

PEOPLE

JTI

COOPERATION

EURATOM

IDEAS

CULTURE

CAPACITIES

CIP

RESEARCH FUND FOR COAL AND STEEL

DG HEALTH AND CONSUMERS

AAL

ERANET

DG JUSTICE

DG HOME AFFAIRS

EUROSTARS

FET FLAGSHIP

EUROPEAN INSTITUTE FOR GENDER EQUALITY

LIFE +

2007-2014

# FRAMEWORK OF THE RESEARCH


AT THE UNIVERSITY OF PADOVA

2007-2014

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**FRAMEWORK  
OF THE RESEARCH**  
AT THE UNIVERSITY OF PADOVA

The great variety  
of projects  
financed by  
different research  
programmes,  
indicates the  
University's  
excellent  
resources in most  
of the scientific  
areas.



International research at the University of Padova has been particularly successful over the last year.

The University now runs 196 projects within the 7th Framework Programme and almost 50 further European research programmes, supported by an overall EU contribution close to € 72 Million over the last seven years.

The remarkable success of the University of Padova in the research field has been recently highlighted by the results of the national Research Quality Evaluation (VQR) carried out by the ANVUR (National Agency for the Evaluation of Universities and Research Institutes) for the period 2004-2010. The main role of the ANVUR is to assess the quality of scientific research carried out by universities as well as by public and private research institutions. The VQR results are the outcome of a huge effort by the Italian Ministry for Education, University and Research, encompassing the evaluation of 185.000 scientific products and the involvement of 15.000 international referees. At the end of this process, in July 2013, the University of Padova obtained extraordinary results, being ranked in 1st position among Universities of comparable size in 7 out of the 14 scientific areas defined in the evaluation process, namely in Physics, Earth Sciences, Biology, Medicine, Agriculture and Veterinary Medicine, Industrial and Information Engineering, Economics and Statistics, as well as in second position in the following areas Chemistry, Philosophy, History, Psychology and Pedagogy and in third position in Jurisprudence.


The large variety of projects funded by various research programmes demonstrates the excellence of the University's researchers in most branches of science.

I remain firmly convinced of the importance of participation in international research and I am sure that our recent results will pave the way for an ever-growing research commitment within the framework of Horizon 2020.

I would like to express my gratitude to all colleagues involved in research activities and to our administrative staff for the essential support they continue to provide.

The University of Padua looks to the future with great confidence, owing to the high level of staff skills and to a strong commitment to excellence in international scientific research.

*The Rector  
Giuseppe Zaccaria*



# INTERNATIONAL RESEARCH PROJECTS

The University of Padova places emphasis on being an internationally-oriented research university, and is involved in a wide variety of international research activities.

The several challenges that researchers nowadays meet can only be faced at European level. A researcher can carry on her/his own work at best only by being involved in international collaborations, which bring him/her the following benefits:

- Make visible the excellence of her/his own research team and of her/his research itself
- Increase funds for advanced research
- Enhance her/his own research capacities thanks to external high-level resources (both human and infrastructural)
- Integrate young researchers in her/his research team and train them up
- Reinforce collaboration with industry and have an impact on society.

International research projects at the University of Padova continue to increase in number and size. This fits the goal of our University to develop its research potentiality at an international level and promote it to standards of excellence.

The aim of this publication is to show the level of participation of the University of Padova in FP7 and other European projects during the period 2007 – 2013, and to promote further commitment in international collaboration and research projects.

## EUROPEAN RESEARCH PROGRAMMES 2007-2013

European Research is one of the priorities on the policy agenda in Europe. The European Union employs different funding instruments to support research and innovation:

1. The 7th Framework Programme for Research and Technological Development (FP7) is the EU's main instrument for funding research

activities in Europe. FET Flagships in FP7 are ambitious large-scale, science-driven, research initiatives that aim to achieve a visionary goal;

2. The Competitiveness and Innovation Framework Programme (CIP) supports innovation activities. It is divided into three operational programmes: the Entrepreneurship and Innovation Programme (EIP), the Information Communication Technologies Policy Support Programme (ICT-PSP), and the Intelligent Energy Europe Programme (IEE);
3. Furthermore, there are programmes related to specific research areas and usually managed by the competent Directorates General. The University of Padova participates, among others, in the following programmes:
  - Health Programme has three overarching objectives: (i) improve citizens' health security, (ii) promote health and reduce health inequalities, (iii) generate and disseminate health information and knowledge;
  - Justice Programme 2007- 2013 contributes to the further development of a European area of justice based on mutual recognition and mutual trust. Dg Home Affairs funding aim at strengthening and developing common approaches to asylum, immigration, security and borders;
  - Ambient Assisted Living (AAL) has the objective to enhance the quality of life of older people and strengthen the industrial base in Europe through the use of Information and Communication Technologies (ICT);
  - Life Plus is the EU main instrument for the environment and the general objective is to contribute to the implementation, updating and development of EU environmental policy and legislation by co-financing pilot or demonstration projects with European added value;
  - Eurostar is a programme that supports research-performing small and medium

enterprises, which develop innovative products, processes and services, to gain competitive advantage;

- ERA-NET scheme develops and strengthens the coordination of national and regional research programmes through two specific actions: 'ERA-NET actions' – and 'ERA-NET Plus actions'; EIGE is a European Union agency which supports the EU and its Member States in their efforts to promote gender equality, to fight discrimination based on sex and to raise awareness about gender equality issues;
- The Research Fund for Coal and Steel (RFCS) supports innovative research in the coal and steel sectors. Steel and coal are key areas for the continuous sustainable economic development of Europe.

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## THE SEVENTH FRAMEWORK PROGRAMME FOR RESEARCH AND TECHNOLOGICAL DEVELOPMENT

The Seventh Framework Programme for Research and Technological Development (FP7) is the EU's main instrument for funding research in Europe and it runs from 2007 to 2013.

FP7 supports research in selected priority areas - the aim being to make, or keep, the EU as a world leader in those sectors. The EU budget for the FP7 is € 50.5 billion.

FP7 is made up of 4 main blocks of activities forming 4 specific programmes plus a fifth specific programme on nuclear research, Euratom; moreover, Joint Technology Initiatives are established in relation with some themes of the first programme (Cooperation):

### COOPERATION

Cooperation is the largest subarea of FP7, and supports transnational research ventures within Europe and between EU countries and third countries. Cooperation covers 10 themes, and different project funding schemes. The programme is intended to promote collaboration between universities, industry, research institutes and national authorities.

### IDEAS

Ideas supports frontier research in Europe within all areas of research and technology. It is not a requirement that the collaboration cross national borders, but that it promote creativity and excellence in European research. The programme is implemented through the European Research Council (ERC).

### PEOPLE

People supports researcher mobility and career development for researchers in Europe and in third countries. The programme is implemented through different instruments in the Marie Curie Actions. They all entail researcher mobility across national borders, and can support individual mobility, larger networks and conferences.

### CAPACITIES

Capacities must stimulate realization of Europe's research potential for a viable knowledge economy. The activities cover several areas – such as research infrastructures, small and medium-sized enterprises (SMEs), Europe's regions and competence development in third countries.

### EURATOM

The programme promotes pacific use of nuclear research and technology. It comprises research, technological development, international cooperation, dissemination of technical information, and exploitation activities, as well as training.

### JOINT TECHNOLOGIES INITIATIVES (JTI)

Joint Technology Initiatives are long-term public-private partnerships that pursue ambitious common research objectives. They support large-scale multinational research activities in areas of major interest to European industrial competitiveness and issues of high societal relevance.

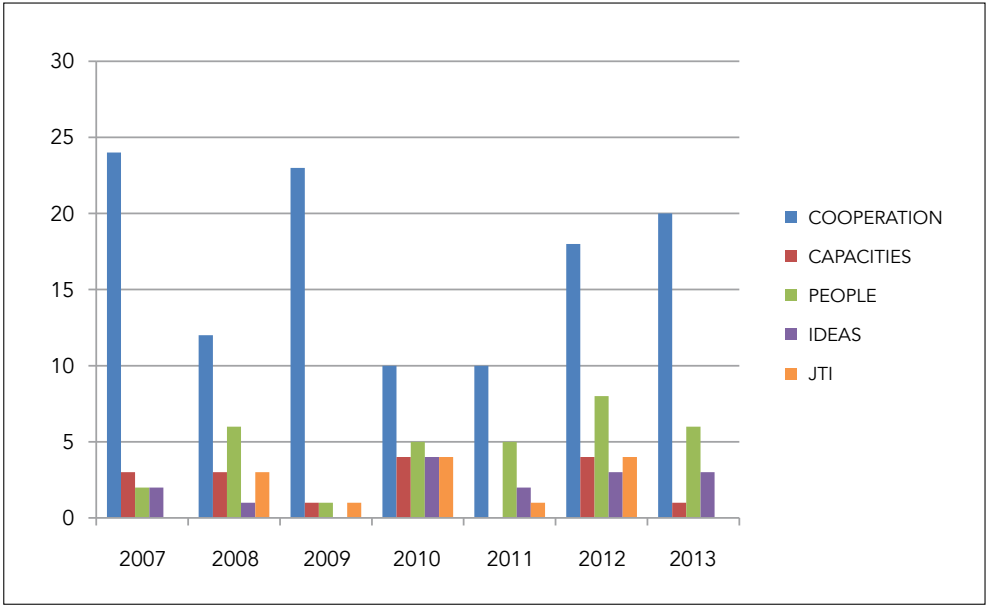
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## PERFORMANCE OF THE UNIVERSITY OF PADOVA

The University of Padova manages almost 250 European research projects. Most of them are funded within the FP7. 32 Departments and Research Institutes are involved in these projects. In 2013, 31 new projects were approved by the

European Commission within the FP7.  
 The total sum of EU contribution assigned to those projects amounts to more than € 11 Million.  
 The participation of the University of Padova in the Seventh Framework Programme has then increased during the years: 196 is now the number of funded projects within the FP7 framework, out of which 41 managed as a coordinating body, for a total contribution of

about € 67 Million.  
 Among them, 16 projects were funded by the European Research Council within the specific programme “Ideas”.  
 The successful participation of the University of Padova in this programme in 2012 and 2013 represents the best result among the Italian Universities. “Ideas” is the most eminent EU programme for research funding. It supports

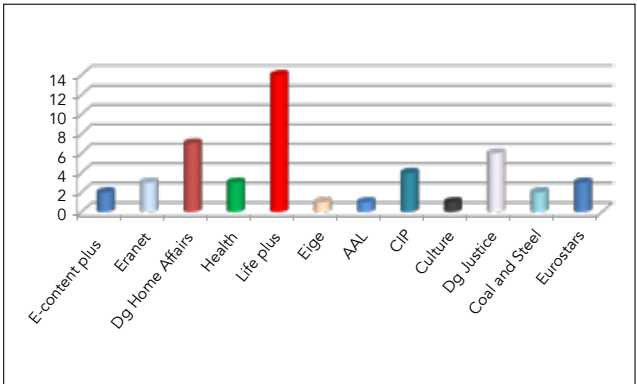


The previous graph shows the performance of the University of Padova in FP7 programmes during the years 2007-2013.

projects with a contribution that varies from € 1,5 to € 3,5 Million.

Furthermore, the University of Padova also performed in a distinguished way in other EU programmes in the last years for a total EU contribution of € 4.9 Million.

Performance of the University of Padova in other Eu Programme in terms of number of grants for each program



Performance of the University of Padova in FP7 in terms of number of grants

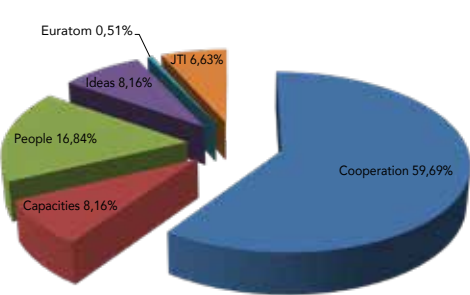
FP7	COOPERATION	CAPACITIES	PEOPLE	IDEAS	EURATOM	JTI	TOTAL
NEGOTIATION	4	0	0	0	0	0	4
ACTIVE	76	8	23	14	0	9	130
CLOSED	37	8	10	2	1	4	62
TOTAL Projects	117	16	33	16	1	13	196
TOTAL Funding	33.226.344,45	3.743.066,00	8.329.879,18	19.638.754,40	22.440,00	1.998.573,47	66.959.057,50

Source: International Research Office database

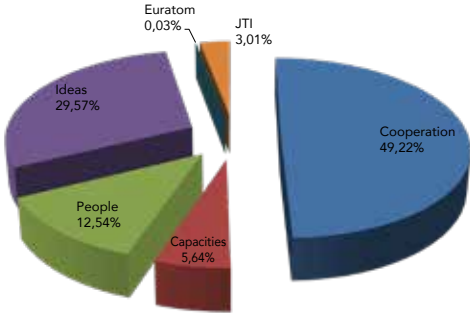
Performance of the University of Padova in FP7 in terms of EU contribution

FP7	COOPERATION	CAPACITIES	PEOPLE	IDEAS	EURATOM	JTI	TOTAL
NEGOTIATION	1.248.812,60	0,00	0,00	0,00	0,00	0,00	1.248.812,60
ACTIVE	22.026.393,85	2.189.826,00	6.914.127,90	18.942.154,40	0,00	1.353.481,40	51.425.983,55
CLOSED	9.951.138,00	1.553.240,00	1415751,28	696.600,00	22.440,00	645.092,07	14.284.261,35
TOTAL Projects	33.226.344,45	3.743.066,00	8.329.879,18	19.638.754,40	22.440,00	1.998.573,47	66.959.057,50

Source: International Research Office database



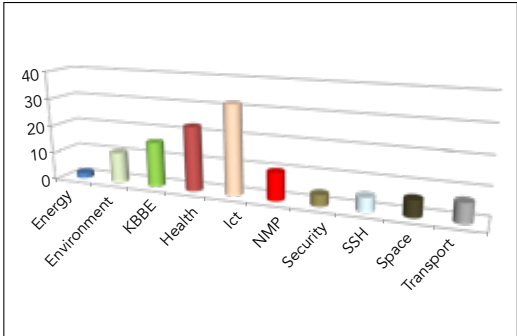
FP7: UNIPD PROJECTS



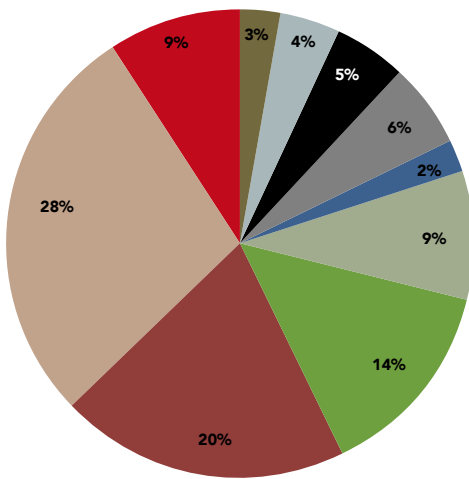
FP7: UNIPD FUNDING

UNIPD PROJECTS IN COOPERATION BY THEME IN UNITS

**COOPERATION.** So far 117 projects have been financed and cover all the research themes. 28 Departments are involved. The participation of the University of Padova in all areas of the Cooperation programme is shown in the following graph. As revealed in the graph the greatest participation is in the themes of Health, ICT and Food Agriculture and Fisheries.







**Energy**

**Environment**

**Food, Agriculture and Fisheries, Biotechnology (KBBE)**

**Health**

**ICT**

**IDEAS.** There are currently 10 ERC Starting grants, 3 ERC Consolidator Grants and 3 ERC Advanced grants at the University.

**PEOPLE.** So far the University has won 33 projects, out of which 17 Initial Training Networks recruiting international PhD students, 8 Marie Curie Individual Fellowships, 4 International Research Staff Exchange and 3 Researchers' Night. Furthermore, 1 COFUND Programme recruiting 28 international postdocs (the University of Padova is the first Italian public University running this kind of Programme) is ongoing.

**Nanosciences, nanotechnologies, materials & new production technologies (NMP)**

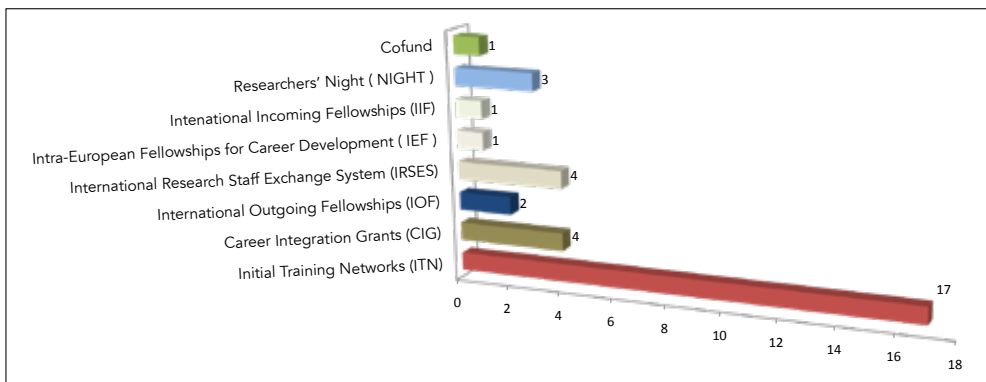
**Security**

**Socio-economic Sciences and Humanities (SSH)**

**Space**

**Transport**

UNIPD PROJECTS IN PEOPLE IN UNITS



**CAPACITIES.** 16 projects have been funded and the participation is concentrated in the subprograms "Research Infrastructures",

"Research for SMEs", "Science in Society".

**EURATOM AND JTI.** 1 Euratom project and 13 JTI projects have been funded.

## THE INTERNATIONAL RESEARCH OFFICE AND ITS ROLE AT THE UNIVERSITY

In the Italian context the capacity of attracting EU and International funding for research happens to be more and more strategic.

For this reason, a big-size University needs suitable structures and resources: the

International Research Office is a reference point for departments and research centres that intend to make use of EU and international funds for research projects. The office supports researchers who wish to participate in EU-funded research projects or in projects funded by other international organizations. In particular, the Office promotes the research interests of the University of Padova, organizes training activities, collects data and provides consulting service for writing, reporting and managing projects both to researchers and administrative staff.

The main activities are the following:

1. Technical and financial support during the project life-cycle
2. Support to the development of the University research policy
3. Networking at all level:
  - a. Prizes & Awards for UNIPD researchers
  - b. Participation in EIPs, KICs, JTI's etc.
4. Training and organization of events, laboratories and workshops on EU-funding programmes (HOW TO... EUROPEAN RESEARCH)
5. Management of Piscopia Fellowship programme
6. Euraxess Local Contact Point (services for researchers in motion)
7. Collection of data and Management of a database of EU and international research projects wherein the University of Padova participate

The University has come to an agreement with the European Office of Veneto Region in Bruxelles.

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## PROJECT LIFE CYCLE

### SUPPORT OF THE INTERNATIONAL RESEARCH OFFICE IN THE PROJECT LIFE CYCLE









# FP7

The Seventh Framework  
Programme for Research and  
Technological Development (FP7)  
is the EU's main instrument for  
funding research in Europe and it  
runs from 2007 to 2013



# COOPERATION

It fosters collaborative research across Europe and other partner countries through projects by transnational consortia of industry and academia.





## ENERGY FORESIGHT NETWORK

REFERENCE	213496
CALL	FP7-ENERGY-2007-1-RTD
THEME	energy
SCIENTIST	Arturo Lorenzoni
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	1,334,405 €
EU FUNDING	1,334,405 €
E-MAIL	arturo.lorenzoni@unipd.it

### PROJECT DESCRIPTION

The EFONET CA addresses Task 9.2.1 Energy foresight network. It primarily aims at providing policy relevant input to the EC, notably in relation with the Review of the EU Energy Strategy, the establishment of the Strategic Technology Plan, the implementation of the Action Plan for Energy Efficiency. EFONET will establish and run a discussion platform gathering representatives from the research community and from all relevant stakeholder groups.

It features 5 Thematic WPs, each concentrating on one of the main priorities that have already been identified within the energy foresight network established and run by the EC since 2005: methodological approaches and tools for foresight, end-use energy efficiency, foresight in the transport sector, technologies integration scenarios, barriers to the penetration of future technologies. 2 additional WPs deal with project management, network coordination and dissemination. 18 workshops and a final conference will be organised over 2.5 years, with an overall attendance estimated in some 500 participants.

The main outputs are:

- country reports summarising state of the art on energy foresight methods and their application
- evaluation papers and policy briefs including recommendations for future energy policy

formulation and implementation.

- EFONET aims at becoming a privileged discussion forum on future EU energy policies.

To this end, provisions are made to

- continuously extend network participation
- establish and maintain links with other EU energy RTD projects including those emerging for other Tasks in this call
- develop a dedicated interactive website to ensure wide dissemination and consolidate a virtual EFONET community that can extend beyond the contractual EFONET lifetime.

The EFONET team includes 14 partners and a large group of external experts, covering 19 different countries, representing public and private research, national and EU institutions, industry, international organisations and NGOs.

### PARTNERS

**Coordinator:** Istituto di Studi per l'integrazione dei Sistemi (ISIS)

**Participants:** Izt Institut für Zukunftsstudien und Technologiebewertung GmbH, National Technical University of Athens, Dublin Institute of Technology, Politecnico di Torino, Enerdata SA, Shell International BV, Comité des Constructeurs Français d'Automobiles, Vienna University of Technology, Interdisciplinary Center for Technological Analysis and Forecasting, Institutt for Energiteknikk, Central Mining Institute, Fundacion Inasmet, Università degli Studi di Padova



## ADVANCED GROUND SOURCE HEAT PUMP SYSTEMS FOR HEATING AND COOLING IN MEDITERRANEAN CLIMATE

REFERENCE	218895
CALL	FP7-ENERGY-2007-2-TREN
THEME	energy
SCIENTIST	Davide Del Col
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	7,247,686 €
EU FUNDING	4,299,695 €
E-MAIL	davide.delcol@unipd.it

### PROJECT DESCRIPTION

GROUND-MED project will demonstrate geothermal heat pump (GSHP) systems for heating and cooling of measured SPF>5,0 in 8 demonstration sites of South Europe.

As the SPF is determined not only by the heat pump unit, but by its operating conditions imposed to the heat pump by the ground heat exchanger and the heating/cooling system of the building as well, integrated systems incorporating the following technological solutions will be demonstrated and evaluated:

- new water source heat pumps of improved seasonal efficiency; key technologies include use of the next generation of compressors, heat exchangers and automation;
- borehole heat exchangers and heating/cooling systems operating with minimum temperature difference between them, which also follows the corresponding heating/cooling demand from the building; design aspects, thermal storage and system controls are important;
- minimum power consumption to system components; key parts are the fan-coil and air-handling units.

GROUND-MED has a duration of 5 years and a budget of around 7,3 million euros, comprising 25% research and 75% demonstration and other activities. The GROUND-MED consortium

comprises 24 organizations mainly from South Europe, including a wide diversity of GSHP actors, such as research and educational institutes, heat pump manufacturers, national and European industrial associations, energy consultants and works contractors.

### PARTNERS

**Coordinator:** Centre for Renewable Energy Sources

**Participants:** Universidad Politecnica de Valencia, Compaigne Industrielle d'Applications Thermiques, Ecoserveis, European Heat Pump Association, Groenholland Geo-energiesystemen BV, Hiref s.p.a., Gejzir Consulting, European Health Telematics, Kungliga Tekniska Hogskolan, Escola Superior de Tecnologia de Setúbal, Instituto de Sistemas e Robotica - Universidade de Coimbra, Ochsner Wärmepumpen GmbH, Eneren s.r.l., Universitatea din Oradea, Edrasis CH Psallidas S.a, University College Dublin, National University of Ireland, Dublin, Centre technique des industries aérauliques et thermiques, Association Greth, Fachinformationszentrum Karlsruhe Gesellschaft für Wissenschaftlich-Technische Information mbH, Commissariat à l'Energie Atomique, Geoteam Technisches Büro für Hydrogeologie, Geothermie und Umwelt Ges.m.b.H., Besel s.a., Università degli Studi di Padova



## INTERACTIONS BETWEEN SOIL RELATED SCIENCES - LINKING GEOPHYSICS, SOIL SCIENCE AND DIGITAL SOIL MAPPING

REFERENCE	211386
CALL	FP7-ENV-2007-1
THEME	environment
SCIENTIST	Giorgio Cassiani
DEPARTMENT	Geosciences
UNIPD	participant
TOTAL COST	4,643,730 €
EU FUNDING	3,420,623 €
E-MAIL	giorgio.cassiani@unipd.it

### PROJECT DESCRIPTION

As formulated in the Thematic Strategy for Soil Protection prepared by the European Commission soil degradation is a serious problem in Europe. The degradation is driven or exacerbated by human activity and has a direct impact on water and air quality, biodiversity, climate and human life-quality. High-resolution soil property maps are one major prerequisite for the specific protection of soil functions and restoration of degraded soils as well as sustainable land use, water and environmental management. However, the currently available techniques for (digital) soil mapping still have deficiencies in terms of reliability and precision, the feasibility of investigation of large areas (e.g. catchments and landscapes) and the assessment of soil degradation threats at this scale.

A further quandary is the insufficient degree of dissemination of knowledge between the scientific community, relevant authorities and prospective users and deficiencies in standardisation. The focus of the iSOIL project is on improving fast and reliable mapping of soil properties, soil functions and soil degradation threats. This requires the improvement as well as integration of geophysical and spectroscopic measurement techniques in combination with advanced soil sampling approaches, pedometrical and

pedophysical approaches. An important aspect of the project is the sustainable dissemination of the technologies and concepts developed. For this purpose guidelines will be written and published. Furthermore, the results will be implemented in national and European soil databases. The present state of technologies and future perspectives will also be transferred to authorities, providers of technologies (SMEs), and end users through workshops at regional level, international conferences and publications throughout the duration of the project.

### PARTNERS

**Coordinator:** Helmholtz-Zentrum für Umweltforschung GmbH - Ufz

**Participants:** Comité Européen de Normalisation, Eberhards Karls Universität Tübingen, Stichting Dienst Landbouwkundig Onderzoek, National Institute of Geophysics Geodesy and Geography – Bulgarian Academy of Sciences, Allsat GmbH Network + Services, Rheinische Friedrich-Wilhelms-Universität Bonn, Vyzkumny Ustav Rostlinné Vyroby, Ceska Zemedelska Unioverszita v Praze, Eijkelpark Agrisearch Equipment BV, Joint Research Center (JRC) – European Commission, Christian-Albrechts-Universität zu Kiel, The Soil Company BV, Allied associates (Geophysical) Limited, Universität Bern, Cranfield University, Joanneum Research Forschungsgesellschaft mbH, Consulaqua Hamburg Beratungsgesellschaft mbH, Università degli Studi di Padova



## MODEL DRIVEN SOIL PROBING, SITE ASSESSMENT AND EVALUATION

REFERENCE	213161
CALL	FP7-ENV-2007-1
THEME	environment
SCIENTIST	Giorgio Cassiani
DEPARTMENT	Geosciences
UNIPD	participant
TOTAL COST	4,679,910 €
EU FUNDING	3,397,609 €
E-MAIL	giorgio.cassiani@unipd.it

### PROJECT DESCRIPTION

Conventional techniques for site characterization are time consuming, cost intensive, and do not support decision making. Therefore, new techniques for step by step site characterization strategy with smart feed back loops are necessary. These will be able to support a future “soil framework directive”. Advanced geophysical site characterization techniques combined with new types of vegetation analysis will be developed. Based on these non-invasive surveys, the extension of sources, contamination levels (THP, BTEX, PAH, CHC, explosives, heavy metals and radio nuclides) and soil heterogeneities will be localized first. Hot spots will then be investigated by new direct push probing systems integrated with geophysical & hydrogeological methods and combined with chemical & isotopic contaminant analysis for source localization and identification (environmental forensics). The actually occurring bioprocesses, such as contaminant degradation or precipitation/mobilization processes, will be assessed using biosensors, in situ microcosms, and stable isotope and biomarker analysis. These new techniques and tools will be evaluated against best practice of conventional methods. Therefore, they will be applied at fully equipped and characterized European reference sites available in the project and will be provided to consultants and SME’s for application. Integrated statistical analysis and

modelling at different stages of the step by step approach will result in an improved view of soil and subsurface contamination and will provide a sound basis for risk assessment and decision.

### PARTNERS

**Coordinator:** Helmholtz-Zentrum für Umweltforschung GmbH - Ufz

**Participants:** Danmarks Tekniske Universitet, Lancaster University, Aecom Cz Sro, Consiglio Nazionale delle Ricerche, Rheinische Friedrich-Wilhelms-Universität Bonn, Umweltbundesamt GmbH, Createc Consorzio per l’Ambiente e l’Innovazione Tecnologica, Saint Petersburg State University – SPSU, Université Catholique de Louvain, Christian-Albrechts-Universität zu Kiel, MpbF Mess-und Probenahmetechnik Berndsen und Faiss Gbr, Aarhus Universitet, Institut de Physique du Globe de Paris, Università degli Studi di Roma La Sapienza, Stichting Deltares, Università degli Studi di Padova



## KNOWLEDGE-BASED SUSTAINABLE MANAGEMENT FOR EUROPE'S SEAS

REFERENCE	226675
CALL	FP7-ENV-2008-1
THEME	environment
SCIENTIST	Luca Palmeri
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	7,403,128 €
EU FUNDING	5,764,200 €
E-MAIL	lpalmeri@unipd.it

### PROJECT DESCRIPTION

Europe's four regional seas (Baltic, Black, Mediterranean and NE Atlantic) have suffered severe environmental degradation due to human pressure. Existing measures to manage pressures have proven inadequate and the EC has responded by proposing a new policy (Maritime Strategy Blue Book) and environmental legislation (Marine Strategy Directive), both currently close to adoption. These instruments rely on the Ecosystem Approach, a management paradigm that encompasses humans and the supporting ecosystem.

But the science base for this approach needs strengthening and practical tools must be developed and tested for policy implementation. In particular, criteria for assessing costs and benefits of management actions are poorly developed, particularly in the complex marine environment where multiple uses and management conflicts are common. The KnowSeas consortium will strengthen the science base for managing Europe's seas through the practical application of systems thinking. It will work at the two scales envisaged for emergent EU policy: the Regional Sea Scale and Member State Economic Exclusive Zones (EEZs). We have developed a new approach of Decision Space Analysis to investigate mismatches of scale. Knowledge created through the FP6 European

Lifestyles and Marine Ecosystems project, augmented with necessary new studies of climate effects, fisheries and maritime industries - in EEZ case studies - will provide a basis for assessing changes to natural systems and their human causes. New research will examine and model economic and social impacts of changes to ecosystem goods and services and costs and benefits of various management options available through existing and proposed policy instruments. Institutional and social analysis will determine conflicts of interest and examine governance as well as stakeholder values and perceptions.

