which ran from 2010-2014.

The goal of Qualinet was to establish a strong network on Quality of Experience with participation from both academia and industry. The Action worked to develop and promote methodologies to subjectively and objectively measure the impact in terms of quality of multimedia experience.

"Standardisation has played a central role in Qualinet and a strong liaisons with major standards active in areas relevant to Quality of Experience have been established. Examples include evaluation of the now established HEVC/H.265 for UHDTV, and next generation 3D video compression standards by MPEG and HDR image compression standard by JPEG committees where Qualinet was officially tasked to evaluate and assess proposed technologies and once selected, help in their progress towards final specifications." Qualinet Final Report

Qualinet still continues to operate as a sustainable network; holding a yearly general assembly and approximately a dozen task forces collaborating on topics related to quality of experience in multimedia. Find out more information about their ongoing work here.

Professor Touradj Ebrahimi receives the award on behalf of the JPEG Committee

"This Emmy award recognises the longevity of an exceptional standard in a field which is known for its rapid pace of change in applications and their underlying technologies."

Professor Touradj Ebrahimi,
Swiss Federal Institute of Technology in Lausanne (EPFL), Switzerland

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EXCELLENT RESEARCH REQUIRES TOP RESEARCH SUPPORT

The European Research Area (ERA) aims to boost the excellence of research across Europe. But research, especially collaborative research, is a team game and that team needs to include engaged and motivated managers and administrators to release the full potential of the research. This is where the COST Targeted Network 'The voice of research administrators - building a network of administrative excellence (BESTPRAC)' is making a big impact.

The role of research support is often neglected, but the complexity of modern collaborative research and its funding systems require the services of a range of skilled professionals, including legal, financial and administrative functions, to enable the research to happen. The COST Association together with key stakeholders initiated BESTPRAC as a Targeted Network that worked to build the capacity of research managers and administrators (RMAs) across Europe and promote excellence in research support.

The Action was largely inspired by the enlargement of the EU and the substantial number of new institutions seeking to get involved with EU research programmes. *"The European Association of Research Managers and Administrators (EARMA) and other organisations saw the need to create a platform for newcomers to benefit from existing experience,"* explains Jan Andersen of the University of Southern Denmark who was the first Chair of BESTPRAC. *"At the time, many administrations in academic institutions in the New Member States had no understanding of the research support needed to succeed in accessing EU research funding."*

However, the BESTPRAC Network would not just cover institutions in New Members States but look to build a network of equals across Europe with all members sharing their knowledge and experience.

THREE PRINCIPLES

"The network was established on three main philosophical principles," states Jan. *"The principle of equality was core from the start. All participants had to come up with their issues within a mutual platform for knowledge sharing and co-creation from the beginning. The second principle was individual interaction. All participants must be active, no passive involvement was allowed. And the third aspect was access to expertise from outside the network. The Commission was almost always present at our meetings so participants could interact with the programme experts directly. This was especially important to both network members and the Commission in understanding and overcoming both real and perceived barriers to participation in research programmes."*

Overall, the three principles worked well together and resulted in a network for administrators that has yielded significant results and now serves as a platform for exchanging experiences, developing best practices, encouraging knowledge sharing and increasing efficiency in the field of research support.

"The principle of equality was core from the start."

Jan Andersen, Chief Executive Advisor, Science Research and Innovation Faculty of Science, University of Copenhagen, Denmark

During its lifetime, BESTPRAC reached more than 680 research administrators from 41 countries giving them the opportunity to increase their knowledge, expand their skill set and professionalize their jobs through training schools, short-term scientific missions and working group meetings. The network has not only supported RMAs in newer Member States, Accession Countries and COST Inclusiveness Targeted Countries (ITCs), but also people new to research administration across Europe enabling them to grow in their professional roles.

Over the years, BESTPRAC evolved into a major knowledge hub creating 'Hands on' guidebooks across a huge range of topics, FAQs, documents, a wiki describing the role of administrators at different stages of a research project, presentations and training materials.

The Action provided a platform for interaction between RMAs connecting the whole of Europe, east to west and north to south, with the objective of creating a stronger ERA and boosting recognition of RMAs as essential contributors.

THE FUTURE

BESTPRAC officially ended at the end of 2019, but the network members felt it was essential to continue with its activities. "*We think this is essential for a successful further development of the ERA in particular to improve the participation of so-called widening member states in future EU research and innovation calls,*" says Andjela Pepic from the University of Banja Luka in Bosnia-Herzegovina who took over as Chair of BESTPRAC in 2018.

One approach to sustain the Action has been to collaborate with EARMA. "*A small task force consisting of three representatives each from BESTPRAC and EARMA have looked at how we can cooperate without losing the BESTPRAC identity. We are looking to compliment EARMA activities – not compete,*" explains Andjela.

Obviously, the COVID crisis in 2020 has hampered some activities, but the collaboration has initiated a one-year pilot programme to organise joint meetings and the first two-day BESTPRAC-EARMA virtual meeting, which attracted some 900 individual registrations, has already been held and was a great success.

"*After the pilot in 2021 we hope to re-start our face-to-face training programme,*" continues Andjela. "*But we have a wide range of proposals under discussion including bilateral connections, a peer-to-peer learning platform as well as the larger conferences. We are especially looking to continue BESTPRAC through the widening participation/spreading excellence programme under Horizon Europe.*"

Further information

View the Action

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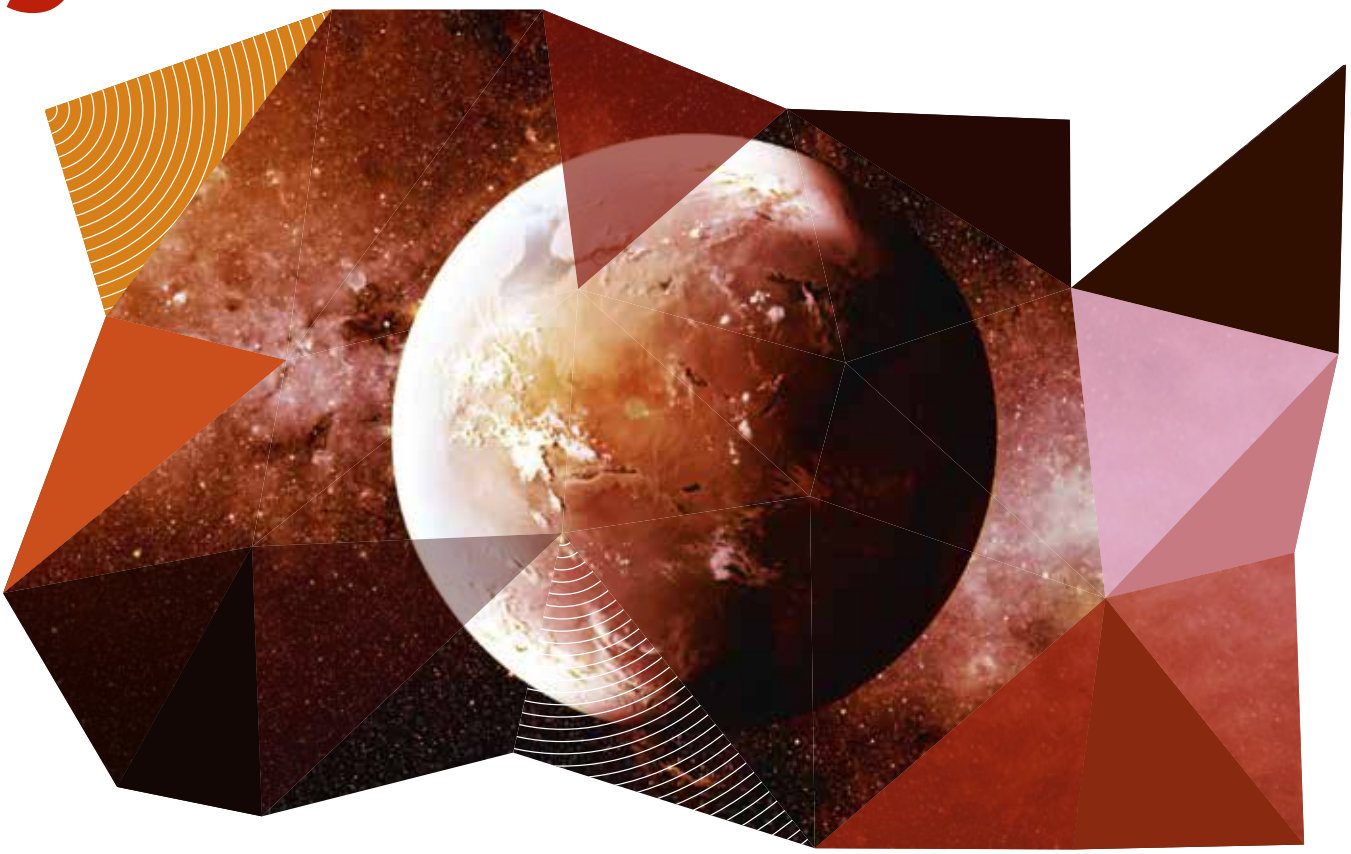

COST SCIENTIST AWARDED 2019 NOBEL PRIZE IN PHYSICS

10 OCTOBER 2019

On 8 October, the Royal Swedish Academy of Sciences in Stockholm awarded this year's Nobel prize in Physics to three scientists for their contributions to our understanding of the evolution of the universe and Earth's place in the cosmos.

The Physics prize will be shared between James Peebles, Michel Mayor and Didier Queloz. James Peebles of Princeton University will receive one half of the award for, 'theoretical discoveries in physical cosmology', which formed the basis of our understanding of the universe's history after the big bang. The other half has been jointly awarded to Michel Mayor of the University of Geneva and Didier Queloz of the Universities of Geneva and Cambridge, for their discovery of 'an exoplanet orbiting a solar-type star.' Since their first discovery in 1995, more than 4 000 exoplanets have been found in the Milky Way, including Earth-like planets.

"*When we discovered the first exoplanet, it was pretty obvious that this was something important, even though not everyone believed us at the time. Back then, exoplanet research was a very small field. I think there were about fifty of us and we were seen as weirdos. Now there are probably over a thousand people working in the field. It's a hot topic at the moment, so I'm really happy that the field of exoplanets has been recognised with a Nobel Prize.*" Professor Didier Queloz.

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Professor Didier Queloz,
Professor of Physics at
the Cavendish Laboratory and Geneva University,
Switzerland

INVOLVEMENT IN COST

Didier Queloz was an active member in the COST Action: Origins and evolution of life on Earth in the Universe, which focused on the origin, evolution and distribution of life. The Action Network gathered over 200 researchers from 30 countries.

Through the Action, a new European astrobiology community has been built, which has led to the launch of the European Astrobiology Institute in May 2019.

A new generation of astrobiologists have produced data on our origins and the possibility of finding life elsewhere.

