

Introduction

The 2014 edition of the EuroScience Open Forum (ESOF) takes place in Copenhagen, Denmark, from 21 to 26 June. The theme is to build bridges between science and society and, in particular, to engage young people on science and innovation topics. The European Research Council (ERC) participates in this exciting conference for the fourth time by bringing high-level speakers and top researchers to present and debate around research topics.

This brochure presents a selection of the remarkable ERC-funded projects showcased this year at ESOF. They are investigating how to assess childhood risks of developing cancer; the usefulness of climate information for policy-makers; the design of spaces for disabled people; how fossils can uncover the evolution of life; the ecosystems and environmental management; the interdependence between species in nature and the prediction of epidemics.

The ERC is the first pan-European funding body designed to support investigator-driven frontier research and stimulate scientific excellence across Europe. It aims to support the best and most creative scientists to identify and explore new directions in any field of research (Physical Sciences and Engineering, Life Sciences and Social Sciences and Humanities) with no thematic priorities. In particular, the ERC encourages proposals which cross disciplinary boundaries, address new and emerging fields and introduce unconventional and innovative approaches.

Since 2007, the ERC has funded over 4,000 researchers. The ERC awards long-term grants to individual researchers of any nationality and age who wish to carry out their research projects in Europe. Excellence is the sole criterion for evaluation in its competitions.



The ERC sessions at ESOF 2014

FRIDAY, June 20

14:00 – 16:00 – BG Fonden, Auditorium S.01, Copenhagen Business School, Solbjerg PLads 3, 2000 Frederiksberg (tbc)

Presentation of the ERC Starting grant by Massimo Gaudina, Head of Communication unit at the ERCEA, and testimonials from former Marie Skłodowska-Curie fellows who now have an ERC grant: Veerle Huvenne and Poul Kjær

SATURDAY, June 21

16:00 – 17:15 – Dipylon Hall, Carlsberg Museum

"Funding opportunities in Europe for creative minds from all over the world"

European Research Council's joint session with Marie Skłodowska-Curie Actions

SUNDAY, June 22

15:00 – 16:15 – Dipylon Hall, Carlsberg Museum

"To be or not to be too many PhDs: what is a PhD for?" with ERC President, Jean-Pierre Bourguignon

MONDAY, June 23

9:00 – 10:15 – Dipylon Hall, Carlsberg Museum

"Women in science: Mind the Gap!" with ERC Scientific Council member Isabelle Vernos

10:30 – 11:45 – Carlsberg Museum/The Dance Halls

"How our planet became habitable" with ERC grantees Philippe Marty, Helen Williams, Emmanuelle Javaux and Birger Schmidt

13:30 – 14:45 – Carlsberg Museum/The Dance Halls

"Environmental change: how do economies, societies and individuals react?" with ERC grantees Cornelius Withagen, Maja Schlüter, Victoria Reyes Garcia and Suraje Dessai

TUESDAY, June 24

13:30 – 14:45 – Carlsberg Museum/The Dance Halls

“Natural resource management and resilience: understanding the role and relevance of human behaviour, decision-making and adaptive capacity” with ERC grantees Wolfgang Lutz, Kirsten Hastrup, Lars Hein and Pieter Verburg

13:30 – 14:45 – Carlsberg Museum/The Dance Halls

“From pathogens to pandemics: can we handle the risk?” with ERC grantees Philippe Lemey, Sylvain Gandon, Vittoria Colizza and Sunetra Gupta

16:30 – 17:45 – Carlsberg Museum/The Dance Halls

“From the deep ocean to the web of life: pressure and change across ecosystems” with ERC grantees Veerle Huvenne, Jens-Christian Svenning, Anne Magurran and Jordi Bascompte

WEDNESDAY, June 25

9:00 – 10:15 – Carlsberg Museum/The Dance Halls

“Fighting Fat: the obesity epidemic” with ERC grantees Kirsty Lee Spalding, Jennifer Lyn Baker, Martin Fussenegger and Sadaf Farooqi

THURSDAY, June 26

8:30 – 9:45 – Pompeii Hall, Carlsberg Academy

“EU-Russia partnership in research and innovation: new opportunities for EU and Russian scientists” with ERC Scientific Council member Prof. Klaus Bock

10:00 – 11:15 – Little Carl, Dance Halls

“Urban Life-Urban form” with ERC grantees Denise Pumain, Robert Kitchin, Rob Imrie and Steven Vertovec

Discover videos on ERC grantees speaking at ESOF: <http://erc.europa.eu>

ERC programme at ESOF: <http://erc.europa.eu/media-and-events/events/esof-euroscience-open-forum-2014>

Assessing childhood risks of developing cancer

In Europe, cancer is a leading cause of death. Establishing risk factors during childhood that indicate an increased chance of developing cancer later in life is important for public health care. In this ERC project, Dr Jennifer Lyn Baker explores the links between childhood body size and the risk of cancer incidence in adulthood.