### PARTNERS

**Coordinator:** The Scottish Association for Marine Science

**Participants:** Agencia Estatal Consejo Superior de Investigaciones Cientificas, Stichting Deltares, Norsk Institutt for Luftforskning, Syddansk Universitet, Université de Bretagne Occidentale, Vereniging voor Christelijk Hoger Onderwijs Wetenschappelijk Onderzoeken en Patientenzorg, University of East Anglia, Universidad de Sevilla, Universitetet I Bergen, University College Cork – National University of Ireland, Università Ca' Foscari di Venezia, University of Plymouth, Coastal & Marine Union, Morski Instytut Rybacki – Panstwowy Instytut Badawczy, Sir Alister Hardy Foundation for Ocean Science, Instituto po Bioraznoobrazie I Ekosistemni Izsledvaniya Balgarska Akademiya Na Naukite, Institute for European Environmental Policy – London, Imar – Instituto do Mar, Koninklijke Nederlandse Akademie van Wetenschappen – KNAW, Alfred-Wegener-Institut für Polar-und Meeresforschung, Megapesca Formação Profissional e Prestação de Serviços Lda, Middle East Technical University, Stockholms Universitet, The Secretary of State for Environment, Food and Rural Affairs, Stichting Koninklijk Nederlands Instituut voor Zeeonderzoek (NIOZ), Ctl Consult Ltd, University of Bath, Suomen Ymparistokeskus, Helmholtz-Zentrum Geesthacht Zentrum für Material-und Küstenforschung GmbH, Institute of Oceanology – Bulgarian Academy of Sciences, Consiglio Nazionale delle Ricerche, Università degli Studi di Padova



## INNOVATIVE COASTAL TECHNOLOGIES FOR SAFER EUROPEAN COASTS IN A CHANGING CLIMATE

REFERENCE	244104
CALL	FP7-ENV-2009
THEME	environment
SCIENTIST	Piero Ruol
DEPARTMENT	Civil, Environmental and Architectural Engineering
UNIPD	participant
TOTAL COST	8,519,726 €
EU FUNDING	6,530,000 €
E-MAIL	piero.ruol@unipd.it

### PROJECT DESCRIPTION

Coastal areas are vital economic hubs in terms of settlement, industry, agriculture, trade and tourism to mention some key sectors. There are already many coastal problems including erosion, flood risk and long-term habitat deterioration.

As economies continue to develop the asset base at risk will grow, while accelerating climate change will increase the likelihood of damaging extreme events, as well as accelerate habitat decline. Existing coastal management and defence approaches are not well tuned to these challenges as they assume a static situation.

THESEUS will develop a systematic approach to delivering both a low-risk coast for human use and healthy habitats for evolving coastal zones subject to multiple change factors. The innovative combined mitigation and adaptation technologies to be considered will include ecologically-based mitigation measures (such as restoration and/or creation of habitats), hydro-morphodynamic techniques (such as wave energy converters, sediment reservoirs, multi-purpose structures, overtop resistant dikes), actions to reduce the impact on society and economy (such as promotion of risk awareness or spatial planning) and GIS-based software to support defence planning.

To integrate the best of these technical measures

in a strategic policy context we will develop overarching THESEUS guidelines which will consider the environmental, social and economic issues raised in any coastal area. It is in this spirit that THESEUS will advance European and international experience in applying innovative technologies to reducing coastal risks. THESEUS activities will be carried out within a multidisciplinary framework using 8 study sites across Europe, with specific attention to the most vulnerable coastal environments such as deltas, estuaries and wetlands, where many large cities and industrial areas are located.

### PARTNERS

**Coordinator:** Alma Mater Studiorum – Università di Bologna

**Participants:** Aristotelio Panepistimio Thessalonikis, Consorzio per la Gestione del Centro di Coordinamento delle Attività di Ricerca Inerenti il Sistema Lagunare di Venezia, Koninklijke Nederlandse Akademie van Wetenschappen - KNAW, Helmholtz-Zentrum Geestacht Zentrum für Material-und Küstenforschung GmbH, University of Plymouth, Université de Versailles Saint-Quentin-en-Yvelines, University of Southampton, Katholieke Universiteit Leuven, Instytut Meteorologii i Gospodarki Wodnej, Aalborg Universitet, Latvijas Universitate, Athens University of Economics and Business – Research Center, Universidad Nacional Autonoma de Mexico, Institute of Oceanology – Bulgarian Academy of Sciences, Middlesex University Higher Education Corporation, Marine Hydrophysical Institute – Ukrainian National Academy of Sciences, Universidad de Cantabria, Entente Interdepartementale pour la Demoustication du Littoral Méditerranéen, Instytut Budownictw Wodnego Polskiej Akademii Nauk, Istituto Superiore per la Ricerca e la Protezione Ambientale, Hamburg Port Authority, East China Normal University – ECNU, National Cheng Kung University, Infram International Bv, University of Delaware, P.P. Shirshov Institute of Oceanology of Russian Academy of Sciences, Bangor University, Bureau de Recherches Géologiques et Minières, Centre d'Etudes Techniques Maritimes et Fluviales, Vlaams Instituut voor de Zee – VZW, Università degli Studi di Padova



## NEW INTEGRATED KNOWLEDGE BASED APPROACHES TO THE PROTECTION OF CULTURAL HERITAGE FROM EARTHQUAKE-INDUCED RISK

REFERENCE	244123
CALL	FP7-ENV-2009-1
THEME	environment
SCIENTIST	Claudio Modena
DEPARTMENT	Environmental and Architectural Engineering
UNIPD	coordinator
TOTAL COST	3,521,656 €
EU FUNDING	2,736,114 €
E-MAIL	claudio.modena@unipd.it

### PROJECT DESCRIPTION

The project tackles the problem of earthquake-impact on Cultural Heritage assets starting from basic consideration that efficient protection, with substantial guarantee of compatibility and low-intrusivity, can only be achieved with minimum intervention approach. This requires that potentialities of existing materials and components are as much as possible exploited in terms of strength and energy dissipation, and candidate interventions are validated and optimized on specific, real application conditions. At the project start, earthquake-induced failure mechanisms, construction types and materials, intervention and assessment techniques will be cross-correlated with the aim of developing new integrated methodologies with a systemic approach.

Traditional materials will be enhanced by innovative industrial processes (e.g., nano-limes or micro-silica for injection), and new high-performance (e.g. dissipative) elements will be developed. Novel collaborative combinations of them will be tested on structural components (walls, pillars, floors, vaults) and on structural connections (wall-, floor- and roof-to-wall), which converge the behaviour of single strengthened

elements into the global structural response. The envisaged techniques will be also validated on model buildings and substructures. Advanced numerical studies will allow parameterizing the results and deriving simple and optimized design procedures. Early warning techniques for intelligent interventions and advanced monitoring techniques for knowledge based assessment and progressive implementation of interventions will be also developed. This bottom-up approach will bring to new integrated materials, technologies and tools for systemic improvement of seismic behaviour of CH assets. The new solutions will be condensed into guidelines for end-users. The large participation of research centres, SME, and end-user from various countries, including ICPC and MPC, ensures increased impact of the research.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Bundesanstalt für Materialforschung und-Prüfung, National Technical University of Athens, Universitat Politecnica de Catalunya, Politecnico di Milano, Cintec International Ltd, Interproject D.O.O., Universidade do Minho, University of Bath, S&B Industrial Minerals Mining Quarrying Industrial Commercial Touristshipping Technical Company SA, Gazi Universitesi, Cairo University, Monumenta – Conservacao e Restaurodo Património Arquitectónico Lda, Ustav Teoretické a Aplikované Mechaniky Avcr, Bozza Lefnami Srl, Ecole Nationale D'Architecture, Ziegert Seiler Ingenieure GmbH, Israel Antiquities Authority





## CLIMATE INDUCED CHANGES ON THE HYDROLOGY OF MEDITERRANEAN BASINS: REDUCING UNCERTAINTY AND QUANTIFYING RISK THROUGH AN INTEGRATED MONITORING AND MODELING SYSTEM

REFERENCE	244151
CALL	FP7-ENV-2009-1
THEME	environment
SCIENTIST	Giorgio Cassiani
DEPARTMENT	Geosciences
UNIPD	participant
TOTAL COST	4,157,348 €
EU FUNDING	3,148,945 €
E-MAIL	giorgio.cassiani@unipd.it

### PROJECT DESCRIPTION

With regard to the objectives specified in ENV-2009.1.1.5.2, modeling capabilities must be improved and appropriate tools developed to advance the capability to assess climate effects on water resources and uses. The project consortium will employ a combination of novel field monitoring concepts, remote sensing techniques, integrated hydrologic (and biophysical) modeling and socioeconomic factor analyses to reduce existing uncertainties in climate change impact analysis and to create an integrated quantitative risk and vulnerability assessment tool. Together, these will provide the necessary information to design appropriate adaptive water resources management instruments and select suitable agricultural practices under climate change conditions. The integrated risk and vulnerability analysis tool will also enable assessment of risks for conflict-inducing actions, e.g. migration. The improved models, new assessment tools, and their results will be evaluated against current methodologies. Improvements will be communicated to stakeholders and decision makers in a transparent, easy-to-understand form, enabling them to utilize the new findings

in regional water resource and agricultural management initiatives as well as in the design of mechanisms to reduce potential for conflict (linkage to SSH-2009.4.2.1).

### PARTNERS

**Coordinator:** Ludwig-Maximilians-Universität München

**Participants:** Université Francois Rabelais de Tours, Forschungszentrum Juelich GmbH, Bayerische Forschungsallianz Gemeinnutzige GmbH, Deutsches Zentrum für Luft - und Raumfahrt EV, Joanneum Research Forschungsgesellschaft MbH, Centre National du Machinisme Agricole, du Genie Rural, des Eaux et des Forets, Agris Sardegna - Agenzia per la Ricerca in Agricoltura, Vista Geowissenschaftliche Fernerkundung GmbH, Gebze Yuksek Teknoloji Enstitusu, Zagazig University, Centro di Ricerca, Sviluppo e Studi Superiori in Sardegna, Christian-Albrechts-Universität zu Kiel, Centre de Recherches et des Technologies des Eaux, Università degli Studi di Trento, Islamic University of Gaza, Université d'Angers, Institut National de la Recherche Scientifique, Consorzio Interuniversitario Nazionale per la Fisica delle Atmosfere e delle Idrosfere, Università degli Studi di Padova





## FUTURE-ORIENTED INTEGRATED MANAGEMENT OF EUROPEAN FOREST LANDSCAPES

REFERENCE	282887
CALL	FP7-ENV-2011
THEME	environment
SCIENTIST	<b>Davide Matteo Pettenella</b>
DEPARTMENT	<b>Land, Environment, Agriculture and Forestry</b>
UNIPD	<b>participant</b>
TOTAL COST	<b>8,845,326 €</b>
EU FUNDING	<b>6,998,601 €</b>
E-MAIL	<b>davide.pettenella@unipd.it</b>

### PROJECT DESCRIPTION

The vital environmental and socio-economic role of European forests is well documented and acknowledged in policy documents of both the European Union and its member states. However, there are critical incoherencies within and between trans-national, national and local forest-related land use policies, the central issue being mismatches between the policies and their implementation at the landscape level. Hence, there is a need to improve existing policy and management approaches capable of delivering a better balance between multiple and conflicting demands for forest goods and services. Diminishing mismatches and providing a new policy and management approach that is sensitive to ecological, socioeconomic and political issues of are the main objectives of INTEGRAL. The objectives are achieved by following a research approach with 3 phases: diagnostic analysis of the status-quo (phase 1), participatory development and evaluation of scenarios (phase 2), and problem-solving oriented back-casting for policy development and evaluation (phase 3). The research design will be applied in a total of 20 landscapes in 10 European countries that differ in key characteristics, such as ownership, the importance of forestry and forest-based industries and the priorities of allocation and management

of new and existing forest lands. The involvement of national and local stakeholder groups all the way through the project plays a decisive role in the project.

The most important long term impact of INTEGRAL consists of the knowledge and competence base for integrating international, national and local levels in participatory decision and planning processes. This includes the development of manuals for how to conduct such processes, methods for utilizing quantitative decision support tools in the participatory process, and the establishment of a body of knowledge among those participating in the extensive case studies. Thus, the consistency of implemented forest policies can be enhanced.

### PARTNERS

**Coordinator:** Sveriges Lantbruksuniversitet

**Participants:** Albert-Ludwigs-Universität Freiburg, Fachhochschule Salzburg GmbH, Technische Universität München, Wageningen Universiteit, European State Forest Association, Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung E.V, Instituto Superior de Agronomia, Institut National de Recherche en Sciences et Technologies pour l'environnement et l'agriculture, The Chancellor, Masters and Scholars of the University of Oxford, Stichting Fern, Universidade Catolica Portuguesa, Università degli Studi del Molise, Aleksandro Stulginskio Universitetas, University of Forestry, Joint Research Centre (JRC) - European Commission, University College Dublin, National University of Ireland, Dublin, Institut des Sciences et Industries du Vivant et de l'environnement - Agro Paris Tech, European Forest Institute, Confederation Europeenne des Propriétaires Forestiers Asbl, Technicka Univerzita Vo Zvolene, Università degli Studi di Padova



## KNOWLEDGE BASED CLIMATE MITIGATION SYSTEMS FOR A LOW CARBON ECONOMY

REFERENCE	308601
CALL	FP7-ENV-2012-two-stage
THEME	environment
SCIENTIST	Marco Borga
DEPARTMENT	Land, Environment, Agriculture and Forestry
UNIPD	participant
TOTAL COST	6,982,677 €
EU FUNDING	5,428,606 €
E-MAIL	marco.borga@unipd.it

### PROJECT DESCRIPTION

The science of complex systems distinguishes linear from non-linear dynamics. Simpler systems can often be satisfactorily described by linear models, but complex systems require non-linear models that can capture more of the characteristics of such systems, such as thresholds, feedback loops, avalanche effects, and irreversibility. Linear systems can be validated by aligning models to the past and using the model to predict the future. Non-linear systems, however, are often time-asymmetric - they can be explained with the wisdom of hindsight, but are not always predictable. For example, systems may respond sharply to minor perturbations, and the quality of this response is a measure of the system resilience. In practice, non-linear dynamics are significant both at the micro-scale of small history and at the macro-scale of deep time. The brilliant young scientist, for example, may experience a series of epiphanies that change his/her understanding and behaviour in an unpredictable and irreversible way. The scientific community as a whole may experience an innovation-cascade that has a similar effect on a much larger scale. Current models of climate change and carbon emission assume the immediate past is a reasonable guide to the future. They struggle

to represent the complex causal structures and time-asymmetries of many socio-natural systems. COMPLEX will integrate the quasi-classic models of meso-scale processes with our best understanding of fine-grained space-time patterns and the system-flips that are likely to occur in the long interval between now and 2050. We believe the sub-national region is the key point of entry for studying climate change and its cause-effect interrelations. It is small enough to be sensitive to local factors, large enough to interact with supra-national agencies and stable enough to be historically and culturally distinctive. In addition to undertaking case studies in Norway, Sweden, Netherlands, Spain and Italy, We will develop a suite of modelling tools and decision-support systems to inform national and supra-national policy and support communities across Europe working to make the transition to a low-carbon economy.

### PARTNERS

**Coordinator:** University of Newcastle Upon Tyne

**Participants:** Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek – Tno, Electricite de France S.A., Universiteit Twente, BC3 Basque Centre for Climate Change – Klima Aldaketa Ikergai, Observatorio para una Cultura del Territorio Asociacion, Sintef Energi As, Scientific Foundation Nansen International Environmental and Remote Sensing Centre, Stockholms Universitet, Sveriges Lantbruksuniversitet, University of Sussex, Max Planck Gesellschaft zur Förderung der Wissenschaften E.V., Sigtunastiftelsen, Internationales Institut für Angewandte Systemanalyse, Centre National de la Recherche Scientifique, Institut National de Recherche en Sciences et Technologies pour l'environnement et l'agriculture, Università degli Studi di Padova



## MANAGING THE EFFECTS OF MULTIPLE STRESSORS ON AQUATIC ECOSYSTEMS UNDER WATER SCARCITY

REFERENCE	603629
CALL	FP7-ENV-2013-two-stage
THEME	environment
SCIENTIST	Giorgio Cassiani
DEPARTMENT	Geosciences
UNIPD	participant
TOTAL COST	9,990,594 €
EU FUNDING	7,590,585 €
E-MAIL	giorgio.cassiani@unipd.it

### PROJECT DESCRIPTION

Water and water-related services are major components of the human wellbeing, and as such are major factors of socioeconomic development in Europe; yet freshwater systems are under threat by a variety of stressors (organic and inorganic pollution, geomorphological alterations, land cover change, water abstraction, invasive species and pathogens). Some stressors, such as water scarcity, can be a stressor on its own because of its structural character, and drive the effects of other stressors. The relevance of water scarcity as a stressor is more important in semi-arid regions, such as the Mediterranean basin, which are characterized by highly variable river flows and the occurrence of low flows. This has resulted in increases in frequency and magnitude of extreme flow events. Furthermore, in other European regions such as eastern Germany, western Poland and England, water demand exceeds water availability and water scarcity has become an important management issue. Water scarcity is most commonly associated with inappropriate water management, with resulting river flow reductions. It has become one of the most important drivers of change in freshwater ecosystems. Conjoint occurrence of a myriad of stressors (chemical, geomorphological, biological) under

water scarcity will produce novel and unfamiliar synergies and most likely very pronounced effects. Within this context, GLOBALAQUA has assembled a multidisciplinary team of leading scientists in the fields of hydrology, chemistry, ecology, ecotoxicology, economy, sociology, engineering and modeling in order to study the interaction of multiple stressors within the frame of strong pressure on water resources. The aim is to achieve a better understanding how current management practices and policies could be improved by identifying the main drawbacks and alternatives.

### PARTNERS

**Coordinator:** Agencia Estatal Consejo Superior de Investigaciones Científicas

**Participants:** Fundacio Institut Catala de Recerca de l'Aigua, Eberhard Karls Universität Tübingen, Università degli Studi di Trento, Centre National de la Recherche Scientifique, Stichting Dienst Landbouwkundig Onderzoek, Helmholtz-Zentrum für Umweltforschung GmbH – Ufz, Ludwig-Maximilians-Universität München, Athena Research and Innovation Center in Information Communication & Knowledge Technologies, Institut Jozef Stefan, Universidad del Pais Vasco Ehu Upv, Sveriges Meteorologiska och Hydrologiska Institut, Imperial College of Science, Technology and Medicine, Hellenic Centre for Marine Research, Institut za Bioloska Istrazivanja, Universitat de Barcelona, Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek – Tno, Aeiforia Srl, Jrc -Joint Research Centre- European Commission, Institut Agronomique et Veterinaire Hassan II, Institut National de la Recherche Scientifique, Wageningen University, Università degli Studi di Padova



## PREVENTING AND REMEDIATING DEGRADATION OF SOILS IN EUROPE THROUGH LAND CARE

REFERENCE	603498
CALL	FP7-ENV-2013-two-stage
THEME	environment
SCIENTIST	Francesco Morari
DEPARTMENT	Agronomy, Food, Natural Resources, Animals and the Environment
UNIPD	participant
TOTAL COST	10,917,791 €
EU FUNDING	8,549,525 €
E-MAIL	francesco.morari@unipd.it

### PROJECT DESCRIPTION

Although there is a large body of knowledge available on soil threats in Europe, this knowledge is fragmented and incomplete, in particular regarding the complexity and functioning of soil systems and their interaction with human activities. The main aim of RECARE is to develop effective prevention, remediation and restoration measures using an innovative trans-disciplinary approach, actively integrating and advancing knowledge of stakeholders and scientists in 17 Case Studies, covering a range of soil threats in different bio-physical and socio-economic environments across Europe. Within these Case Study sites, i) the current state of degradation and conservation will be assessed using a new methodology, based on the WOCAT mapping procedure, ii) impacts of degradation and conservation on soil functions and ecosystem services will be quantified in a harmonized, spatially explicit way, accounting for costs and benefits, and possible trade-offs, iii) prevention, remediation and restoration measures selected and implemented by stakeholders in a participatory process will be evaluated regarding efficacy, and iv) the applicability and impact

of these measures at the European level will be assessed using a new integrated bio-physical and socio-economic model, accounting for land use dynamics as a result of for instance economic development and policies. Existing national and EU policies will be reviewed and compared to identify potential incoherence, contradictions and synergies. Policy messages will be formulated based on the Case Study results and their integration at European level. A comprehensive dissemination and communication strategy, including the development of a web-based Dissemination and Communication Hub, will accompany the other activities to ensure that project results are disseminated to a variety of stakeholders at the right time and in the appropriate formats to stimulate renewed care for European soils.

### PARTNERS

**Coordinator:** Wageningen University  
**Participants:** Technical University of Crete , Aarhus Universitet, Universitat de Valencia, The Cyprus Institute Limited, Norwegian Institute for Agricultural and Environmental Research - Bioforsk, Universidade de Aveiro, Landgrædsla Rikisins, Evenor Tech SL, Universit t Bern, Umweltbundesamt GmbH, Stichting International Soil Reference and Information Centre , JRC -Joint Research Centre- European Commission , Ecologic Institut Gemeinn tzige GmbH , University of Leeds , Stichting Dienst Landbouwkundig Onderzoek , Consult and Research on Participation and Gender - Corepage - Claringbould Heleen Elsa , Sveriges Lantbruksuniversitet , Agencia Estatal Consejo Superior de Investigaciones Cientificas, Slovensk  Technick  Univerzit  v Bratislave, Institutul National de Cercetare-Dezvoltare Pentru Pedologie, Agrochimie si Protectia Mediului, Instytut Uprawy Nawozenia i Gleboznawstwa, Panstwowy Instytut Badawczy, University of Gloucestershire, Research Institute for Knowledge Systems B.V, Cranfield University, Kongskilde Industries AS, Universit  degli Studi di Padova



## SILICON KERF LOSS RECYCLING

REFERENCE	603718
CALL	FP7-ENV-2013-two-stage
THEME	environment
SCIENTIST	Michele Forzan
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	1,954,286 €
EU FUNDING	1,401,498 €
E-MAIL	michele.forzan@unipd.it

### PROJECT DESCRIPTION

Solar energy direct conversion to electricity is expanding rapidly to satisfy the demand for renewable energy. The most efficient commercial photovoltaic solar cells are based on silicon.

While the reuse of feedstock is a severe concern of the photovoltaic industry, up to 50% of the valuable resource is lost into sawdust during wafering. Presently, the majority of silicon ingots are sliced in thin wafers by LAS (loose abrasive sawing) using slurry of abrasive silicon carbide particles. The silicon carbide is not separable from the silicon dust in an economical way. The newer FAS (fixed abrasive sawing) uses diamond particles fixed to the cutting wire. It is expected that FAS will replace LAS almost completely by 2020 for poly/mono-crystalline wafering. The intention of the proposed project is to recycle the FAS loss aiming at a sustainable solution.

The main problem is the large surface to volume ratio of micron size silicon particles in the kerf loss, leading to formation of SiO<sub>2</sub> having a detrimental effect on the crystallisation. The compaction process developed by GARBO meets the requirements of a reasonable crucible-loading factor. Overheating the silicon melt locally in combination with optimised electromagnetic stirring provides the means to remove SiO<sub>2</sub>. The technology developed by GARBO removes the organic binding agents, leaving about 200 ppm wt diamond particle contamination. If untreated, the carbon level is above the solubility limit.

Formation of silicon carbide and precipitation during crystallisation is to be expected. The electromagnetic mixing, in combination with the effective means to separate electrically non-conducting silicon carbide and remaining SiO<sub>2</sub> particles from the silicon melt by Leenov-Kolin forces and the control of the solidification front, is the proposed route to produce the solar grade multi-crystalline silicon blocks cast in commercial size in a unified process.

### PARTNERS

**Coordinator:** Helmholtz-Zentrum Dresden-Rossendorf EV

**Participants:** Elektrische Automatisierungs-und Antriebstechnik Eaat GmbH Chemnitz, Garbo Srl, University of Greenwich, Università degli Studi di Padova



## FISH POPULATION STRUCTURE AND TRACEABILITY

REFERENCE	212399
CALL	FP7-KBBE-2007-1
THEME	kbbe
SCIENTIST	Tomaso Patarnello
DEPARTMENT	Comparative Biomedicine and Food Science
UNIPD	participant
TOTAL COST	3,897,418 €
EU FUNDING	2,949,984 €
E-MAIL	tomaso.patarnello@unipd.it

### PROJECT DESCRIPTION

Although exploited fishes have traditionally been managed on a geographic basis, for conservation purposes they should be managed at the population level: the extent and dynamics of population structuring underlies resilience and sustainability. More effective enforcement and conservation demands a focus on identification and monitoring of wild fish populations and traceability of products. FishPopTrace brings together expertise in fish traceability projects (Fish and Chips, FishTrace, FISH-BOL) to: 1. Integrate data from European fish species traceability projects, and to generate a single compatible database and tissue archive managed by the Joint Research Centre of the European Commission. 2. Examine single nucleotide polymorphisms (SNPs) and otolith microchemistry and morphometrics in widely distributed populations of cod, hake, herring and sole. Outputs will comprise population-level signatures associated with fish origins in early life and representative spawning groups. 3. Undertake validation of traceability tools in relation to end-user technology. 4. Develop a population monitoring system based on genetic and otolith data that will assess population stability in a temporal and spatial framework. 5. Test the utility of additional novel traceability systems (fatty acid profiles, proteomics, gene expression,

microarray platform for SNP genotyping). 6. Facilitate technology transfer in relation to enforcement and conservation policies of the EU Common Fisheries Policy (CFP) and associated socio-economic consequences. Outputs from FishPopTrace will improve the traceability of fish and fish products and protection of consumer interests through enhanced understanding of the dynamics, temporal stability and distribution of major populations of four key exploited fish species. Central elements of the output will be the development and evaluation of end-user tools, a Cost Benefit Analysis and a final report setting FishPopTrace in the context of the CFP.

### PARTNERS

**Coordinator:** Bangor University

**Participants:** Institut Français de Recherche pour l'Exploitation de la Mer, Universidad Complutense de Madrid, Asociacion Nacional de Fabricantes de Conservas de Pescados y Mariscos - Centro Tecnico Nacional de Conservacion de Productos der la Pesca, Danmarks Tekniske Universitet, Joint Research Centre (JRC) - European Commission, Universität Bremen, Wildlife DNA Services Limited\*WDNAS, Russian Federal Research Institute of Fisheries and Oceanography, Trace Wildlife Forensics Network Limited, Katholieke Universiteit Leuven, Alma Mater Studiorum – Università di Bologna, Aarhus Universitet, Universitetet i Bergen, National Agricultural Research, Università degli Studi di Padova



## ENHANCEMENTS OF PEST RISK ANALYSIS TECHNIQUES

REFERENCE	212459
CALL	FP7-KBBE-2007-1
THEME	kbbe
SCIENTIST	Andrea Battisti
DEPARTMENT	Agronomy, Food, Natural Resources, Animals and the Environment
UNIPD	participant
TOTAL COST	4,131,556 €
EU FUNDING	2,764,317 €
E-MAIL	andrea.battisti@unipd.it

### PROJECT DESCRIPTION

PRATIQUE (Enhancements of Pest Risk Analysis Techniques) will carry out all the key work listed in the call and address the major challenges for pest risk analysis (PRA) in Europe. This will be achieved through three principal objectives: to assemble the datasets required to construct effective PRAs valid for the whole of the EU, to conduct multi-disciplinary research that enhances the techniques used in PRA and to ensure that the PRA decision support scheme meets its purpose, is efficient and user-friendly.

Pest risk analysts, phytosanitary experts, invasive alien species specialists, ecologists, economists and risk modellers from 13 leading institutes in the EU, one from Australia and one from New Zealand will produce the first structured inventory of PRA datasets for the EU and undertake targeted research to improve existing procedures and develop new methods for the assessment of economic, environmental and social impacts, summarising risk in effective, harmonised ways that take account of uncertainty, mapping endangered areas, pathway risk analysis and systems approaches and guiding actions during emergencies caused by outbreaks of harmful pests.

### PARTNERS

**Coordinator:** The Secretary of State for Environment, Food and Rural Affairs

**Participants:** Julius Kuhn Institut Bundesforschungsinstitut für Kulturpflanzen, Stichting Dienst Landbouwkundig Onderzoek, Plant Protection Institute, Botanický Ústav avcr, V.V.I., European and Mediterranean Plant Protection Organisation, Cab International, Cooperative Research Centre for National Plant Biosecurity, Lincoln University, Université de Fribourg, Wageningen Universiteit, Institut National de la Recherche Agronomique, Imperial College of Science, Technology and Medicine, Centre de Cooperation International en Recherche Agronomique pour le Développement, Università degli Studi di Padova





## ACQUIRED ENVIRONMENTAL EPIGENETICS ADVANCES: FROM ARABIDOPSIS TO MAIZE

REFERENCE	226477
CALL	FP7-KBBE-2008-2B
THEME	kbbe
SCIENTIST	Serena Varotto
DEPARTMENT	Agronomy, Food, Natural Resources, Animals and the Environment
UNIPD	coordinator
TOTAL COST	4,124,572 €
EU FUNDING	2,992,863 €
E-MAIL	serena.varotto@unipd.it

### PROJECT DESCRIPTION

This proposal, entitled Acquired Environmental Epigenetics Advances: from Arabidopsis to maize (acronym: AENEAS), aims to assess the impact of environmental conditions on epigenetic states in the model plant Arabidopsis thaliana and then transfer knowledge to maize (Zea mays): an important European crop. Advances in understanding the detailed mechanisms of epialleles formation in response to environmental cues and their heritable maintenance in a model plant such as Arabidopsis will be the starting objective of the AENEAS proposal.

To this end, we will focus on three epigenetic regulatory pathways, which have been well characterized for their interaction with environmental signals in mediating changes into the epigenome. They are: the autonomous, the small RNA and the CpG methylation pathways. The outcome of this research activity will be a road map for plant environmental epigenetics, necessary for further progress of the basic research in this area and for the transfer of the knowledge to crop plants. Concomitantly, the constitution of an Environmental Epigenetics platform for maize, will start with the development of tools indispensable for the shift of epigenetic research

from Arabidopsis to maize. This will be achieved by the functional characterization of maize mutants for epi-regulators belonging to the three pathways studied in Arabidopsis.

The tools will comprise: maize epi-regulator mutants, their targets, and information about their interaction with environmental cues for epialleles formation and inheritance throughout generations. It is our opinion that the deliverables from AENEAS will be the progenitors for the next-generation of breeding programs, based on the exploitation of the environmental-induced epigenetics variability. In addition, we will conduct a comparative genomics analysis of data arising from the project to generate comparative models for environmental epigenomics in two evolutionary distinct species such as Arabidopsis and maize.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** John Innes Centre, Max Planck Gesellschaft zur Förderung der Wissenschaften E.V., Université de Genève, Consiglio per la Ricerca e la Sperimentazione in Agricoltura, The Chancellor, Masters and Scholars of the University of Cambridge, The University of Warwick, The Biogemma





## INDICATORS FOR BIODIVERSITY IN ORGANIC AND LOW-INPUT FARMING SYSTEMS

REFERENCE	227161
CALL	FP7-KBBE-2008-2B
THEME	kbbe
SCIENTIST	Maurizio Paoletti
DEPARTMENT	Biology
UNIPD	participant
TOTAL COST	3,920,679 €
EU FUNDING	2,999,614 €
E-MAIL	maurizio.paoletti@unipd.it

### PROJECT DESCRIPTION

Organic and low-input farming systems have been shown to benefit farmland biodiversity although a generic indicator system to assess these benefits at the European level is lacking. The BIOBIO project will therefore pursue the following objectives:

- Conceptualization of criteria for a scientifically-based selection of biodiversity indicators for organic/low-input farming systems;
- Assessment and validation of a set of candidate biodiversity indicators in representative case studies across Europe (and in ICPC countries);
- Preparation of guidelines for the implementation of biodiversity indicators for organic/low-input farming systems for Europe and beyond.