The Action most significant success led to the creation of a White paper, 'Astrobiology and Society in Europe today' the first international multidisciplinary overview and assessment of astrobiology research's impact on society.

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HOW GENOMICS CAN HELP FARMERS

5 JANUARY 2010

COST scientists turn to genomics – digging for solutions to beat plant parasites, helping farmers protect their valuable crops.

Keeping crops healthy is a costly business for farmers worldwide. Plant parasitic nematodes or roundworms are responsible for global agricultural losses estimated at over € 80,000,000 annually. To add to the challenge, recent EU restrictions on certain chemicals mean farmers are calling for effective and more environmentally acceptable ways to protect their crops.

These issues brought together researchers involved in COST Action 872 Exploiting Genomics to Understand Plant-Nematode Interactions. The project has not only helped bring about advances in research but it has also trained early stage researchers on new techniques in the field.

"*Understanding how these nematodes operate, infect plants and how some plants resist nematode attack is essential to develop novel strategies to combat them and reduce damages to agriculture,*" explains COST Action 872 Chair Prof. John Jones.

GETTING TO THE ROOT OF THE PROBLEM

Nematodes can be free living but many can be parasites of animals or plants. Plant parasitic nematodes exclusively depend on plant material for survival. The most damaging species have complex interactions with their hosts, setting up a long-lasting feeding site within the roots of the plant. The consequences for the plant are disastrous and may include yield losses or increased susceptibility to other pathogens. Since many plant nematodes have soil borne survival stages it is usually impossible to remove nematodes entirely simply by removing the crop.

COST researchers contributed significantly to the genome sequencing project for the root knot nematode or Meloidogyne incognita, one of the most damaging species. Managed by INRA, Génoscope, and the CNRS in France, the genome project was completed in 2008. The outcome was published in the July 2008 edition of Nature Biotechnology.

"*COST has allowed us to bring scientists together for large meetings and has also allowed us to organise small workshops on specific issues. Thanks to short-term scientific missions and a workshop on genome annotation, we have not only contributed to research but trained researchers and spread the expertise,*" adds Prof. Jones.

11 ESOF 2014: LEADERS IN TRANSDISCIPLINARY SCIENCE

Three COST Action Chairs talk transdisciplinary research and how COST helps them connect young researchers with policy makers and industry.

12 WHY JOIN A COST ACTION?

This was the first COST video-animation ever showing why researchers and innovators should consider taking part in a COST Action.

13 DR MERSIHA MAHMIC KAKNJO

COST Action participant, Dr Mahmic Kaknjo, works as a researcher at the Department of Clinical Pharmacology at Zenica Cantonal Hospital in Bosnia and Herzegovina.

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NURTURING SUSTAINABLE BIO-BASED CONSTRUCTION

29 AUGUST 2019

A new institute researching renewable materials for sustainable buildings has been founded in Slovenia thanks to a COST Action on bio-based materials in construction. The Action connected the institute's pioneers with research ideas, future staff and an essential start-up grant.

Bio-based materials could reduce the construction industry's carbon footprint and boost rural economies where these products are grown. But can hemp or flax fibres reduce the amount of concrete in buildings? How can wood improve building interiors and the well-being of the people inside.

Reliable data and performance tests could answer these questions and more, giving Europe's building sector the confidence to use bio-based materials more widely.

The COST Action 'Performance of Bio-based Building Materials' addressed gaps in this area. The Action coordinated research on the performance of bio-based materials in buildings, on mould resistance, on staining and decay, and on assessing their environmental and health impacts.

Between 2013 and 2017, up to 200 participants from 31 countries worked on the topic and shared best practices. The result was an overview of properties, applications and standards for bio-based materials in construction – the book Performance of Bio-based Building Materials by Dennis Jones and Christian Brischke – as a reference for academics, policymakers and industry.

"*During its 4 year duration, this Action allowed a wide group of researchers and in particular early career investigators, to become active contributors within the European scientific community, gaining guidance, advice and opportunities for collaboration from established experts in many fields related to bio-based materials.*" says Dennis Jones, Chair of the Action.

For four participants, the Action also allowed them to realise a bigger dream – to set up a new research institute in forest-rich Slovenia to explore the technology for, and health impacts of, renewable materials in construction. In 2017, the InnoRenew Centre of Excellence (InnoRenew CoE) was born.

"*This was in a large part thanks to the Action, its conferences and training schools,*" says one of the initiators, US-born researcher Michael Burnard, who was a PhD student when he joined the Action.

STRONG SUPPORT

"The Action allowed us to identify other centres doing similar or complementary research to shape our research agenda and introduced us to a lot of the people we wanted to work with," Burnard explains. *"It also played a strong role in supporting work that led to some of our main areas of research, such as wood modification,"* he adds.

The institute is being funded in its early years by EU grants. It was founded as a cross-Europe collaboration by the University of Primorska, the Slovenian National Building and Civil Engineering Institute, the Institute for the Protection of Cultural Heritage of Slovenia and Germany's Fraunhofer Institute for Wood Research Wilhelm-Klauditz-Institut WKI.

Burnard says the successful grant applications cited research carried out in the Action and the more industry-focused complementary Action ModWoodLife.

"The Action allowed us to identify other centres doing similar or complementary research to shape our research agenda and introduced us to a lot of the people we wanted to work with."

Michael Burnard,
Deputy Director & Research Group Leader for Human Health in the Built Environment, InnoRenew CoE

BLOSSOMING GROWTH

Since it was founded, InnoRenew CoE has published studies, articles and abstracts on a range of topics, from non-toxic wood preservation to the impact of office environments on health. It is also helping local communities develop their extensive plant-based resources, both locally and through the institute's international living lab innovation network.

Furthermore, as part of this success story, researchers from InnoRenew have initiated the construction of the largest timber frame building in Izola, Slovenia.

Cooperation started in the network continues to grow. In 2018, the InnoRenew CoE joined partners from the same network in the Pro-Enrich project, which received funding from the EU and Bio-based Industries Joint Undertaking. The joint undertaking is funded by the EU and industry.

Dennis Jones, Chair of the Action says: *"the key legacy of the Action has been the career development of many of these Early Career Investigators into the new generation of professional researchers, at a time when bio-innovation and sustainable construction is needed to help protect our environment and combat global climatic changes."*

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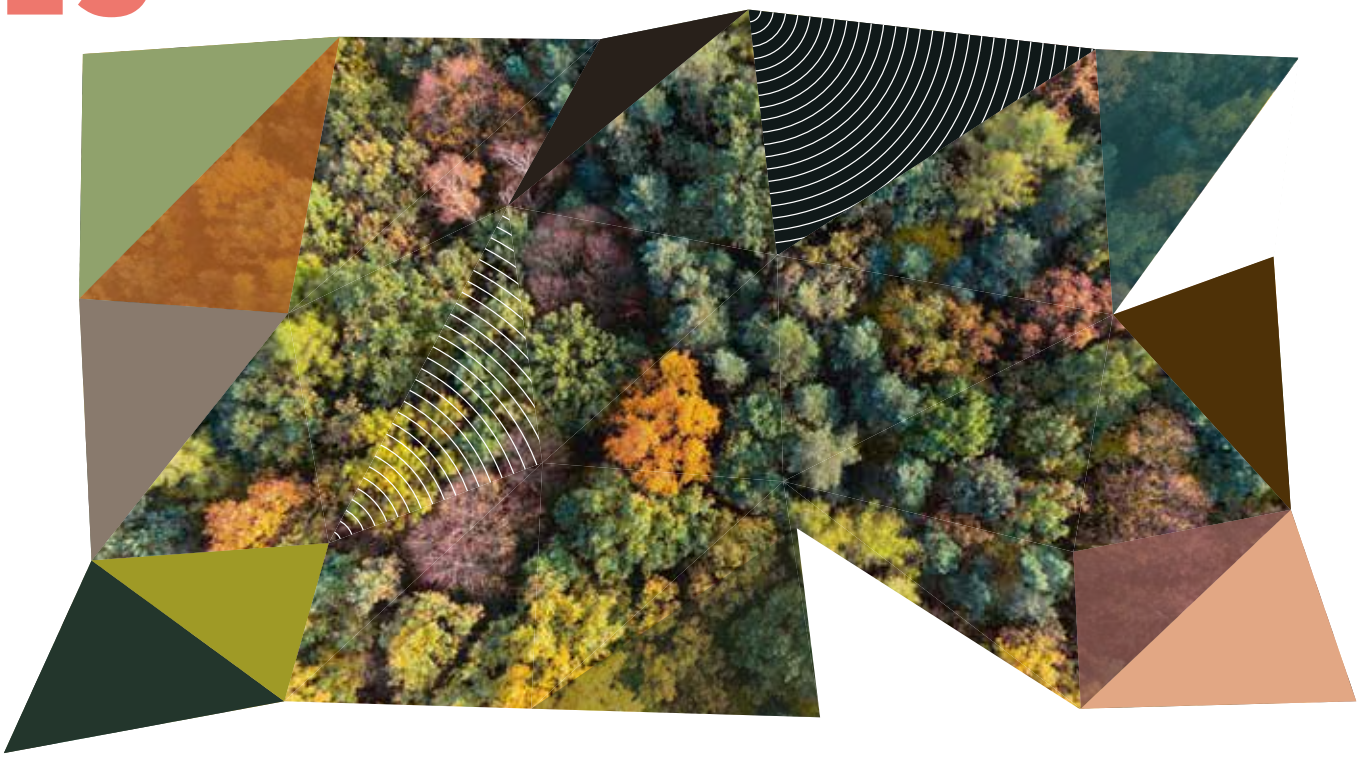

DOORS OPENING ACROSS EUROPE THANKS TO TREE TALK

16 AUGUST 2018

Cross border collaboration is helping scientists in Serbia, like researchers Dr Saša Orlović and Dr Dejan Stojanović, to open the doors of cooperation with their colleagues around Europe.

Serbian scientists are starting to see an improvement in their situation thanks to cooperation and collaboration with their counterparts across Europe. Dr Saša Orlović and Dr Dejan Stojanović are two researchers who are reaping the rewards of more contact with academics like them from beyond their borders, thanks to help from COST.

Events in their country's recent history have meant that opportunities for improvement and knowledge exchange for Serbian scientists have been limited at times. Serbia is not a member of the European Union, meaning that aspects of scientific life possibly taken for granted elsewhere, like studying in and travelling to other countries, can be more difficult.

But becoming part of several COST networks in recent years has opened doors to Dr Orlović and Dr Stojanović. "*Since Serbia is still not part of the EU, we have fewer scientific and travel opportunities compared to colleagues from EU countries,*" says Dr Orlović.

"*Valuable international contacts are the key benefit of our participation in COST Actions,*" adds Dr Orlović, a

"Since Serbia is still not part of the EU, we have fewer scientific and travel opportunities compared to colleagues from EU countries."