Individuals with a greater body size may have a higher risk of developing cancer due to the bigger number of proliferating cells within their bodies. Higher numbers of these cells may increase the probability of cell mutations that lead to the development of cancer. Because childhood is a period of growth, cellular proliferation is particularly acute during this early life phase. The goal of Dr Baker is to demonstrate whether childhood is a critical time for the establishment of the risk for several forms of cancer in adulthood. More specifically, she is investigating how factors such as weight, height, change in body size, and pubertal timing in children aged 7 to 13, are associated - individually or in combination - with the risk of developing different cancers in adulthood.

In order to carry out their research, Dr Baker's team is using a comprehensive dataset taken from the Copenhagen School Health Records Register, which contains computerised weight and height measurements of more than 370,000 schoolchildren born between 1930 and 1989. Through linkages to the national Danish Cancer Registry and the Danish Register of Causes of Death, the team is able to identify which subjects later developed cancer.

The results obtained so far suggest that body size and growth in childhood is associated with the risk of developing breast, liver, prostate and thyroid cancer in adulthood. These outcomes have generated a great deal of interest among cancer experts and may lead to several new avenues of research. Upon completion of the project, Dr Baker's team expects to have a more accurate understanding of the link between these anthropometric factors during childhood and the risk of developing more than 14 different forms of cancer during adulthood.



Principal investigator: Jennifer Lyn Baker

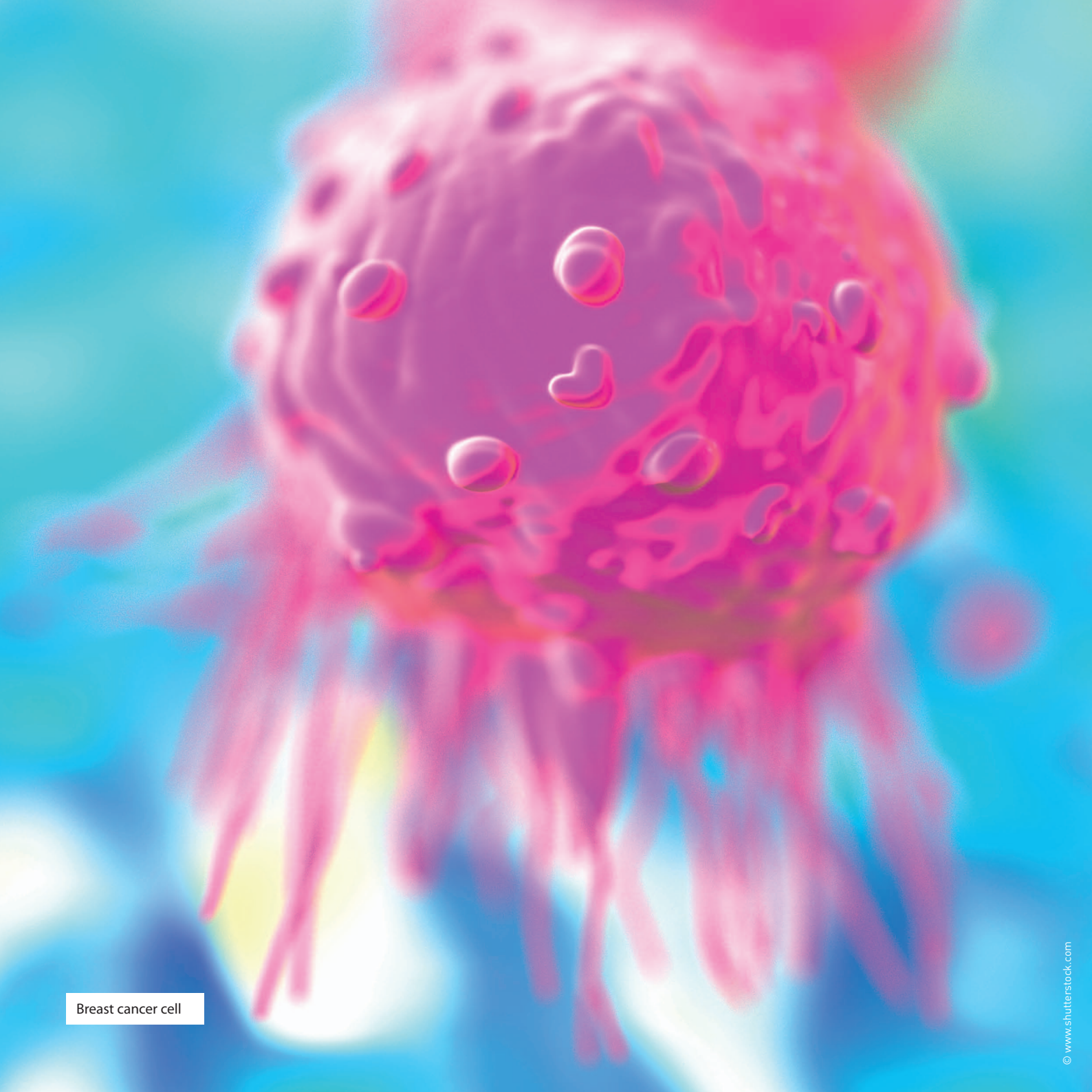
Host institution: Institute of Preventive Medicine, Region Hovedstaden (Denmark)