Existing indirect farm management indicators as well as direct indicators for genetic, species and habitat diversity will be assessed for their scientific soundness, practicality, geographic scope and usefulness for stakeholders. Candidate indicators will be tested in a standardized design in twelve case studies across Europe and later in three ICPC countries. Case study regions will include pannonian, alpine, boreal, Atlantic and Mediterranean grassland systems (both organic and/or low-input), rain fed organic farms under temperate and Mediterranean conditions, mixed

organic farming, organic special crops and low-input tree/agroforestry systems. Plot, farm and regional scales (where applicable) will be addressed.

The investigation will include new agricultural practices, e.g. soil conservation, crop rotation management, seed and crop mixtures and economic issues relating to the costs of indicator measurement and to benefits of biodiversity as perceived by different groups of the population. Stakeholders (farming communities, conservation NGOs, administrators) will be integrated at critical stages of the indicator selection process. A handbook with factsheets will be produced for validated indicators and a sampling design for biodiversity monitoring in organic and low-input farming systems across Europe.

### PARTNERS

**Coordinator:** Eidgenoessisches Volkswirtschaftsdepartment

**Participants:** Technische Universität München, Universidad de Extremadura, Bila Tserkva National Agrarian University, Institut National de la Recherche Agronomique, Norsk Institutt for Skog og Landskap, Szent Istvan Egyetem Alma Mater Studiorum – Università di Bologna, Universität für Bodenkultur Wien, Institut National de Recherches en Genie Rural, Eaux et Forêts, Institute of Plant Genetic Resources, Aberystwyth University, Stichting Dienst Landbouwkundig Onderzoek, Makerere University, Solagro Association, Università degli Studi di Padova



## BIODIVERSITY AND CLIMATE CHANGE, A RISK ANALYSIS

REFERENCE	226299
CALL	FP7-KBBE-2008-2B
THEME	kbbe
SCIENTIST	Andrea Battisti
DEPARTMENT	Agronomy, Food, Natural Resources, Animals and the Environment
UNIPD	participant
TOTAL COST	4,063,759 €
EU FUNDING	2,998,014 €
E-MAIL	andrea.battisti@unipd.it

### PROJECT DESCRIPTION

The effect of climate change on forest biodiversity will be evaluated through better understanding of the ecological processes that shape species composition and are particularly sensitive to climate conditions. Forest species composition will correspond to the assemblage of tree species and both symbiotic and antagonistic species that can drive tree species composition. Climate conditions will include both average and extreme values of climatic variables (e.g. temperature, humidity and wind).

The relationships between forest biodiversity and functioning will be deciphered through better understanding of the respective role of tree species richness and composition and by focussing on the biotic interactions between species. As the fundamental ecological hypothesis behind the diversity productivity relationship is the optimal use of resources, we will analyse the energy flow (i.e. resources production and consumption) across different trophic levels (trees and symbiotic organisms as producers, herbivores and pathogens as consumers).

In a final step we will aggregate the information from the first two steps to predict the effect of climate change on forest productivity through changes in tree species composition. The prediction will be expressed as a risk of

dysfunction, in particular the risk of forest productivity loss. Traditionally, the risk for a given system is a function of hazard probability and system vulnerability to this hazard. In this case, hazards will be changes in average and extreme climatic conditions. Vulnerability will be the vulnerability to climate change of forest species that both shape forest composition and are the main drivers of forest biomass productivity. In each step, we will focus on fundamental ecological processes at work so that to deliver more generic scientific outcomes that will allow easier generalization to diverse types of European forest or forest managers expectations than a case by case approach.

### PARTNERS

**Coordinator:** Institut National de la Recherche Agronomique

**Participants:** The University Court of the University of Aberdeen, Albert-Ludwigs-Universität Freiburg, Royal Holloway and Debford New College, Università degli Studi della Tuscia, Centre National du Machinisme Agricole, du Genie Rural, des Eaux et des Forets, Agencia Estatal Consejo Superior de Investigaciones Cientificas, Stichting Dienst Landbouwkundig Onderzoek, Instytut Badawczy Lesnictwa, Sveriges Lantbruksuniversitet, Universität Zürich, Cab International, Eidgenoessische Technische Hochschule Zürich, Inra Transfert S.A., Peking University, Università degli Studi di Padova



## DEVELOPING QUARANTINE PEST DETECTION METHODS FOR USE BY NATIONAL PLANT PROTECTION ORGANIZATIONS (NPPO) AND INSPECTION SERVICES

REFERENCE	245047
CALL	FP7-KBBE-2009-1
THEME	kbbe
SCIENTIST	Andrea Battisti
DEPARTMENT	Agronomy, Food, Natural Resources, Animals and the Environment
UNIPD	participant
TOTAL COST	3,988,899 €
EU FUNDING	2,995,918 €
E-MAIL	andrea.battisti@unipd.it

### PROJECT DESCRIPTION

Detection methods are the first tools used by national plant protection organizations (NPPO) and inspection services in order to find incursions of quarantine plant pathogens or pests (Q-pests) across a border, a crucial step to implement Council Directive 2000/29/EC. This is often done visually in the first instance, with support from a laboratory for confirmatory testing and subsequent monitoring. Reliance on laboratory testing causes significant delays when action is only taken on the return of results from the laboratory to which the samples were sent. Thus, there is a real need for rapid, simple and robust detection methods that can be deployed by NPPOs in the field with inspection services to enable early detection of Q-pests.

The Q-detect consortium aims to develop detection methods based on biochemical (detecting volatile organic compounds [VOC] and nucleic acid), acoustic (including resonance), remote imaging (incorporating spectral and automated data analysis) and pest trapping (insect pests and pathogen vectors) techniques. The careful selection of traded products (primarily

potato and forestry/trees) ensures the methods will be developed on high priority targets for the EU such as the pine wood nematode (*Bursaphelenchus xylophilus*), potato brown rot (*Ralstonia solanacearum*) and potato ring rot (*Clavibacter michiganensis* ssp. *Sepedonicus*), Asian longhorn beetle (*Anoplophora glabripennis*) and a range of whitefly transmitted viruses. The diversity of targets enables the Q-detect consortium to work on suites of complementary techniques; this is of particular importance since the diverse range of targets listed in Directive 2000/29/EC means no single detection method will be suitable for all Q-pests. Critically, NPPOs and third country institutes are partners, which will enable testing, and validation of methods at real outbreak sites where these are absent in the EU. SME partners ensure access to technology and routes for exploitation after the project ends.

### PARTNERS

**Coordinator:** The Secretary of State for Environment, Food and Rural Affairs

**Participants:** Optisense Limited, Chinese Academy of Inspection and Quarantine, Stichting Dienst Landbouwkundig Onderzoek, Q-linea AB, Centro Internacional de la Papa, Nacionalni Institut za Biologijo, Alma Mater Studiorum – Università di Bologna, Science and Technology Facilities Council, Eidgenoessisches Volkswirtschaftsdepartement, Stichting Katholieke Universiteit, Sensor Sense B.V., Bundesforschungs- und Ausbildungszentrum für Wald, Naturgefahren und Landschaft, Università degli Studi di Padova



## BIOTECHNOLOGICAL CONVERSION OF CARBON CONTAINING WASTES FOR ECO- EFFICIENT PRODUCTION OF HIGH ADDED VALUE PRODUCTS

REFERENCE	245084
CALL	FP7-KBBE-2009-3
THEME	kbbe
SCIENTIST	Sergio Casella
DEPARTMENT	Agronomy, Food, Natural Resources, Animals and the Environment
UNIPD	participant
TOTAL COST	3,754,375 €
EU FUNDING	2,895,660 €
E-MAIL	sergio.casella@unipd.it

### PROJECT DESCRIPTION

The applicants propose the development of a sound industrial process that unites the urgently needed solution of industrial waste problems with the creation of essential alternative strategies for polymer industry. This will be done by the biotechnological conversion of waste streams from slaughterhouses, rendering and biodiesel industry towards biodegradable polymeric materials. Slaughterhouse waste is converted towards fatty acid esters (FAMES, biodiesel). Subsequently those FAME fractions that negatively influence the biodiesel properties as a fuel are biotechnologically converted towards high-value polyhydroxyalkanoate (PHA) biopolymers. This brings together representatives of the envisaged lead users: waste producers from animal processing industry and bio-fuel industry with the polymer industry looking for alternatives technologies. Providing long-term strategies for long-term problems, the project will result in value creation for all players and provide innovative biotechnological approaches for absolutely needed eco-efficient alternatives to contemporary industrial polymer production. The development of this integrated process will

be accomplished by beyond the state-of-the-art inputs of microbiology, genetics, biotechnology, chemical engineering, polymer chemistry- and processing and life cycle analysis, combined with feasibility studies for marketing of the final products.

The compiled Consortium absolutely conforms to the requirements to fulfill the envisaged project aims. Research will be done in close cooperation between academic and industrial partners.

The project activities aim at solving local waste problems affecting the entire EU; the solutions will be developed on local scales, but are meant to be applied to the entire EU and will provide cost-efficient and sound alternatives for polymer industry.

### PARTNERS

**Coordinator:** Technische Universität Graz

**Participants:** Università di Pisa, Kemijski Institut, Ulrike Reistenhofer GmbH, Universität Graz, University of Zagreb – Faculty of Food Technology and Biotechnology, Centrum Materialow Polimerowych Iwęglowych Polska Akademia Nauk\* Cmpiw Pan, Argus Umweltbiotechnologie GmbH, Argent Energy Limited, Termoplast, Università degli Studi di Padova



## NEW WAYS TO VALUE AND MARKET FOREST EXTERNALITIES

REFERENCE	243950
CALL	FP7-KBBE-2009-3
THEME	kbbe
SCIENTIST	Davide Matteo Pettenella
DEPARTMENT	Land, Environment, Agriculture and Forestry
UNIPD	participant
TOTAL COST	3,552,017 €
EU FUNDING	2,712,501 €
E-MAIL	davide.pettenella@unipd.it

### PROJECT DESCRIPTION

Many forest goods and services are not marketed. Methods for assessing these values are incomplete, and so is an understanding of who benefits from them. Forest owners are not rewarded for the value of these externalities and may make decisions providing less externalities than optimal. We can increase welfare, if we develop ways to enhance their provision.

The objectives of NEWFOREX are:

- To provide methods for valuing forest externalities, which handle the jointly produced externalities in an integrated way. Specific attention will be given to the question: Who benefits? This is important as it is among the beneficiaries that likely buyers are to be found.
- To develop a methodology for assessing the cost of provision for externalities. We take into account trans-boundary effects of forest management, and transactions and opportunity costs.
- To assess several market-based methods for enhancing the provision of forest externalities, including e.g. payment schemes provision, certification or (re-)definition of property rights.

A method for choice and design of market-based methods will be provided. Method: We will test

methods and tools and undertake analytical, applied research on a set of empirical surveys among beneficiaries (buyers) and forest owners (providers).

These will take place in 5 EU case studies and a developing country case study. They will focus on key externalities: Carbon sequestration, biodiversity protection, watershed services and recreation. The surveys will be designed to allow for comparative analyses and detailed results supporting the achievement of the objectives. Addressing the demand and supply side simultaneously is a unique and innovative stroke. Results: New and improved methods, comparative analyses and guidelines of great value will result. We communicate the gains in knowledge using seminars, popular articles, guidelines and best practice examples across Europe. An easy-access Guiding tool is compiled.

### PARTNERS

**Coordinator:** Kobenhavns Universitet

**Participants:** European State Forest Association, Metsantutkimuslaitos, Centre Tecnologic Forestal de Catalunya, Universität Hamburg, Institut National de la Recherche Agronomique, European Forest Institute, Confederation Européenne des Propriétaires Forestiers ASBL, Center for International Forestry Research, Uniwersytet Warszawski, Università degli Studi di Padova



## RESEARCH TO IMPROVE PRODUCTION OF SEED OF ESTABLISHED AND EMERGING BIVALVE SPECIES IN EUROPEAN HATCHERIES

REFERENCE	245119
CALL	FP7-KBBE-2009-3
THEME	kbbe
SCIENTIST	Luca Bargelloni
DEPARTMENT	Comparative Biomedicine and Food Science
UNIPD	participant
TOTAL COST	4,931,756 €
EU FUNDING	2,994,853 €
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### PROJECT DESCRIPTION

Secure and stabilised hatchery production of bivalve seed is the unifying objective of the REPROSEED project. Development of innovative new methods will lead to high quality seed of guaranteed physiological health, sanitary status and genetic diversity. By considering the biology of bivalve life stages and the trophic and microbial environment of rearing conditions REPROSEED researches ways of controlling key processes, like reproduction, larval rearing and metamorphosis. New technological advances, like recirculation systems and outdoor algal culture, will provide ways to reduce costs.

The need for hatcheries is growing in Europe due to demands from the shellfish industry for quality juveniles and concerns about wild seed due to inconsistent spatfall or environmental harm caused by seed collection of some species. Four economically important molluscs were selected to represent these needs: two species already reared in hatcheries, *Crassostrea gigas* and *Pecten maximus*, and two emerging hatchery species, *Mytilus edulis* and *Ruditapes decussatus*. Scientific research is most advanced for *C. gigas*, so its further development will enable us to attain a level of excellence. Knowledge on this species

and on *P. maximus*, an excellent model for solving particular bivalve rearing problems, can also help improve hatchery culture of the other species.

Inter-specific differences enable comparative study of important traits.

REPROSEED investigates the physiological basis of early sexual maturation, gamete competency, immunity and metamorphosis, at cellular and molecular levels, including genomics and proteomics. Application of these results and dedicated studies will be made on practical aspects of controlled bivalve reproduction, nutritional needs for broodstock conditioning and larval growth (including testing of mutant yeasts and lipid microcapsules) and the benefits of probiotics. Advances will be shared with end-users throughout the project.

### PARTNERS

**Coordinator:** Institut Francais de Recherche pour l'exploitation de la Mer

**Participants:** Université de Caen Basse Normandie, Universidade de Santiago de Compostela, Societe Atlantique de Mariculture, Universitetet i Bergen, Stichting Dienst Landbouwkundig Onderzoek, Instituto Nacional de Recursos Biologicos I.P. Inrb, Syndicat des Selectionneurs Avicoles et Aquacoles Francais, Bangor University, Scalpro AS, Agencia Estatal Consejo Superior de Investigaciones Cientificas, Università degli Studi di Padova



## CONTROLLING INFECTIOUS DISEASES IN OYSTERS AND MUSSELS IN EUROPE

REFERENCE	266157
CALL	FP7-KBBE-2010-4
THEME	kbbe
SCIENTIST	Paola Venier
DEPARTMENT	Biology
UNIPD	participant
TOTAL COST	4,472,116 €
EU FUNDING	2,995,636 €
E-MAIL	paola.venier@unipd.it

### PROJECT DESCRIPTION

The two core objectives of BIVALIFE are (i) to provide innovative knowledge related to pathogens infecting oysters and mussels and (ii) to develop practical approaches for the control of infectious diseases and resulting mortality outbreaks these pathogens induce. The project will address the major issue identified by the European commission (i.e. detection and management of infectious diseases in oysters and mussels) at the EU level since the increase in international and intra EU trade and exchanges of animals increases the risk of pathogen transfer and infectious disease outbreak occurrence. In this context, the specific objective of BIVALIFE are:

- (i) transfer and validate existing methods for detection and identification of oyster and mussel pathogens;
- (ii) improve the characterisation of oyster and mussel pathogens and develop innovative complementary diagnostic approaches;
- (iii) characterise culture sites in Europe regarding presence of oyster and mussel pathogens in relation to the presence or absence of mortality;
- (iv) investigate the life cycle, mechanisms allowing oyster and mussel pathogens to survive outside the host and their original source;

- (v) identify pathogen intrinsic virulence factors and effects on host defence mechanisms;
  - (vi) assess the relationship between the presence of oyster and mussel pathogens and their role in observed mortality;
  - (vii) develop methods and recommendations for pathogen control and eradication in Europe.
- The project will focus on three mollusc species, namely the Pacific cupped oyster *Crassostrea gigas* and two mussel species *Mytilus edulis* and *M. galloprovincialis*, the most important species in terms of European production. Interestingly, Pacific oysters and mussels display different levels of susceptibility to diseases. The targeted pathogens will be the virus OsHV-1, *Vibrio* species including *V. splendidus* and *V. aestuarianus*, as well as the parasite *Marteilia refringens* and the bacterium *Nocardia crassostreae*.

### PARTNERS

**Coordinator:** Institut Français de Recherche pour l'Exploitation de la Mer

**Participants:** University College Cork, National University of Ireland, Cork, Università degli Studi di Genova, Institut de Recerca i Tecnologia Agroalimentaries, The Secretary of State for Environment, Food and Rural Affairs, Atlantium Technologies LTD, Centre National de la Recherche Scientifique, Marine Institute, Stichting Dienst Landbouwkundig Onderzoek, Agencia Estatal Consejo Superior de Investigaciones Cientificas, Università degli Studi di Padova





## THE DEVELOPMENT OF TOOLS FOR TRACING AND EVALUATING THE GENETIC IMPACT OF FISH FROM AQUACULTURE: AQUATRACE

REFERENCE	311920
CALL	FP7-KBBE-2012-6-singlestage
THEME	kbbe
SCIENTIST	Luca Bargelloni
DEPARTMENT	Comparative Biomedicine and Food Science
UNIPD	participant
TOTAL COST	3,927,338 €
EU FUNDING	2,999,184 €
E-MAIL	luca.bargelloni@unipd.it

### PROJECT DESCRIPTION

The genetic changes associated with domestication in aquaculture pose an increasing threat to the integrity of native fish gene pools. Consequently, there is a burgeoning need for the development of molecular tools to assess and monitor the genetic impact of escaped or released farmed fish. In addition, exploration of basic links between genetic differences among farmed and wild fish and differences in important life-history traits with fitness consequences are crucial prerequisites for designing biologically informed management strategies. The project AquaTrace will establish an overview of current knowledge on aquaculture breeding, genomic resources and previous research projects for the marine species seabass, seabream and turbot. The project will apply cutting-edge genomic methods for the development of high-powered, cost-efficient, forensically validated and transferable DNA based tools for identifying and tracing the impact of farmed fish in the wild. Controlled experiments with wild and farmed fish and their hybrids will be conducted with salmon and brown trout as model organisms using advanced common garden facilities. These experiments will elucidate the fundamental consequences of introgression

by pinpointing and assessing the effects on fitness of specific genomic regions. Generated insights will form the basis of a risk assessment and management recommendations including suggestions for mitigation and associated costs. This information and the developed molecular tools will be available as open-access support to project participants and external stakeholders including the aquaculture industry.

The project is expected to facilitate technology transfer to the aquaculture sector by promoting better tailored breeding practices and traceability throughout production chain. Overall this initiative will support the development of sustainable European aquaculture and provide Good Environmental Status in line with the Marine Strategy Framework Directive.

### PARTNERS

**Coordinator:** Danmarks Tekniske Universitet

**Participants:** The University of Stirling, Universidade de Santiago de Compostela, Cluster de la Acuicultura de Galicia Asociacion, Scottish Government, Institut National de la Recherche Agronomique, Istituto Superiore per la Protezione e la Ricerca Ambientale, Fios Genomics Limited, Ferme Marine du Douhet Sas, Bangor University, Joint Research Centre (JRC) - European Commission, Havforskninginstituttet, Syndicat des Selectionneurs Avicoles et Aquacoles Français, Trace Wildlife Forensics Network Limited, Katholieke Universitet Leuven, Gie Laboratoire d'Analyses Genetiques pour les Espaces Animales, Biomolecular Research Genomics Srl, Ardag Ltd, Mustafa Kemal University, Aristotelio Panepistimio Thessalonikis, Plagton Ae, Università degli Studi di Padova





## LINKING FARMLAND BIODIVERSITY TO ECOSYSTEM SERVICES FOR EFFECTIVE ECOFUNCTIONAL INTENSIFICATION

REFERENCE	311781
CALL	FP7-KBBE-2012-6-singlestage
THEME	kbbe
SCIENTIST	Lorenzo Marini
DEPARTMENT	Agronomy, Food, Natural Resources, Animals and the Environment
UNIPD	participant
TOTAL COST	3,808,368 €
EU FUNDING	2,997,630 €
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### PROJECT DESCRIPTION

The next few decades will witness a rapidly increasing demand for agricultural products. This growing demand needs to be met largely through intensification (produce more from the same land surface) because there is little scope for an increase in agricultural area. Eco-functional intensification has been proposed as a promising solution. Eco-functional intensification is the optimization of all provisioning, regulating and supporting ecosystem services in the agricultural production process. LIBERATION aims to provide the evidence base for eco-functional intensification and demonstrate the concept in seven representative agricultural landscape types in Europe. Using existing datasets from past and on-going European-scale studies we will first identify general relationships between the configuration of semi-natural habitats, on-farm management and biodiversity in a range of European landscapes and farming systems. Using a modelling approach we will link biodiversity to ecosystem services, by determining relationships between biodiversity, the delivery of multiple ecosystem services and agronomic yield. A novel aspect is that LIBERATION considers above- and

below-ground ecosystem services simultaneously and analyses synergies and trade-offs between different ecosystem services. Using this modeling approach we will analyse which on-farm management practices and spatial configuration of semi-natural habitats optimizes yield and which optimizes farm income. We will synthesise management and policy recommendations. We will raise awareness and promote uptake of eco-functional intensification by disseminating project results to the widest possible range of stakeholders, amongst others by means of demonstration projects. This way we hope to liberate the forces of nature to the benefit of agricultural production.

### PARTNERS

**Coordinator:** Stichting Dienst Landbouwkundig Onderzoek

**Participants:** Food and Agriculture Organisation of the United Nations FAO, Universität Bayreuth, Uniwersytet Przyrodniczy w Poznaniu, Magyar Tudományos Akadémia Ökológiai Kutatóközpont, Sveriges Lantbruksuniversitet, Lunds Universitet, Koninklijke Nederlandse Akademie van Wetenschappen KNAW, Julius-Maximilians Universität Würzburg, The University of Reading, Università degli Studi di Padova



## MULTIPURPOSE TREES AND NON-WOOD PRODUCTS A CHALLENGE AND OPPORTUNITY

REFERENCE	311919
CALL	FP7-KBBE-2012-6-singlestage
THEME	kbbe
SCIENTIST	Davide Matteo Pettenella
DEPARTMENT	Land, Environment, Agriculture and Forestry
UNIPD	participant
TOTAL COST	7,493,700 €
EU FUNDING	5,992,813 €
E-MAIL	davide.pettenella@unipd.it

### PROJECT DESCRIPTION

Europe has set a clear and ambitious strategy (Europe 2020 Strategy) to base its economy on a smart, sustainable and inclusive growth. Part of this concept is to initiate the development towards an innovative, resource efficient and bio-based (bio-economy) European economy. Such development should contribute to economic growth and the creation of jobs, while mitigating climate change effects and providing effective responses to address the need for carbon neutral energy. In this context, European forests and the forest-based sector play an increasingly important role in fostering smart, sustainable and inclusive growth in Europe based on the production of eco-services and eco-efficient products from wood and non-wood-based products. Up to now the forest-based sector has been mainly build around wood based products. However, also multipurpose trees and non-wood forest products and services can significantly contribute to the achievement of the set goals. The objective of the STAR TREE project is to provide better understanding, knowledge, guidance and tools to support relevant stakeholders (e.g., forest owners, resource managers, enterprises, decision makers, other public and private entities) in optimising the management of multi-purpose trees and developing innovative approaches for increasing

the marketability and profitability of NWFP for a more competitive rural economy. The overall impacts of the project are in the long term to support a sustainable rural development through a stronger utilisation of business opportunities based on non-wood forest products and multipurpose trees. This will particularly benefit the rural population as much as land owners and companies through a more competitive and robust rural economy and a better quality of life.

### PARTNERS

**Coordinator:** European Forest Institute  
**Participants:** Food and Agriculture Organisation of the United Nations Fao, Metsantutkimuslaitos, Universität Hamburg, Llais y Goedwig Lbg, Karadeniz Teknik Universitesi, Instituto Superior de Agronomia, Reforesting Scotland, Instituto de Restauracion y Medio Ambiente, Latvijas Valsts Mezzinatnes Instituts Silava, Fvl Forstwirtschaftliche Vereinigung Luneburg GmbH, Asamer-Handler & Co Og, Centre Tecnologic Forestal de Catalunya, Universität für Bodenkultur Wien, Instituto Nacional de Investigacion y Tecnologia Agraria y Alimentaria, Albert-Ludwigs-Universität Freiburg, Foreco Technologies S.L, Plansinn - Büro für Planung und Kommunikation GmbH, University Stefan cel Mare Suceava, Mantau Udo, Gozdarski Institut Slovenije, Joensuu Tuote ja Vihannes Ky, Wild Resources Limited, Università degli Studi di Padova



## BIOLOGICAL CONTROL MANUFACTURERS IN EUROPE DEVELOP NOVEL BIOLOGICAL CONTROL PRODUCTS TO SUPPORT THE IMPLEMENTATION OF INTEGRATED PEST MANAGEMENT IN AGRICULTURE AND FORESTRY

REFERENCE	612713
CALL	FP7-KBBE-2013-7-single-stage
THEME	kbbe
SCIENTIST	Roberto Causin
DEPARTMENT	Land, Environment, Agriculture and Forestry
UNIPD	participant
TOTAL COST	12,086,533 €
EU FUNDING	8,997,264 €
E-MAIL	roberto.causin@unipd.it

### PROJECT DESCRIPTION

The objective of BIOCOMES is to develop 11 new biological control agents (BCAs) for key markets in European agriculture and forestry. BCAs were identified through market analysis by six manufactures of biological control products. BCAs will primarily be for use in open field crops of vegetables (3), of which 2 are also for use in protected crops, arable crops (3), fruit crops (3), and three different types of forests (2). Primary targeted pests are: gypsy moth (*Lymantria dispar*), pine weevil (*Hylobius abietis*), tomato pinworm (*Tuta absoluta*), white flies, aphids of fruit tree crops and *Mamestra brassicae*. Primary targeted pathogens are: damping-off diseases in forest nurseries, soilborne pathogens of oilseed rape and cereals, brown rot (*Monilinia* spp.) of stone fruit, and powdery mildew of cereals (*Blumeria graminis*). The economic sustainability during the entire development process will be assessed by the responsible industrial partners. The environmental sustainability will be quantified for each BCA by means of the Sustainable Process

Index method. The entire developmental process for each of the 11 BCA products is guided by a consultancy partner specialized and leading in (bio) pesticide registration including risk assessments for European (bio) pesticide industries. In vitro production of entomopathogenic viruses as new innovative technique like will be developed aimed at a breakthrough in economic production. Downstream-technology and shelf life for entomopathogenic nematodes will be improved. BIOCOMES will communicate project results with all stakeholders with special attention to European IPM networks throughout the whole project duration. BIOCOMES combines the expertise of 10 industrial SME partners, 3 larger industrial partners and 14 research partners with 38% of the requested EU contribution supporting SMEs. All 11 BCA solutions will be novel IPM tools and new alternatives to replace major pesticide applications in European agriculture and forestry.

### PARTNERS

**Coordinator:** Stichting Dienst Landbouwkundig Onderzoek

**Participants:** Technische Universität Graz, Universidad Publica de Navarra, Julius Kuhn-Institut Bundesforschungsinstitut für Kulturpflanzen, Zürcher Hochschule für Angewandte Wissenschaften, Instytut Badawczy Lesnictwa, Sekem Energy GmbH, Instituto Nacional de Investigacion Y Tecnologia Agraria Y Alimentaria, E-Nema Gesellschaft für Biotechnologie und Biologischen Pflanzenschutz mbH, Opennatur Sl, Andermatt Biocontrol Ag, The Agricultural Research Organisation of Israel - The Volcani Centre, Universidade dos Açores, Prophyta Biologischer Pflanzenschutz GmbH, Viridaxis Sa, Cbc Europe Srl, Gab Consulting GmbH, Mariann Kerstin Wikstrom, Faculty of Biology, University of Belgrade, Proefcentrum Fruitteelt Vzw, National University of Ireland Maynooth, Institut de Recerca I Tecnologia Agroalimentaries, Forschungsinstitut für Biologischenlandbau Stiftung, Coillte Teoranta, Viomichania Emporikon Georgikon Pharmakon Hellafarm Ae, Ara Srl, Università degli Studi di Padova



## STRATEGIES TO DEVELOP EFFECTIVE, INNOVATIVE AND PRACTICAL APPROACHES TO PROTECT MAJOR EUROPEAN FRUIT CROPS FROM PESTS AND PATHOGENS

REFERENCE	613678
CALL	FP7-KBBE-2013-7-single-stage
THEME	kbbe
SCIENTIST	Nicola Mori
DEPARTMENT	Agronomy, Food, Natural Resources, Animals and the Environment
UNIPD	participant
TOTAL COST	8,526,899 €
EU FUNDING	5,997,965 €
E-MAIL	nicola.mori@unipd.it

### PROJECT DESCRIPTION

The DROPSA consortium will create new knowledge and understanding of the damage and losses of fruit crops resulting from pests and pathogens, with a specific focus on the new and emerging threats due to *Drosophila suzukii* and quarantine pathogens *Pseudomonas syringae*, *Xanthomonas fragariae* and *X. arboricola*. The project will deliver a cost effective approach that can be widely implemented by the EU fruit industry. The aims and objectives are to:

- Determine the pathways of introduction and spread of *D. suzukii* and pathogens into the EU and develop preventative strategies and recommendations against the introduction of other dangerous fruit pests and pathogens.
- Determine the biology, ecology and interaction of these pests and diseases in different regions of Europe. This will involve a comprehensive evaluation of the life cycles, host ranges, capacities to disperse, the identification of natural enemies, plant-pathogen interactions as well as the semiochemicals involved in the behaviour of *D. suzukii*. The biology will provide the platform to

develop practical solutions for sustainable pest control.

- Develop innovative and effective control options using approved chemicals, semiochemicals, novel antimicrobial compounds and biological control agents as well as cultural practices, sterile insect techniques and new mode of action compounds. The most reliable and effective control options will be combined to optimise an integrated pest management (IPM) strategy.
- Develop forecasting and decision support systems and risk mapping as a component of IPM. The economic viability of proposed strategies for fruit crop protection will be evaluated and used to support decision making in the implementation of IPM strategies to protect the EU fruit sector. To protect intellectual property (IP) and to undertake dissemination and exploitation actions to maximise the impact and up take of the recommended IPM by commercial fruit growers.