Dr Saša Orlović,
Institute of Lowland Forestry and Environment,
Serbia

Professor at the Faculty of Agriculture and Head of the Institute of Lowland Forestry and Environment at the University of Novi Sad. "*Especially contacts with scientific institutions in the forestry sector which we would never have been able to get any other way.*"

The Institute has taken part in different COST networks over the last decade, with the most prized fruit of their endeavours being Serbia's first Dendrolab at the university. It's a laboratory for tree ring research based around a system called ATRICS that scans tree cores in very high resolution. The lab possesses several tree core borers, including a unique one-metre long device for extraordinarily old and thick trees. It was inspired by Dr Stojanović's first short-term scientific mission to the Slovenian Forestry Institute in Ljubljana in 2013 as part of the COST Action 'Climate Change and Forest Mitigation and Adaptation in a Polluted Environment'.

"*We took the rich experience gained from Dr Tom Levanič, the senior researcher at the Slovenian Forestry Institute who is also a professor at the University of Ljubljana, and an expert in the field of dendrochronology – the science of dating events and environmental change through studying tree rings. We started going to the field intensively to acquire as many tree samples as we could,*" says Dr Stojanović, a graduate and researcher at the Institute since 2012. "*We would never have established this successful cooperation without the COST funding. We have also introduced colleagues from abroad to our Institute and our country, and our discussions with European researchers from the top of their field have helped us focus our research goals.*"

Dr Orlović is a big believer in empowering young researchers to take part in training schools and scientific missions to mature in the industry, and learn from new cultures and individuals. COST supported the Institute through working group meetings, training schools and short term missions as well as financing a training school and one of the Management Committee meetings in the Institute at Novi Sad.

"*It is crucial to have the opportunity to challenge your ideas and scientific work concepts with people who excel in your specific field,*" he says. "*It can save months if not years of hard work.*" Much like the tree rings studies, time will inevitably reveal just how important that collaboration has been.

Further information
View the Action

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COST NETWORK MAKES LASTING IMPACT ON CARBON-SAVING STANDARDS

7 DECEMBER 2018

As world leaders meet at the United Nations Climate Change Conference (COP 24) to decide on rules to combat climate change, a COST Action has shown how expert networks can accelerate the process. COST-supported information-sharing on carbon-reducing measures for buildings and towns has had a lasting impact on government action and boosted research.

One such network is COST Action C23, Low Carbon Urban Built Environments (LCUBE). Started in 2005, this four-year network of researchers from 19 European countries shared and published knowledge on how to reduce buildings-related carbon emissions, in consultation with governments, professional bodies and construction and maintenance industries.

Buildings can produce carbon either directly when people use them, or indirectly when they are built. They are responsible for 40% of all energy consumption and 36% of CO_2 emissions in the EU.

LCUBE contributed to information that EU, national and local authorities used to develop regulations and standards to reduce emissions.

The network also fostered international research on sustainable towns and cities, a minor interest in the 2000s but one that now has a key role in limiting carbon emissions.

Among other outputs, the network published in 2009 the *European Carbon Atlas*, an overview of carbon-reduction activities and legislation for cities and towns across Europe. This has such a strong impact that leading USA technology university MIT published parts of the Austria chapter on one of its websites when it was setting up their now well-established department on sustainable built environments.

"*This network developed state-of-the-art knowledge,*" says a member of the Action management committee, Professor Gerald Leindecker, of Austria's College for Building and Design in Linz (LINC) and director of the research institute Future Concept Group.

BUILDING A BASELINE

Leindecker explains that LCUBE began in response to the European Commission's first Energy Performance Buildings Directive (EPBD), of 2003. The directive promoted regulation for greener buildings and energy performance certification. "*The problem for local authorities and researchers was that there was no consensus at the time on what was achievable,*" he says.

The Action gathered information on diverse approaches and standards. "*We had leading people on*

Energy efficient building

the topic in Europe. This gave us a strong scientific base. We studied and promoted pioneering projects to show how far you could go," Leindecker adds.

LCUBE was also a bridge between regulation stakeholders, including local and regional policymakers. Leindecker says, "*We laid the groundwork to see how a network can share ideas and knowledge more quickly.*"

Later, the EPBD was revised to its 2010 version to include standards and clearer guidance. "*This was based partly on the results of work in Member States, including work by the Action,*" Leindecker says.

He adds that the COST approach is valid for COP 24. "*It takes time for research to influence widespread policy. COP 24 is an important way to bring results to politicians.*"

DEVELOPED KNOWLEDGE

The field of low-carbon building is now much more developed. Policies and projects promote upgrades of buildings so that they use less energy while other initiatives integrate renewable heat and power sources into urban environments.

"*The Action was a good instrument to make the topic grow. It spread ideas on how to achieve a low-carbon built environment,*" Leindecker says.

LCUBE also shared ideas with other researchers through publications and conferences. In the case of MIT, the university was interested in the European Carbon Atlas as a source of information about the latest research in Europe. "*They were glad to have everything in one book,*" he adds.

Scientists in the network found that they could more easily develop original research. "*Because we already had a strong group, members who applied for EU funding for projects were very successful. About half of their proposals were accepted for funding,*" he adds. "*For some colleagues, the network has been the basis of their career. It gave them internationally recognised work.*"

In Leindecker's case, he has taken part in nine other COST Actions on sustainable urban environments. "*I am involved in many projects and with many institutions. COST provides a guarantee that I know the state of the art in the field.*"

The collaboration with MIT is a sign of a growing trend, with non-EU-based researchers encouraged to contribute to COST networks. "*COST is opening its doors to the world,*" says Leindecker.

He is optimistic that there is future for low-carbon towns and cities. "*The technology is there. You now have to put it into practice.*"

Further information

View the Action

View the Network website

17

THE BIG CHILL: HOW FREEZING FOOD MAY HELP THE BATTLE WITH CANCER

14 AUGUST 2018

Successfully freezing and thawing fruits, vegetables and spices allows food to be moved around the world and helps to reduce food waste. Now the technology used in this process may help in freezing human stem cells used in newly developed cell-based therapies including cancer treatment, thanks to the initiative of a group of scientists from across Europe who were able to cooperate and achieve results after coming together in a COST network.

Technology and ideas used in the food industry could have a positive impact on research into cancer following research helped by a COST network. Experts from across Europe have realised that methods used to freeze and thaw plants, like spinach or rocket, while preserving their cells alive could be used on human stem cells to treat cancer, without the need to use potentially harmful substances.

The realisation sprang from COST Action 'EP4Bio2Med' – the European network for development of electroporationbased technologies and treatments. Its aim was to increase pan-European understanding of electroporation – increasing permeability of cell membranes by exposing them to electrical fields. And that goal was successfully reached by one member, with many beneficial results.

Dr Dymek was studying for a PhD at Lund University in Sweden, but discovered that methods used by a group in Slovenia could be useful to her. With funding from COST, she visited the University of Ljubljana to look at mathematical modelling that helped continue with her research.

*"Essentially, without the funding, I would not have been able to travel,"*says Dr Dymek. *"Visiting the research group at University of Ljubljana, Faculty of Electrical Engineering allowed me to meet very experienced scientists, who shared their knowledge with me. They helped me to look at the plant tissue, and the processes taking place in it, from a different perspective. I also saw a new laboratory, learned new techniques and explored a new city and its culture."*

Having built a theoretical model of a leaf structure thanks to her trip to Ljubljana, Dr Dymek's understanding of electroporation increased. She could continue with her PhD project, and devise a method of freezing spinach or rocket leaves without killing them.

This has also helped her in work at Optifreeze, a company founded at Lund University, that uses an innovative method to freeze fruits and vegetables without losing their structure after the freezing and thawing process. Plus, scientists from Ljubljana from the Laboratory of Biocybernetics who worked with Dr Dymek realised that technology she uses in Optifreeze could help in their work on stem cells. They are now working with a Slovenian biotech company Educell on analysing how human stem cells can be frozen without using toxic cryoprotectants.

"Now, when I have a scientific problem or I am looking for a collaboration, I can easily find experts in a specific field and direct the question to them."

Dr Dymek,
Division of Food Technology,
Lund University, Sweden

The results of her visit to Ljubljana continues to help Dr Dymek, whose network of contacts expanded thanks to COST's funding.

"Now, when I have a scientific problem or I am looking for a collaboration, I can easily find experts in a specific field and direct the question to them," she adds. *"I learned many things during my COST trip, and I use this knowledge every day working at Optifreeze."*

"Applying for funding from COST is easy and straight forward, and there is not much paperwork. Gaining knowledge and experience, meeting new people, discovering new countries and cultures – there are no drawbacks to this project, only benefits!"

Further information

View the Action
View the Network website

18

WIDENING FRONTIERS

11 DECEMBER 2008

COST Brings Australia, New Zealand and Europe Closer Together

Two pilot schemes introduced by COST are helping European researchers and their counterparts in New Zealand and Australia meet, learn from each other and explore opportunities for working together. The first researchers from Australia have already returned from successful study trips to Europe with tangible results.

Both of the schemes, launched on 1 July 2007, will run for an initial two-year pilot period. Each scheme initially provided for up to twenty travel grants of approximately EUR 2 500 each. To cope with the overwhelming demand, the Australian Academy of Science has already increased its funding significantly since.

EXCHANGING KNOWLEDGE

By encouraging visits to Europe, the schemes increase participation in existing COST Actions. Professor Wieslaw Krolikowski of the Laser Physics Centre at the Australian National University in Canberra visited the Centre for Nanotechnology in Münster, Germany, as part of COST Action MP0604 Optical Micro-Manipulation. He found out more about the state of the art in non-linear nanophotonics and laser trapping. He also established new contacts that could lead to further collaborative work.

"My trip to Germany was very fruitful. Not only was I able to advance my collaboration with the group on non-linear effects in periodic systems but I also identified new research problems for my future activities. I exchanged ideas with a number of researchers from various European institutions and Universities which may lead to future collaboration, student exchanges and joint publications," says Professor Krolikowski. *"I was impressed by the extremely high-quality research in the field".*

CROSSING DISCIPLINARY BOUNDARIES AS WELL AS CONTINENTS

Tomaso Aste and Tiziana Di Matteo, also from the Australian National University, in particular its Department of Applied Mathematics, were able to travel to Europe to visit colleagues working on COST Action P10 the Physics of Risk. The aim here is to apply the latest knowledge and tools from the physics of

complex systems to understanding problems of risk in economics, social sciences, food safety and health.

"I participated in different international forums where I presented results from my research and collaborated with COST members in Europe. In particular, I enhanced my existing international collaborations and also started new ones. I discussed new EU research and COST Action proposals," says Tiziana Di Matteo.