Project: Childhood body size, growth and pubertal timing and the risk of cancer in adulthood (CHILDGROWTH2CANCER)

ERC call: Starting grant 2011

ERC funding: €2 million for five years

Project's website: <http://childgrowth2cancer.org/>



Breast cancer cell

The Web of Life to explain how nature works

Species in nature are all part of interdependent networks. Professor Jordi Bascompte proposes to use the “Web of Life” hypothesis as a starting point to understand the interactions between plants and their insect pollinators, as well as the network’s collapse following global change.

Traditional ecological research has often focused on species richness rather than on the interactions between species. In contrast, Prof. Bascompte uses the network’s approach, which he calls the “Web of Life”, to decode the global interdependence of species.

With his research team, he plans to provide a new conceptual framework to decrypt how the disruptions in a network may reduce the entire pollination which is known as one of the essential features of our ecosystems. According to Prof. Bascompte, this new way of thinking in ecology and evolutionary biology is quite similar to how economists would treat systemic risks in financial systems.

By combining field work with computer simulations, analytical work, and phylogenetic methods, the team examines the specific properties of the plants and animals forming the network and their different life-history traits. This allows them to incorporate past evolutionary history quantifying, for example, the tendency of a plant species to be pollinated by a specific set of insects. The research group has already managed to compile a large dataset of life-history traits that includes e.g. information such as longevity, type of dispersal (wind, animal or none), existence of a seed bank or floral architecture and colour.

What makes this project innovative is that it will simulate the network’s collapse to evaluate the rate of coextinctions of the species that are left without resources. Such experiments should help to detect early-warning signals for network collapses in real-time situation and help to develop a more predictive ecology in the face of global change. Other applications are foreseen in areas such as food supply, another major challenge for today’s ecology.

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Principal investigator: Jordi Bascompte

Host institution: Agencia Estatal Consejo Superior de Investigaciones Científicas, CSIC (Spain)

Project: Robustness of the Web of Life in the Face of Global Change (WEBOFLIFE)

ERC call: Advanced grant 2010

ERC funding: €1.7 million for five years

Researcher’s webpage: <http://ieg.ebd.csic.es/>



Mutually beneficial interactions between flowering plants and their pollinators

Supply and demand for scientific knowledge for long-term adaptation to climate change

Adaptation to climate change poses an important challenge for society to development sustainability. The interdisciplinary project of Professor Suraje Dessai and his team aims to understand the demand for climate information across society, as well as its supply for informing long-term planning.

Currently, people lack understanding of how to most effectively harness science and technology for long-term adaptation to the threat posed by climate change. Informing decision-makers will require new kinds of information and new ways of thinking and learning to function effectively in a changing climate.

Prof. Dessai and his team's research focuses on the United Kingdom. The first part of this research seeks to understand how users of climate information, such as government, private and third sector organisations, actually use it. The second part focuses on the climate change information itself. The researchers ask scientists and other experts who produce climate information to consider what influences that process and how different users interpret that information. The aim is to gain an understanding of how scientific knowledge is converted into something usable by non-climate experts and non-scientists. Clarifying this complex relationship will help address the impact that changes to climate information can have on decision-making processes.

Preliminary results show that local authorities in Great Britain are now much better informed and more confident about accessing and using climate information compared to 10 years ago. Concerns about the practical relevance of climate information remain and have been further exacerbated by the economic crisis.