### PARTNERS

**Coordinator:** The Secretary of State for Environment, Food and Rural Affairs

**Participants:** Consiglio per la Ricerca e la Sperimentazione in Agricoltura, Institut National de la Recherche Agronomique, Alma Mater Studiorum-Università di Bologna, Imperial College of Science, Technology and Medicine, Instytut Ogrodnictwa, Stichting Dienst Landbouwkundig Onderzoek, Oxitec Limited, United States Department of Agriculture, Julius Kuhn-Institut Bundesforschungsinstitut für Kulturpflanzen, Universitat de Girona, Zürcher Hochschule für Angewandte Wissenschaften, The New Zealand Institute for Plant and Food Research Limited, Ecologia y Protección Agrícola SL, Pherobank Bv, Kokuritsu Daigaku, Hojin Hokkaido Daigaku, University of Leeds, Universitat Politècnica de Valencia, Yunnan Agricultural University, Endoterapia Vegetal SL, European and Mediterranean Plant Protection Organisation Agriculture and Agri-Food Canada, Agrifutur Srl, Cab International, Handelsonderneming Vlamings Bv, Università degli Studi di Padova



## IMPROVING EUROPEAN AQUACULTURE BY ADVANCING SELECTIVE BREEDING TO THE NEXT LEVEL FOR THE SIX MAIN FINFISH SPECIES

REFERENCE	613611
CALL	FP7-KBBE-2013-7-single-stage
THEME	kbbe
SCIENTIST	Luca Bargelloni
DEPARTMENT	Department of Comparative Biomedicine and Food Science
UNIPD	participant
TOTAL COST	7,955,911 €
EU FUNDING	6,000,000€
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### PROJECT DESCRIPTION

Only about 10% of today's global aquaculture production use genetically improved stocks. In Europe, some breeding programmes consist of only the basic components of a breeding scheme. Hence, there is large potential to increase efficiency and profit by domestication and genetic improvement of farmed finfish. The main challenge of FISHBOOST is to realise this potential into economic and socially acceptable breeding schemes, and advance these for each of the six target species. Acknowledging the different capacities of the species, the aim of FISHBOOST is: To improve the efficiency and profitability of European aquaculture by advancing selective breeding to the next level for each of the six main finfish species through collaborative research with industry. FISHBOOST considers the main components of breeding programmes for Atlantic salmon, common carp, European seabass, gilthead seabream, rainbow trout and turbot. Disease resistance and production efficiency are genetically improved through detailed phenotyping and advanced genomic technologies. The economic impact and producers' perceptions will be assessed for the recommendations for

each of the species. 14 well-recognised RTD participants in Europe on aquaculture breeding will collaborate in a five-year comprehensive research project with 7 SMEs, 4 large industries and 1 NGO throughout Europe that are in the lead of the development of their species' breeding programmes or are vectors between industry and RTD. A mixture of low and high-tech technological advances depending on current capacities of the species will be developed to move each species' breeding program to the next level. This step-change advance will facilitate balanced and sustainable breeding programmes applying a wide set of traits, breeding tools and technologies. A dissemination program will deliver these results to SMEs and other end-users, thereby advancing existing and stimulating new aquaculture breeding programmes in Europe.

### PARTNERS

**Coordinator:** Nofima AS

**Participants:** Institut National de la Recherche Agronomique, Institut Français de Recherche pour l'exploitation de la Mer, The University of Edinburgh, Sarl Milin Nevez, Salmobreed AS, Cluster de la Acuicultura de Galicia Asociacion, Hellenic Centre for Marine Research, Ferme Marine du Douhet SAS, Biomolecular Research Genomics Srl, Kalliergeis Ydrovion Organismon Anonymos Etairaia, Genequa SL, Gie Laboratoire d'analyses Genetiques pour les Espaces Animaux, Jihoceska Univerzita v Ceskych Budejovicich, Instituto Nacional de Investigacion y Tecnologia Agraria y Alimentaria, European Forum of Farm Animal Breeders, Vyzkumny Ustav Veterinarniho Lekarstvi, Stichting Dienst Landbouwkundig Onderzoek, Maa Ja Elintarviketalouden Tutkimuskeskus, Universitetet for Miljo og Biovitenskap, Syndicat des Selectionneurs Avicoles et Aquacoles Français, Fédération Européenne des Producteurs Aquacoles, Wageningen University, Klatovske Rybarstvi AS, Scea les Poissons du Soleil, Università degli Studi di Padova



## PATHOPHYSIOLOGY AND NATURAL COURSE OF AUTOIMMUNE ADRENAL FAILURE IN EUROPE

REFERENCE	201167
CALL	HEALTH-2007-2.4.4-1
THEME	health
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DEPARTMENT	Medicine
UNIPD	participant
TOTAL COST	3,968,171 €
EU FUNDING	2,999,931 €
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### PROJECT DESCRIPTION

Autoimmune Addison's disease (AAD) is an endocrine disease resulting from the immune system's destruction of hormone producing cells in the adrenal cortex. Diagnosis is frequently first established after a life-threatening adrenal crisis, often resulting in untimely fatalities. The disease is rare, more common in women than in men, and also affects children. AAD very frequently occurs with other autoimmune diseases, such as type 1 diabetes mellitus, autoimmune thyroid disease and/or premature ovarian failure. Based on a European network of patient registry and biobanks, a translational approach using genetics, immunology, clinical management, and epidemiology, the project aims to unravel the pathogenesis and natural course of AAD, ultimately to improve diagnosis and treatment as well as to offer strategies for disease prevention. The consortium capitalises on the joint cutting edge expertise of leading European investigators covering all these fields. Exploiting these resources, we will describe the natural course of the disease with focus on factors limiting quality of life, and identify and characterise the disease-causing genes, using the corresponding disease in a spontaneous dog model and a gene targeted mouse model. In parallel, the cellular

and molecular mechanisms of autoimmunity directed at the adrenal cortex will be unravelled both in humans with ADD and in the genetic mouse model. Together, these efforts will increase our still incomplete understanding of pathogenic pathways operational in AAD and pave the way for new therapies of this debilitating disorder. Moreover, clinical studies will be performed to evaluate more physiological and personalised treatment with cortisol also aimed at prevention. As an autoimmune model disease the results of the project will not only lead to the development of novel diagnostic and therapeutic interventions for Addison patients, but also increase our understanding of the pathogenesis of autoimmune diseases in general.

### PARTNERS

**Coordinator:** Universitetet i Bergen  
**Participants:** Università degli Studi di Perugia, Karolinska Institutet Sverige, Uppsala Universitet, Universität Basel, Universitetet i Oslo, University of New Castle upon Tyne, University of Manchester, Centrum Medyczne Kształcenia Podyplomowego, Johann Wolfgang Goethe Universität Frankfurt am Main, The Chancellor, Masters and Scholars of the University of Oxford, Università degli Studi di Padova



## TARGETED NANOSYSTEMS FOR IMPROVING PHOTODYNAMIC THERAPY AND DIAGNOSIS OF CANCER

REFERENCE	201031
CALL	FP7-HEALTH-2007-A
THEME	health
SCIENTIST	Elena Reddi
DEPARTMENT	Biology
UNIPD	coordinator
TOTAL COST	3,248,383 €
EU FUNDING	2,453,118 €
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### PROJECT DESCRIPTION

The overall objective of this proposal is the development of one or more nanosystems loaded with Foscan® and conjugated to cancer cell specific ligands for improving the efficacy and selectivity of photodynamic therapy (PDT) and optimise a fluorescence-based tumour imaging approach. At present, PDT with Foscan® can be very effective but is not selective because Foscan® accumulates in the tumour tissue as well as in healthy ones. A great improvement of the therapy can only come from the availability of a carrier able to seek cancer cells and deliver Foscan® selectively to them. Three types of nanosystems, namely, liposomes, silica nanoparticles or poly(lactide-co-glycolide) copolymer nanoparticles, have been selected as potential nanocarriers for the selective delivery of Foscan®. The selection was mainly based on the different chemical nature of these systems, which can affect biocompatibility. During the first part of the project each type of nanosystem will be optimised through in vitro and in vivo tests and leader nanocarriers will be selected and conjugated to cancer cells specific ligands for increasing the selective delivery of Foscan®. The ligands we will use (folic acid, EGF, and antibodies) for targeting the nanosystems find their corresponding receptor over-expressed

on the surface of cancer cells, therefore allowing a selective delivery of drugs in these cells. In vitro and in vivo investigations will be carried to demonstrate the validity of our approach and deliver, at project conclusion, a final product which can then be tested clinically. Because of the red fluorescence emitted by Foscan®, once it is selectively accumulated in cancer cells fluorescence based technique can be used for tumour imaging and diagnosis. Therefore we expect to develop a Foscan® loaded nanosystem/s which can be used for improving both therapeutic and tumour imaging approaches.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** University College London, Biolitec Ag, Univerza v Ljubljani, Academisch Ziekenhuis Groningen





## NOVEL SECRETION SYSTEMS OF MYCOBACTERIUM TUBERCULOSIS AND THEIR ROLE IN HOST-PATHOGEN INTERACTION

REFERENCE	201762
CALL	FP7-HEALTH-2007-A
THEME	health
SCIENTIST	Riccardo Manganelli
DEPARTMENT	Molecular Medicine
UNIPD	participant
TOTAL COST	3,762,443 €
EU FUNDING	2,821,726 €
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### PROJECT DESCRIPTION

Tuberculosis is a major public health threat to the populations of Europe and the world. *Mycobacterium tuberculosis*, the etiological agent of the disease, can multiply and persist within phagocytic cells and this early event is of primary importance for the outcome of the infection. The main objectives of this proposal are to use highly innovative approaches in molecular and cell biology, biochemistry, immunology and imagery to elucidate the function and interplay of three families of immunogenic proteins of *M. tuberculosis*, the ESX, PE and PPE families. It was recently found that the ESX systems constitute novel secretion machineries that export major virulence factors and important diagnostic and protective antigens. While the ESX-1 system is responsible for the secretion of the prototypic ESX proteins, namely, the 6 kDa early secreted antigenic target (ESAT-6) and the 10 kDa culture filtrate protein (CFP-10), which are the most important proteins of *M. tuberculosis* involved in host-pathogen interaction, ESX-5 is implicated in the secretion of PE/PPE proteins. Restriction

to pathogenic mycobacteria makes them highly interesting targets for host-pathogen interaction. The ESX-3 system appears to be essential.

### PARTNERS

**Coordinator:** Institut Pasteur

**Participants:** Ecole Polytechnique Federale de Lausanne, Università Cattolica del Sacro Cuore, Vrije Universiteit Medisch Centrum, University College Dublin, National University of Ireland, Dublin, Università di Pisa, South African Medical Research Council, Università degli Studi di Padova



## PAEDIATRIC EUROPEAN NETWORK TREATMENT AIDS LABORATORY NETWORK

REFERENCE	201057
CALL	FP7-HEALTH-2007-A
THEME	health
SCIENTIST	Anita De Rossi
DEPARTMENT	Surgery, Oncology and Gastroenterology
UNIPD	participant
TOTAL COST	1,132,977 €
EU FUNDING	1,000,000 €
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### PROJECT DESCRIPTION

PENTA-LABNET(PL) is a coordination action aimed at improving the range of products and clinical use of antiretrovirals(ARVs) in HIV-infected children in resource-rich and resource-limited countries. This will be achieved through building capacity of laboratories to undertake co-ordinated studies on pharmacokinetics, pharmacodynamics and pharmacogenetics of new formulations and dosing and studies of viral and immune responses to novel regimens and strategies for using ARVs in children. PL forms a logical, necessary and cost-effective addition to the clinical-trial-focused research activities of the longstanding PENTA network, building on its existing operational infrastructures and expertise. To respond to emerging needs identified by EU as priority areas, the aim of PL is the development of a drug centred research platform, which will provide a complimentary range of activities focused on supporting the rational selection of optimal dosage and delivery forms of ARVs, and providing the lab basis for evaluating new ARVs strategies in children. The definition, organisation and management of integrated pharmacological and viro/immunological studies to better characterise the concentration-exposure-effect relationship will be a central activity of PL. In support of these studies, standardised data

collection systems will be established enabling linkage of clinical and laboratory data. In addition a central biobank will be set up to provide rapid identification of samples to be used for research. The laboratory and paediatric expertise generated in PL will support rapid assessment of new and existing individual and combined ARVs. The WHO will be a key partner of PL to define research priorities in ARV drug development and (also through PENTA's extensive international links) to rapidly disseminate results to a range of stakeholders (e.g. EMEA and industries) and support the rapid translation of research findings into guidelines and practice for children in all settings.

### PARTNERS

**Coordinator:** Fondazione Penta-for the Treatment and Care of Children With Hiv-Onlus

**Participants:** University College London, Universiteit Leiden, Radboud Universiteit Nijmegen - Stichting Katholieke Universiteit, Assistance Publique - Hopitaux de Paris, The University of Liverpool, Institut de Recherche pour le Developpement, Institut National de la Santé et de la Recherche Medicale (Inserm), Fondazione Irccs Policlinico San Matteo, Medical Research Council, World Health Organization, Università degli Studi di Padova



## GOOD PRACTICE IN TRADITIONAL CHINESE MEDICINE RESEARCH IN THE POST-GENOMIC ERA

REFERENCE	223154
CALL	FP7-HEALTH-2007-B
THEME	health
SCIENTIST	Maria Carrara
DEPARTMENT	Pharmaceutical and Pharmacological Sciences
UNIPD	participant
TOTAL COST	1,117,778 €
EU FUNDING	995,100 €
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### PROJECT DESCRIPTION

In contrast to the reductionist approach of Western medicine that is based on modern anatomy, cell and molecular biology, Traditional Chinese Medicine (TCM) uses a unique theory system and an individualized and holistic approach to describe health and disease, based on the philosophy of Yin-Yang balance and an emphasis on harmony of functions. These two medicine systems disagree with each other in many situations as both of them may observe health from their limited perspective. GP-TCM aims to inform best practice and harmonies research of the safety and efficacy of TCM, especially Chinese herbal medicines (CHM) and acupuncture, in EU Member States using a functional genomics approach through exchange of opinions, experience and expertise among scientists in EU Member States and China. In 10 proposed work packages, we will take actions to review the current status, identify problems and solutions in the quality control, extraction and analysis of CHM. While these fundamental issues are addressed, discussion forums emphasizing the use of functional genomics methodology in research of the safety, efficacy and mechanisms of CHM and acupuncture will be the core of

this Coordination project. It will include the application of the technique in cell-based models, animal models and in clinical studies. Guidelines about good practice and agreed protocols in related research areas will be published to promote future TCM research in all the EU member states; online tools and research resources will be made available to EU member states; EU member states and additional China partners will be invited to join this network; the European Society of TCM Research will be established during this project and kept running autonomously to continue the guidance and coordination of EU-China collaboration in TCM research.

### PARTNERS

**Coordinator:** King's College London

**Participants:** Brunel University, University of Wolverhampton, The Provost Fellows & Scholars of the College of the Holy and Undivided Trinity of Queen Elizabeth Near Dublin, Heinrich-Heine-Universität Düsseldorf, The Chancellor, Masters and Scholars of the University of Cambridge, Universidade do Minho, Institute of Medicinal Plant Development, Chinese Academy of Medical Sciences, University of Southampton, Universiteit Leiden, Shanghai Institute of Acupuncture - Moxibustion and Meridians, Università degli Studi di Milano, China Capital Medical University, Universität Wien, Bundesinstitut für Arzneimittel und Medizinprodukte, Beijing University of Chinese Medicine, Servicio Madrilenio de Salud, Royal Botanic Gardens Kew, The University of Hong Kong, Université Libre de Bruxelles, Philipps Universität Marburg, Shanghai University of Traditional Chinese Medicine, London South Bank University, Rheinische Friedrich-Wilhelms-Universität Bonn, Ludwig-Maximilians-Universität München, Cmc Tasly Group Bv, Asper Biotech As, Universidad de Alcalá, Li Dan Jiang, Università degli Studi di Padova



## EUROPEAN NETWORK FOR GENETIC-EPIDEMIOLOGICAL STUDIES: BUILDING A METHOD TO DISSECT COMPLEX GENETIC TRAITS, USING ESSENTIAL HYPERTENSION AS A DISEASE MODEL

REFERENCE	201550
CALL	FP7-HEALTH-2007-B
THEME	health
SCIENTIST	Edoardo Casiglia
DEPARTMENT	Medicine
UNIPD	participant
TOTAL COST	14,608,340 €
EU FUNDING	10,213,420 €
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### PROJECT DESCRIPTION

The project is focused on the definition of a comprehensive genetic epidemiological model of complex traits like Essential Hypertension (EH) and intermediate phenotypes of hypertension dependent/associated Target Organ Damages (TOD). To identify the common genetic variants relevant for the pathogenesis of EH and TODs, we will perform a Whole Genome Association (WGA) study of 4.000 subjects recruited from historical well-characterized European cohorts. Genotyping will be done with the Illumina Human 1M BeadChip. Well-established multivariate techniques and innovative genomic analyses through machine learning techniques will be used for the WGA investigations. Using machine learning approach we aim at developing a disease model of EH integrating the available information on EH and TOD with relevant validated pathways and genetic/environmental information to mimic the clinician's recognition pattern of EH/TOD and their causes in an individual patient. Our statistical design is with two samples run in parallel, each with 1,000 cases and 1,000 controls, followed by a replication/joint analysis. This design is more powerful

than replication alone and allows also a formal testing of the potential heterogeneity of findings compared to a single step (one large sample) design. The results represent the source to build a customized and inexpensive genetic diagnostic chip that can be validated in our existing cohorts (n=12,000 subjects). HYPERGENES is in the unique position to propose a groundbreaking project, improving the methodology of genetic epidemiology of chronic complex diseases that have a high prevalence among EU populations. Designing a comprehensive genetic epidemiological model of complex traits will also help us to translate genetic findings into improved diagnostic accuracy and new strategies for early detection, prevention and eventually personalised treatment of a complex trait. The ultimate goal will be to promote the quality of life of EU populations.

### PARTNERS

**Coordinator:** Università degli Studi di Milano  
**Participants:** Katholieke Universitet Leuven, Imperial College of Science, Technology and Medicine, Stmicroelectronics Srl, Ibm Israel - Science and Technology Ltd, The University of Warwick, Softeco Sismat Spa, Università degli Studi di Sassari, Pharnext S.A.S., Uniwersytet Jagiellonski, Université de Lausanne, Reform E.C., Druzba za Mednarodno Trgovino, D.O.O., Institute of Internal Medicine, Siberian Branch of the Russian Academy of Medical Sciences, Medical University of Gdansk, Inserm - Institut National de la Santé et de la Recherche Médicale, Charles University in Prague, Shanghai Institute of Hypertension, I.M.S. - Istituto di Management Sanitario S.R.L., Università degli Studi di Padova



## UNDERSTANDING AND COMBATING HUMAN AGE-RELATED MUSCLE WEAKNESS

REFERENCE	223576
CALL	FP7-HEALTH-2007-B
THEME	health
SCIENTIST	Rosario Rizzuto
DEPARTMENT	Biomedical Sciences
UNIPD	participant
TOTAL COST	14,991,949 €
EU FUNDING	11,200,000 €
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### PROJECT DESCRIPTION

Ageing of skeletal muscle results in a progressive loss of mobility that decreases the quality of life and has major economic and social consequences for society at large. Increasing muscle weakness is a major component of muscle ageing. In the elderly muscles become atrophic (loss in muscle mass) and weaker (loss in muscle force), more susceptible to damage and consequently regenerate and recover more slowly than was the case in their youth.

The challenge for FP7 is to identify the relative importance of sarcopaenia, thus proposing standards to define healthy ageing in order to identify age-related muscle weakness; secondly to identify molecular pathways which may be targeted to combat normal age related muscle weakness, and thirdly to identify therapeutic strategies to prevent muscle loss and weakness and enhance recovery following injury or immobilisation.

The approaches which we will take to understand and combat muscle weakness in the aged population and improve healthspan can be defined in several steps: the collection and collation of data and samples, the assessment of physiological and functional parameters, the understanding of the various biological mechanisms involved, leading through integration to the development of strategies

and their translation for the general European population.

In order to develop and propose the general public with efficient countermeasures, the consortium will integrate data from genetics and epidemiology, molecular and cellular biology, physiology, biomechanics, as well as clinical and public health aspects, to ensure optimal scientific synergy from the leading European specialists and companies.

### PARTNERS

**Coordinator:** Institut National de la Santé et de la Recherche Medicale (Inserm)

**Participants:** The Manchester Metropolitan University, Universitat Pompeu Fabra, Alma Mater Studiorum – Università di Bologna, Uppsala Universitet, Université Pierre et Marie Curie - Paris 6, Università degli Studi di Pavia, Jyväskylä Yliopisto, Kayser Italia Srl, Region Hovedstaden, Università degli Studi di Roma La Sapienza, Facultes Universitaires Notre-Dame de la Paix de Namur, Fondazione per la Ricerca Biomedica Avanzata Onlus, Academisch Ziekenhuis Leiden - Leids Universitair Medisch Centrum, Inserm - Transfert SA, Tartu Ülikool, Unilever UK Central Resources Limited, Università degli Studi di Padova



## IDENTIFYING AND VALIDATING PRE-CLINICAL BIOMARKERS FOR DIAGNOSTICS AND THERAPEUTICS OF NEUROMUSCULAR DISORDERS

REFERENCE	241665
CALL	FP7-HEALTH-2009-singlestage
THEME	health
SCIENTIST	Paolo Bonaldo
DEPARTMENT	Molecular Sciences
UNIPD	participant
TOTAL COST	7,539,671 €
EU FUNDING	5,634,356 €
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### PROJECT DESCRIPTION

The rapidly expanding knowledge of NMDs genetic diagnosis, pathogenesis and therapeutic possibilities has provided new targets for disease characterisation, early diagnosis, drug discovery and development as well as has raised many questions about how to translate this knowledge into clinical practice as (initial) clinical trials typically run for such a short time that clinical improvement can hardly be expected within that time frame. This militates for the discovery of surrogate endpoints for establishing the efficacy of clinical trials.

The concept of biomarkers represents measurable bio-parameters able to flank the process of diagnosis, functional characterisation and therapy in NMDs. OMIC sciences (genomic, transcriptomics, proteomics) offer opportunities to identify biomarkers for finely defining and tuning the NMDs bases. This approach can make available non-invasive biomarkers, to be used for monitoring disease progression, prognosis and drugs response, therefore optimising the choice of appropriate and often personalised therapies. Validated biomarkers will increase therapy efficiency (meaning optimal dose of drug to get responders) and efficacy (responders vs non responders for example if we will identify genomic

biomarkers linked to the lack of any therapeutic effect).

In this case we could address a truly efficacious therapy (avoiding inefficacious treatment due to unfavourable genomic contexts). The new genomic and proteomic biomarkers discovered within BIO-NMD will be validated both in animal models and in human samples, before entering into a qualification process at the EMEA.

The qualified biomarkers resulting from the BIO-NMD project will be ready for ongoing and further clinical trials for the patient benefit. This will increase the therapy efficacy and efficiency and also reduce adverse effects, with impact on patients quality of life with also economical relevance. The BIO-NMD consortium is led by the University of Ferrara.

### PARTNERS

**Coordinator:** Università degli Studi di Ferrara

**Participants:** Institut National de la Santé et de la Recherche Medicale (Inserm), University College London, University of Newcastle upon Tyne, Academisch Ziekenhuis Leiden - Leids Universitair Medisch Centrum, Ariadne Genomics Inc, Université d'Aix Marseille, Università degli Studi di Milano, Novamen Sas, Università degli Studi di Roma Tor Vergata, Kungliga Tekniska Hogskolan, Life Technologies GmbH, Sanitario S.R.L., Università degli Studi di Padova



## VITAMIN D AND LIFESTYLE INTERVENTION FOR GESTATIONAL DIABETES MELLITUS (GDM) PREVENTION

REFERENCE	242187
CALL	FP7-HEALTH-2009
THEME	health
SCIENTIST	Annunziata Lapolla
DEPARTMENT	Medicine
UNIPD	participant
TOTAL COST	3,862,867 €
EU FUNDING	2,999,429 €
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### PROJECT DESCRIPTION

Europe is facing a rapidly growing threat from Type 2 diabetes mellitus (T2D), which is undoubtedly associated with an unhealthy diet and a more sedentary lifestyle. Evidence is accumulating that gestational diabetes mellitus (GDM) may be playing a role in this process. Thus it provides a significant opportunity for preventing future T2D. Not only is GDM prevalence on the rise, but intrauterine exposure to hyperglycaemia predisposes the offspring to diabetes and obesity. Another putative contributing factor is a low vitamin D status, which is also increasing in prevalence and may have causal links with both obesity and decreased glucose tolerance. The main aims of this project are: 1) to establish the current status of the prevalence of GDM in Europe and facilitate the adoption of a single diagnostic approach and 2) to deliver the best strategy that prevents GDM. The latter was deemed as not fully feasible within the scope of this call and our decision was to test the most relevant approaches (diet, exercise, vitamin D, alone or in combination) against surrogate variables of GDM (fasting blood glucose, insulin sensitivity, pregnancy weight gain) to come up with the best intervention for entry into a definitive GDM prevention trial. Deliverables include the sample size and modus operandi for

such a trial. Value will be added to the project by 1) Assessing variables modifying the uptake of preventive interventions, 2) Exploring health costs of GDM and potential savings of preventive approaches, 3) Improving pathophysiological understanding by assessing intervention effect on several parameters in mother and foetus and 4) Facilitating future research through a well defined cohort of mother-offspring pairs and comprehensive biobanking.

### PARTNERS

**Coordinator:** Medizinische Universität Graz  
**Participants:** Fundació Privada Institut de Recerca de l'Hospital de la Santa Creu, Medical Research Council, Medizinische Universität Wien, University Central Hospital, Recherche en Santé Lawson S.A. Katholieke Universiteit Leuven, Region Hovedstaden, Akademia Medyczna im Karola Marcinkowskiego, BAP Health Outcomes Research, S.L., National University of Ireland, Vrije Universiteit Medisch Centrum, Cambridge University Hospitals NHS Foundation Trust, Odense University Hospital, Stichting-VU-VUMC, Università degli Studi di Padova





## IDENTIFICATION AND THERAPEUTIC TARGETING OF COMMON ARRHYTHMIA TRIGGER MECHANISMS

REFERENCE	241526
CALL	FP7-HEALTH-2009-singlestage
THEME	health
SCIENTIST	Marco Mongillo
DEPARTMENT	Biomedical Sciences
UNIPD	participant
TOTAL COST	15,857,600 €
EU FUNDING	12,000,000 €
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### PROJECT DESCRIPTION

Arrhythmias are common manifestations of heart disease which frequently cause sudden cardiac death (SCD) or other devastating health problems. In Europe, prevention of SCD by device and drug therapy is expensive and increasingly strains public health resources due to a growing population at risk. However, identification of patients at increased risk for SCD is ineffective, and SCD prevention strategies are not directed at the underlying risk mechanisms. To address this challenging situation, new insights into genetic and environmental modulators of SCD risk, arrhythmia initiating mechanisms (Triggers) and therapeutic strategies (Treatments) are urgently needed.

The EUTrigTreat consortium proposes a translational project strategy based on interactive objectives (modules).

- Module 1 investigates novel genetic arrhythmia mechanisms in patients and is supported by Module 2.
- Module 2 which investigates genetic and environmental SCD risk modulators in animals with arrhythmias.
- Module 3 elucidates common environmental arrhythmia risk mediators including obesity and diabetes.

- Module 4 applies molecular and biophysical imaging techniques to identify novel risk biomarkers.
- Module 5 translates experimental data through computer modeling and prediction analysis.
- Modules 6 develops new SCD risk identification strategies through combined patient and experimental studies.
- Module 7 develops and validates novel therapeutic drug compounds and a new form of anti-arrhythmic device therapy. The pre-clinical and clinical activities will potentially result in patents of diagnostic and therapeutic applications, licensing strategies, early clinical trials and a spin-off company.
- Module 8 manages, advises and reviews the project progress of EUTrigTreat.

Ultimately, we aim to better understand and educate about arrhythmia initiating mechanisms and associated risk biomarkers. Such knowledge will provide strong rationales towards improved prevention and treatment of patients at risk for SCD.

### PARTNERS

**Coordinator:** Universitätsmedizin Göttingen - Georg-August-Universität Göttingen - Stiftung Öffentlichen Rechts

**Participants:** Max Planck Gesellschaft zur Foerderung der Wissenschaften E.V., Institut National de la Santé et de la Recherche Medicale (Inserm), Universitair Medisch Centrum Utrecht, Katholieke Universiteit Leuven, Universität Bern, Endotherm GmbH, Polygene Ag, Università degli Studi di Firenze, Biomedical Research Foundation, Academy of Athens, Johann Wolfgang Goethe Universität Frankfurt am Main, University of Glasgow, Fundacion Light4tech Firenze Srl, University System of Maryland, Università degli Studi di Padova



## DISCOVERY AND PRECLINICAL DEVELOPMENT OF NEW GENERATION TUBERCULOSIS VACCINES

REFERENCE	241745
CALL	FP7-HEALTH-2009-singlestage
THEME	health
SCIENTIST	Riccardo Manganelli
DEPARTMENT	Molecular Medicine
UNIPD	participant
TOTAL COST	18,875,943 €
EU FUNDING	11,996,730 €
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### PROJECT DESCRIPTION

With 14.4 million prevalent cases and 1.7 million deaths tuberculosis (TB) remains one of the most serious infectious diseases to date. An estimated 2 billion people are believed to be infected with *Mycobacterium tuberculosis* and at risk of developing disease. Multi- and extensively drug resistant strains are increasingly appearing in many parts of the world, including Europe. While with current control measures the Millennium Development Goals (MDGs) set for 2015 may be achieved, reaching these would still leave a million people per year dying from TB.

Much more effective measures, particularly more effective vaccines will be essential to reach the target of eliminating TB in 2050. Two successive FP5 and FP6 funded projects, Tuberculosis (TB) Vaccine Cluster (2000-2003) and TBVAC (2004-2008), have in the recent decade made significant contributions to the global TB vaccine pipeline, with four vaccines (out of nine globally) being advanced to clinical stages. Both projects strongly contributed to the strengthening and integration of expertise and led to a European focus of excellence that is unique in the area of TB vaccine development.

In order to sustain and accelerate the TB vaccine developments and unique integrated excellence of TBVAC, a specific legal entity was created named TuBerculosis Vaccine Initiative (TBVI).

The NEWTBVAC proposal is the FP7 successor of TBVAC, and will be coordinated by TBVI.

The proposal has the following objectives:

- 1) To sustain and innovate the current European pipeline with new vaccine discoveries and advance promising candidates to clinical stages;
- 2) To design new, second generation vaccines based new prime-boost strategies and/or new (combinations of) promising subunit vaccines, that will impact on reduction of disease in exposed individuals;
- 3) To sustain and innovative discovery, evaluation and testing of new biomarkers, that will be critically important for future monitoring of clinical trials.

### PARTNERS

**Coordinator:** Stichting Tuberculosis Vaccine Initiative

**Participants:** Istituto Superiore di Sanita, London School of Hygiene and Tropical Medicine, Universität Ulm, Institut Pasteur, Stichting Dienst Landbouwkundig Onderzoek, Max Planck Gesellschaft zur Förderung der Wissenschaften E.V., Universitätshospital Basel, Educational Foundation Yonsei University, Health Protection Agency Hpa, Università degli Studi di Palermo, Aston University, Fondazione per l'istituto di Ricerca in Biomedicina, Université de Genève, Universitätsklinikum Erlangen, Ministerie van Volksgezondheid, Welzijn en Sport, International Vaccine Institute, Institut Scientifique de Santé Publique, Stichting Biomedical Primate Research Center, Université Libre de Bruxelles, Px'therapeutics, Universidad de Zaragoza, Academisch Ziekenhuis Leiden - Leids Universitair Medisch Centrum, Universität Zürich, The Chancellor, Masters and Scholars of the University of Oxford, Eberhard-Karls Universität Tübingen, Glaxosmithkline Biologicals, Institut Pasteur de Lille, Centre National de la Recherche Scientifique, Statens Serum Institut, Fundacio Institut de Investigacio en Ciencies de la Salut Germans Trias i Pujol, Institut Pasteur Korea, Università degli Studi di Padova



## ZEBRAFISH REGULOMICS FOR HUMAN HEALTH

REFERENCE	242048
CALL	FP7-HEALTH-2009-two-stage
THEME	health
SCIENTIST	Francesco Argenton
DEPARTMENT	Biology
UNIPD	participant
TOTAL COST	14,911,236 €
EU FUNDING	11,375,000 €
E-MAIL	francesco.argenton@unipd.it

### PROJECT DESCRIPTION

In recent years, the zebrafish has emerged as a new vertebrate model organism for biomedical research which offers a unique combination of traits: a short generation time, small size and efficient breeding procedures make it the best choice among vertebrates for forward genetic screening and small-molecule screens, including toxicology, while the transparent embryo and larva offers unique opportunities for imaging of cell movement and gene expression in a developing organism. Building on recent advances in the zebrafish field, we will conduct high-throughput phenotyping of at least a thousand regulatory genes relevant for common human diseases, by behavioural assays (for viable mutants), 3D / 4D imaging and expression profiling (including high-throughput sequencing). We will include mutants generated by TILLING and by the new zinc finger nuclease method, as well as mutants from earlier forward-genetics screens. A phenotyping effort of this scale has never been undertaken before in any vertebrate organism. Complementing the study of mutants relevant for neurological disorders, we will produce an atlas of gene expression in the brain, the most comprehensive one in a vertebrate. We will further perform a genome-wide characterisation of regulatory elements of potential disease genes by a combination of bioinformatics and transgenics.