By helping them join international forums in Europe, the COST pilot scheme helped the Canberra-based researchers to showcase Australian research capacities. Furthermore, meeting with European colleagues working on similar problems in econophysics and complex systems, as well as concrete research carried out during the visit, has already produced two new research papers submitted for publication.

"This visit was of fundamental importance to establish strong links with the European scientific community in a moment of high strategic importance: the first year of the Seventh Framework Programme. This will assure future participation in international collaborative programmes with Europe. Moreover this was a valuable occasion to showcase leading Australian research in important international forums," explains Tomaso Aste.

SOWING THE SEEDS OF FUTURE COLLABORATION

In 2007, Chief Executive of the Royal Society of New Zealand, Dr Di McCarthy explained the need for the new schemes, saying: *"global scientific research still faces practical barriers such as lack of funding for travel. This agreement helps alleviate some of those barriers"*.

The launch of the pilot programmes was also welcomed by Professor Sue Serjeantson, Executive Secretary of the Australian Academy of Science, who said last year that this agreement provides opportunities for people-to-people cooperation, which is essential to the success of global engagement in science.

The networking opportunities with hundreds of European scientists encourage work on proposals for new projects in EU research funding programmes. These links will grow in importance as the European Seventh Framework Programme progresses and should stimulate further international cooperation in future.

The missions can also lead to two-way exchanges or lay the ground work for longer-term collaboration. A follow-up visit to Canberra by the COST Action P10 coordinator, Professor Peter Richmond, for example, has led to the drafting of a new COST Action proposal.

A BRIGHT FUTURE AHEAD

The enthusiastic response to the pilot schemes could serve as a model for similar reciprocal agreements which "bridge" scientific communities in the 35 COST countries to their colleagues in the rest of the world. South Africa, India and Argentina are already looking at the possibility of similar arrangements.

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ROBOTS ACROSS EUROPE HELP CHILDREN WITH DISABILITIES PLAY

12 JUNE 2017

Educators, psychologists, therapists and engineers teamed up to achieve a common vision: changing mentalities and creating the right conditions for children with disabilities to simply be able to play. They have also set up a database of assistive technologies used in hospitals and homes across the continent.

For instance, robot Teo plays with a girl with Down syndrome: she makes up a game to interact with the robot, then shows it to other children. She had never interacted with others prior to this session. Teo won the Kazuo Tanie Award in 2016 (KROG project, Politecnico di Milano).

Watch the video

Humanoid robot Kaspar, a product of the University of Hertfordshire, helps children with autism socialise with others through playful interactions; the robot can help them develop their communication and social interaction skills.

Watch the video

Kaspar has worked with children in rehabilitation centres across the Republic of North-Macedonia and has inspired research and design of other toys in the Netherlands. The experimental methodology adopted with NAO, the first humanoid robot, to support the play of deaf children, is now transferred to clinics in Bulgaria.

Children with disabilities can also learn how to manipulate objects like LEGO robots, which makes them active participants in play and academic activities. A team at the Catholic University of Portugal ran this project.

Watch the video

This video was made during a pilot study at the Cyprus University of Technology, exploring the unique characteristics of humanoid robots (NAO) to support deaf or hard of hearing children with cochlear implants.

Watch the video

GIODI project included another trial where children with severe motor impairments enjoy unmodified, commercial games (University of Aosta Valley, Politecnico di Milano, "L'abilità" NGO).

Watch the video

Thanks to this widespread network, these robots are now known in the research and clinical fields.

A WORLD WHERE ALL CHILDREN CAN PLAY

Researchers in the group are now developing links with companies like Outfit7, the creators of the Talking Tom, a popular app, in order market toys depending on their accessibility, usability or on how engaging they are in inclusive environments. Two of the leading institutes in the field, The Technological Institute for Children's Products and Leisure (AIJU) and Lekotek, are also part of the network.

"*It's all about accessibility and usability*", says Dr Serenella Besio, leading the network. "*Our dream is a world where any child can play with any toy, no matter if they have an impairment or not.*" This is why the network is now working on a series of guidelines on the accessibility and usability of toys, tools and devices like tablets or smartphones that are used for playing.

In 2014, Dr Besio, Professor of special education and an expert in assistive technology (University of Aosta Valley), and Dr Pedro Encarnação, a specialist in robotics for rehabilitation (Catholic University of Portugal), set up the network in an attempt to bring out the role of play and stress how life changing interdisciplinary research solutions can be for children with disabilities.

"*Multidisciplinary research where engineers and social scientists would work together to help children with autism only started ten years ago. Network LUDI attracted experts from very different backgrounds from the very beginning*", Prof. Ben Robins (Uni of Hertfordshire), LUDI member, commented.

Network members from all over Europe and Israel have done short research stays abroad trying to increase the benefits of the robots in the videos by sharing different practices.

Children's families are directly involved in the studies and trials, which ultimately helps the Action's main goal: seeing children take control of their own lives, avoiding getting excluded from society.

"*Our efforts are part of a global move to change the current policy on play for children with disabilities. Research agendas should now focus on all children, including those with disabilities*", added Dr Encarnação.

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TESTIMONIAL BY MR PETER WINTLEV-JENSEN

"I had the pleasure of acting as Scientific Secretary of the COST Telecommunications, Information Science and Technologies (TIST) from 2000-2002, whilst I was working at the European Commission. COST is for me a unique instrument, complementing the science and technology activities in the national and EU Framework Programmes for research and technology development.

COST is agile and focused on networking of excellent scientists on a European scale and can quickly be mobilised to support cross-disciplinary or emerging fields of RTD which is even more relevant today.

During my responsibility for COST TIST I supported 27 multidisciplinary COST Actions, of which COST Action 244 and 281 concerned groundbreaking large-scale studies with WHO on the safety and potential health implications of Electro Magnetic Fields (in particular mobile and wireless communications (4G) and several COST Actions preparing the technological grounds for 4G wireless antennas in widespread usage today."

Peter Wintlev-Jensen
Scientific Secretary of the COST Telecommunications, Information Science and Technologies (TIST) from 2000 to 2002

21 MR GORAN TMUSIC

COST Action participant, Mr Tmusic, is Research Assistant at the Faculty of Sciences of the University of Novi Sad in Serbia.

22 DR IVANA OGNJANOVIC

COST Action participant, Dr Ognjanovic, is Associate Professor at the University of Donia Gorica in Montenegro.

23 COST EXHIBITION AT THE EUROPEAN PARLIAMENT

Network of Science and Technology' was a successful COST Exhibition held at the European Parliament in Brussels from 18 to 20 October 2011. The event was kindly hosted by Pilar del Castillo Vera MEP. It brought together the COST science community, EU policy-makers and stakeholders in the field of research, technology and innovation.

This highlights video covers the opening ceremony of the COST exhibition as well as a breakfast meeting with MEPs on 18 October 2011.

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THE FIRST REFERENCE FOR SIGN LANGUAGE GRAMMAR WRITING EMPOWERS SIGNERS ALL OVER THE WORLD

11 MAY 2016

Researchers from 15 countries worldwide started from a crucial issue: the absence of comprehensive, state-of-the-art grammars takes its toll on sign language learning, training and interpreting. Most signers are born to hearing parents, who, in turn, ideally have to learn sign languages in order to communicate with their children.

Unlike spoken languages, sign languages can only be learnt through face-to-face interaction, given the generalised lack of learning material.

ACKNOWLEDGING SIGN LANGUAGES

Despite the importance of formal training, sign language grammars remain a widely unknown territory. Most sign languages are not even formally recognised as languages, although virtually every country in the

"The Action was our starting point for something bigger – we wanted to actually produce grammars."

Professor Josep Quer,
ICREA Research Professor at
Universitat Pompeu Fabra,
Barcelona, Spain

world has a sign language of its own or even a variety of them.

Studies on sign language grammars have been scattered and only date back to the 1960s, which is why little is known about how such languages emerge and evolve.

The network, led by Prof. Josep Quer (Universitat Pompeu Fabra) and Prof. Carlo Cecchetto (University of Milan-Bicocca/CNRS), includes researchers from 15 countries worldwide. They developed the SignGram Blueprint– the first-ever tool to study sign language grammars as a whole.

It takes the form of a multimedia handbook and works as a standard for both linguists and non-specialists interested in writing up a grammar.

The Blueprint includes a checklist of topics or building blocks that need to be addressed when writing up a grammar. Each building block comes with explanations, methodological tips and examples from sign languages, as well as bibliographical support. The handbook will be available free of charge by the end of the year.

The guide will also help linguists understand, monitor and document how sign languages evolve. "*Differences in the way young and elderly signers use sign language can be staggering, which is also due to the absence of a standard way of teaching sign language grammars. This is why sign languages are endangered,*" Prof. Cecchetto explained.

A NETWORK FOR A BIGGER PURPOSE

The network will take the SignGram Blueprint one step further through their Horizon 2020-funded collaborative research project SIGN-HUB, which will see them develop actual grammars using innovative software developed from the handbook.

"*Studying sign languages is like entering a parallel universe. It's so gratifying because you can easily see the direct link between basic research and its results in real life. We have developed a real blueprint, which will contribute to a standard for teaching sign languages to signers and interpreters alike, or to sign language assessment in different domains,*" Prof. Quer commented.

The project will also be creating assessment tools to identify language difficulties in signers who have suffered brain damage, have developed dementia or were born with language impairments. The Horizon 2020 project also holds an educational and cultural purpose, as it plans to uncover new facets of historical events such as Shoah, World War II or the Spanish Civil War by looking into elderly signers' experiences.

"*Language normally evolves through sound, so we are somewhat biased to see language through that lens. We want to explore how these silent communities experienced such defining events in our history,*" Prof. Cecchetto added.

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MOTIVATING MOBILE COMMUNICATION

Mobile communications technology has arguably had the most widespread impact in the shortest time of any human technology. And COST has had a pivotal enabling role in its establishment and evolution. Professor Luis M. Correia is a central figure in the development of mobile telecommunications in Europe and in a range of COST Actions in the area since the early 90s.

Professor Luis M. Correia received his Ph.D. in Electrical and Computer Engineering from the Technical University of Lisbon in 1991, where he is currently Professor of Telecommunications.

How did your involvement with COST start?

Prof. Correia: I started my involvement with COST in 1991. I was introduced to the initiative by a colleague. At the time mobile communications were in their infancy and relatively few people were working in the area, but there were huge expectations for the technology and COST offered great opportunities to exchange information and collaborate with colleagues.

You were first involved with the landmark COST Action 231; what was the significance of that initiative?

Prof. Correia: Indeed, the first Action I was involved with was the famous Action 231 (Digital mobile radio towards future generation systems) which built on the impact of a previous Action 207 (Digital land mobile radio communications) that had designed the channel model for what would become the Global System for Mobile Communications (GSM).

The work under COST Action 231 essentially laid the basis for the deployment of the second generation of mobile communications otherwise known as 2G or GSM. Before this, mobile communications were restricted to analogue mobile phones that were very bulky and expensive.