This ground-breaking research could help to increase the usefulness of climate information, and could influence both the policy of the UK government and other countries which may follow the UK's lead. It is hoped it will also stimulate further academic interest in climate change adaptation science.



© Suraje Dessai

Principal investigator: Suraje Dessai

Host institution: University of Leeds (United Kingdom)

Project: Advancing Knowledge Systems to Inform Climate Adaptation Decisions (ICAD)

ERC call: Starting grant 2011

ERC funding: €1 million for four years

Researcher's webpage: <http://www.see.leeds.ac.uk/people/s.dessai>

Project's webpage: <http://www.icad.leeds.ac.uk/>



St Ives Beach, Cornwall, UK

Crafting designed spaces for disabled people

The design of inclusive environments that facilitate independent living and equity of access to, and use of, products and services for disabled people is a common objective in many societies. In his research project, Professor Rob Imrie investigates the nature of “Universal Design” and the extent to which it is possible to create an inclusively designed world.

Despite societal and legal progress, disabled people continue to experience significant variations in the quality of designed environments; from the design of new housing to the performance of workspaces and kitchenware.

By exploring the relationship between disability and design through the concept of “Universal Design” (UD), Prof. Imrie is evaluating how far UD may provide a panacea to the problems faced by disabled people. He suggests that many studies regard it as a technique and have failed to understand it as a bio-political phenomenon. In his project, he will investigate to what extent the principles and practices of UD have permeated public discourses and socio-institutional networks, and how these are shaping the form of designed environments.

The first part of his research is mapping and understanding the practices of UD practitioners in a number of EU countries as well as Japan and the USA. The second part is case studies in Norway, Ireland and the UK. This includes evaluation of the application of UD in urban spatial settings, including open space projects, commercial buildings, and schools. The research team is also exploring specific

practices of UD, including body simulation, designer-user interfaces, and disabled people’s techniques of interacting with design technologies.

By interrogating UD’s role and relevance in responding to the manifold complexities of the body, this pioneering research will offer a greater understanding of how UD is interpreted, and put into practice, in a diverse range of modern societies.



© Rob Imrie

Principal investigator: Rob Imrie

Host institution: Goldsmiths College, University of London (United Kingdom)

Project: Universalism, universal design and equitable access to the designed environment (UNIDESIGN)

ERC call: Advanced grant 2012

ERC funding: €853,000 for three years

Researcher’s webpage: <http://www.gold.ac.uk/sociology/staff/imrie/>

Project’s webpage: <http://universalisingdesign.info/>



BLACK CAT DRIVE

Lifetime homes or dwellings crafted to design standards for people with different impairments (Northampton, UK)

From early life traces to uncovering the evolution of life

The first three billion years of Earth's history is a complicated puzzle, with many missing pieces. Professor Emmanuelle Javaux's project looks for unambiguous traces of life on Earth in this period, and aims to provide answers to some fundamental questions in the evolution of life and extra-terrestrial life forms.

The greatest difficulty in micropaleontology is recognising real traces of life. Clear criteria and reliable methods are essential. The research team uses innovative multidisciplinary techniques involving micro and macro characterisation, morphological, ultrastructural and chemical approaches, and nanoscale analyses. This project's objective is to identify traces of life from the Precambrian era (up to 3.5 billion years ago), and examine their state of preservation. Materials under analysis are fossils from South, Western and Central Africa, Russia, China, Australia and the USA, as well as analogues of these fossils in recent sediments.

On this basis, a chronology of the major stages in the evolution of life will be developed, in particular two aspects: the origin of cyanobacteria, which invented oxygen-releasing photosynthesis, gave rise to chloroplasts, and influenced drastically both the evolution of life and of Earth, and the evolution of eukaryotes, organisms whose cells contain a nucleus and other organelles enclosed within membranes. In her ELITE project, Prof. Javaux will also examine the environmental context, as well as the biological interactions and innovations which affected the evolution of life in the Precambrian era.

The research results could widen our understanding of the causes and patterns of biological evolution and the rise of more complex life forms on Earth, with implications for the search for extra-terrestrial life forms. This ambitious project could also aid substantially to the success rate of future Mars missions.