Small-molecule screening for mutant rescue or disease-relevant processes will identify candidate drugs and provide insights into gene function. Our increasing knowledge on the regulators and their interactions with regulatory targets will be integrated with knowledge at cellular and organismic level. By capitalising on the virtues of the zebrafish system, this systems biology approach to the regulome will gain unique knowledge complementing ongoing work in mammalian systems, and provide important new stimuli for biomedical research.

### PARTNERS

**Coordinator:** Karlsruher Institut für Technologie  
**Participants:** Max Planck Gesellschaft zur Förderung der Wissenschaften E.V., Institut National de la Santé et de la Recherche Medicale (Inserm), Albert-Ludwigs-Universität Freiburg, Universiteit Leiden, Imperial College of Science, Technology and Medicine, University College London, Universität Zürich, Universität zu Köln, The University of Sheffield, Technische Universität Dresden, King's College London, Koninklijke Nederlandse Akademie van Wetenschappen - Knaw, Genome Research Limited, Zf Biolabs Sl, The University of Sydney, Centre National de la Recherche Scientifique, Uni Research AS, The University of Birmingham, Università degli Studi di Padova



## EUROPEAN NETWORK FOR CANCER RESEARCH IN CHILDREN AND ADOLESCENTS

REFERENCE	261474
CALL	FP7-HEALTH-2010-single-stage
THEME	health
SCIENTIST	Giuseppe Basso
DEPARTMENT	Women's and Children's Health
UNIPD	participant
TOTAL COST	13,493,973 €
EU FUNDING	11,997,958 €
E-MAIL	giuseppe.basso@unipd.it

### PROJECT DESCRIPTION

ENCCA aims to establish a durable, European Virtual Institute clinical and translational research in childhood and adolescent cancers that will define and implement an integrated research strategy and will facilitate the necessary investigator-driven clinical trials to introduce the new generation of biologically targeted drugs into standard of care for children and adolescents with cancer. This will lead to more efficacious and less toxic therapies that will maximise the quality of life of the increasing number of survivors of cancer at a young age in Europe and allow them to assume their proper place in society. This biologically-driven research agenda will improve training of the clinical investigators and translational scientists of the future to spread excellence, increase capacity to participate in research and monitor outcomes across Europe. Patients and their families will be full partners and will be better informed about the need for and processes of clinical research. They will be in a better situation to care from their long term health risks for children. Drug development will be accelerated in partnership with industry through improved access to young patients with cancer, to academic expertise in care, clinical and biological research. All of this will be achieved with respect for the highest ethical and patient safety standards.

ENCCA will bring all stakeholders to the table in a timely and efficacious manner. It will address the needs of all the current multinational clinical trial groups for the benefit of children with cancer. It will provide them with common tools and approaches to solve the bottlenecks in testing new therapeutic strategies for those rare diseases in a vulnerable age group and in running a competitive clinical research agenda. Ongoing efforts to coordinate EU and US clinical research will be reinforced. ENCCA will be led by the most active EU institutes in the field (31), recognised as being at the forefront of excellence.

### PARTNERS

**Coordinator:** St. Anna Kinderkrebsforschung  
**Participants:** Foundation for Research and Technology Hellas, Centre International de Recherche sur le Cancer, Università degli Studi di Milano-Bicocca, Akademisch Medisch Centrum Bij de Universiteit van Amsterdam, Universitätsklinikum Essen, Westfälische Wilhelms-Universität Muenster, Karolinska Institutet, Christian-Albrechts-Universität zu Kiel, Universiteit Gent, University College London, Assistance Publique - Hopitaux de Paris, Charite - Universitätsmedizin Berlin, Erasmus Universitair Medisch Centrum Rotterdam, The Leeds Teaching Hospitals National Health Service Trust, Landeshauptstadt Stuttgart, Österreichische Kinder-Krebs-Hilfe Verband der Österreichischen Kinder Krebs Hilfe Organisationen, Ait Austrian Institute of Technology GmbH, Institut Curie, Esqh Vienna Office - Europäische Gesellschaft für Qualität im Gesundheitswesen - Wiener Büro Verein, Università Cattolica del Sacro Cuore, Istituto Giannina Gaslini, Siop Europe, Gdanski Uniwersytet Medyczny, University of Leeds, Consorzio Interuniversitario Cineca, The University of Birmingham, University of Southampton, Akademisch Ziekenhuis Leiden - Leids Universitair Medisch Centrum, Centre Anticancereux Leon Berard, Fundacion Para la Investigacion del Hospital Universitario la Fe de la Comunidad Valenciana, European Cancer Organisation, Institut Gustave Roussy, Università degli Studi di Padova



## MORE MEDICINE FOR TUBERCULOSIS

REFERENCE	260872
CALL	FP7-HEALTH-2010 singlestages
THEME	health
SCIENTIST	Riccardo Manganelli
DEPARTMENT	Molecular Medicine
UNIPD	participant
TOTAL COST	16,822,393 €
EU FUNDING	11,873,052 €
E-MAIL	riccardo.manganelli@unipd.it

### PROJECT DESCRIPTION

The More Medicines for Tuberculosis (MM4TB) consortium evolved from the highly successful FP6 project, New Medicines for TB (NM4TB), that delivered a candidate drug for clinical development two years ahead of schedule. Building on these firm foundations and exploiting its proprietary pharmacophores, MM4TB will continue to develop new drugs for TB treatment. An integrated approach will be implemented by a multidisciplinary team that combines some of Europe's leading academic TB researchers with two major pharmaceutical companies and four SMEs, all strongly committed to the discovery of anti-infective agents. MM4TB will use a tripartite screening strategy to discover new hits in libraries of natural products and synthetic compounds, while concentrating on both classical and innovative targets that have been pharmacologically validated. Whole cell screens will be conducted against *Mycobacterium tuberculosis* using in vitro and ex vivo models for active growth, latency and intracellular infection. Hits that are positive in two or more of these models will then be used for target identification using functional genomics technologies including whole genome sequencing and genetic complementation of resistant mutants, yeast three hybrid, click chemistry and proteomics. Targets thus selected will enter assay development, structure determination, fragment-based and

rational drug design programs; functionally related targets will be found using metabolic pathway reconstruction. Innovative techniques, based on microfluidics and array platforms, will be used for hit ranking, determining rates of cidal activity and confirming mechanism of action. Medicinal chemistry will convert leads to molecules with drug-like properties for evaluation of efficacy in different animal models and late preclinical testing.

### PARTNERS

**Coordinator:** École Polytechnique Fédérale de Lausanne

**Participants:** Indian Institute of Science, Institut National de la Santé et de la Recherche Médicale (Inserm), University of Cape Town, Queen Mary and Westfield College, University of London, The Chancellor, Masters and Scholars of the University of Cambridge, Vichem Chemie Kutato Kft, Collaborative Drug Discovery Inc Corporation, Università degli Studi di Pavia, Alere Technologies GmbH, Universidad del País Vasco, Sanofi-Aventis Recherche & Développement, Institut Pasteur, Univerzita Komenského v Bratislave, Tydock Pharma S.R.L., Universidad de Zaragoza, Cellworks Research India Private Limited, Institution of the Russian Academy of Sciences, A.N. Bach Institute of Biochemistry of Ras, Eidgenössische Technische Hochschule Zürich, Università degli Studi del Piemonte Orientale Amedeo Avogadro, Uppsala Universitet, Sciprom Sarl, John Innes Centre, Astrazeneca India Pvt Ltd, Università degli Studi di Padova



## WEST NILE INTEGRATED SHIELD PROJECT: EPIDEMIOLOGY, DIAGNOSIS AND PREVENTION OF WEST NILE VIRUS IN EUROPE

REFERENCE	261426
CALL	FP7-HEALTH-2010-single-stage
THEME	health
SCIENTIST	Giorgio Palù
DEPARTMENT	Molecular Medicine
UNIPD	participant
TOTAL COST	3,922,214 €
EU FUNDING	2,938,497 €
E-MAIL	giorgio.palu@unipd.it

### PROJECT DESCRIPTION

The world is facing a variety of viral infections of high pathogenic potential. These are either novel or formerly only endemic in specific areas of the world. It is intrinsic to such emerging diseases that actions to prevent and fight them must be taken while the number of infections is still relatively low and geographically restricted. Therefore, research efforts are required well before large outbreaks occur. In addition, effective surveillance networks for a given emerging disease must be established in time. Only with tools for treatment and control (such as vaccines) it will be possible to avoid major uncontrolled outbreaks.

This proposal aims at the development of these tools for the control and prevention of one of the most threatening vector-borne emerging diseases, West Nile Fever, caused by West Nile Virus (WNV), which has recently spread through North America. Although the viral strains are similar in America and Europe, different conditions for a WNV epidemic have to be taken into account, like insect vectors, reservoir hosts (birds) and their endemic virus populations plus specialities of European climate and geography. To achieve the goals of the call and to make a significant impact in the enhancement of Europe's preparedness to WNV, the consortium has defined three major

scientific and technical objectives. Firstly, to develop a diagnostic system for WNV-infections, which has no cross-reaction with other common flavivirus infections. Secondly, to develop a vaccine for humans and last but not least to establish a scientific network to collect, investigate and standardize biological data associated with WNV records using standardized methods. Several European Institutes supported by US scientist experienced with the North American outbreak will be collaborating to fight the disease from a European perspective.

### PARTNERS

**Coordinator:** Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung e.V

**Participants:** Stichting Biomedical Primate Research Center, The Washington University Corporation, Universität Zürich, Universität Leipzig, Isconova AB, Genetic Immunity Kutatasi Fejlesztési és Szolgáltató Kft, Universiteit Gent, Università degli Studi di Padova



## EUROPEAN NETWORK FOR THE STUDY OF ADRENAL TUMOURS - STRUCTURING CLINICAL RESEARCH ON ADRENAL CANCERS IN ADULTS

REFERENCE	259735
CALL	FP7-HEALTH-2010 two stages
THEME	health
SCIENTIST	Ambrogio Fassina
DEPARTMENT	Medicine
UNIPD	participant
TOTAL COST	8,107,677 €
EU FUNDING	5,993,978 €
E-MAIL	ambrogio.fassina@unipd.it

### PROJECT DESCRIPTION

Among patients with adrenal masses Adrenocortical carcinoma (ACC) and malignant pheochromocytomas (MPH) are found with a low incidence but very unfavorable prognosis. Due to this poor clinical outcome, concomitant hormone dysregulation and limited treatment options the two cancer entities severely impact on affected patients. However, the rarity of the tumours also impedes clinical studies which are affected by fragmentation and low cohort sizes. The European Network for the Study of Adrenal Tumours (ENS@T) has recently implemented a collection of adrenal tumour related databases and defined an associated network of Biological Resource Centers devoted to research on adrenal tumours. The concurrence of recent achievements of this evolving network, the progress in the understanding of molecular mechanisms and increasing availability of specific diagnostic and therapeutic tools for adrenal cancers provides the unique opportunity to achieve unmatched progress in the implementation of both translation and clinical research dedicated to ACC and MPH. Specifically, the newly formed ENS@T-CANCER consortium will address the following topics:

1. Structuring European clinical and translational research through implementation

- of a virtual research environment,
2. Improving clinical outcome of patients with adrenal cancer by conducting interventional trials carried out by European centers of excellence,
3. Improvement of differential diagnosis and risk stratification of adrenal cancer,
4. Identification and validation of tools for follow-up of patients with adrenal cancer,
5. Identification of novel biomarkers for treatment response.

The ultimate aim of the ENS@T-CANCER Consortium is to develop research in the field of adrenal cancers to improve diagnosis and treatment abilities. The Network will allow recruiting sufficient patients in all relevant European centers, to harmonize diagnosis criteria and to use the various technological approaches of a number of laboratories.

### PARTNERS

**Coordinator:** Ludwig-Maximilians-Universität München

**Participants:** Institut National de la Santé et de la Recherche Médicale (Inserm), The University of Birmingham, Technische Universität Dresden, Gabo:Mi Gesellschaft für Ablauforganisation:Milliarium MbH & Co Kg Gab O, University of Melbourne, Erasmus Universitair Medisch Centrum Rotterdam, Fundacion Centro Nacional de Investigaciones Oncologicas Carlos III, Universitätsklinikum Wuerzburg - Klinikum der Bayerischen Julius-Maximilians-Universität, Università degli Studi di Torino, Philipps Universität Marburg, Assistance Centre National de la Recherche Scientifique, Institut Gustave Roussy, Università degli Studi di Padova





## EUROPEAN CLINICAL STUDY FOR THE APPLICATION OF REGENERATIVE HEART VALVES

REFERENCE	278453
CALL	FP7-HEALTH-2011-two-stage
THEME	health
SCIENTIST	Giovanni Stellin
DEPARTMENT	Cardiac, Thoracic and Vascular Sciences
UNIPD	participant
TOTAL COST	6,645,283 €
EU FUNDING	5,200,000 €
E-MAIL	giovanni.stellin@unipd.it

### PROJECT DESCRIPTION

Acquired and congenital heart disease can necessitate heart valve replacement. However, current heart valve substitutes are not considered ideal as they need anticoagulation, bearing the risk of bleeding when manufactured from non-organic material, or they degenerate when they derive from animals or human tissue donors (homografts) thereby leading to frequent reoperation especially in the young population. An ideal heart valve substitute would overcome these limitations and even have the potential to grow when implanted in pediatric patients. Haverich et al. have developed an implant for heart valves, which is better tolerated than the known alternatives and which has the potential for regeneration by autologous recellularization. Implants derive from donated homografts, which are chemically treated to inactivate potential microorganisms and viruses. The heart valves then are decellularized chemically, so that only connective tissue remains, the matrix of the decellularized heart valve (DHV). DHV has been examined in extensive animal studies, including immunological and toxicological analysis, long term and growth models, all of which have shown that the implant is well tolerated and spontaneously recellularized by the recipient.

The proposed ESPOIR project is based on auspicious early clinical results in 45 children and young adults. In order to drive translation of this promising regenerative approach towards practical clinical use and to reduce the burden of congenital heart defects in particular, the ESPOIR consortium will undertake a prospective multi-centre trial to include at least 200 patients from 8 leading European Centres for Congenital Heart Surgery, for robust statistical evaluation of DHV in direct comparison to conventional heart valve substitutes.

### PARTNERS

**Coordinator:** Medizinische Hochschule Hannover

**Participants:** Universität Zürich, Gottfried Wilhelm Leibniz Universität Hannover, Katholieke Universiteit Leuven, Association Internationale European Homograft Bank Aisbl, Academisch Ziekenhuis Leiden - Leids Universitair Medisch Centrum, Universitatea de Stat de Medicina si Farmacie Nicolae Testemitanu din Republica Moldova, Azienda Ospedaliera di Padova, Université Paris Descartes, Deutsche Gesellschaft für Gewebetransplantation Gemeinnützige Gesellschaft MbH, Great Ormond Street Hospital for Children Nhs Trust, Haverich Dr.Axel, Meyer-Kobbe, Dr.Clemens Gbr, Università degli Studi di Padova



## EUROPEAN CONSORTIUM FOR THE EARLY TREATMENT OF DIABETIC RETINOPATHY

REFERENCE	278040
CALL	FP7-HEALTH-2011-two-stage
THEME	health
SCIENTIST	Edoardo Midena
DEPARTMENT	Neurosciences
UNIPD	participant
TOTAL COST	7,755,341 €
EU FUNDING	5,998,762 €
E-MAIL	edoardo.midena@unipd.it

### PROJECT DESCRIPTION

Diabetic retinopathy (DR), the leading cause of blindness among working-age individuals in developed countries has been classically considered to be a microcirculatory disease of the retina. However, there is growing evidence to suggest that retinal neurodegeneration is an early event in the pathogenesis of DR. For this reason, it is reasonable to hypothesize that therapeutic strategies based on neuro-protection will be effective not only in preventing or arresting retinal neurodegeneration but also in preventing the development and progression of the early stages of DR (ie. Micro-aneurysms and/or retinal thickness). EUROCONDOR (European Consortium for the Early Treatment of Diabetic Retinopathy) is a solid and well balanced consortium (ophthalmologists, endocrinologists, basic researchers) which has been created in order to implement the first clinical trial using eye drops for treatment of the early stages of DR. The participants are top leaders in their field and central readings will be performed by the Coordinating Centre of the European Vision Institute Clinical Research Network (EVICR.Net). The main objectives of the project are the following: Primary objective: To assess whether the selected neuro-protective drugs (brimonidine

and somatostatin) administered topically are able to prevent or arrest neurodegeneration, as well as the development and progression of the early stages of DR. Secondary objectives:

- 1) To determine the prevalence of functional abnormalities related to neurodegeneration in those patients without or with minimal micro-vascular damage under ophthalmoscopic examination.
- 2) To compare the effectiveness of the selected drugs.
- 3) To evaluate the local and systemic adverse effects of the selected drugs.
- 4) To identify those patients most prone to progressive worsening (characterization of phenotypes and circulating biomarkers).
- 5) To determine the molecular mechanisms by which the selected drugs exert their beneficial effects.

### PARTNERS

**Coordinator:** Fundacio Institut de Recerca de l'hospital Universitari Vall d'Hebron

**Participants:** Assistance Publique - Hopitaux de Paris, Bcn Peptides S.A, Università degli Studi di Torino, Aston University, Aibilii - Associazione de Apoioao Instituto Biomedico de Investigacao da Luz e Imagem, The University of Liverpool, Universität Ulm, Università Vita-Salute San Raffaele, Syddansk Universitet, Gloucestershire Hospitals Nhs Foundation Trust, Agencia Estatal Consejo Superior de Investigaciones Cientificas, Fundacion de la Comunidad Valenciana Centro de Investigacion Principe Felipe, Moorfields Eye Hospital Nhs Foundation Trust, Federation Internationale du Diabete Region Europe Aisbl, Consorcio de Apoyo a la Investigacion Biomedica En Red, Institut Catala de la Salut, Università degli Studi di Padova



## BIOMARKER RESEARCH ALLIANCE FOR DIAGNOSING HEART DISEASE IN THE AGEING EUROPEAN POPULATION

REFERENCE	306031
CALL	FP7-HEALTH-2012-INNOVATION-1
THEME	health
SCIENTIST	Mario Plebani
DEPARTMENT	Medicine
UNIPD	participant
TOTAL COST	15,184,316 €
EU FUNDING	10,906,368 €
E-MAIL	mario.plebani@unipd.it

### PROJECT DESCRIPTION

The ageing of the European population represents a rapidly rising social and economic challenge. Especially cardiovascular morbidity increases with age, but unfortunately, elderly patients are often difficult to diagnose due to confounding factors, leading to uncertainties in clinical decision making with huge impact on patients outcomes. Hence, there is an unmet need for novel biomarkers for more accurate diagnosis, risk assessment, and clinical outcome prediction for both acute and chronic cardiovascular diseases in the elderly.

The BestAgeing consortium aims to improve this lack of diagnostic capabilities by developing and validating innovative omics-based biomarkers particularly for elderly patients supporting healthy ageing in Europe. Our study design addresses the most frequent and severe cardiovascular diseases of elderly patients by incorporating the appropriate disease cohorts and biomaterials from European populations. We aim to develop new omics-assays to diagnose cardiovascular disease, estimate risk, and monitor the response to treatment in elderly. This is envisaged to enable a more stratified and economic delivery of medicine. We expect that BestAgeing will generate novel European medical technologies

that can improve the efficacy and efficiency of our care for elderly patients, which will also impact on socioeconomic wealth in Europe.

### PARTNERS

**Coordinator:** Universitätsklinikum Heidelberg  
**Participants:** Institut National de la Santé et de la Recherche Médicale (Inserm), Academisch Medisch Centrum Bij de Universiteit van Amsterdam, Uppsala Universitet, Siemens AG, Servicio Madrilenio de Salud, Health in Code SL, Tartu Ulikool, Comprehensive Biomarker Center GmbH, Acs Biomarker BV, Università Cattolica del Sacro Cuore, Metanomics GmbH, Johann Wolfgang Goethe Universität Frankfurt am Main, Universität des Saarlandes, National and Kapodistrian University of Athens, Multiplicom NV, Azienda Complesso Ospedaliero San Filippo Neri, State Institution National Scientific Center Institute of Cardiology Named After Academician M. D. Strazhesko National Academy Medical Sciences of Ukraine, Università degli Studi di Padova



## ORPHANS UNITE: CHILD BETTER TOGETHER EUROPEAN MANAGEMENT PLATFORM FOR CHILDHOOD INTERSTITIAL LUNG DISEASES

REFERENCE	305653
CALL	FP7-HEALTH-2012-INNOVATION-1
THEME	health
SCIENTIST	Angelo Barbato
DEPARTMENT	Women's and Children's Health
UNIPD	participant
TOTAL COST	3,854,000 €
EU FUNDING	3,000,000 €
E-MAIL	angelo.barbato@unipd.it

### PROJECT DESCRIPTION

Children with diffuse lung disease, also called childhood interstitial lung diseases (chILD), may have one of more than 200 entities, the biggest group of respiratory orphan lung diseases. Frequently undiagnosed because of lack of awareness or complex differential diagnosis, they lead to much morbidity, mortality (about 15%) and psychosocial stress for the families. Current lack of evidence based guidelines reflects the absence of any real scientific evidence for management. All current therapeutic options are off label. We propose that leading European clinical scientists and paediatric pulmonologists collaborate to assemble cohorts in which children with well-defined disease entities, verified by international panels of clinicians, radiologists, geneticists and pathologists are followed in a pan-European database and biobank compatible with others worldwide to allow common projects. Outcomes and treatment schemes will be rigorously defined and their value systematically assessed. We will put defined treatment protocols systematically into practice to allow their evaluation and perform a randomised controlled trial in line with the EU recommendations, to put prescribing for children on an evidence based footing. This will give evidence to use medicines

available based on their objectively determined effects and side effects. The project will lead to accepted evidence-based and consensus-agreed diagnostic and management clinical guidelines, to a better care of patients afflicted by rare chILD and lead to improved quality of life for children with these incurable diseases.

### PARTNERS

**Coordinator:** Ludwig-Maximilians-Universität München

**Participants:** The University of Edinburgh, Université Pierre et Marie Curie - Paris 6, Universität Ulm, Philipps Universität Marburg, Royal Brompton and Harefield National Health Service Trust, Hacettepe Üniversitesi, Universitätsmedizin der Johannes Gutenberg-Universität Mainz, Medizinische Hochschule Hannover, Università degli Studi di Padova



## DEVELOPMENT AND EPILEPSY - STRATEGIES FOR INNOVATIVE RESEARCH TO IMPROVE DIAGNOSIS, PREVENTION AND TREATMENT IN CHILDREN WITH DIFFICULT TO TREAT EPILEPSY

REFERENCE	602531
CALL	FP7-HEALTH-2013-INNOVATION-1
THEME	health
SCIENTIST	Alessandra Murgia
DEPARTMENT	Women's and Children's Health
UNIPD	participant
TOTAL COST	16,451,004 €
EU FUNDING	11,995,646 €
E-MAIL	alessandra.murgia@unipd.it

### PROJECT DESCRIPTION

DESIRE will focus on epileptogenic developmental disorders EDD, i.e. early onset epilepsies whose origin is closely related to developmental brain processes. A major cause of EDD are malformations of cortical development (MCD), either macroscopic or subtle. EDD are often manifested as epileptic encephalopathies (EE), i.e. conditions in which epileptic activity itself may contribute to severe cognitive and behavioural impairments. EDD are the most frequent drug-resistant pediatric epilepsies carrying a lifelong perspective of disability and reduced quality of life. Although EDD collectively represent a major medical and socio-economic burden, their molecular diagnosis, pathogenic mechanisms (PM) and rationale treatment are poorly understood. Specific objectives of DESIRE are to advance the state of the art with respect to: (1) the genetic and epigenetic causes and PM of EDD, particularly epileptogenic MCD, to elucidate molecular networks and disrupted protein complexes and search for common bases for these apparently heterogeneous disorders. (2) the diagnostic tools (biomarkers) and protocols through the study of a unique and well-characterized cohort of children to provide

standardized diagnosis for patient stratification and research across Europe. (3) treatment of EDD using randomized, multidisciplinary clinical protocols and testing preclinical strategies in experimental models to also address novel preventative strategies.

The workplan spans from clinical observation, to whole exome studies, cellular and animal models and basic research, identification of biomarkers and improvement of diagnostic methods, and back to the clinical trials and assessment of innovative, targeted treatment strategies. The consortium partners have an outstanding track record in genetics, basic neurophysiology, neuropathology and clinical research. Specialized expertise will be made available by the SMEs involved to develop novel diagnostic tools for tailored treatment approaches.

### PARTNERS

**Coordinator:** Università degli Studi di Firenze  
**Participants:** Fondazione Istituto Italiano di Tecnologia, Agencia Estatal Consejo Superior de Investigaciones Científicas, Institut National de la Santé et de la Recherche Médicale (Inserm), Christian-Albrechts-Universität zu Kiel, Université Libre de Bruxelles, University College London, King's College London, Cf Consulting Finanziamenti Unione Europea Srl, Charité - Universitätsmedizin Berlin, Università Ta' Malta, Amarna Therapeutics Bv, Micromed S.P.A., Cegat GmbH, Università degli Studi di Verona, Di.V.A.L. Toscana Srl, Ospedale Pediatrico Bambino Gesù, Università Cattolica del Sacro Cuore, Baker Idi Heart And Diabetes Institute Holdings Limited, Klinikum der Universität zu Köln, Varionostic GmbH, Universitätsklinikum Erlangen, Centre National de la Recherche Scientifique, The University of Liverpool, Fondazione Irccs Istituto Neurologico Carlo Besta, Università degli Studi di Padova



## DEFINING THE ROLE OF XENO-DIRECTED AND AUTOIMMUNE EVENTS IN PATIENTS RECEIVING ANIMAL-DERIVED BIOPROSTHETIC HEART VALVES

REFERENCE	603049
CALL	FP7-HEALTH-2013-INNOVATION-1
THEME	health
SCIENTIST	Gino Gerosa
DEPARTMENT	Cardiac, Thoracic and Vascular Sciences
UNIPD	participant
TOTAL COST	7,949,030 €
EU FUNDING	5,996,971 €
E-MAIL	gino.gerosa@unipd.it

### PROJECT DESCRIPTION

TRANSLINK is a project devoted to assessing the mid- to long-term risk factors and improve the outcome of animal (bovine/porcine)-derived Bioprosthetic Heart Valve (BHV) implants. 300,000 patients/year benefit from BHV, a major healthcare problem (second most frequent cardiac surgery). BHV clinical outcome suffers from late dysfunctions restricting their application to older recipients. Based on a retrospective (already computerised) and prospective cohort of approximately 3,000 BHV recipients and control patients from 3 large EU cardiac surgery groups, TRANSLINK aims primarily to establish the possible role of recipients' immune response (IR) against BHV as a major cause to mid- to-long term clinical dysfunction. Precise molecular analysis of preimplantation BVH sugar moieties will be performed. Possible indirect side-effects on BHV endocarditis and host vessels inflammation are secondary end points. Serial and trans-sectional blood samples will be dispatched to a battery of highly specialised partner groups for testing anti-Gal, -Neu5Gc and -hyaluronic acid antibodies (Ig) using both validated and newly designed screening tools, glycan array patterns, and macrophages/NK responses. Data

will be crossed with clinical outcome scores. Project design aims at delivering comprehensive recommendations in the time-frame of the grant. Fundamental basic science progress in the field of carbohydrate antigens is also expected. Furthermore, prevention (BHV from engineered animal source lacking major antigens) and treatment (bioabsorbants of deleterious Ig) oriented remedies as well as prospective biomarkers of longterm BHV deterioration will be set up by three first-class SMEs. TRANSLINK may strongly impact the treatment of heart valve diseases by improving morbid-mortality in patients with heart valves diseases and increasing the indication of BHV to younger patients.

### PARTNERS

**Coordinator:** Azienda Ospedaliera di Padova

**Participants:** Institut National de la Santé et de la Recherche Medicale (Inserm), University College London, Tel Aviv University, Avantea Srl, Fundacio Institut d'Investigacio Biomedica de Bellvitge, Institut Univ. de Ciència i Tecnologia Sa, Mind the Byte Sl, Goeteborgs Universitet, Centre Hospitalier Universitaire de Nantes, The Regents of the University of California, Institut Catala de la Salut, Università degli Studi di Padova



## MESENCHYMAL STEM CELLS TO REDUCE LIVER INFLAMMATION

REFERENCE	602363
CALL	FP7-HEALTH-2013-INNOVATION-1
THEME	health
SCIENTIST	Antonella Viola
DEPARTMENT	Biomedical Sciences
UNIPD	participant
TOTAL COST	7,234,740 €
EU FUNDING	5,382,958 €
E-MAIL	antonella.viola@unipd.it

### PROJECT DESCRIPTION

Prevalence of liver disease is c6% (29 million people) in the EU with mortality rates from chronic liver diseases estimated at 14.3 per 100.000 in the EU-25 in 2004. Most liver diseases have a significant inflammatory component that underpins liver damage and fibrogenesis, yet current therapies have limited effectiveness. Safe novel anti-inflammatory therapies would satisfy a large unmet need for inflammatory liver conditions such as primary sclerosing cholangitis (PSC). Mesenchymal Stromal Cells (MSC) are a mixed population of plastic-adherent (PA) cells isolated from bone marrow and adipose. Preclinical studies show that intravenous administration of PA-MSC reduces liver inflammation/damage, however only one MSC-based clinical study has been reported to date. MERLIN will examine if MSC can safely reduce biliary damage in mouse models followed by a clinical study in patients with PSC. We have identified an antibody (S2) that isolates comparable MSC from human & mouse marrow, enabling testing of pure functionally distinct cell S2+ & S2- and PA-MSC populations. We will use the world's first GMP-compliant non-bead-based cell sorter to select S2+ MSC to comply with future therapeutic regulatory requirements. MERLIN partners will use novel methods to enhance MSC efficacy in PSC - by reducing immune clearance of MSC & by promoting MSC

functionality & localisation in vivo.

We will assess if MSC sub-sets exert differing levels of control upon liver inflammation in pre-clinical models, as well as defining their proliferation and mechanism of action. We will develop entirely novel biomarkers for PSC within the disease pathway pre and post cell infusion. The optimal combination of MSC sub-set and efficacy enhancement, will be selected for progression to a Phase 2 clinical safety study in patients with PSC.