COST Action 231 looked at the propagation of the 2G signals from the mobile phone to the base station and vice versa, and the models it developed are known as 'COST 231 models'. These models have enabled mobile phone networks to be established efficiently and helped understand phenomena such as interference in urban and rural settings. They were a major step forward in ensuring high-quality communication networks.

Are the models still used for current network technologies?

Prof. Correia: Of course! The laws of physics do not change! The models are easy to use and work with other subsequent generations of technologies. The system characteristics may change, but the underlying physics remains the same. These models have been the basis for all subsequent mobile communication propagation models.

Can you describe the impact of this research?

Prof. Correia: The advent of 2G as a technology had a huge disruptive impact. No one knew what the implications or the applications would be, but it enabled

"The laws of physics do not change! The models are easy to use and work with other subsequent generations of technologies."

Professor Luis M. Correia, Professor of Telecommunications, University of Lisbon, Portugal

mobile communications to be possible and affordable for everyone.

How did the COST programme assist?

Prof. Correia: The nature of the COST programme was of huge benefit to the success of this technology development. The Actions and their networks are excellent forums for exchange and collaboration. The areas in which they operate are essentially pre-competitive research, so there are no commercial competitive issues, which can inhibit collaboration and exchange of information.

The fact that COST funds the networking activities, rather than the work itself, also eliminates competitive issues that surface in other collaborative funding programmes. The research community that was established under the initial COST Actions still exists today and is active and continues to push the technology forward.

How has the COST programme benefitted you personally?

Prof. Correia: Being part of COST has definitely helped me in my career. Following the COST Action 231 I was asked to chair two follow-up Actions (Action 259 'Wireless flexible personalised communications' and Action 273 'Towards mobile broadband multimedia networks') which increased the visibility of my work immensely.

The COST programme helped me to increase my personal scientific networking. The Action brought my work on modelling into contact with people working on measurement and I benefited a lot from that.

I have managed to be involved in a continuing series of COST Actions with new Actions starting as others finish. Such continuity is very important. The COST Actions have established a scientific community that has been working together now for three decades. It has built trusting relationships that have enabled, and continue to enable, high quality research outcomes.

What has been the impact of this COST programme?

Prof. Correia: From the perspective of 1991 no one could have imagined how fast mobile communications would have evolved. The technology went from zero to practically 100% penetration in less than 30 years - today almost everyone in the World has – or can benefit from - the use of mobile phones. It is the fastest growth for a technology that humanity has ever seen.

No one could have imagined the global impact. Not only in developed countries but also bringing services, such as banking, to remote or economically disadvantaged communities anywhere in the world.

And the impact will continue to be very high. The 5th generation (5G) technology currently being deployed will have more impact in indirect terms than previous generations. 5G is an enabler for new services such as autonomous vehicles, Internet of Things applications, wearable sensors and much more.

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THE COST CONNECT AND THE COST ACADEMY

Two initiatives kicked-off in 2017 as part of the COST Strategic Plan: the COST Connect and the COST Academy.

The COST Connect are a series of thematic multi-stakeholder workshops providing an open space for researchers from COST Actions, policymakers and the broader research and innovation (R&I) community to network on scientific or science-policy-related topics. The aim of these events is to provide new funding opportunities for COST Actions by creating new partnerships. Through this initiative, COST is increasing the awareness of European funding and cooperation opportunities.

The Connect series offers a very interactive format to stimulate dialogue and active engagement among participants. Its thematic approach allows each session to be built based on stakeholder input. Topics are defined along the lines of the current EU policy agenda and societal challenges.

The COST Academy is a capacity-building initiative that offers training and mentoring to boost the leadership, management, administrative and communications skills of young researchers and/or researchers affiliated to institutions in less-research-intensive countries.

"COST Connect is an excellent way of getting together in the same room all the links needed to transform new knowledge into positive societal challenges, speeding up the process. Being there allowed me to see that we, the scientists, can have a say in political decisions that can make the world better."

Dr Antonio J.Meléndez Martínez,
Lab. Colour and Quality of Food (Nutrition and Bromatology Section),
Faculty of Pharmacy,
University of Sevilla, Spain

COST Action: European network to advance carotenoid research and applications in agro-food and health (EUROCAROTEN). View the Action

"The COST leadership workshop motivated me to engage in a leadership position within my COST Action ENEC (European Network for Environmental Citizenship). To me, the role of working group leader is a golden opportunity to network and practise my leadership skills in a highly international context.

Dr Jelle Boeve-de Pauw, Postdoc project manager,
University of Antwerp Department of Training
and Education Sciences, Belgium

COST Action: European Network for Environmental Citizenship (ENEC). View the Action

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PUTTING THE SOCIAL INTO OLD AND NEW MEDIA

Today, the user experience is a key consideration in the development of digital technologies. But this was not always the case. COST has played a significant role in shaping research into social aspects of digital technologies, consolidating and broadening the academic community working in this area.

Italian sociologist Professor Leopoldina Fortunati of the University of Udine has conducted extensive research in gender studies, cultural processes and digital technologies and has been involved for more than 20 years in COST.

How did you first get involved with COST?

Prof. Fortunati: My involvement with COST began around 1996. I first participated in COST Action 248 that looked at possible future European telecommunications users. This Action took a very innovative perspective for the time and opened the topic to the social sciences. This was the first time that the concept of a user and their role and requirements were brought into telecommunications. It was a highly formative experience. I met a lot of new colleagues, very many of whom I am still in contact with.

This is a significant characteristic of COST: the formation of persistent networks that continue beyond the end of any single Action. The nature of COST is to enable and amplify the cross-fertilisation of ideas through international networks of scholars. It enables the construction of very stable and meaningful relationships.

How did your involvement with COST evolve?

Prof. Fortunati: I then followed up with another Action – COST Action 269 on User aspects of ICTs - essentially a follow-up on the first initiative. Again, this was a very productive experience, which also opened relations with colleagues in China and Australia. The Action organised workshops, PhD training schools and other initiatives for early career academics in Europe.

In 2001 I joined a third Action – COST Action A20 on The Impact of the Internet on the Mass Media in Europe. This Action I discovered via the COST newsletter and thought that it would be interesting. The Action was, again, a very future-orientated project.

Further Actions followed looking at the increasing influence of technologies on society including COST Action 298 on participation in the 'Broadband Society' and COST Action IS1202 on the nature and dynamics of working in a virtual environment. My last COST Action was FP1104 on new possibilities for print media and packaging looking at hybridisation between traditional sectors and new digital initiatives.

You also took on managerial roles in the COST structure?

Prof. Fortunati: Yes, from 2002 I was appointed as the Italian representative on COST's Technical Committee on Social Sciences and helped to incorporate the Humanities into the area too. Then in 2006 I was appointed to the Domain Committee on Individuals, Societies, Cultures and Health (ISCH).

"This is a significant characteristic of COST: the formation of persistent networks that continue beyond the end of any single Action."

Professor Leopoldina Fortunati,
Senior Professor of Sociology of Communication and Culture,
University of Udine, Italy

I did a lot of work for COST! I would say that it was my main academic engagement outside the university. My life in COST has been very meaningful and very satisfactory. I could see how the community of scholars evolved, developed and stayed connected. COST is especially important to the scientific community in Europe inspiring a spirit of cooperation in a very sustainable and productive way.

What is the secret of COST's success?

Prof. Fortunati: COST has always been highly interdisciplinary compared to other programmes. Interdisciplinarity is in its DNA. This is a distinct advantage for COST and is also key to explaining why its initiatives have succeeded at both intellectual and scientific levels. For example, my area has benefited enormously from bringing together technical engineers and sociologists, which in turn has had a tremendous impact on how the technologies we use today have evolved.

An example is the COST strategic workshop on social robotics that I helped organise in 2013. This was the first time such an event had been held at the European level and brought together the technology community and the social sciences. The event helped to better understand what was needed in this area and established collaborations between truly diverse research communities.

How do you see the impact of COST across academia in Europe?

Prof. Fortunati: I think that COST can have a tremendous impact on personal careers. It can be greatly beneficial for younger generations of scholars, as it enables them to rapidly build their own international networks. A new generation of academics now see themselves as more European, embracing connections within Europe, recognising the worth of European unity and a common purpose across the continent. These networks are particularly important, especially when there is a global problem, like COVID19, as it allows scientific forces to be put together very quickly and solutions achieved in a short time.

This is good for Europe and the world – but also good for the individuals as it enables them to acquire a new autonomy and to create new structures within and between their institutions that allow younger people with new ideas to be recognised outside traditional structures.

In this context COST has been especially important for women and diversity. It has given the possibility to women working across a wide variety of topics to build new platforms and to receive significant recognition for their work. It has helped to raise women's voices and build scientific networks at the European level.

28 PROF. JANET MIFSUD

Interview with Prof. Janet Mifsud, COST Committee of Senior Officials delegate for Malta.

29 PROF. PAULO FERRÃO

Interview with Prof. Paulo Ferrão, current President of COST.

30 PROF. SIERD CLOETHINGH

Interview with Prof. Sierd Cloethingh, COST President 2017-2019.

31

TESTIMONIAL BY PROF. SJUR BAARDSEN

"I was there when the first three forest sector COST Actions (E1, E2 and E3) were selected. Must have been back in 1997, and I think the meeting was led by Mr Ignacio Seoane, who later became a colleague while I worked for the European Commission (EC) DG RTD 2000-2004. At that time COST was hosted by the EC, so we worked in the same building in Square de Meeus. But it was not before 2006, after a reorganisation of COST, that I came into the picture. I was elected chair of the Domain Committee on Forests, their Products and Services (DC FPS) in the very first meeting, re-elected in 2009(?) and I stepped down in 2014."

Former COST President Fedi used to quote Voltaire with his own little twist: "If COST did not exist, it would be necessary to invent it". It felt true. COST is based on excellent ideals like openness, knowledge creation and sharing, international cooperation, added value and inclusion. Therefore, it felt very right to me to spend quite some time working for COST, and I did it with pleasure and energy. Remember that COST was an early enabler for research collaboration between researchers from both sides of the iron curtain (after it fell), and thus opened new possibilities to many researchers. And during my time as leader of DC FPS we organised several special initiatives, e.g. directed towards young researchers, and towards cross-disciplinary issues like in arts and science, and in ICT and forestry. This said, the main impact comes of course from all the COST Actions. The networking of "nearly all" forest researchers all over Europe has had an enormous impact on the sector. And yes, also on me as a person and scientist, and on my own career and development as leader. I try my best to bring further the excellent ideals learned into my daily work.