© E. Javaux

Principal investigator: Emmanuelle Javaux

Host institution: Université de Liège (Belgium)

Project: Early Life Traces and Evolution, and implications for Astrobiology (ELITE)

ERC call: Starting grant 2012

ERC funding: €1.5 million for five years

Researcher's webpage: http://www.ulg.ac.be/cms/j_5871/repertoires?uid=u014762

Project's webpage: <http://www.palaeobiogeo.weebly.com>



Cradle of Life, Barberton, South Africa

Ecosystem accounting in support of environmental management

Natural resource degradation has put pressure on the Earth's ecosystems and has affected the supply of current ecosystem services. Professor Dr Lars Hein is working on a dynamic approach to conserve major ecosystem services such as flood protection or optimisation of land use.

Prof. Dr Hein and his team have developed a number of approaches for 'Ecosystem Accounting', a new framework for understanding the linkages between environment and human activity. He considers that a systemic approach that encompasses both ecology and macro-economics is necessary to analyse changes in the capacity of ecosystems to generate ecosystem services at national or provincial scale. The System for Environmental Economic Accounts – Experimental Ecosystem Accounting (SEEA-EEA) for which guidelines were recently prepared under the auspices of the United Nations, is one of the best placed approaches to integrate environmental and economic considerations in the various decision-making processes. Another major advantage is that this approach allows consistency with national accounts (which yield indicators such as GDP).

In his ECOSPACE project, Prof. Dr Hein uses the ecosystem accounting approach to analyse, map and value the ecosystem services, in three geographical areas: Limburg Province (the Netherlands), Telemark County (Norway) and Central Kalimantan Province (Indonesia). The team has obtained some interesting results. In Telemark, the researchers are now examining how the approach can be used to

support land use planning in a dynamic setting. In Limburg, their focus is about combining biodiversity conservation with ecosystem services supply whilst in Central Kalimantan, they are studying peat subsidence - and its associated CO₂ emissions - and ecosystem services supply in order to guide land use planning. All the models they use are prepared with the Geographic Information Systems (GIS), a computer system that stores, analyses and manages geographical data.

The group expects that the project will contribute to monitor changes in ecosystem capital over time, and that their approach can be used by policy-makers to identify environmental management options and assess their cost-effectiveness. They also hope to contribute to the development of new global guidelines and standards in the field of 'Ecosystem Accounting'.



Principal investigator: Lars Hein

Host institution: University of Wageningen (the Netherlands)

Project: Spatial-Dynamic Modelling of Adaptation Options to Climate Change at the Ecosystem Scale (ECOSPACE)

ERC call: Starting grant 2010

ERC funding: €760,000 for five years

Researcher's webpage: <http://www.wageningenur.nl/en/show/Ecospace-spatial-modelling-and-accounting-for-ecosystem-services.htm>

Project's webpage: <http://www.wageningenur.nl/en/Persons/dr.-LG-Lars-Hein.htm>



Nature recreation in Norwegian highlands

A tool for predicting the spread of epidemics

Due to the increasing mobility of people on a global scale, infectious diseases now spread rapidly and frequently reach epidemic proportions. Dr Vittoria Colizza has developed an array of computational tools that could provide accurate predictions of future viral outbreaks, enabling a timely and efficient response to the threat.

The transmission of infectious diseases such as SARS, avian influenza and Lyme disease, remains a serious economic and medical burden with an estimated 15 million deaths every year. How can the spread of such epidemics be better predicted, anticipated and controlled? Dr Colizza, who works in Computational Epidemiology, a new scientific discipline that brings together mathematics, statistics, computational sciences and epidemiology, tackles this challenge in her project.

This novel combination of different scientific disciplines and methods has enabled Dr Colizza's research team to collect and integrate massive datasets on historical epidemics with which to develop computational models. Such models - based on sophisticated algorithms - could be used to provide reliable, detailed and accurate predictions of the spread of future epidemics. The aim is to enhance our ability to control the transmission of a disease, to better target interventions and to understand more about its effects on large populations.

Confronted with two emerging epidemics during the lifetime of her ERC project – the 2009 H1N1 pandemic (or Swine Flu) and the current MERS-CoV epidemic – Dr Colizza was able to concretely test her innovative approaches in real-life situations. These experiments confirmed the significant capabilities of the computational models developed and provided useful patterns on the potential future spread of infectious diseases.

The promising outcomes of this project are crucial to shape public health policies and guide decision-making processes in the event of future epidemic outbreaks.