MERLIN will deliver a comprehensive data-set on optimised purified MSC and their efficacy/safety in pre-clinical models prior to a clinical trial in patients with PSC.

### PARTNERS

**Coordinator:** The University of Birmingham

**Participants:** Orbsen Therapeutics Limited, Erasmus Universitair Medisch Centrum, The Chancellor Masters and Scholars of The University of Cambridge, Bionvision Inc, Nhs Blood and Transplant, Pintail Ltd, Università degli Studi di Padova





## PERSONAL GLUCOSE PREDICTIVE DIABETES ADVISOR

REFERENCE	216592
CALL	FP7-ICT-2007-1
THEME	ict
SCIENTIST	Claudio Cobelli
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	9,306,127 €
EU FUNDING	7,099,992 €
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### PROJECT DESCRIPTION

The DIAdvisor is a large scale- integrating project (IP) aiming at development of a prediction based tool which uses past and easily available information to optimise the therapy of type I and developed type II diabetes.

The DIAdvisor does not depend on specific sensor technologies and technologies like standard strip sensing, minimally invasive continuous glucose sensors and non-invasive methods.

For safety reason, the DIAdvisor system will be able to self-assess the confidence of its proposed decisions. For safety reasons as well as for the sake of therapy improvements the system connects and provides information and trends to the Health Care Provider.

Glucose prediction is difficult and requires advanced science. This can be achieved only by a well-balanced group of eminent experts including academics, clinicians, user representatives and leading companies. This includes physiological modelling, identification theory, control theory, medical device technology, risk management theory, sensor science and user understanding.

The expected impact of DIAdvisor will be improved diabetes control and quality of life in large populations of insulin treated patients, leading to fewer diabetic complications and lower Health Care costs. Moreover, the project will constitute a valuable opportunity for European companies to build up a special know-how leading

products that profoundly and positively impacts the lives of millions with other indications than diabetes.

### PARTNERS

**Coordinator:** Novo Nordisk A/S

**Participants:** Ondalys Sarl, Universität Linz, Toumaz Technology Limited, Lunds Universitet, Institut Klinické a Experimentální Medicíny, Centre Hospitalier Universitaire de Montpellier, Romsoft Srl, Intelesens Ltd, Ramboll Danmark A/S, Oesterreichische Akademie der Wissenschaften, Federation Internationale du Diabete Region Europe Aisbl, Università degli Studi di Padova



## ADVANCED TELEMATICS FOR ENHANCING THE SAFETY AND COMFORT OF MOTORCYCLE RIDERS

REFERENCE	216355
CALL	FP7-ICT-2007-1
THEME	ict
SCIENTIST	Roberto Lot
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	5,370,015 €
EU FUNDING	3,473,899 €
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### PROJECT DESCRIPTION

Motorcycle and moped fatalities account for 17,8% of the total number of road accident fatalities in Europe and, compared to a passenger car occupant, a motorcycle rider is 26 times more likely to die in a crash, based on vehicle miles travelled, as riders are among the vulnerable road users.

SAFERIDER aims to enhanced PTW riders' safety by applying ADAS/IVIS on PTWs of all types for the most crucial functionalities and develop efficient and rider-friendly interfaces and interaction elements for riders' comfort and safety. Relevant applications prioritisation is based on in-depth accident studies, riders needs and wants, as well as benchmarking and ergonomic inspection of existing applications. The selected functionalities will be developed according to a modular and multi-layer (perception-decision-action) architecture, allowing multi ADAS/IVIS applications setup and integration.

Four ADAS applications are preliminary planned to be developed, namely Speed Alert, Curve Speed Warning, Frontal Collision Warning and Intersection Support; as well as four IVIS applications, namely eCall, Telediagnostic Services, Navigation and Route Guidance, Weather, Traffic and Black Spot Warnings. They are supported holistically by optimal and concise

warning concepts and strategies, supported by new haptic elements, an integrated smart helmet and context-related HMI adaptation; integrated upon 3 riding simulator and 8 PTW demonstrators of 3 manufacturers (PIAGGIO, TRIUMPH and YAMAHA) and tested in 6 sites Europe-wide.

### PARTNERS

**Coordinator:** Centre for Research and Technology Hellas

**Participants:** Scuola Superiore di Studi Universitari e di Perfezionamento Sant'Anna, Sick AG, Università degli Studi di Modena e Reggio Emilia, Fraunhofer-Gesellschaft zur Foerderung der Angewandten Forschung E.V, Università degli Studi di Trento, Yamaha Motor Europe N.V., Porsche Engineering Group GmbH, Meta System S.P.A, Fundacion Cidaut, Mira Ltd, Nzi Technical Protection S.L., Institut Francais des Sciences et Technologies des Transports, de l'Amenagement et des Reseaux, Piaggio & C S.P.A., Federation of European Motorcyclist' Associations, Università degli Studi di Firenze, Bundesanstalt für Strassenwesen, Europe Recherche Transport, AVMAP S.R.L., Università degli Studi di Padova



## TREBLE-CLEF: EVALUATION, BEST PRACTICES AND COLLABORATION FOR MULTILINGUAL INFORMATION ACCESS

REFERENCE	215231
CALL	FP7-ICT-2007-1
THEME	ict
SCIENTIST	Nicola Ferro
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	1,164,750 €
EU FUNDING	842,497 €
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### PROJECT DESCRIPTION

The popularity of Internet and the consequent global availability of networked information sources and digital libraries has led to a strong demand for multilingual access and communication technologies. Such technologies should support the timely and cost-effective provision of knowledge-intensive services for all members of linguistically and culturally diverse communities.

This is particularly true in the multilingual setting of Europe. However, despite recent research advances, there are still very few operational systems in existence, and these are limited to the most widely used languages.

The challenge that must now be faced is how to best transfer the research results to the wider market place. The objective of the Treble-CLEF proposal is to build on and extend the results already achieved by the existing Cross Language Evaluation Forum.

The aim is not only to support the development and consolidation of expertise in the multidisciplinary research area of multilingual information access but also to disseminate this know-how to the application communities. The specific target would be the European digital library context. Treble-CLEF

would thus:

- support the annual CLEF system evaluation campaigns with tracks designed to meet the specific requirements of the user and application communities, and particular focus on user modeling, language-specific experimentation, and results presentation
- launch a concerted action of technology transfer and dissemination of know-how, tools, resources and best practice guidelines through the organisation of workshops, tutorials and training sessions
- encourage community-building and collaboration around this topic by providing a forum for the discussion of results and making the scientific data, experiments and results produced during the course of an evaluation campaign publicly available.

### PARTNERS

**Coordinator:** Consiglio Nazionale delle Ricerche

**Participants:** Fundacion General de la Universidad Nacional de Educacion a Distancia - F- Uned, Evaluations and Language Resources Distribution Agency SA, Centre for the Evaluation of Language and Communication Technologies Srl, The University of Sheffield, Zürcher Hochschule für Angewandte Wissenschaften, Università degli Studi di Padova



## BOOSTING ENERGY AWARENESS WITH ADAPTIVE REAL-TIME ENVIRONMENTS

REFERENCE	224557
CALL	FP7-ICT-2007-2
THEME	ict
SCIENTIST	Luciano Gamberini
DEPARTMENT	General Psychology
UNIPD	participant
TOTAL COST	3,965,802 €
EU FUNDING	2,711,816 €
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### PROJECT DESCRIPTION

Reduction of energy consumption is a societal challenge that requires combination of technical, economical, and social means. So far, energy conservation has focused on new technologies and automation, treating users as passive consumers. However, strong evidence suggests that users can adapt actively their behaviour to energy saving with suitable feedback, support, and incentives, reducing significantly and cost-effectively energy use without impacting adversely their comfort. At present, energy information flows are slow, aggregated, and hidden, being operated by a market lacking incentives and proper service models. The opaqueness discourages users to learn and apply conservation strategies in their everyday lives. However, novel ICT's offer opportunities for removing this bottleneck. In particular, ubiquitous interfaces combined with low-cost sensors support real-time information from energy networks and consumption, empowering users to learn and share conservation strategies.

BeAware studies how ubiquitous information can turn users into active players by developing:

- 1) an open and capillary infrastructure sensing wirelessly energy consumption at appliance level;
- 2) ambient and mobile interaction to integrate

- energy use profiles into users' everyday life;
- 3) value added service platforms and models where consumers can act on ubiquitous energy information while energy producers and other stakeholders gain new business opportunities.

BeAware combines research excellence with relevant industrial involvement. To ensure wide applicability, a Nordic and a Southern evaluation site are planned. A liaison with the CITRIS programme in the USA facilitates dissemination. The expected impact focuses on:

- 1) grounding the conservation potential to users' cognitive constraints and practices,
- 2) ubiquitous computing applications for sensing wirelessly energy use and enabling users to act, and
- 3) value added service models to innovate a new energy and multi-utility market.

### PARTNERS

**Coordinator:** Aalto-Korkeakoulusaatio

**Participants:** Vattenfall Research and Development Ab, Enel.Si Srl, Intelligence for Environment and Security Srl Les Solutions Srl, Engineering - Ingegneria Informatica Spa, Basen Oy, The Interactive Institute Ii Aktiebolag, Università degli Studi di Padova



## FEEDBACK DESIGN FOR WIRELESS NETWORKED SYSTEMS

REFERENCE	223866
CALL	FP7-ICT-2007-2
THEME	ict
SCIENTIST	Sandro Zampieri
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	3,756,750 €
EU FUNDING	2,900,000 €
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### PROJECT DESCRIPTION

Revolutionary developments in microelectronics over the past decades have led to the production of cheap yet powerful devices that communicate with one another, sense and act on their environment and are deployed in large numbers to deliver an abundance of data. Such devices and the networks they form (wireless sensor networks) bring together communication, computation, sensing and control and have enabled monitoring and automation at an unprecedented scale. Specially challenging in this context are networked control systems, where feedback control loops are closed over networked. To take full advantage of this technology novel design methods are necessary to transcend the traditional borders between disciplines, to apply the principles of feedback to complex, interconnected systems. The objective of the FEEDNETBACK project is to generate precisely such a co-design framework, to integrate architectural constraints and performance trade-offs from control, communication, computation, complexity and energy management. This will allow the development of more efficient, robust and affordable networked control technologies that scale and adapt with changing application demands. By focusing on wirelessly connected networks, we will study networked control from a

fundamental point of view.

We will extend the current scientific state-of-the-art in networked control and will develop a software tool set to support our co-design framework. To demonstrate and evaluate this framework, we will apply it to two industrial case studies: a smart camera network for surveillance and motion capture, and an underwater inspection system that comprises autonomous surface and underwater vehicles. In addition to the impact in these two application areas, the new technologies in FEEDNETBACK will be disseminated through an ambitious program led by an innovation accelerator company, with the objective of linking the project's research advances to market opportunities.

### PARTNERS

**Coordinator:** Institut National de Recherche en Informatique et en Automatique

**Participants:** Universidad de Sevilla, Vitamib Sas, Eidgenössische Technische Hochschule Zürich, Vodera Limited, Omg Plc, Videotec Spa, Kungliga Tekniska Högskolan, Institut Français de Recherche pour l'exploitation de la Mer, Università degli Studi di Padova



## A BRAIN-CHIP INTERFACE FOR HIGH-RESOLUTION BI-DIRECTIONAL COMMUNICATION

REFERENCE	216528
CALL	FP7-ICT-2007-C
THEME	ict
SCIENTIST	Stefano Vassanelli
DEPARTMENT	Biomedical Sciences
UNIPD	coordinator
TOTAL COST	2,402,439 €
EU FUNDING	1,800,000 €
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### PROJECT DESCRIPTION

We intend to create an innovative interface between a semiconductor chip or an ensemble of semiconductor chips and the brain of a living rat. Small CMOS chips featuring stimulation and recording sites integrated at high-density (1000 elements spaced only 5-10 micrometers) will be implanted in several brain areas, either independently or simultaneously, thus obtaining an unprecedented control of neuronal activity in the mammalian brain. Thanks to high-density integration, functional electrical imaging and stimulation of neuronal networks within the brain cortex and deep nuclei will be performed at a spatial resolution close to the single neuron and at a temporal resolution of a few tens of microseconds. Obtaining such high spatiotemporal resolution will enable for the first time to explore and control brain information processing with unprecedented detail. The project will focus on sensory-motor circuits regulating coordinated voluntary movement. By exploring interfacing with the main cortical and nuclear structures of the brain, the choice of this neurobiological context ensures that the approach will have a general applicability to several other brain circuits such as those underlying vision, hearing and attention.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Max Planck Gesellschaft zur Förderung der Wissenschaften E.V., Consiglio Nazionale delle Ricerche, Bar Ilan University, Consorzio Nazionale Interuniversitario per le Scienze Fisiche della Materia, Fondazione Istituto Neurologico Casimiro Mondino



## BRINGING THE ARTIFICIAL PANCREAS HOME

REFERENCE	247138
CALL	FP7-ICT-2009-4
THEME	ict
SCIENTIST	Claudio Cobelli
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	13,614,751 €
EU FUNDING	10,499,851 €
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### PROJECT DESCRIPTION

The objective of AP@home is to build and evaluate an artificial pancreas (AP) with automated closed loop glycaemic control for insulin treated patients with diabetes. AP systems require algorithms using blood glucose levels obtained via glucose monitoring for controlling subcutaneous insulin administration. First, well established subcutaneous continuous glucose sensors and insulin pumps will be combined to improve and verify the functionality of enhanced closed-loop algorithms. We will advance algorithm quality, improve sensors by bringing their accuracy below the desired 5% error level and add a remote hypoglycaemia alarm. Second, in parallel, two AP systems will be developed by combining an insulin pump and a sensor into a single device, using only one access point through the skin (single-port). Thereby the need to puncture the skin twice, once for the glucose sensor and once for the insulin infusion, can be avoided (two-port). If proven successful in computer simulations we will evaluate the best selected single-port system under clinical conditions. Deliverables include:

- Description of more precise glucose sensing methods
- Description of system integration of the two-port and both single-port AP systems

- Validation of prototypes in the clinic and at home.

In a multinational controlled trial AP performance will be compared with standard intensive insulin therapy in daily life. Impact of the project includes strengthened competitiveness of European industry across a complete value chain involving large, mid-sized and small companies, enabling Europe to lead progress in AP systems. Also, the project will put European research and clinical organizations in leading positions with an increased number of high-skilled jobs in the medical device industry. Finally, diabetes care will be simplified, quality of life of patients with diabetes will be improved and diabetes related complications and health costs will diminish in the long run.

### PARTNERS

**Coordinator:** Profil Institut für Stoffwechselforschung GmbH

**Participants:** Medizinische Universität Graz, Meduni Graz, Università degli Studi di Pavia, Triteq Ltd, Stmicroelectronics Srl, Academisch Medisch Centrum Bij de Universiteit van Amsterdam, The Chancellor, Masters and Scholars of the University of Cambridge, Sensile Medical AG, École Polytechnique Fédérale de Lausanne, Centre Hospitalier Universitaire de Montpellier, 4a Engineering GmbH, Università degli Studi di Padova





## PATIENT CENTRIC APPROACH FOR AN INTEGRATED, ADAPTIVE, CONTEXT AWARE REMOTE DIAGNOSIS AND MANAGEMENT OF CARDIOVASCULAR DISEASES

REFERENCE	248694
CALL	FP7-ICT-2009-4
THEME	ict
SCIENTIST	Gaetano Thiene
DEPARTMENT	Cardiac, Thoracic and Vascular Sciences
UNIPD	participant
TOTAL COST	10,382,905 €
EU FUNDING	6,999,546 €
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### PROJECT DESCRIPTION

BRAVEHEALTH proposes a patient-centric vision to CVD management and treatment, providing people already diagnosed as subjects at risk with a sound solution for continuous and remote monitoring and real time prevention of malignant events. The solution proposed will be made up of the following sub-systems:

- 1)WEARABLE UNIT: it is an innovative concept of miniaturised multi-parameter sensor, able to continuously monitoring the most critical parameters needed to perform a thorough diagnosis by means of specific diagnostic and prognostic algorithms running on it. It will be possible both to perform scheduled analysis of critical parameters and to remotely trigger the screening of specific vital signs.
- 2)REMOTE MANAGEMENT UNIT: it represents the main interface between physicians and the system, providing both automated support, in the form of text messages with information or suggestions to the patient directly generated by the system, and doctor managed supervision, allowing direct communication with the patients with voice/text/chat messages. The most important added value of the this unit is the

possibility to be interfaced with existing National Health Records and Physiological Data Banks in order to generating and verifying risk prediction models using advanced data mining approaches.

3)LIFE! GATEWAY: Data acquired by the wearable unit will be relayed to a gateway which represents the means by which the information flow from the user to the Central Supervision Unit. This unit will provide the user with the following functionalities:

- 1) Real time communications: in case of anomalies, or simply to suggest specific drugs to be taken, or to advice some particular activity to be performed;
- 2) Location aware information, exploiting the positioning capabilities of GPS;
- 3) Mobile virtual community for education and support.

### PARTNERS

**Coordinator:** Labor S.R.L

**Participants:.** University of Hull, Stmicroelectronics Srl, Klopman International Srl, University of Southampton, Consorzio per la Ricerca nell' Automatica e nelle Telecomunicazioni C.R.A.T., The University of Birmingham, Oulun Yliopisto, Tsinghua University, Katholieke Universiteit Leuven, Azienda Ospedaliera Camillo Forlanini, Portugal Telecom Inovacao Sa, Istituto Nazionale per le Ricerche Cardiovascolari Consorzio Interuniversitario, Universiteit Twente, Telbios S.P.A., Gdanski Uniwersytet Medyczny, Università degli Studi di Padova



## THE CONVERGENT SCIENCE NETWORK FOR BIOHYBRID AND BIOMIMETIC SYSTEMS

REFERENCE	248986
CALL	FP7-ICT-2009-4
THEME	ict
SCIENTIST	Stefano Vassanelli
DEPARTMENT	Biomedical Sciences
UNIPD	participant
TOTAL COST	583,179 €
EU FUNDING	520,000 €
E-MAIL	stefano.vassanelli@unipd.it

### PROJECT DESCRIPTION

The Convergent Science Network (CSN) will coordinate and facilitate the development and deployment of multidisciplinary methods, concepts and technologies to advance the understanding and engineering of biomimetic and hybrid biological and artificial systems. The concrete outcome will be the establishment of an independent 'European Association for Biomimetic and Biohybrid Research'. This association will further advance and coordinate the field of biohybrid and biomimetic convergent sciences within the Future and Emerging Technology programmes. This goal will be achieved through a number of concrete actions during the 3 years. These actions include roadmapping events with accompanying policy documents, high-impact workshops and schools to achieve intense exchange among the leading groups in the field and provide training opportunities for junior researchers, the deployment of a web 2.0 CSN portal that will be a main point of access and dissemination, the production of a handbook of biomimetic and biohybrid systems, a number of brokerage and outreach events to address additional stakeholders.

The driving motivation behind CSN is that the development of future real-world technologies will depend strongly on our fundamental

understanding and harnessing of the principles underlying living systems. However, to achieve this goal some obstacles have to be addressed including: the development of a truly convergent perspective on biomimetic and biohybrid systems that translates into effective paradigms for research and development, the advancement of European curricula of postgraduate teaching, the creation of platforms of exchange among the active members of the research community and further stakeholders and the dissemination of concrete policy suggestions to pertinent policy makers. CSN will directly address these obstacles and facilitate and accelerate the development of this new field of research and development.

### PARTNERS

**Coordinator:** Universitat Pompeu Fabra

**Participants:** The University of Sheffield, Universität Zürich, Università degli Studi di Padova



## PROBABILISTICALLY ANALYSABLE REAL-TIME SYSTEMS

REFERENCE	249100
CALL	FP7-ICT-2009-4
THEME	ict
SCIENTIST	Tullio Vardanega
DEPARTMENT	Mathematics
UNIPD	participant
TOTAL COST	2,425,654 €
EU FUNDING	1,800,000 €
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### PROJECT DESCRIPTION

There is an ever-increasing demand both for new functionality and for reduced development and production costs for all kinds of Critical Real-Time Embedded (CRTE) systems (safety, mission or business critical). Moreover, new functionality demands can only be delivered by more complex software and aggressive hardware acceleration features like memory hierarchies and multi-core processors. However, these greatly increase system complexity, making it much more difficult to analyse applications for their temporal behaviour. Another key problem of CRTE systems is the need to prove that they operate correctly, satisfying all temporal constraints. The current generation of platforms, despite being based on comparatively simple and old processor technologies, are already extremely difficult to analyse for their temporal behaviour, and resulting errors in operation, cost EU industries billions of Euros annually in warranty and post-production costs.

The PROARTIS thesis is that the timing behaviour of systems that use advanced hardware features like multi-core CPUs and complex memory hierarchies can be analysed effectively by probabilistic timing analysis techniques that reduce the risk of temporal pathological cases to quantifiably negligible levels. Preliminary research results in cache replacement policies by members of the PROARTIS consortium strongly

support this claim. PROARTIS defines new hardware and software architecture paradigms based on the concept of randomisation that, with minimal changes to current processes and methods, guarantee timing behaviours that can be analysed with probabilistic techniques. PROARTIS uses a holistic approach in which probabilistic analysis extends from hardware design, compiler and real time operating system to applications. On top of this platform, we will build probabilistic timing analysis methods based on current commercial tools. We will validate our approach via an industrial case study.

### PARTNERS

**Coordinator:** Barcelona Supercomputing Center - Centro Nacional de Supercomputacion

**Participants:** Rapita Systems Limited, Airbus Operations Sas, Institut National de Recherche en Informatique et en Automatique, Università degli Studi di Padova



## THE COLLECTIVE EXPERIENCE OF EMPATHIC DATA SYSTEMS

REFERENCE	258749
CALL	FP7-ICT-2009-5
THEME	ict
SCIENTIST	Luciano Gamberini
DEPARTMENT	General Psychology
UNIPD	participant
TOTAL COST	8,627,550 €
EU FUNDING	6,499,982 €
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### PROJECT DESCRIPTION

The Collective Experience of Empathic Data Systems (CEEDS) project will develop novel, integrated technologies to support human experience, analysis and understanding of very large datasets.

#### Making use of humans' implicit processing abilities

CEEDS will develop innovative tools to exploit theories showing that discovery is the identification of patterns in complex data sets by the implicit information processing capabilities of the human brain. Implicit human responses will be identified by the CEEDS system's analysis of its sensing systems, tuned to users bio-signals and non-verbal behaviours. By associating these implicit responses with different features of massive datasets, the CEEDS system will guide users discovery of patterns and meaning within the datasets.

#### Immersion in synthetic reality spaces

To achieve this goal, users will be immersed in synthetic reality spaces (SRS), allowing them to explore complex data whilst following narrative structures of varying spatio-temporal complexity. Unobtrusive multi-modal wearable technologies will be developed in the project for users to wear whilst experiencing the SRS. These will provide an assessment of the behavioural, physiological and mental states of the user.

#### Two brains are better than one collective experience

Individuals' pattern detection abilities will be

augmented by linking multiple users together, creating a collective discovery system. Components of the CEEDS system will be integrated using generalized architectures from network robotics, creating a genuinely novel approach to massive distributed synthetic reality applications.

#### Making a practical difference

CEEDS' effectiveness will be validated through studies involving stakeholders from science, history and design. The consortium envisages genuine benefits from the CEEDS system. Think, for example, of a young pupil using CEEDS being able to see complex patterns in an astronomy data set, patterns which without CEEDS would only be perceptible to an experienced professor. By unleashing the power of the subconscious, CEEDS will make fundamental contributions to human experience. When we look back to life before CEEDS, we may liken our experience to living with our eyes closed.

#### Enriching theory across disciplines

On the theoretical level, CEEDS targets a novel integrated computational and empirical framework, merging the delivery of presence with the study of consciousness, its underlying sub-conscious factors and creativity. To do this, CEEDS will follow a multi-disciplinary approach that will significantly further the state of the art across science, engineering and the humanities. By bringing together a team of leading experts in psychology, computer science, engineering, mathematics, and other key disciplines, CEEDS will build the foundations for key developments in future confluent technologies.

### PARTNERS

**Coordinator:** Goldsmiths' College

**Participants:** University of Teesside, Electrolux Italia S.P.A., Max Planck Gesellschaft zur Förderung der Wissenschaften E.V., Eberhard Karls Universität Tübingen, Helsingin Yliopisto, Universitat Pompeu Fabra, École Normale Supérieure, Universitat Politecnica de Catalunya, Università di Pisa, University Of Sussex, Centre for Research and Technology Hellas, Universiteit Leiden, Universität Augsburg, Budapesti Muszaki és Gazdaságtudományi Egyetem, Università degli Studi di Padova



## COLLABORATIVE EMBEDDED NETWORKS FOR SUBMARINE SURVEILLANCE

REFERENCE	258359
CALL	FP7-ICT-2009-5
THEME	ict
SCIENTIST	Michele Zorzi
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	2,889,076 €
EU FUNDING	1,999,984 €
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### PROJECT DESCRIPTION

The CLAM project aims at developing a collaborative embedded monitoring and control platform for submarine surveillance by combining cutting edge acoustic vector sensor technology, underwater wireless sensor network protocols, collaborative situation-aware reasoning and distributed signal processing techniques for horizontal and vertical linear sensor arrays. The result will be a cooperative, flexible and robust underwater sensing, reasoning and communication platform for online surveillance of submarine environments accommodating pervasively deployed heterogeneous sensor nodes deployed at different water depths, enabling sensing and actuating devices to exchange data, autonomously network together, and collaboratively and locally assess their observation environment and act upon. Horizontal and vertical collaboration between sensor arrays in form of collaborative routing and beam forming, sensor fusion and distributed processing and reasoning enables fine-grained monitoring of the submarine environment and collaborative event detection as well as transmission of the network information to the monitoring stations. CLAM's consortium has experience and knowledge needed to deliver, exploit, and commercialize a complete solution right from the sensor node platform design, collaborative

communication and networking protocols, adaptive, robust and scalable collaborative data processing and reasoning, up to the application requirements and market analysis. Participation of the international, external advisory board in this project indicates that the demand and potential market for such monitoring platforms goes beyond Europe. This can offer Europe a great opportunity in becoming an international leader in this emerging area which is still very much in its infancy.

### PARTNERS

**Coordinator:** Universiteit Twente

**Participants:** Microflow Technologies BV, Stiftelsen Sintef, Kongsberg Maritime AS, Consorzio Interuniversitario Nazionale per l'informatica, Università degli Studi di Roma La Sapienza, Università degli Studi di Padova



## HIGHLY-COMPLEX AND NETWORKED CONTROL SYSTEMS

REFERENCE	257462
CALL	FP7-ICT-2009-5
THEME	ict
SCIENTIST	Sandro Zampieri
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	4,932,106 €
EU FUNDING	3,900,000 €
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### PROJECT DESCRIPTION

ICT developments both enable and also enforce large-scale, highly-connected systems in society and industry. Knowledge to cope with these emerging systems is lacking. HYCON2 will stimulate and establish the long-term integration of the European research community, leading institutions and industry in the strategic field of control of complex, large-scale, and networked dynamical systems. It will interconnect scattered groups to create critical mass, and will provide the necessary visibility and communication with the European industries. HYCON2 will assess and coordinate basic and applied research, from fundamental analytical properties of complex systems to control design methodologies with networking, self-organizing and system-wide coordination.

HYCON2 has identified several applications domains to motivate, integrate, and evaluate research in networked control. These domains are ground and aerospace transportation, electrical power networks, process industries, and biological and medical systems. Benchmarking will serve as a tool for testing and evaluating the technologies developed in HYCON2 and for stimulating and enforcing excellence by the identification and adoption of best practices. In particular, two show-case applications corresponding to real-world problems have been selected in order

to demonstrate the applicability of networked control and the need for research in control. As no substantial technological breakthrough can be achieved without preparing the proper cultural background, a further important objective of HYCON2 is to spread and disseminate excellence through multi-disciplinary education at the graduate and undergraduate level. The proposed research, integration and dissemination program will make Europe both the prominent scientific and the industrial leader in the area of highly complex and networked control systems, therefore posing Europe in an extraordinary position to exploit their impact in economy and society.

### PARTNERS

**Coordinator:** Centre National de la Recherche Scientifique

**Participants:** Eidgenoessische Technische Hochschule Zürich, Università di Pisa, Technische Universität Berlin, Università degli Studi di Cagliari, Institut Francais des Sciences et Technologies des Transports, de l'aménagement et des Reseaux, Università degli Studi di Pavia, Technische Universiteit Eindhoven, Università degli Studi dell'Aquila, Rijksuniversiteit Groningen, Kungliga Tekniska Hogskolan, Universidad de Sevilla, Universität Kassel, Institut Européen pour le Contrôle de Systemes Embarques, Technische Universiteit Delft, Università degli Studi di Trento, Technische Universität Dortmund, Lunds Universitet, Consiglio Nazionale delle Ricerche, Institut National de Recherche en Informatique et en Automatique, Ruhr-Universität Bochum, Universidad de Valladolid, Università degli Studi di Padova



## INTERNET OF THINGS ARCHITECTURE

REFERENCE	257521
CALL	FP7-ICT-2009-5
THEME	ict
SCIENTIST	Michele Zorzi
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	18,678,983 €
EU FUNDING	11,956,284 €
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### PROJECT DESCRIPTION

There has been much hype about the so-called Internet of Things. The idea of such a globally interconnected continuum emerged with the RFID technology, and this concept has considerably been extended to the current vision that envisages a plethora of heterogeneous objects interacting with the physical environment.

Today, a large number of different means are used to enable communication between heterogeneous devices. We see these as “Intranet of things”, representing vertical silos that do not support interoperability. However, this balkanisation of efforts will lead to a predictable slowdown in devising a viable global solution. Furthermore, existing solutions do not address the scalability requirements for a future Internet of Things, they provide inappropriate models of governance and fundamentally neglect privacy and security in their design.

IoT-A, the Internet-of-Things Architecture, proposes the creation of an architectural reference model together with the definition of an initial set of key building blocks. Together they are envisioned as crucial foundations for fostering a future Internet of Things. Using an experimental paradigm, IoT-A will combine top-down reasoning about architectural principles and design guidelines with simulation and prototyping to explore the technical consequences of architectural design choices.

IoT-A will lead to the following tangible outcomes:

- 1) architectural reference model for the interoperability of Internet-of-Things systems, outlining principles and guidelines for the technical design of its protocols, interfaces, and algorithms;
- 2) corresponding mechanism for its efficient integration into the service layer of the Future Internet;
- 3) novel resolution infrastructure, allowing scalable look up and discovery of Internet-of-Things resources, entities of the real world, and their associations;
- 4) novel platform components;
- 5) implementation of real-life use cases demonstrating the benefits of the developed architecture.