Prof. Sjur Baardsen
Rector-Norwegian University of Life Sciences, Norway

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40 YEARS OF 'NETWORKS OF SCIENCE AND TECHNOLOGY'

13 FEBRUARY 2012

COST was created to help European researchers share their work to foster breakthrough, progress and innovation. Supporting networks that gather academia, research institutes, SMEs and industry, COST still excels at what it does best: bringing people together to foster innovation in Europe. This was the core message of the event held at the European Parliament from 18 to 20 October 2011.

"Networks of Science and Technology" is the name of the exhibition created by COST to showcase the scientific and societal impact of science and technology networking. The nature of COST and the aim of this exhibition project could not have been explained better than through the words of Dr Ángeles Rodríguez-Peña, President of the COST Committee of Senior Officials, who introduced COST as "*a very simple, yet very powerful bottom-up instrument – where the best ideas are put forward and driven by science*" during her speech at the opening reception.

Hosted by Pilar del Castillo Vera MEP, the COST exhibition received a very warm welcome in the European Parliament, and undoubtedly raised interest and awareness on bottom-up programmes for science and technology networking.

COST ACTIONS

A number of COST networks, known as 'COST Actions', were put on display. They spanned from forest management and bioenergy to honeybee extinction and sustainable fishing; from wireless technologies and information access to smart materials and nanotechnologies, privacy and data protection, mobility, hazards and natural disasters in European cities; from issues within food and health to biomedicine, neurodegeneration, drug development, diagnostics and cancer treatment.

The opening ceremony of the exhibition was marked by the distinguished presence of high-level speakers who made the COST community proud and honoured. Pilar del Castillo Vera was an excellent COST ambassador and testified to the key role that networking plays in the European Research Area (ERA).

COST is indeed a unique programme in that it offers the European scientific community a funding scheme corresponding to their need. As Dr Rodríguez-Peña stated "*COST is a flexible tool that works towards connecting people and researchers, both in research communities and local communities*".

One of the fundamental advantages of COST is that it paves the way to pan-European research networking, beyond the EU Member States. And this is because "*we believe that knowledge is produced in a team, in a common brain; its creation, dissemination and application is done collectively. In order to create this community and this collective thinking, COST needs to be the instrument that connects all these people*" added Dr Rodríguez-Peña.

COST was the very first framework for international cooperation in Europe, well before the creation of the EU's Framework Programme (FP). It is intergovernmental, thus representing an agreement among member states, and has received the support of the European Parliament because it responds to societal needs: connecting science and technology in order to create a competitive advantage in Europe's innovation and quality of life.

COST's Networks of Science and Technology were also celebrated by Jerzy Buzek, President of the European Parliament, who gave a warm welcome to all guests and visitors of the COST exhibition through a video message. He emphasised the essential role of networking programmes for Europe's scientific excellence: "*As a scientist, I know how networks are key to research: you can divide tasks, share best practices, compare results, feel both challenged and motivated in the pursuit of a common goal*".

President Buzek also took the opportunity to highlight the role that COST plays in pooling and sharing national R&D investments: "*COST also acts as a catalyst to leverage funds for science and technology: its 240 million euro budget ultimately leads to research worth billions*" and added that "*In the midst of fiscal pressure on national budgets, we need COST's network more than ever to make the Europe 2020 strategy for growth and jobs into a reality and to strengthen European innovation*".

"In order to create this community and this collective thinking, COST needs to be the instrument that connects all these people."

Dr Àngeles Rodríguez-Peña,
President of the COST Committee of Senior Officials

REAL VALUE

Máire Geoghegan-Quinn, European Commissioner for Research, Innovation and Science, gave the keynote speech and applauded this opportunity "*to bring researchers, business, parliamentarians, and governments together, to work together to improve our science systems and policy*". Commissioner Geoghegan-Quinn highlighted areas in which the flexible, bottom-up nature of COST has proven to add real value saying that "*COST identifies, supports and gives visibility to 'pockets of excellence' throughout Europe*". Underlining the importance of pan-European programmes, Commissioner Geoghegan-Quinn added that "*COST can be instrumental in helping research communities in less advanced regions to develop their capacities, strengthen excellence and thus boost their participation in FP7, and indeed in the future research and innovation programme, Horizon 2020*".

With its 40th anniversary, COST has marked a milestone in the ERA. Today, more than 200 networks are active within the COST Framework – involving some 30 000 researchers. As this year of celebration is drawing to a close, COST remains firmly committed to offering European scientists networking opportunities as – in the words of Commissioner Geoghegan-Quinn – "*a marvellous way to improve Europe's scientific excellence*".

33

THE COST ASSOCIATION IS UP AND RUNNING

20 OCTOBER 2014

An international non-profit association under Belgian law, the COST Association now includes all 35 COST Member Countries and Israel, a cooperating state.

By managing the contract signed with the European Commission after taking over the COST branch of activity from the European Science Foundation, the Association is meant to ensure stability and continuity in fulfilling the mission of COST: enabling breakthrough scientific developments leading to new concepts and products.

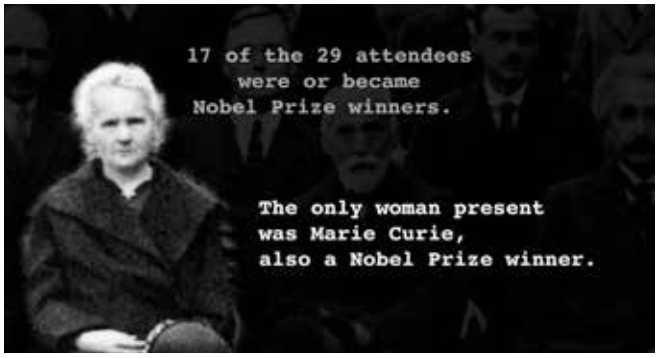
As a result, COST will continue its key role in supporting inclusive science and technology networking and cooperation at European level, thereby fostering scientific and technological excellence in the Horizon 2020 context.

For more information on the mission of COST, its strategy and organisation, see COST mission and COST strategy.

34 MR ROBERT-JAN SMITS

Interview with Mr Robert-Jan Smits, former Director General DG Research and Innovation at the European Commission, 2010 - 2018.

35 WOMEN'S PARTICIPATION IN COST ACTIONS



COST has been supporting gender balance for 50 years, watch the video we created on the International Day of Women and Girls in Science!

36 COST - WHAT'S IN IT FOR RESEARCHERS?

Watch one of the first corporate videos that was created in context of the Ministerial Conference in Bratislava in 2016.

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COST BRINGS MATERIAL BENEFIT

Getting involved in COST Actions opens up networking opportunities that can really boost your research career. Professor Urszula Stachewicz is a young polish materials scientist who has participated in multiple COST Actions since 2014 and has recently been granted a European Research Council (ERC) Starting Grant to work on innovative insulation materials: the first such grant awarded to a researcher at the AGH University of Science and Technology in Krakow.

Urszula's first involvement with COST was in 2014 when she started teaching at Krakow. "*The first two Actions that I was involved with were on electrospinning and biomaterials for bone regeneration,*" she says. "*I joined both towards the end of their respective programmes.*"

The initial Action on electrospinning is closely related to the ERC grant research area, which started at the beginning of 2021. The ERC research will look to replicate the properties of highly insulating materials from nature, such on polar bear fur or penguin feathers, using electrospinning to produce innovative composite materials. "*As well as being highly thermally efficient and h elping to save energy, these new materials will also be biodegradable and easy to recycle,*" explains Urszula.

For her three subsequent COST Actions Urszula joined from the start. "*COST Action CONTEXT looked at the development of advanced textiles, on the biomedical side BIONECA continues work on biomaterials for regenerative applications, and AERoGELS works on these advanced materials that have a very high porosity and tuneable properties,*" says Urszula.

NETWORKING FOR SUCCESS

Participation in COST allowed her to learn about new material science. "*For example, aerogels was a totally new area for me,*" she says. Involvement with COST Actions has clearly been especially useful from a technical perspective for Urszula, but it offers much more than that.

"*COST has given me excellent possibilities to network, to get the viewpoints of different disciplines and to see how different techniques can be applied in diverse application areas such as biomaterials or nanomaterials and smart textiles,*" she says. "*For example, I joined a group related to applications in architecture, a completely new area for me, where I learnt about possible novel applications of the materials I work on.*"

Working with COST has enabled Urszula to grow her network, learn about issues in different sectors and listen to experts in her field. "*This gave me creative ideas for translating techniques to different application areas: using the material science skills and knowledge I had but applied to new and different problems,*" she says.

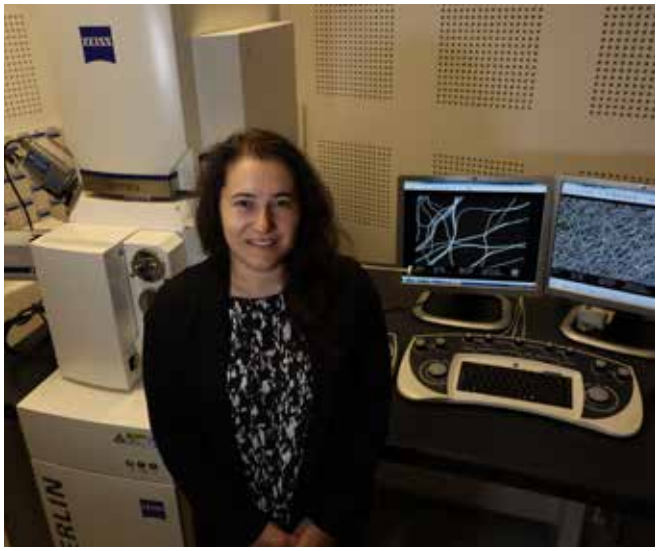
Networking at COST events, especially in the more informal parts of the programme such as over dinner, gave Urszula the opportunity to talk through ideas for

"I was very open about my ideas for the ERC proposal and talking them through with COST collaborators helped improve my concepts or added new aspects."

Professor Urszula Stachewicz, University of Science and Technology, Kraków, Poland

future work with colleagues. *"I was very open about my ideas for the ERC proposal and talking them through with COST collaborators helped improve my concepts or added new aspects,"* says Urszula. *"I was also able to ask colleagues about their experience in writing ERC proposals."* In this way she learnt how to approach grant writing and was also able to ask people to read her draft proposal and comment on it.

"Without COST I would not have been able to access this feedback and opinion," concludes Urszula. *"Which was very important in developing my ideas, understanding the challenges, and helping in the creative thinking to develop the ERC proposal."*



Read more about the COST Actions that Urszula has participated in:

COST Action MP1005
COST Action MP1206
COST Action CA17107
COST Action CA18125
COST Action CA16122

38 DR EMMANUEL PASCO-VIEL

Interview with Dr Emmanuel Pasco-Viel, former member of the COST Committee of Senior Officials for France, of the Executive Board and former interim Vice-President of COST.

39 COST GREEN ENGINEERING CAMP (GEC)

17 international, multidisciplinary, young researchers presented their ideas at the Green Engineering Camp, a springboard for their initial proposals to grow into national or even international projects with the positive input of GEC peers and the support from COST.