Principal investigator: Vittoria Colizza

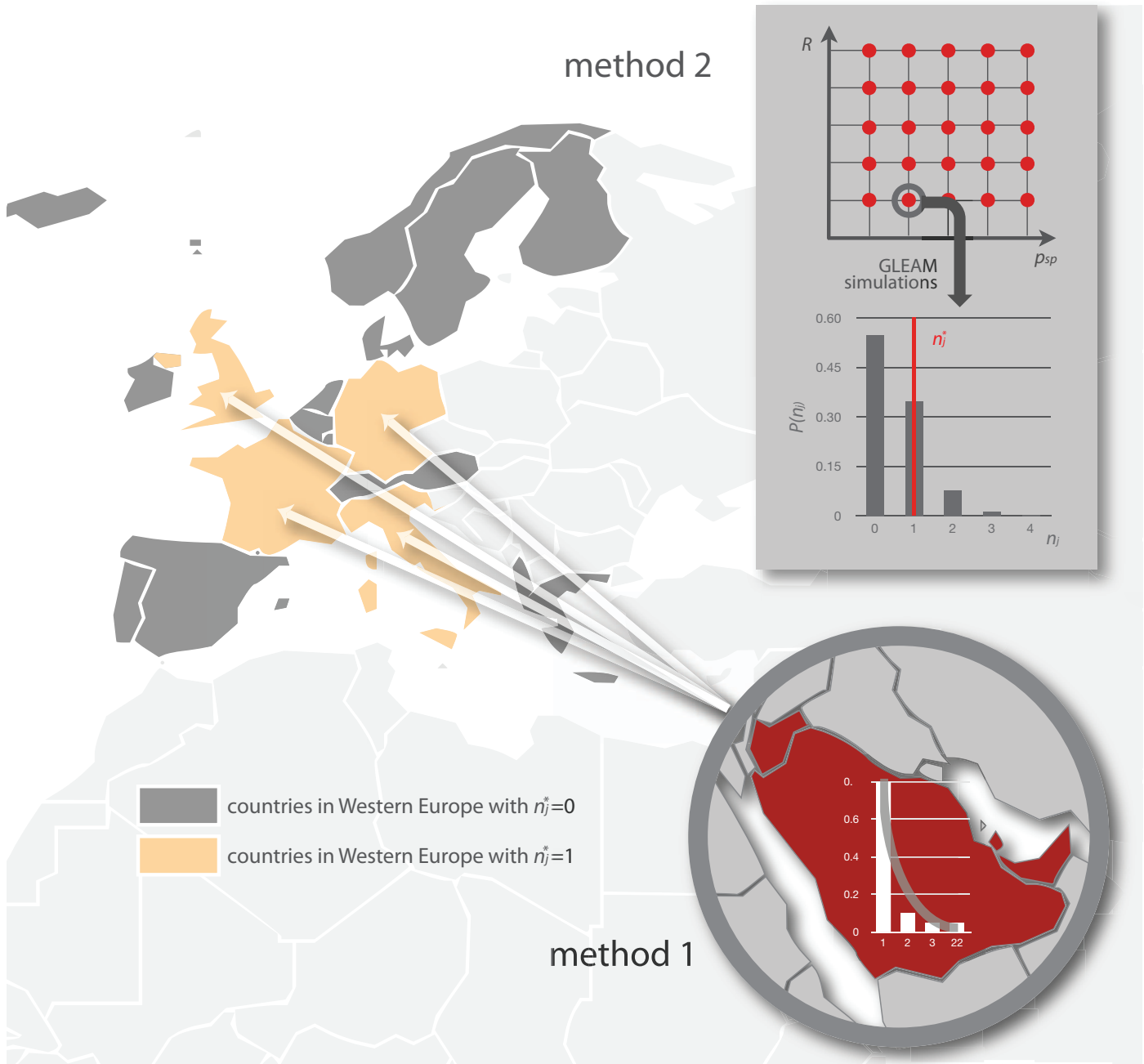
Host institution: Fondazione Istituto per l'Interscambio Scientifico (I.S.I.) (Italy)

Project: Complexity and predictability of epidemics: toward a computational infrastructure for epidemic forecasts (EPIFOR)

ERC call: Starting grant 2007

ERC funding: €684,000 for five years

Project's website: <http://www.epifor.eu/>



Schematic representation of the integrative maximum likelihood approach for the estimation of the MERS-CoV reproductive number and the incidence of cases in the affected region

“The European Research Council has, in a short time, achieved world-class status as a funding body for excellent curiosity-driven frontier research. With its special emphasis on allowing top young talent to thrive, the ERC Scientific Council is committed to keeping to this course. The ERC will continue to help make Europe a power house for science and a place where innovation is fuelled by a new generation.”

Jean-Pierre Bourguignon
ERC President and Chair of its Scientific Council



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