### PARTNERS

**Coordinator:** VDI/VDE Innovation + Technik GmbH

**Participants:** Consorzio Ferrara Ricerche, Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung E.V, Telefonica Investigacion y Desarrollo SA, Nec Europe Ltd, University of Surrey, Alcatel - Lucent Bell Labs France, Julius-Maximilians Universität Würzburg, Siemens AG, Nxp Semiconductors Germany GmbH, Universität St Gallen, Commissariat à l'Énergie Atomique et aux Énergies Alternatives, Nxp Semiconductors Belgium Nv, Università degli Studi di Roma La Sapienza, Creative Systems Engineering (C.S.E) Monoprosopi Epe, IBM Research GmbH, Alcatel-Lucent Bell Nv, Sap Ag, Hitachi Europe Limited, Università degli Studi di Padova





## MULTIMEDIA TRANSPORT FOR MOBILE VIDEO APPLICATIONS

REFERENCE	258053
CALL	FP7-ICT-2009-5
THEME	ict
SCIENTIST	Michele Zorzi
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	5,369,788 €
EU FUNDING	3,470,885 €
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### PROJECT DESCRIPTION

Video is a major challenge for the future Internet. This traffic type is foreseen to account for close to 90 percent of consumer traffic already by 2012. However, the current Internet, and in particular the mobile Internet, was not designed with video requirements in mind and, as a consequence, its architecture is very inefficient when handling video traffic. It is the vision of this consortium that, as video is going to represent the majority of the traffic, the future Internet architecture should be tailored to efficiently support the requirements of this traffic type. Specific enhancements for video should be introduced at all layers of the protocol stack where needed, ideally supporting an incremental deployment. Following the above vision, the main goal of the current proposal is to evolve the Internet architecture for efficient video traffic support. The proposed architecture will follow a cross-layer design that, by exploiting the interaction between layers, can raise performance to values unattainable with individual developments. The following key issues will be addressed by the architecture: i) enhanced wireless access support to optimise video performance, ii) novel IP mobility architecture adapted to the requirements of video traffic, iii) transport optimisations for video distribution and iv) network-aware video services that interact with the underlying layers. The technology developed

by the project will be designed taking into account the requirements of network operators for commercial deployment, and will aim at improving the Quality of Experience by users as well as reducing the associated costs for operators. Standardization and early incremental testing are considered key success factors for MEDIEVAL. The consortium is well balanced and combines the integrated perspectives of three mobile operators, a major manufacturer and an innovative video technology company, in addition to leading academic partners and research institutes.

### PARTNERS

**Coordinator:** Alcatel - Lucent Bell Labs France  
**Participants:** Instituto de Telecomunicacoes, Telecom Italia S.P.A, Consorzio Ferrara Ricerche, Portugal Telecom Inovacao Sa, Universidad Carlos III de Madrid, Eurecom, Docomo Communications Laboratories Europe GmbH, Liveu Ltd, Università degli Studi di Padova



## PARTICIPATIVE RESEARCH LABORATORY FOR MULTIMEDIA AND MULTILINGUAL INFORMATION SYSTEMS EVALUATION

REFERENCE	258191
CALL	FP7-ICT-2009-5
THEME	ict
SCIENTIST	Nicola Ferro
DEPARTMENT	Information Engineering
UNIPD	coordinator
TOTAL COST	4,391,421 €
EU FUNDING	3,529,357 €
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### PROJECT DESCRIPTION

Measuring is a key to scientific progress. This is particularly true for research concerning complex systems, whether natural or human-built. Multilingual and multimedia information systems are increasingly complex: they need to satisfy diverse user needs and support challenging tasks. Their development calls for proper evaluation methodologies to ensure that they meet the expected user requirements and provide the desired effectiveness.

Large-scale worldwide experimental evaluations provide fundamental contributions to the advancement of state-of-the-art techniques through common evaluation procedures, regular and systematic evaluation cycles, comparison and benchmarking of the adopted approaches, and spreading of knowledge. In the process, vast amounts of experimental data are generated that beg for analysis tools to enable interpretation and thereby facilitate scientific and technological progress.

PROMISE will provide a virtual laboratory for conducting participative research and experimentation to carry out, advance and bring automation into the evaluation and benchmarking of such complex information systems, by facilitating management and offering

access, curation, preservation, re-use, analysis, visualization, and mining of the collected experimental data. PROMISE will: foster the adoption of regular experimental evaluation activities; bring automation into the experimental evaluation process; promote collaboration and re-use over the acquired knowledge-base; stimulate knowledge transfer and uptake.

Europe is unique: a powerful economic community that politically and culturally strives for equality in its languages and an appreciation of diversity in its citizens. New internet paradigms are continually extending the media and the task where multiple language based interaction must be supported. PROMISE will direct a world-wide research community to track these changes and deliver solutions so that Europe can achieve one of its most cherished goals.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Centre for the Evaluation of Language and Communication Technologies Scrl, Zürcher Hochschule für Angewandte Wissenschaften, Università degli Studi di Roma La Sapienza, SICS - Swedish Institute of Computer Science Ab, Technische Universität Wien, Haute Ecole Specialisee de Suisse Occidentale, Evaluations and Language Resources Distribution Agency SA, Humboldt-Universität zu Berlin, Universiteit Van Amsterdam



## AN ADAPTIVE LEARNING SYSTEM FOR REASONING ABOUT STORIES WITH POOR COMPREHENDERS AND THEIR EDUCATORS

REFERENCE	257410
CALL	FP7-ICT-2009-5
THEME	ict
SCIENTIST	Barbara Arfè
DEPARTMENT	Psychology and Socialisation
UNIPD	participant
TOTAL COST	2,730,828 €
EU FUNDING	2,100,000 €
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### PROJECT DESCRIPTION

Developing the capabilities of children to comprehend written texts is key to their development as young adults. Text comprehension skills and strategies develop enormously from the age of 7-8 until the age of 11, when children develop as independent readers. Nowadays, more and more young children turn out to be poor (text) comprehenders: they demonstrate text comprehension difficulties, related to inference-making skills, despite proficiency in word decoding and other low-level cognitive skills. Though there are several pencil-and-paper reading interventions for improving inference-making skills on text, and specifically addressed to poor comprehenders, the design and development of adaptive learning systems for this purpose are lagging behind. A few adaptive learning systems consider specific inference-making interventions that are pivotal in text comprehension, but such systems are designed for high-school children or university-level students, and with textbooks as reading material. The use of more intelligent adaptive learning systems to custom-tailor such interventions in an adaptive fashion to (hearing and deaf) poor comprehenders has tremendous potential. TERENCE embodies that potential.

TERENCE aims at offering innovative usability and evaluation guidelines, refining the current cognitive and pedagogical models concerning story comprehension and inference making, and delivering a showcase intelligent adaptive learning system. The system's smart games, developed and classified according to the refined models, will ask children to draw inferences about temporal events of stories, in Italian and in English. Moreover, the system will allow teachers to choose and custom-tailor the types of stories and games according to the needs of their learners.

The guidelines, the models and the system will be the result of an orchestrated cross-disciplinary effort of European experts in diverse and complementary fields (art and design, computer science, engineering, linguistics, evidence-based medicine, psychology), and with the constant involvement of the end-users (deaf and hearing poor comprehenders, their educators) from schools in Brighton (UK), and in the Veneto area (Italy).

### PARTNERS

**Coordinator:** Università degli Studi dell'Aquila  
**Participants:** Siveco Romania SA, Katholieke Universiteit Leuven, Universidad de Salamanca, Amnin D.O.O Centr za Znanstveno Vizualizacijo, Università degli Studi di Verona, University of Sussex, Gottfried Wilhelm Leibniz Universität Hannover, Libera Università di Bolzano, Moholy-Nagy Muvezzeti Egyetem, Fondazione Bruno Kessler, Università degli Studi di Padova



## CULTIVATING UNDERSTANDING AND RESEARCH THROUGH ADAPTIVITY

REFERENCE	269973
CALL	FP7-ICT-2009-6
THEME	ict
SCIENTIST	Maristella Agosti
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	3,912,222 €
EU FUNDING	2,869,525 €
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### PROJECT DESCRIPTION

A key challenge facing curators and providers of digital cultural heritage across Europe and Worldwide is to instigate, increase and enhance engagement with digital humanities collections. To achieve this, a fundamental change in the way cultural artefacts are experienced and contributed to by communities is required. CULTURA will pioneer the development of next generation adaptive systems which will provide new forms of multi-dimensional adaptivity:

- personalised information retrieval and presentation which respond to models of user and contextual intent
- community-aware adaptivity which responds to wider community activity, interest, contribution and experience
- content-aware adaptivity which responds to the entities and relationships automatically identified within the artefacts and across collections
- personalised dynamic storylines which are generated across individual as well as entire collections of artefacts
- CULTURA advances and integrates the following key technologies:
- Cutting edge natural language processing, which normalises ambiguities in noisy historical texts
- Entity and relationship extraction, which

highlights the key individuals, events, dates and other entities and relationships within unstructured text

- Social network analysis of the entities and relationships within the content, and also of the individuals and broader community of users engaging with the content
- Multi-model adaptivity to support dynamic reconciliation of multiple dimensions of personalisation

CULTURA will deliver innovative adaptive services and an interactive user environment which dynamically tailors the investigation, comprehension and enrichment of digital humanities artefacts and collections. Through the provision of such functionality, CULTURA can empower all users to investigate, comprehend and contribute to digital cultural collections.

CULTURA will provide rigorous evaluation and validation of its adaptive services using high impact, contrasting, multicultural digital cultural heritage collections and diverse user communities and individuals. The CULTURA use cases, defined in collaboration with real users, will clearly illustrate how the adaptive environment will offer genuine user empowerment and unprecedented levels of engagement with these collections and communities.

The CULTURA consortium has a strong emphasis on meeting real end-user needs, maximising societal impact and laying a foundation for successful commercialisation. Thus, the project has a strong scientific foundation, informed by two significant digital cultural resources and associated communities, and supported by experienced and effective project management.

### PARTNERS

**Coordinator:** The Provost, Fellows, Foundation Scholars & the Other Members of Board of the College of the Holy & Undivided Trinity of Queen Elizabeth Near Dublin

**Participants:** IBM Israel - Science and Technology Ltd, Commetric EOOD, Pintail Ltd, Sofiiski Universitet Sveti Kliment Ohridski, Technische Universität Graz, Università degli Studi di Padova



## REALISTIC REAL-TIME NETWORKS: COMPUTATION DYNAMICS IN THE CEREBELLUM

REFERENCE	270434
CALL	FP7-ICT-2009-6
THEME	ict
SCIENTIST	Stefano Vassanelli
DEPARTMENT	Biomedical Sciences
UNIPD	participant
TOTAL COST	3,105,453 €
EU FUNDING	2,390,000 €
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### PROJECT DESCRIPTION

The brain circuits of the central nervous system are formed by neurons and synapses endowed with complex dynamical properties. However, the traditional architectures of computational systems, like artificial neuronal networks, are based on connectivity rules while making use of very simplified neurons.

Moreover while brain circuits operate through discontinuous signal called spikes organized in complex sequences, theoretical analysis usually deals with continuous signals. To understand circuit computations a different approach is needed: to elaborate realistic spiking networks and use them, together with experimental recordings of network activity, to investigate the theoretical basis of central network computation. As a benchmark we will use the cerebellar circuit. The cerebellum is supposed to compare expected and actual activity patterns and to reveal their congruence with respect to stored memories. By these means, the cerebellum takes part to control loops regulating movement and cognition. Experimental evidence has revealed that cerebellar circuits can dynamically regulate their activity on the millisecond time scale and operate complex spatio-temporal transformation of signals through non-linear neuronal responses. Moreover, synaptic connections can be fine-tuned by distributed forms of synaptic

plasticity, the correlate of memory in neural circuits. In this project, we will develop specific chips and imaging techniques to perform neurophysiological recordings from multiple neurons in the cerebellar network. Based on the data, we will develop the first realistic real-time model of the cerebellum and connect it to robotic systems to evaluate circuit functioning under closed-loop conditions. The data deriving from recordings, large-scale simulations and robots will be used to explain circuit functioning through the adaptable filter theory.

REALNET will thus provide a radically new view on computation in central brain circuits laying the basis for new technological applications in sensori-motor control and cognitive systems.

### PARTNERS

**Coordinator:** Fondazione Istituto Neurologico Nazionale Casimiro Mondino

**Participants:** The Hebrew University of Jerusalem, Bar Ilan University, Technische Universität Berlin, Politecnico di Milano, Universidad de Granada, The University of Sheffield, Università degli Studi di Padova



## GAN-BASED NORMALLY-OFF HIGH POWER SWITCHING TRANSISTOR FOR EFFICIENT POWER CONVERTERS

REFERENCE	287602
CALL	FP7-ICT-2011-7
THEME	ict
SCIENTIST	Gaudenzio Meneghesso
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	5,573,196 €
EU FUNDING	3,578,938 €
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### PROJECT DESCRIPTION

Highly efficient power electronics is needed for low volume and low weight future power conversion systems. The proposed project aims for the exploitation of novel gallium nitride (GaN) transistors for advanced switched power supplies. High voltage normally-off GaN power devices on Si substrates in vertical device architecture will be developed and its technology transferred to an European industrial environment. The devices are planned to reliably operate at elevated junction temperatures up to 225°C. The project covers the full value added chain from substrate technology and epitaxy to complete power electronic system prototypes. It brings together experienced partners in automotive technology, power electronic system and circuit design, power semiconductor technology, high temperature packaging technologies, GaN power device technology including GaN on Si epitaxy as well as sophisticated device characterization and reliability evaluation techniques. Therefore very good prospects for a successful realization of the project targets and for a competitive implementation of the new devices in an industrial environment are seen.

### PARTNERS

**Coordinator:** Forschungsverbund Berlin E.V.  
**Participants:** Infineon Technologies Austria AG, Artesyn Austria GmbH & Co Kg, Technische Universität Wien, Aixtron Se, Institute of Electrical Engineering, Slovak Academy of Sciences, Epigan NV, Università degli Studi di Padova

## REHABILITATIVE WAYOUT IN RESPONSIVE HOME ENVIRONMENTS

REFERENCE	287713
CALL	FP7-ICT-2011-7
THEME	ict
SCIENTIST	Umberto Castiello
DEPARTMENT	General Psychology
UNIPD	participant
TOTAL COST	3,558,902 €
EU FUNDING	2,730,000 €
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### PROJECT DESCRIPTION

REWIRE develops, integrates and field tests an innovative virtual reality based rehabilitation platform, which allows patients, discharged from the hospital, to continue intensive rehabilitation at home under remote monitoring by the hospital itself. The main idea is to assemble off the shelf components in a robust and reliable way to get a platform system that can be to be deployed massively at the patients homes. The platform is constituted of three hierarchical components: a patient station (PS), deployed installed at home, a hospital station (HS) and a networking station (NS) at a the health provider site. The PS is based on video-based tracking (through a mix of 2D and 3D cameras) and virtual reality. The patient sees on the display himself or an avatar moving and interacting in real-time with a virtual game with his movements tracked in real-time. Game variety of scenarios, balanced scoring system, quantitative exercise evaluation, audio-visual feed-back aims at maximum patients motivation. A robust and reliable auto-calibration and spatial synchronization with the graphics is developed. Patients daily activity is monitored by a Body Sensor Networks and his activity is profiled through eigenbehaviours. Environmental, physiological and motion data are combined to tune the rehabilitation exercise level, to assess potential risks and advice clinicians on the



therapy. The HS main role is the definition and monitoring of the treatment. Data mining in the NS discovers common features and trends of rehabilitation treatment among hospitals and regions. A virtual community is setup to educate and motivate patients. A pilot is designed both for the clinical evaluation of effectiveness and suitability of REWIRE, and the study of the most appropriate model to seamlessly connect long-term at home rehabilitation to that at hospital, appropriate service settings and adequate business models. Using advanced DTI imaging it is tested whether REWIRE meets the rationale of rehabilitation, that it triggers brain adaptations that mediate recovery.

## PARTNERS

**Coordinator:** Università degli Studi di Milano

**Participants:** Fundacio Privada Barcelona Digital Centre Tecnologic, Iavante, Fundacion Publica Andaluza para el Avance Tecnologico y el Entrenamiento Profesional, École Polytechnique Fédérale de Lausanne, Institut Jozef Stefan, Technogym SPA, The Chancellor, Masters and Scholars of the University of Oxford, Universität Zürich, Servicio Andaluz de Salud, Eidgenoessische Technische Hochschule Zürich, AB.ACUS SRL, Università degli Studi di Padova

## MULTI-VALUED AND PARALLEL MOLECULAR LOGIC

REFERENCE	317707
CALL	FP7-ICT-2011-8
THEME	ict
SCIENTIST	Elisabetta Collini
DEPARTMENT	Chemical Sciences
UNIPD	participant
TOTAL COST	2,487,237 €
EU FUNDING	1,900,000 €
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## PROJECT DESCRIPTION

MULTI replaces the familiar sequential model of computation that uses Boolean variables and combinational gates by logic operations that are executed in parallel on devices that have a built-in many state memory and whose inputs and outputs are multivalued. MULTI seeks to design, simulate and experimentally implement proof of principle devices on the atomic and molecular scale. MULTI refers to the unique novel characteristics of the proposed schemes. We use MULTI-level logic variables as opposed to two valued Boolean variables. We use MULTI-variate circuits that act in parallel so that more than one logic function is evaluated at every stage of the computation thereby aiming for parallel circuits. We use MULTI-state inbuilt memories. New functionalities and ground-breaking characteristics of information processing are provided by the radically post-Boolean MULTI approach. As a final thrust, MULTI will explore a post-Turing model of computation by using continuous variables. In MULTI a single atom, molecule or a supra(bio)molecular assembly acts as a logic element. We aim for new foundational principles and for proof of concept of computing in hardware at the level of laboratory experiments. MULTI plans to take advantage of internal degrees of freedom of atoms or molecules to implement logic operations by electrical addressing in the solid state and/or by





optical addressing in solution. The dynamics offers time-resolved response and thereby enables parallelism that can be massive because of the many resolvable states. Internal states of different molecules can be made to communicate thereby providing for concatenation. The other route of MULTI is (bio)chemical recognition that offers exquisite control for implementing many state, optically readable finite state machines. Benefits of MULTI approach are higher information rates for inputs and outputs, enhanced rates of processing due to parallelism and computing in memory and exploration of continuous logic.

## PARTNERS

**Coordinator:** Université de Liege

**Participants:** The Hebrew University of Jerusalem, University of New South Wales, Università degli Studi di Padova

## CONVERGENCE SCIENCE NETWORK OF BIOMIMETICS AND NEUROTECHNOLOGY

REFERENCE	601167
CALL	FP7-ICT-2011-9
THEME	ict
SCIENTIST	Stefano Vassanelli
DEPARTMENT	Biomedical Sciences
UNIPD	participant
TOTAL COST	1,064,936 €
EU FUNDING	950,000 €
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## PROJECT DESCRIPTION

Despite tremendous progress in neuroscience, ICT and related fields we are still unable to build perceptive, emotive and cognitive systems that are comparable with even simple insect brains with respect to function, energy sufficiency or computational power. One promising approach to answer this challenge is to translate principles underlying the abilities of natural systems into new technologies. Such an advance would entail major societal and economical impacts, particularly in the areas of information and communication technologies, robotics, brain-machine interfacing, quality of life and health and nanotechnology applied to life sciences. In parallel this paradigm would boost our fundamental understanding of mind and brain: ourselves. Currently the fields of research in Neuro- and Bio-inspired Systems (NBIS) on which these developments depend are critically fragmented, lacking common objectives, methods, critical mass and penetration of the academic curricula with associated obstacles for growth and consolidation. The Coordination Action Convergent Science Network for Biomimetics and Neurotechnology (CSNII) will directly address these challenges. CSNII will advance the definition, visibility, federation and consolidation of research in the Future and Emerging Technology area of NBIS with specific



emphasis on Biomimetics and Neurotechnology. CSNII will achieve these objectives by advancing and developing strategic roadmaps, supporting workshops, the annual conference “Living Machines” and realizing global cooperation and alliances in particular through collaborations with similar and well established activities in the USA and Japan. At the end of this 3 year project we expect a measurable impact on the level of collaboration and the quality of research in Biomimetics and Neurotechnology combined with a direct impact on post graduate curricula and funding policies and mechanisms furthering this strategic field in which Europe can obtain international leadership.

## PARTNERS

**Coordinator:** Universitat Pompeu Fabra

**Participants:** The University of Sheffield, Universität Zürich, Okinawa Institute of Science and Technology School Corporation Gako Hojin, Johns Hopkins University, Università degli Studi di Padova

## CULTURALLY ENHANCED AUGMENTED REALITIES

REFERENCE	601139
CALL	FP7-ICT-2011-9
THEME	ict
SCIENTIST	Luciano Gamberini
DEPARTMENT	General Psychology
UNIPD	participant
TOTAL COST	4,364,255 €
EU FUNDING	3,400,000 €
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## PROJECT DESCRIPTION

CultAR will provide a mobile platform that 1) actively increases users’ awareness of their cultural surroundings with advanced, adaptable and personalized interfaces, 2) increase users’ social engagement with culture via a leap in social media technologies and contextual inference methods. To reach these goals, CultAR will advance the State of the Art in mobile 3D, augmented reality and tactile technologies, combining them into a completely new mobile experience interface. The CultAR platform achieves personalised and engaging digital cultural experiences through enhanced representation, hybrid space mediation, social engagement and awareness. Adaptability and context awareness will be enhanced through dynamic 3D models of urban environments with an ability to control all aspects of the representation, including dynamic content such as the presence of other users (real and virtual) and user created Culture Ghosts, applying various emphasis methods that draw the attention of the user to potentially interesting cultural content.

A user-centric approach is applied throughout the development. During the first phase, scenarios are designed together with cultural stakeholders. Application design is iterative, where end user input is directly taken into the development loop. Cultural stakeholders will provide content and expert users for CultAR.



Advances in technology are verified and analyzed not just by technical benchmarking, but with both specialist analysis and on-location field experiments in Padua, Italy and Aalborg, Denmark. Methodology in measuring user experiences is developed with thorough monitoring using eye trackers, physiological sensors, gesture tracking and gesture recognition in pursue of inferring emotional states quantitatively.

## PARTNERS

**Coordinator:** Aalto-Korkeakoulusaatio  
**Participants:** Helsingin Yliopisto, Technische Universität Graz, Aalborg Universitet, Comune di Padova, Ubiest Spa, Università degli Studi di Padova

## MOSAIC - MODELS AND SIMULATION TECHNIQUES FOR DISCOVERING DIABETES INFLUENCE FACTORS

REFERENCE	600914
CALL	FP7-ICT-2011-9
THEME	ict
SCIENTIST	Claudio Cobelli
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	4,722,938 €
EU FUNDING	3,556,000 €
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## PROJECT DESCRIPTION

MOSAIC will address two very specific aspects linked to the prediction of risk of developing diabetes (type 2 and gestational) and complications associated to diabetes. These objectives respond to a widely recognized problem related to diabetes management and have the potential to have a major impact in the way diabetes is currently diagnosed and followed in Europe. The MOSAIC consortium counts with the expertise of four modelling partners who have worked over 25 years in the development of models of the human metabolic response in diabetes that will be enhanced in the project with the incorporation of elements that provide information related to environmental and clinical factors that prove to be relevant for the objectives defined such as socio-economic aspects, geographic localization, cultural background, nutrition, etc. Multiple data bases cutting across geographic boundaries are available to the MOSAIC consortium as a result of the activities of previous studies and projects of the members, such as (a) METABO 7FP EU project; (b) from the transversal study “Healthy Breakfast” enriched with Medtronic’s CareLink® reports for continuous glucose monitoring systems; (c) two large longitudinal epidemiological studies over 10 years long (VIVA study, BOTNIA prospective ▶



study); (d) outpatient data treated by FSM, Athens Hospital, Health Department 'Valencia-La Fe', ASL Pavia program over more than 10 years and (e) other data bases generated in ongoing 7FP EU studies like ePREDICE. MOSAIC will integrate these models into an already existing platform for diabetes management and remote monitoring, NOMHAD Chronic, to facilitate the interpretation and visualization of the data and to enable a comprehensive understanding of the information by the health care professionals. At the same time this platform will be used during the validation phase of the project to acquire data during the prospective study to feed the models under test.

## PARTNERS

**Coordinator:** Medtronic Iberica Sa

**Participants:** Universidad Politecnica de Madrid, Università degli Studi di Pavia, Fondazione Salvatore Maugeri Clinica del Lavoro e della Riabilitazione, Asociacion Espanola Para el Desarrollo de la Epidemiologia Clinica, Lunds Universitet, Soluciones Tecnologicas para la Salud y el Bienestar SA, Samfundet Folkhalsan I Svenska Finland Rf, National Technical University of Athens, Università degli Studi di Padova

## SMART WEARABLE ROBOTS WITH BIOINSPIRED SENSORY-MOTOR SKILLS

REFERENCE	611695
CALL	FP7-ICT-2013-10
THEME	ict
SCIENTIST	Monica Reggiani
DEPARTMENT	Management and Engineering participant
UNIPD	
TOTAL COST	3,987,384 €
EU FUNDING	2,680,000 €
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## PROJECT DESCRIPTION

Wearable robots (WR) are person-oriented devices, usually in the form of exoskeletons. These devices are worn by human operators to enhance or support a daily function, such as walking. WRs find applications in the enhancement of intact operators or in clinical environments, e.g. rehabilitation of gait function in neurologically injured patients. Most advanced WRs for human locomotion still fail to provide the real-time adaptability and flexibility presented by humans when confronted with natural perturbations, due to voluntary control or environmental constraints. Current WRs are extra body structures inducing fixed motion patterns on its user.

The main objective of the project is to improve existing wearable robotic exoskeletons exploiting dynamic sensorimotor interactions and developing cognitive capabilities that can lead to symbiotic gait behaviour in the interaction of a human with a wearable robot.

BioMot will use and adapt available tools to reveal how neural circuits generate behaviour, and to yield new strategies for co-adaptation during use of wearable robots for walking:

- The systems will fuse the information from both interaction with the environment and human gait dynamics, and exploit this information for safe and natural locomotion adjusted to the user's intentions and capabilities.



- The proposed bioinspired cognition for WRs will consider the interplay between biomechanical and sensorimotor levels with a developmentally guided coordination.
- It will establish advanced computational neuromusculoskeletal models based on dynamic sensorimotor interactions that are suitable as controllers for symbiotic interaction.
- BioMot will produce guidelines and benchmarking for WRs to become available for human locomotion in realistic scenarios.

BioMot proposes a cognitive architecture for WRs exploiting neuronal control and learning mechanisms which main goal is to enable positive co-adaptation and seamless interaction with humans.

## PARTNERS

**Coordinator:** Agencia Estatal Consejo Superior de Investigaciones Científicas

**Participants:** Riken the Institute of Physical and Chemical Research, Technaid SL, Universidad Miguel Hernandez de Elche, A-Ssur Hf, Fundacion Hospital Nacional de Paraplejicos, Università degli Studi di Padova

## SYMBIOTIC MIND COMPUTER INTERACTION FOR INFORMATION SEEKING

REFERENCE	611570
CALL	FP7-ICT-2013-10
THEME	ict
SCIENTIST	Luciano Gamberini
DEPARTMENT	General Psychology
UNIPD	participant
TOTAL COST	3,779,783 €
EU FUNDING	2,990,000 €
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## PROJECT DESCRIPTION

While real time analysis of user states based on signals from the brain and peripheral physiology have made progress (as separate branches of research), the possibility to predict intentions and infer implicit user variables is still a grand challenge in real-world applications. As a novel approach, MindSee proposes to fuse EEG as a main sensor with peripheral physiological sensors (EDR, fEMG, eye gaze and pupillometry) and context information for an unobtrusive acquisition of implicit measures of perception, cognition and emotions. Real-time estimates of these hidden user states will be exploited to complement keyboard and gestural input exemplary in the real-world application of scientific literature search where the information exploration of the user is guided by a co-adaptation with the computer. The proposed Symbiotic Information Seeking System will provide a wide range of visualization resources adapting information retrieved and its relevance, cognitive ergonomic complexity, and aesthetic aspects.

For the target application of scientific literature search, MindSee builds upon a cutting-edge retrieval system that has access to 50 million documents from the main scientific databases. MindSee will be developed in an iterative approach with three full cycles of implementation ►



and evaluation of increasingly complex symbiotic interactions in information seeking. The iterative evaluation of MindSee technology and validation of underlying methods will be done in realistic user experiments with user groups of different skills and areas.

The MindSee project will develop a new symbiotic information retrieval system capable of more than doubling the performance of information seeking in realistic tasks, compared to mainstream tools. MindSee symbiotic interaction will deliver solutions to increase productivity and creative potential. Several MindSee results are exploitable and applicable to other information seeking contexts beyond scientific literature search!

## PARTNERS

**Coordinator:** Helsingin Yliopisto

**Participants:** Technische Universität Berlin, Aalto-Korkeakoulusaatio, I2 Media Research Limited, Università degli Studi di Padova

## PHONON-ASSISTED PROCESSES FOR ENERGY TRANSFER AND SENSING

REFERENCE	323901
CALL	FP7-ICT-2013-C
THEME	ict
SCIENTIST	Elisabetta Collini
DEPARTMENT	Chemical Sciences
UNIPD	participant
TOTAL COST	2,503,347 €
EU FUNDING	1,834,424 €
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## PROJECT DESCRIPTION

There is mounting experimental and theoretical evidence that suggests that coherent electronic and vibrational dynamics are essential to understand physiological processes. This project addresses this newly emerging frontier between biology and quantum physics by aiming to determine the role of coherent vibrational dynamics in the efficiency of energy storage in natural and artificial light harvesting systems, as well as in odour recognition. Although these are at first sight two very different biological processes, in both cases their effectiveness is now believed to rely on phonon-assisted mechanisms. In fact, more generally, it is becoming increasingly clear that vibrational dynamics plays a key role in establishing the fundamental connection between structure and function of protein complexes. In this project we not only plan to experimentally demonstrate the crucial role of the phonon-assisted dynamics in facilitating efficient energy transfer in chromophoric complexes and odour recognition, but also to develop a general theoretical framework to describe and understand the role coherent vibrations play in the dynamics of biomolecular systems, as well as to develop methods to identify the presence and properties of such vibrations.

Furthermore, we aim at controlling the vibrational dynamics for the development of efficient



artificial light harvesting systems. To attain these goals we develop a truly multidisciplinary and original approach. The project will be developed in close collaboration between theorists and experimentalists, and is expected to yield an understanding of photosynthesis and olfaction at the most fundamental level, thus contributing in a unique way to such important challenges as the development of more efficient light harvesting technologies or artificial odour sensors. Furthermore, the understanding and control of environment-assisted coherent dynamics could potentially lead to new forms of robust quantum information processing in the future.

## PARTNERS

**Coordinator:** Instituto de Telecomunicacoes  
**Participants:** University College London,  
 Stichting Vu-Vumc, Biomedical Sciences Research  
 Center Alexander Fleming, Centre National de  
 la Recherche Scientifique, Universitaet Ulm,  
 Università degli Studi di Padova

## PRESERVATION FORMATS FOR CULTURE INFORMATION/E-ARCHIVES

REFERENCE	619568
CALL	FP7-ICT-2013-11
THEME	ict
SCIENTIST	Nicola Ferro
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	4,758,014 €
EU FUNDING	3,525,822 €
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## PROJECT DESCRIPTION

Memory institutions are facing increasing transfers of electronic documents and other media content for long term preservation. Preservation models are often inspired by ISO 14721:2003, known as “the OAIS model”, where transfers and preservation are built on information packages containing both data and metadata. DMetadata is normally stored in XML and specified in different schemas controlled by the community of professional curators through international organisations. Data content are normally stored in specific file formats for documents, images, sound, video etc. that are These files are usually produced by software from different vendors. Even if the transferred files are in standard formats, the implementation of standards cannot be guaranteed. The software implementing standards for the production of the electronic files is not in control neither by the institutions that produces them nor by the memory institutions. Conformance tests of transfers are done, but are not totally reliable. Different software for testing could end up in different results. This poses problems in long-term preservation. Data objects meant for preservation, passing through an uncontrolled generative process, can jeopardise the whole preservation exercise. The overall intention of PREFORMA project is to research critical factors in the quality of standard ►





implementation in order to establish a long-term sustainable ecosystem around developed tools with a variety of stakeholder groups organised in a network of common interest. The tools should be innovative and provide a reference implementation of the most common file format standards for the assessment of the collections to be archived and for the correction of the collections. PREFORMA will target a wider digital preservation community, by providing specifications and feedback to developers, standard bodies and memory institutions. Main objective of PREFORMA is to develop and deploy an open source software licensed reference implementation for different format standards as a tool to be used by memory organisations to check conformance with standard specifications. The PCP, following the rules for tenders in public sector, will match the memory institutions professional knowledge and the supplier's skills in development and promotion of products and create a win-win situation. Joint procurement will enable PREFORMA to build a sustainable network of common interest, where the public procurers can remain in contact and cooperate beyond the EC funding period. Results will be broadly disseminated during the projects life time and summed up at a final conference.