The Green Engineering Camp (GEC) was a pilot COST Interdisciplinary Science Initiative (ISI) aimed at engaging specifically early stage researchers and investigators in real-life applications and intelligent and innovative uses of green ICT in order to boost knowledge transfer efficiently and to initiate new ideas and solutions to current and future challenges.

40 COST SCIENCE NIGHT 2012 HIGHLIGHTS

COST Science Night - How Science & Technology Networks Impact Tomorrow's Europe was held on 4 December 2012. This exclusive event showcased the impact of science and technology networks on Europe's society. At this unique science night researchers leading successful COST networks met research policy-makers and stakeholders for interactive discussions... and fun experiments!

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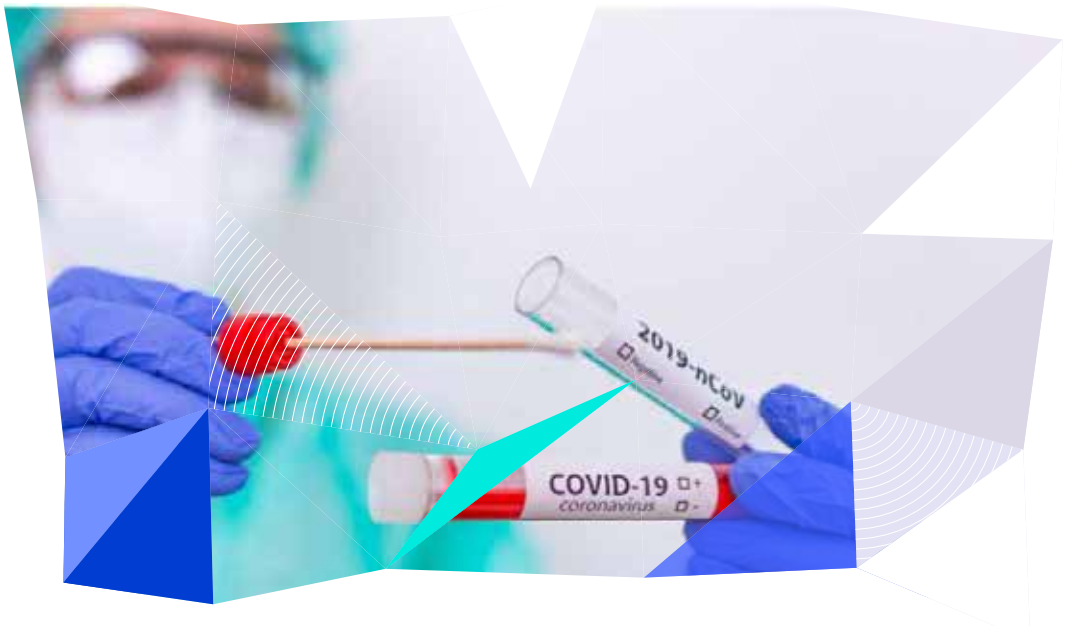

ACTION PARTICIPANTS CONTRIBUTE TO FIRST ONLINE TOOL FOR DRUG REPURPOSING PREDICTION AGAINST SARS-COV-2

29 APRIL 2020

OpenMultiMed Action member, Prof. Jan Baumbach, and his lab team at the Technical University of Munich have developed the tool with the help of Prof. Harald Schmidt, Chair of the Action, and of two other researchers in the network.

CoVex is the first online platform for SARS-CoV-2 and SARS-CoV-1 host interactome exploration and drug identification. This user-friendly tool shows how human and viral proteins interact and implements systems medicine algorithms for network-based prediction of drugs against SARS-CoV-2 and similar viruses. In other words, CoVex gives the science community direct access to basic network medicine algorithms integrating drug-protein-virus interactions.

Watch the video

Prof. Jan Baumbach, core member of Open Multiscale Systems Medicine (OpenMultiMed) Action, and his team at the Experimental Bioinformatics lab of the Technical University of Munich, developed CoVex in a 10-day hackathon. Prof. Harald Schmidt, Chair of OpenMultiMed, provided help as well as two researchers that undertook a short-term scientific mission at Prof. Baumbach's lab.

The tool is available in open source and the development process and functionalities are documented here.

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INTERVIEW WITH 2010 NOBEL PRIZE LAUREATE IN PHYSICS PROF. KONSTANTIN NOVOSELOV

20 JULY 2011

GraphITA (L'Aquila, Italy, 15 to 18 May 2011) has been a major international conference on what promises to be the material of the future, bringing together scientists and engineers working on different technological uses of graphene in a multidisciplinary environment.

Prof. Konstantin Novoselov, 2010 Nobel Laureate in Physics, giving a keynote lecture at GraphITA (L'Aquila, Italy, 15 May 2011)

Prof. Francesco Fedi, COST President 2004-2010 and President of the COST Office Association (COA) addressing GraphITA (L'Aquila, Italy, 15 May 2011)

On 15 May 2011 COST interviewed Prof. Konstantin Novoselov, 2010 Nobel Laureate in Physics, keynote speaker at GraphITA.

The Nobel Prize in Physics 2010 was awarded jointly to Andre Geim and Konstantin Novoselov "for groundbreaking experiments regarding the two-dimensional material graphene". Prof. Novoselov received the Nobel Prize at the age of 36. At the time of the award he was affiliated with the University of Manchester, United Kingdom.

What got you on to the idea of Graphene?

Graphene is just one of the many ideas which we had in the lab. We tried to spread and diversify our research as much as possible. There are plenty of ideas you have never heard of – a few of those are more fruitful than Graphene and yet, you never hear of them. There are still quite a number of them which have not worked out, but I'm still thinking about coming back to those. Graphene was only one of many. We just thought why don't we try to make a transistor out of an atom? Then, which metal to take? And it was graphite. We started to work with it and we quite liked it. The first samples worked. Usually we allow ourselves just a few days, probably a week, for such projects; and if it doesn't work, we forget about it. Another idea before, or around the same time, as the Graphene one was gecko tape. This flew quite nicely and is probably more of a dream.

Graphene research is now a worldwide project. What is Europe's role in this? Is Europe – in your opinion – the world leader in Graphene research?

At the moment it's practically impossible to be a leader in Graphene research because there are so many aspects of the research which you can touch. Graphene is like the philosopher's stone: any property you touch is either unique or is better than that in other materials. It is the electronic properties of Graphene which attract a lot of people, but there are mechanical

properties too. It's the thinnest possible material; it's the strongest material; it's the most stretchable material; and it is the stiffest one. There are also chemical and optical properties. All properties of Graphene are attracting a lot of interest. Because of its diversity, so many different groups work in this area and I don't think any single group can cover all those directions. So we try to do some cross-collaboration projects. But I don't think that any single group is dominating the field.

There are of course a few leaders, such as Columbia University, doing extremely active research; people in Singapore and in Korea who are quite good in applications; then there is Cambridge University as well who leads more towards optics and applications. So there are quite a few centres, but in fact research is quite spread – and that's exactly because there are so many different aspects of this material which can be started.

Graphene is exciting because of its uniqueness. Firstly, it is so easy to obtain, and then immediately you get so many different properties, leading to so many different experiments. It is this low-cost characteristic which attracts a lot of people and labs across the world who love experimenting with it. But then it's really the combination of all those unique properties which is exciting. Each individual researcher would have a top list of properties.

In terms of applications, I can speculate but, as they say, I cannot predict the future – I can only predict the past. So I certainly hope that there will be applications. You can see that probably the first ones will be coming from transparent conductive coating: liquid crystal display, solar cells, touch screens, tactile screens and so on. We probably have to wait another year, but it is encouraging that there are some applications already in use. There are already small companies, people working in biology and life sciences, who love using Graphene as a transparent conductive coating for studying objects using TEM – transmission electron microscopy – because it's transparent, conductive and an ideal substrate on which to put objects like DNA for instance. There are several companies which sell Graphene on TEM grids for these purposes. They are not selling Graphene for the purpose of science – they sell Graphene as a device.

How does getting a Nobel Prize change your life? How does it feel to receive a Nobel Prize? Were you nervous in Stockholm at the award ceremony?

It changed in a way because I had to fight really hard over a few months not to change it at all. So now it's pretty much back to normal, there are only some minor disruptions. Sure, it was quite a shock for a few days – it was a pleasant shock, but still a shock. Was I nervous in Stockholm – why should I be? No, I wasn't, I was nervous and I was excited while I was doing the experiments.

COST brings scientists together across different countries and continents. You've moved a lot during your scientific career. Do you think mobility for researchers is important?

Absolutely – It is important and it is necessary. It broadens your horizons and allows you to learn different techniques. Actually I feel that I have stayed in the Graphene area for far too long. I would certainly love to see more mobility both in Europe and between other countries.

What would your advice be to young people who would like to learn and work in a field such as nanotechnology?

I don't think you can start specialising in nanotechnology as early as school; school is there to give you as broad an education as possible, and you have to take it. I would certainly disagree with people who say that we have to push our kids to learn some specific subjects as early as possible. It is the other way around: I think you need to broaden your horizons and try to study a wide range of subjects in school – that is your last chance to study everything. You go to university and that's it, you have chosen your path and if you've chosen incorrectly you still go down that path. You should give kids an opportunity to learn about nanotechnology but you should certainly not give it any priority in comparison to other subjects.

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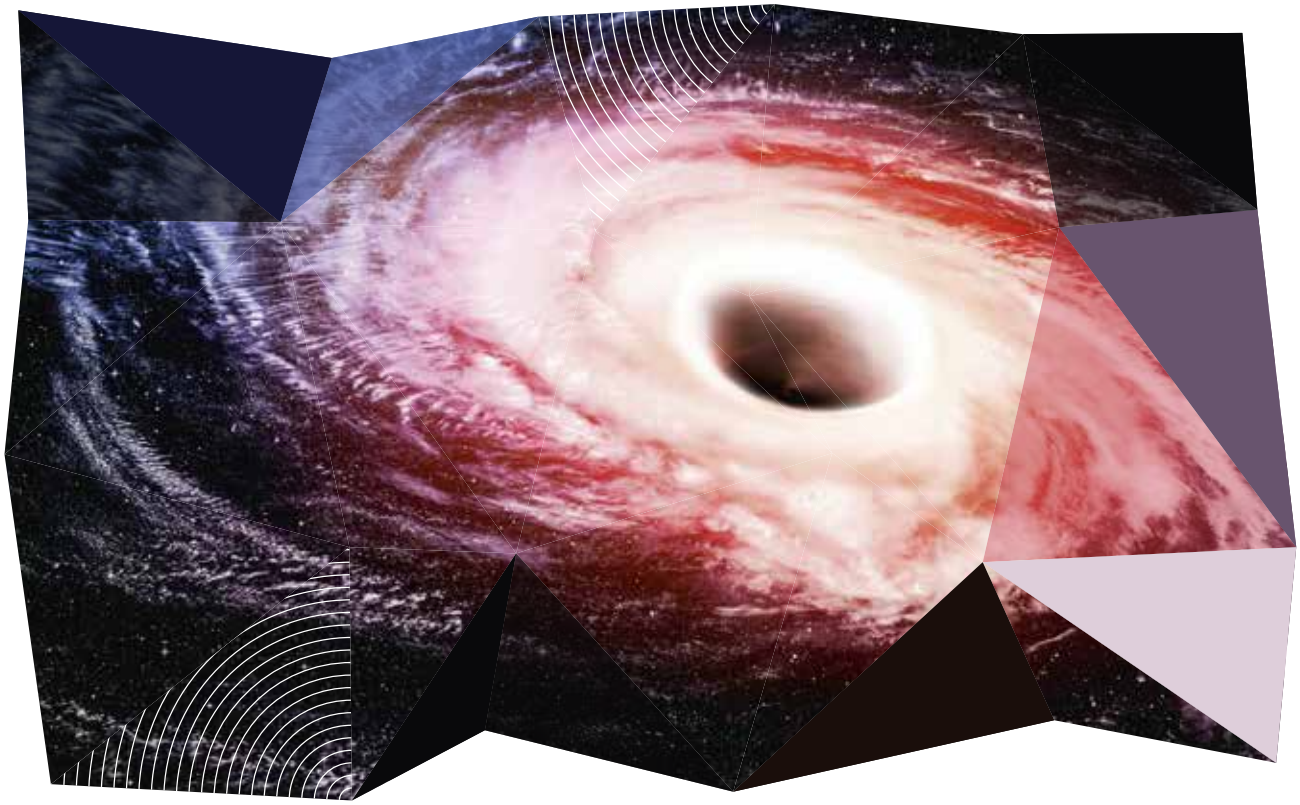

EUROPEAN EXPERTISE PROVIDES FERTILE GROUND FOR FIRST-EVER BLACK HOLE IMAGE

20 SEPTEMBER 2019

On 10 April 2019, the world discovered the first-ever picture of a black hole in stunning detail. While this groundbreaking achievement emerged from a global collaboration, the fruitful knowledge developed under COST Action NewCompStar helped to shape this titanic research landscape.

In fact, NewCompStar focused on neutron stars, and many similarities exist between these two objects. "*Neutron stars like to become black holes,*" says Action Chair Professor Luciano Rezzolla of Goethe University Frankfurt, Germany, who also played a prominent role in the collaboration that had presented the first-ever image of a black hole. "*The two have a lot in common, and so the expertise that was developed and nurtured in NewCompStar also provided fertile ground for this imaging work.*"

"The two have a lot in common, and so the expertise that was developed and nurtured in NewCompStar also provided fertile ground for this imaging work."

Professor Luciano Rezzolla,
Professor of Theoretical Relativistic Astrophysics,
Goethe University, Frankfurt, Germany

THE INTERDISCIPLINARY PULL OF NEUTRON STAR RESEARCH

The COST Action NewCompStar – 'Exploring fundamental physics with compact stars' (MP1304) – was set up in 2013 to encourage dialogue among astrophysicists, gravitational physicists and nuclear physicists studying these and similar astronomical objects.

"*Interdisciplinarity can bring in new ideas and apply techniques in fields other than those where they originated,*" says Rezzolla.

Four years on, at least 413 scientific papers acknowledge support from the Action, reflecting its contribution to the development of new expertise and methodologies. NewCompStar also led to follow-on COST Action PHAROS, dedicated to the study of neutron stars through the detection of gravitational waves and different types of light. NewCompStar ended in 2017, and the collaborations it enabled are still bearing fruit.

COMPACT OBJECTS, COMMON OBJECTIVES

"*People tend to forget that there are different ways of looking at any given topic in science,*" Rezzolla observes. NewCompStar made a convincing case for collaboration.

"*We came to have workshops involving nearly 200 participants from the three fields, all discovering that there actually is a lot of overlap,*" says Rezzolla. The Action, which built on the outcomes of the European Science Foundation programme CompStar, also backed over a hundred research exchanges.

NewCompStar was built on an important extended network, where each node had different skills. This feature permitted studies of neutron stars combining the expertise of the three communities involved (nuclear physics, gravitational physics and astrophysics). In a field that was in crucial need of collaborations and sharing of expertise, NewCompStar facilitated new interactions and helped research to be conducted and expanded.

Young researchers and students held a specific place within the Action, which fostered their involvement in the exchanges and encouraged them to act as strategic links within the network.

Rather than highlighting examples from NewCompStar's impressive output, Rezzolla underlines collective achievements: a community has been created and a new field – astronuclear physics – is gaining in stature.

"*Until recently, the two fields of nuclear physics and astrophysics were seen as very distinct, and scientists felt they were working in either one or the other,*" Rezzolla concludes. "*Nowadays, they consider themselves as working in nuclear astrophysics. This is particularly true in Europe, and I believe that it is partly due to NewCompStar.*"

Further information
View the Action
View the Network website

44 MS RITA WARD

Interview with MS Rita Ward, former COST Committee of Senior Officials delegate for Ireland, National Coordinator and Executive Board member.

45 PROF. FRANCESCO FEDI

Interview with Prof. Francesco Fedi, former President of COST 2004 - 2010.

46 DR EVA KLAPER

Interview with Dr Eva Klaper, former member of the Committee of Senior Officials for Switzerland, Executive Board member and COST National Coordinator.

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TESTIMONIAL BY PROF. ANNE KAHRU

"Small countries such as Estonia are inherently benefiting from COST Actions as small and big countries have an equal representation of participants in the Management Committee. My lab has been active in several successful Actions, most recent of which was 'Anti-Microbial Coating Innovations to prevent infectious diseases' (AMICI), 2016-2020. In this Action I was nominated to lead one of the central tasks and was a core group member.

Most importantly, this network led to the publication of 8 joint scientific papers in my team with key participants of this Action. In addition, students and post-docs from other labs (Krunoslav Ilic from Zagreb, Croatia, Virginija Kalciene from Vilnius University, Lithuana, Svetlana Vihodceva from Riga Technical University, Latvia) worked in my lab and my lab's students (Merilin Rosenberg) and post-docs (Angela Ivask) worked in the lab of Prof. William C. Keevil (University of Southampton, UK) during their short-term scientific missions.

Finally, my lab hosted a successful AMICI seminar in Tallinn (2017) and was active in all the annual and working group meetings of AMICI. Thus, this COST Action has been a real success story for my lab."

Prof. Anne Kahru
Head of the Laboratory of Environmental Toxicology,
National Institute of Chemical Physics and Biophysics (NICPB),
Tallinn, Estonia

AMICI group picture

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INTERVIEW WITH DR ÜLLE MUST

Former COST Committee of Senior Officials (CSO) member and COST National Coordinator (CNC) for Estonia

What are you most proud of in your term as CSO member?

I started at COST in 2001 and finished my job as member of the COST CSO/CNC in 2018. Although Estonia has been a COST member since 1997, I can say that I started from scratch. At the end of my career, I could confirm that the Estonian research community respects and values COST. This is shown by the fact that our top researchers participate in COST activities.

In what way is COST important for your country?

We conducted several COST studies. Based on the answers, it turned out that the most valued outcomes of COST were cooperation in the field of research (83%), improving the capacity of international cooperation (80%) and finding new partners in COST (78%).

Where do you place COST in the wider field of EU R&I policies?

COST is a gap-filler - it supports cooperation between different types of organisations, different career levels, cooperation between participants with different opportunities, etc. COST is a combination of strong competition, but also inclusion and empowerment.

How important is COST in connecting research communities in Europe?

The fact that we are celebrating the 50th anniversary of COST shows that, despite the major changes that have taken place in the European research and innovation landscape during this period, researchers still need networks of their own initiative.

What is the best memory you have of your time at COST?

Collegiality and the ability to mobilise oneself in difficult moments.

What role can COST play in the "new" European Research Area?

I hope COST remains at the forefront of communication between scientists. COST stands for global collaboration, despite the different reefs in global collaboration, helping to bring bright minds together around the world.

How would you describe COST in one word or a sentence?

Opportunity to prove yourself.

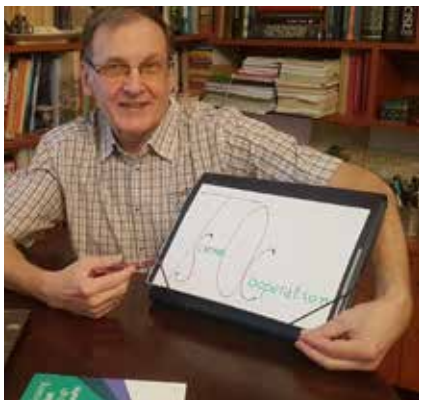
49 MR DREN GERGURI

COST Action participant, Mr Gerguri, is Teaching Assistant at the Department of Journalism at the University of Prishtina in Kosovo.

50 DR ARTA LUGAJ

COST Action participant, Dr Lugaj, is currently working at the Faculty of Natural Sciences in the University of Tirana, Albania.

COST IN ONE WORD




COLABORATION


FRIENDS
IN
SCIENCE


Science
matters


NATURAL
SCIENCES,


FAMILY MOOD


OPPORTUNITY


MUTUALLY
ENRICHING


OPPORTUNITIES

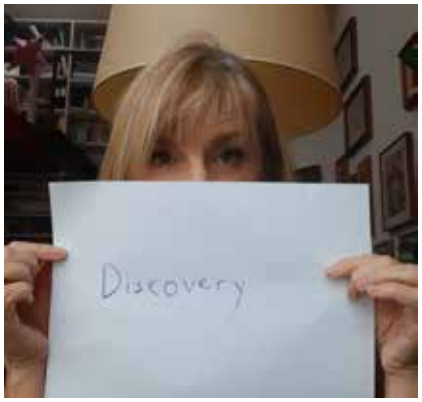

Networking


COOPERATION
NETWORKING


MULTICULTURAL


SCIENCE
INCLUSIVENESS


GIFT


Discovery


STEWARD
SHIP


Inspiration
through
Collaboration


COMMUNITY


AGORA


young


NETWORKING


GLOBAL
NETWORKING


Europa


SHARING


DISCOVERY


INTER-
DISCIPLINARITY


Curiosity


Global
networking


STRONGER
TOGETHER


NICE
PEOPLE


CAPITALE
UMANO


INCLUSIVE
&
CULTURAL
DIVERSITY


TEAM
WORK


COORDINATION


C
BOTTOMUP
S
CONNECTION


OPPORTUNITIES

cost
EUROPEAN COOPERATION
IN SCIENCE & TECHNOLOGY

Funded by the Horizon 2020
Framework Programme
of the European Union

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