## PARTNERS

**Coordinator:** Riksarkivet

**Participants:** Packed Expertisecentrum Digitaal Erfgoed Vzw, Promoter Srl, Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung, Hogskolan I Skovde, Stichting Nederlands Instituut voor Beeld en Geluid, Koninklijk Instituut Voor Het Kunstpatrimonium, Greek Film Centre, Local Government Management Agency-An Ghniomhaireacht Bainistíochta Rialtais Aitiuil Lgma, Stiftung Preussischer Kulturbesitz, Ayuntamiento de Girona, Eesti Vabariigi Kultuuriministeerium, Kungliga Biblioteket (National Library Of Sweden), Università degli Studi di Padova

## PROBABILISTIC REAL-TIME CONTROL OF MIXED-CRITICALITY MULTICORE AND MANYCORE SYSTEMS

REFERENCE	611085
CALL	FP7-ICT-2013-10
THEME	ict
SCIENTIST	Tullio Vardanega
DEPARTMENT	Mathematics
UNIPD	participant
TOTAL COST	6,793,991 €
EU FUNDING	4,650,000 €
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## PROJECT DESCRIPTION

In the next decade, EU industries developing Critical Real-Time Embedded Systems (CRTES) (safety, mission or business critical) will face a once-in-a-life-time disruptive challenge caused by the transition to multicore processors and the advent of manycores, tantamount to complex networked systems. This challenge brings the opportunity to integrate multiple applications onto the same hardware platform bringing significant advantages in performance, production costs, and reliability. It also brings a severe threat relating to a key problem of CRTES; the need to prove that all temporal constraints will be satisfied during operation. Current CRTES, based on relatively simple singlecore processors, are already extremely difficult to analyse for temporal behaviour, resulting in errors in operation costing EU industry billions each year. The advent of multicore and manycore platforms exacerbates this problem, rendering traditional temporal analysis techniques ineffectual. A new approach is needed.

The PROXIMA thesis is that the temporal behaviour of mixed-criticality CRTES executing on multicore and manycore platforms can be analysed effectively via innovative probabilistic techniques. PROXIMA defines new hardware and software architectural paradigms based on



the concept of randomisation. It extends this approach across the hardware and software stack ensuring that the risks of temporal pathological cases are reduced to quantifiably small levels. On top of this, PROXIMA builds a comprehensive suite of probabilistic analysis methods integrated into commercial design, development, and verification tools, complemented by appropriate arguments for certification. PROXIMA provides a complete infrastructure; harnessing the full potential of new processor resources, demonstrating and supporting effective temporal analysis, bringing the probabilistic approach to a state of technological readiness, and priming multiple EU industry sectors in its use via a number of case studies.

## PARTNERS

**Coordinator:** Barcelona Supercomputing Center - Centro Nacional de Supercomputacion

**Participants:** Ikerlan S.Coop., Astrium Sas, Sysgo Sas, University Of York, Infineon Technologies UK Ltd, Rapita Systems Limited, Aeroflex Gaisler Ab, Airbus Operations Sas, Institut National de Recherche en Informatique et en Automatique, Università degli Studi di Padova

## REAL NEURONS- NANOELECTRONICS ARCHITECTURE WITH MEMRISTIVE PLASTICITY

REFERENCE	612058
CALL	FP7-ICT-2013-10
THEME	ict
SCIENTIST	Stefano Vassanelli
DEPARTMENT	Biomedical Sciences
UNIPD	coordinator
TOTAL COST	2,740,750 €
EU FUNDING	2,068,000 €
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## PROJECT DESCRIPTION

Information processing in classical ‘von Neumann’ architectures is less efficient compared to biological counterparts when dealing with ill-posed problems and noisy data. The reason is that the biological brain is configured differently and the key is its evolving structure, where connectivity elements between individual neurons, the synapses, undergo ‘birth’ and ‘death’ as well as strengthening and weakening through a selection process, reconfiguring neuronal connectivity in a self-organizing manner and allowing the networked population of neuronal processors to adapt motor and behavioural responses to the ever changing environment. Artificial neural networks in the form of software run on conventional ‘von Neumann’ computers appear incomparable to the biological systems in terms of speed, energy efficiency, adaptability and robustness. The challenge is to propose a ‘physical’ neural network where elements overcome this deficiency by merging data storage and processing into single electronic devices and by self-organizing and reconfiguring connectivity. Along this route, we aim to create a new biohybrid architecture of natural and artificial neurons endowed with plasticity properties. Communication between artificial and natural worlds will be established through ►



new nano- and microtransducers allowing direct electrical interfacing of a network of neurons in culture to an artificial CMOS-based counterpart. Adaptation properties of the artificial network will rely on memristive nanoelectronic devices with synaptic-like plasticity and on activity-dependent rearrangement of neuronal connectivity. As such, the biohybrid system will provide new and unique adaptive, self-organizing and evolving properties deriving from the fusion of natural and artificial neuronal elements into a new plastic entity and will represent a fundamental step towards the development of novel brain-inspired computing architectures as well as 'intelligent' autonomous systems and prostheses.

## PARTNERS

**Coordinator:** Università degli Studi di Padova  
**Participants:** Universität Zürich, Consiglio Nazionale delle Ricerche, University of Southampton, Max Planck Gesellschaft zur Förderung der Wissenschaften E.V.

## NOVEL BIOFUNCTIONAL HIGH POROUS POLYMER SCAFFOLDS AND TECHNIQUES CONTROLLING ANGIOGENESIS FOR THE REGENERATION AND REPAIR OF THE DEGENERATED INTERVERTEBRAL DISC

REFERENCE	213904
CALL	FP7-NMP-2007-LARGE-1
THEME	nmp
SCIENTIST	Barbara Zavan
DEPARTMENT	Biomedical Sciences
UNIPD	participant
TOTAL COST	9,422,854 €
EU FUNDING	6,977,150 €
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## PROJECT DESCRIPTION

30% of European workers experience back pain, and it is the most frequently reported work-related disorder. The proposed work seeks to provide a cure for lower back pain by developing porous scaffolds and technology which will repair a damaged intervertebral disc (IVD) by enabling its regeneration to a natural healthy state or better. Injectable acellular and cell-loaded bioactive polymer-based scaffolds will be developed. These will be designed to be implanted into the patient by minimally invasive surgery. A biomimetic approach will confer the appropriate mechanical and biological properties and enable the inclusion of the requisite cell signalling factors to produce a bio-hybrid structure which closely resembles the human tissue in all its essential attributes. Particular attention will be paid to angiogenesis. In IVD tissue, vascularization must be carefully controlled, due to the unique anatomy and physiology of the intervertebral disc. There must be negligible vascularization in the annulus and nucleus regions and moderate vascularization at the vertebral body level. Work will therefore be performed on materials functionalization, and on growth factor incorporation and



delivery, to enable this region-specific control of vascularization at different levels. Natural IVD tissue contains a relatively low number of cells, which are chondrocyte-like in character. Consequently, it will be necessary to devote some research to identifying and evaluating suitable and more readily available alternative cells for incorporation in the bio-hybrid substitutes produced. Modelling studies will identify the physical and mechanical properties of the natural IVD and the substitute materials, and provide an understanding of the physical aspects of the regeneration process. In vivo study on animal model will be performed the bio-functionality of both substitutes. Surgical methodology and protocol will be developed.

## PARTNERS

**Coordinator:** Consiglio Nazionale delle Ricerche  
**Participants:** National University of Ireland, Galway, King's College London, Universidad de Alicante, University of Brighton, Ineb-Instituto Nacional de Engenharia Biomedica Associacao, Universidade do Minho, Universitätsmedizin der Johannes Gutenberg-Universität Mainz, Societa Azionaria Materiale Ospedaliero Samo Spa, Universität Ulm, Fundació Privada Institut de Bioenginyeria de Catalunya, Swerea Ivf Ab, Anika Therapeutics Srl, Katholieke Universitet Leuven, Universitätsspital Basel, Universitatea Politehnica Din Bucuresti, Università degli Studi di Padova

## EARLY RECOGNITION, MONITORING AND INTEGRATED MANAGEMENT OF EMERGING, NEW TECHNOLOGY RELATED RISKS

REFERENCE	213345
CALL	FP7-NMP-2007-LARGE-1
THEME	nmp
SCIENTIST	Giuseppe Maschio
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	19,081,868 €
EU FUNDING	13,629,109 €
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## PROJECT DESCRIPTION

iNTeg-Risk is a large-scale integrating project aimed at improving the management of emerging risks in the innovative industry. This will be achieved by building a new risk management paradigm for emerging risks, which is a set of principles supported by a common language, commonly agreed tools & methods and Key Performance Indicators integrated into a single framework. As main impact, it will reduce time-to-market for the lead market EU technologies and promote safety, security, environmental friendliness and social responsibility as a trademark of the advanced EU technologies.

The project will improve early recognition and monitoring of emerging risks, seek to reduce accidents caused by them (estimated 75 B /year EU27) and decrease reaction times if major accidents involving emerging risks happen. iNTeg-risk will reach its goals by promoting a EU-wide cross-sectorial life-cycle-based integration across all major disciplines, methods and tools as well as through integration of all relevant stakeholders. The project will be initiated from an empirical basis of 17 individual emerging risk issues (Emerging Risk Representative industrial Applications), and generalize their solutions addressing new technologies, products/materials, ►

production and policies.

The solutions will be validated in a second application cycle, and the overall solution made available to stakeholders in the form of the iNTeg-Risk platform: a one-stop shop for EU solutions addressing emerging risks. It will feature issues of early recognition and monitoring of emerging risks, communication, governance, pre-standardization, education & training, dissemination, as well as new tools such as SafetyPedia, Atlas of Emerging Risks, Reference Library... The project has a solid industry leadership and involves the leading EU R&D institutions. It is coordinated by the European Virtual Institute for Integrated Risk Management, the EEIG guaranteeing the sustainability of the results after the project.

## **PARTNERS**

**Coordinator:** European Virtual Institute for Integrated Risk Management

**Participants:** Bundesanstalt für Materialforschung und-Prüfung, Imperial College of Science, Technology and Medicine, Danmarks Tekniske Universitet, Mol Hungarian Oil and Gas Plc, European Union of the Natural Gas Industry, Vysoka Skola Banska - Technicka Univerzita Ostrava, European Virtual Institute on Knowledge-Based Multifunctional Materials Aisbl, Commissariat à l'Energie Atomique et aux Energies Alternatives, Politecnico di Milano, Stiftelsen Sintef, Technische Universität Braunschweig, Trimble Germany GmbH, Technical University of Crete, Eni Norge As, Technical University Kosice, British Telecommunications Public Limited Company, Institut National de l'Environnement et des Risques Ineris, Saipem Energy International Spa, Definiens Ag, Association pour la Recherche et le Développement des Methodes et Processus Industriels – Armines, Cowi A/S, Sp Sveriges Tekniska Forskningsinstitut Ab, Comité Européen de Normalisation, Steinbeis Advanced Risk Technologies GmbH, Electricite de France S.A., Mavionics GmbH, Schweizerisches Institut zur Forderung Der Sicherheit, Institutul National de Cercetare-Dezvoltare Pentru Protectia

Muncii Alexandru Darabont, National Center For Scientific Research «Demokritos», Swerea Ivf Ab, Università degli Studi di Roma La Sapienza, D'appolonia Spa, H.G. Geo Data Solutions GmbH, Agenzia Regionale Protezione Civile-Emilia Romagna, Rijksinstituut Voor Volksgezondheiden Milieu\*National Institute for Public Health and the Environment, Iberdrola Sa, Det Norske Veritas As, Joint Research Centre (Jrc) - European Commission, Institut Jozef Stefan, Teknologian Tutkimuskeskus Vtt, Atos Spain Sa, Alma Mater Studiorum – Università di Bologna, Bay Zoltan Alkalmazott Kutatasi Kozhasznu Nonprofit Kft., Università di Pisa, Naftna Industrija Srbije Ad, Vereinigung Zur Forderung Des Deutschen Brandschutzes, Tuv Sud Industrie Service GmbH, Consiglio Nazionale delle Ricerche, Materials Engineering Research Laboratory Limited, Health and Safety Executive, Institut Quimic de Sarria, Novineon Healthcare Technology Partners GmbH, Studiengesellschaft für Unterirdische Verkehrsanlagen - Stuva E.V., Gdf Suez, Vsh Hagerbach Test Gallery Ltd, Technologica Group - European Technical Joint Venture Cvba, Universität Stuttgart, Poyry Finland Oy, Fundacion Tecnalia Research & Innovation, Enagas S.A., Mit-Management Intelligenter Technologien GmbH, Schweizerische Ruckversicherungs-Gesellschaft Ag, Ekon Modeling Software Systems Ltd\*Ekon, Univerzitet U Novom Sadu Fakultet Tehnickih Nauka, Università degli Studi di Padova



## MOLECULAR MOTORS-BASED NANODEVICES

REFERENCE	228971
CALL	FP7-NMP-2008-SMALL-2
THEME	nmp
SCIENTIST	Giuseppe Basso
DEPARTMENT	Women's and Children's Health
UNIPD	participant
TOTAL COST	3,730,573 €
EU FUNDING	2,646,773 €
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### PROJECT DESCRIPTION

The MONAD project will focus on the design, fabrication and implementation of dynamic nanodevices based on the purposeful interaction of nano-structured surfaces and nano-objects with protein linear molecular motors - ubiquitous biological nano-machines responsible for biological functions as diverse as cell movement and division, transport of vesicles and muscle contraction. The project will develop novel hybrid nano-bio-devices which will allow:

- quasi-immediate diagnostics, compared with the present hours-long response time;
- entirely new, efficient high throughput drug discovery for critical diseases, e.g., cancer;
- new methodologies to study the information storage and processing processes in individual cells, with wider impact on medicine and health care industry.

This high level of inter-disciplinary innovation will lead to further future new industrial applications, such as immediate, personalised diagnostics.

The research consortium will undertake the whole innovation path on molecular-motors based devices, starting from fundamental science to the implementation of the research in demonstration devices for health care and industry. We can pursue this comprehensive science, technology and engineering knowledge transfer because of the existing synergism within

the consortium between academia, research institutes and industry.

In the context of NMP-2008-1.1-1 the MONAD project will advance the development of protein molecular motors-based devices, well beyond the state of the art, leveraging on, consolidating, and making sustainable the already commanding position of European research in this very specific, paradigmatic-shift emerging area. On a more general level, MONAD will advance and consolidate the high added value of European biomedical industry in the global world market, as well as providing a new high-added value economic rationale to the excellent European semiconductor device knowledge and capability.

### PARTNERS

**Coordinator:** The University of Liverpool

**Participants:** The Chancellor, Masters and Scholars of the University of Oxford, Linneuniversitetet, Medizinische Hochschule Hannover, Philips Electronics Nederland B.V., Lunds Universitet, Max Planck Gesellschaft zur Förderung der Wissenschaften E.V., Tritagema Consult SRL, Università degli Studi di Padova



## DEVELOPMENT OF NEXT GENERATION COST EFFICIENT AUTOMOTIVE CATALYSTS

REFERENCE	280890
CALL	FP7-NMP-2011-SMALL-5
THEME	nmp
SCIENTIST	Antonella Glisenti
DEPARTMENT	Chemical Sciences
UNIPD	participant
TOTAL COST	5,615,292 €
EU FUNDING	3,938,298 €
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### PROJECT DESCRIPTION

The main objective of NEXTGENCAT proposal is the development of novel eco-friendly nano-structured automotive catalysts utilizing transition metal nano-particles (Cu, Ni, Co Zn, Fe etc) that can partially or completely replace the PGMs. Based on nanotechnology, low cost nano-particles will be incorporated into different substrates, including advanced ceramics (SiO<sub>2</sub>, perovskite etc) and silicon carbides, for the development of efficient and inexpensive catalysts. The main idea of the proposal is the effective dispersion and the controllable size of the metal nano-particles into the substrate that will lead to improved performance. To this end a modified polyol process as well as chemical and physical treatment of selected substances will enable the introduction of transition metal nano-particles on the catalyst substrate precursors via adsorption and ion-exchange.

The presence of metal ions sorbed on fixed precursor sites will inhibit the agglomeration during heating and final products with very fine particle dispersion and tuneable metal content will be obtained. It is expected that the developed catalysts will exhibit increased catalytic performance, even at low temperatures (200-250°C). Other key properties of the proposed nano-structured catalysts include: increased thermal stability (avoiding aggregation), improved

durability, capability of reuse and recovery of transition metals as well as low health and environmental impact.

Apart from the scientific innovations and the environmental impact, the proposal holds also great economic importance. Taking into account that the auto-catalyst industry uses extremely large quantities of precious metal-68% of Pt and 72% of Pd in Europe the impact of replacing PGMs is of tremendous significance. Based on the current metal prices, it is estimated that the developed catalysts will reduce the catalyst cost at about 40-50%, opening the way to an efficient adaptation of nanotechnology-based catalysts in the automotive sector.

### PARTNERS

**Coordinator:** National Center for Scientific Research «Demokritos»

**Participants:** Monolithos Recycling Technologies Epe, Lurederra, Fundacion para el Desarrollo Tecnologico y Social, Zakład Produkcji Katalizatorów Jmjpuchalski I Krawczyk Spj, Johnson Matthey Plc., Universiteit Antwerpen, Tecnologia Navarra de Nanoproductos Sl, National Technical University of Athens, Centre National de la Recherche Scientifique, Tp Engineering Ltd, Università degli Studi di Padova





## AUTONOMOUS ROBOTIC SYSTEM FOR THERMO-GRAPHIC DETECTION OF CRACKS

REFERENCE	284607
CALL	FP7-2011-NMP-ICT-FoF
THEME	nmp
SCIENTIST	Emanuele Menegatti
DEPARTMENT	Information Engineering
UNIPD	coordinator
TOTAL COST	3,504,053 €
EU FUNDING	2,550,000 €
E-MAIL	emanuele.menegatti@unipd.it

### PROJECT DESCRIPTION

Non-destructive testing of components is an important auxiliary process step, not only in post-production but also in regular maintenance. The detection of cracks is currently done by using magnetic particle inspection, which is a decades-old, inefficient and ecologically undesirable process. There is an urgent need in industry to replace this technology with more up-to-date methods that provide fully automatic testing. This project thus aims at the development of an autonomous robotic system for the inspection of metallic and composite parts using thermography. By combining automatic path planning for robots using a process model of thermographic image acquisition and knowledge-based image analysis methods, an inspection robot will be developed that can adapt to new parts within 15 minutes and achieves cycle times in the range of 20-30 seconds. Applications include inspection of metallic and composite parts in the automotive and aircraft industry as well as inspection during regular maintenance, mainly in the aircraft industry, where magnetic particle inspection is often a requirement. Market estimates show a potential of more than 1000 such inspection systems within 5-7 years after the end of the project. Despite a higher initial investment (compared to magnetic particle inspection) the robotic inspection system will save more than 400kEUR after 5 years of

operation, thus contributing to a substantial increase in efficiency in these tasks. Furthermore, ecologically undesirable suspensions of magnetic particles that include corrosion-inhibitors can be avoided.

The consortium consists of technology providers in robotics, industrial inspection and thermographic cameras and end-users that cover metallic and composite parts in the automotive and aircraft industry. SMEs play a leading role in the project and contribute 60% of the total effort.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Bundesanstalt für

Materialforschung und-Prüfung, Benteler Sgl Composite Technology GmbH, Infratec GmbH Infrarotsensorik Und Messtechnik, It+Robotics Srl, Trimek Sa, Profactor GmbH, Brp-Powertrain GmbH & Co Kg



## NEW QUALITY AND DESIGN STANDARDS FOR ALUMINIUM ALLOYS CAST PRODUCTS

REFERENCE	319188
CALL	FP7-NMP-2012-CSA-6
THEME	nmp
SCIENTIST	Franco Bonollo
DEPARTMENT	Management and Engineering
UNIPD	coordinator
TOTAL COST	479,081 €
EU FUNDING	427,177 €
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### PROJECT DESCRIPTION

To exploit the enormous potential of Aluminium Alloys EU Foundry Industry (more than 2000 Companies, mostly SMEs), a coordinated set of Support Actions, is strongly needed. The challenge of StaCast proposal is to promote the transformation of this field in a quality/efficiency-driven and integration-oriented sector, thanks to the development and introduction of two new and advanced Standards, covering aspects which are not approached in current norms: Casting Defects Classification and Aluminium Foundry Alloys Mechanical Properties.

In view of this target, StaCast Consortium, in which 4 European Countries are represented, is highly complementary and constituted by: one University Dept (DTG, Co-ordinator), well used at cooperating with SMEs, special in the field of Aluminium alloys; two other University Depts, with a relevant background on gravity (NTNU) and high pressure (GTA) casting technologies; one National Association of Metallurgical Companies (AIM), with more than 2000 members; one EU Association of Aluminium Consumers (FACE); one member of Italian National Standardisation body (ASSO).

StaCast project will convert in specific CEN items (Workshops of Agreement) the results of previous EU-funded research projects (e.g. IDEAL in the 5th FP and NADIA, IP-SMEs, in the 6th

FP) as well as of other National and International technological developments programmes. The consistent set of activities of StaCast, whose duration is 18 months, is articulated into 6 WPs, logically organised to focus the standardisation needs (WP1), to support the development of new EU Standards on Al alloy casting defects (WP2) and on Al foundry alloys mechanical properties (WP3), to elaborate new guidelines for using such Standards in mechanical design (WP4), to disseminate the knowledge on and promote the use of new Standards and Guidelines (WP5), to integrate and manage the overall Project (WP6).

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Assomet Servizi S.R.L., Hochschule Aalen - Technik und Wirtschaft, Federation of Aluminium Consumers in Europe Union Professionnelle, Associazione Italiana di Metallurgia, Norges Teknisk-Naturvitenskapelige Universitet Ntnu



## NOVEL BUSINESS MODEL GENERATOR FOR ENERGY EFFICIENCY IN CONSTRUCTION AND RETROFITTING

REFERENCE	314326
CALL	FP7-2012-NMP-ENV-ENERGY-ICT-EeB
THEME	nmp
SCIENTIST	participant
DEPARTMENT	Arturo Lorenzoni
UNIPD	Industrial Engineering
TOTAL COST	4,564,610 €
EU FUNDING	3,350,000 €
E-MAIL	arturo.lorenzoni@unipd.it

### PROJECT DESCRIPTION

The increasing cost of traditional energy sources and the availability of new emerging building technologies in lighting, heating, ventilation, air conditioning, isolation, energy monitoring and management of the buildings, are expected to increase the global market for low carbon solutions. However, some financial, organizational and social innovation enablers are required to leverage the transformation towards more sustainable building and cities. New green performance based business models should clearly be introduced for stepping up the adoption of new energy efficient solutions through the creation of cooperative and collaborative business networks, which will allow an early involvement of all relevant value chain stakeholders in the retrofitting optimization process, such as construction SMEs, ESCOs, building owners (private and local authorities), local administrations or financial institutions. Overall aim:

- NewBEE project will develop the NewBEE system enabling SMEs to generate New performance based Business models for cost and Energy Efficient construction works with special incidence in retrofitting.
- NewBEE system will be composed of:
- NewBEE methodology: Methodology and

working handbook

- NewBEE ICT platform: Set of ICT tools

Innovation:

The main innovation of NewBB comes from the seamless integration from the first time, of all actors in the value chain of energy efficiency in construction industry (paying special attention to the retrofitting works where most of the savings in energy efficiency can be achieved) by the use of a new working methodology fitted to the new paradigm efficiently supported by an ICT set of tools.

Another important innovative issue is the creation of a system which benefit from the previous knowledge in order to enabling SMEs to find an easy way of generating new business opportunities and also provide them the means to develop them.

### PARTNERS

**Coordinator:** Fundacion Tecnalia Research & Innovation

**Participants:** Slovenski Gradbeni Grozd, Gospodarsko Interesno Zdruzenje, Acrosslimits Limited, Kva Arkkitechdit Oy, Eslaban Obras y Servicios, Teknologian Tutkimuskeskus Vtt, Gradbeni Institut Zrmk Doo, Acciona Infraestructuras S.A., Eriksson Arkkitechdit Oy, Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung E.V, Verfuss GmbH, Ifa Bau Consult GmbH, Institut für Angewandte Systemtechnik Bremen GmbH, Teusa Técnicas de Restauracion Sa, Finnenergia Oy, Conclude GmbH, Università degli Studi di Padova



## DIRECT ELECTROCHEMICAL OXIDATION REACTION OF ETHANOL: OPTIMIZATION OF THE CATALYST/SUPPORT ASSEMBLY FOR HIGH TEMPERATURE OPERATION

REFERENCE	309741
CALL	FP7-NMP-2012-SMALL-6
THEME	nmp
SCIENTIST	Gaetano Granozzi
DEPARTMENT	Chemical Sciences
UNIPD	coordinator
TOTAL COST	3,070,020 €
EU FUNDING	2,341,664 €
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### PROJECT DESCRIPTION

The main general goal of DECORE is to achieve the fundamental knowledge needed for the development of a fuel cell (FC) electrode, which can operate efficiently (both in terms of activity and selectivity) as the anode of a direct ethanol (EOH) FC (DEFC) in the temperature range between 150-200 °C (intermediate-T). Such a technology is still lacking in the market. The choice for EOH as an alternative energy source is well founded on the abundance of bioethanol, and on the relatively simpler storage and use with respect to other energy carriers. The intermediate-T is required for an efficient and selective total conversion of EOH to CO<sub>2</sub>, so exploiting the maximum number of electrons in the DEFC.

DECORE will explore the use of fully innovative supports (based on titanium oxycarbide, TiO<sub>x</sub>Cy) and nano-catalysts (based on group 6 metal carbides, MC<sub>x</sub>, M=Mo,W), which have never been tested in literature as anodes for DEFCs. The new support is expected to be more durable than standard carbon supports at the targeted temperature. The innovative nano-catalysts would be noble-metal free, so reducing Europes reliance on imported precious metals. To tailor the needed

materials, the active role of the support and nano-catalyst will be studied at atomic level.

Demonstrating an activity of such nano-catalyst/support assembly at intermediate-T would open a novel route where DEFCs with strongly reduced production costs would have an impact on a fast industrialisation. The power range for the envisioned application is of the order of hundreds of Watts, i.e. the so called distributed generation, having an impact for devices such as weather stations, medical devices, signal units, auxiliary power units, gas sensors and security cameras. By the end of the project, a bench-top single DEFC operating at intermediate-T will be built and tested.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Technische Universität München, Evaluations Università degli Studi di Milano-Bicocca, Consiglio Nazionale delle Ricerche, Universidad de la Laguna, Kobenhavns Universitet, Elcomax GmbH



## MULTI-LAYERS CONTROL&COGNITIVE SYSTEM TO DRIVE METAL AND PLASTIC PRODUCTION LINE FOR INJECTED COMPONENTS

REFERENCE	314145
CALL	FP7-2012-NMP-ICT-FoF
THEME	nmp
SCIENTIST	Franco Bonollo
DEPARTMENT	Management and Engineering
UNIPD	participant
TOTAL COST	9,302,073 €
EU FUNDING	6,135,000 €
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### PROJECT DESCRIPTION

High Pressure Die Casting (HPDC) of light alloys and Plastic Injection Molding (PIM) are two of the most representative large-scale production-line in manufacturing field, which are strategic for the EU-industry largely dominated by SMEs. Due to the high number of process variables involved and to the non-synchronisation of the process control units, HPDC and PIM are most “defect-generating” and “energy-consumption” processes in EU industry. In both, sustainability issue imposes that machines/systems are able to efficiently and ecologically support the production with higher quality, faster delivery times, and shorter times between successive generations of products. The MUSIC is strongly aimed at leading EU-HPDC/PIM factories to cost-based competitive advantage through the necessary transition to a demand-driven industry with lower waste generation, efficiency, robustness and minimum energy consumption. The development and integration of a completely new ICT tool, based on innovative Control and Cognitive system linked to real time monitoring, that allow an active control of quality, avoiding the presence of defects or over-cost by directly acting on the process-machine variables optimization or equipment boundary conditions.

The Intelligent Manufacturing approach will work at machine-mold project level to optimise/ adapt the production of the specific product and can be extended at factory level to select/plan the appropriated production line. The sensors calibration and quality control of measurements will be the pre-requisite of Intelligent Sensor Network to monitor the real-time production and specific focus will be also devoted to Standardization issues. The challenge of MUSIC is to transform a production-rate-dominated manufacturing field into a quality/efficiency-driven and integration-oriented one to exploit the enormous (and still underestimated) potential of HPDC/PIM through collaborative research and technological development, along the value chain.

### PARTNERS

**Coordinator:** Enginsoft SPA

**Participants:** Electronics GmbH Vertrieb Elektronischer Geräte, Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung E.V., Fundacion Tekniker, Toolcast Snc di Voltazza Samuela &C., Assomet Servizi S.R.L., Maier, S.Coop., Motul SA, Rds Moulding Technology SPA, Fundacio Privada Ascamm, Audi Aktiengesellschaft, Hochschule Aalen - Technik und Wirtschaft, Regloplas AG, Magma Giessereitechnologie GmbH, Oskar Frech GmbH Co Kg, Università degli Studi di Padova



## AUTOMATIC MAPPING OF FIBRE ORIENTATION FOR DRAPING OF CARBON FIBRE PARTS

REFERENCE	608768
CALL	FP7-2013-NMP-ICT-FOF(RTD)
THEME	nmp
SCIENTIST	Emanuele Menegatti
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	2,877,787 €
EU FUNDING	2,000,000 €
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### PROJECT DESCRIPTION

This project aims at the development of an automatic quality control and feedback mechanism to improve draping of carbon fibres on complex parts. There is a strong need in the automotive industry for automatic systems that perform quality control and improve draping processes in order to allow high production volumes.

The technology that is being developed in the project will include a new sensor system for robust detection of fibre orientation combined with a robotic system to scan complex parts. This is based on a new technology that uses reflection models of carbon fibre to solve the problems encountered with earlier vision-based approaches. The data coming from the inspection system will be fed into draping simulation to improve the accuracy of the processes. Draping is the process of placing woven carbon material on typically complex 3D parts (preforms) with the goal of having the fibres oriented along specific directions predicted by finite element calculations. This is done to maximize the strength-to-weight ratio of the part.

There is a strong trend in the automotive industry towards lightweight parts to increase fuel efficiency, also considering the needs of electrical vehicles. Setting up the draping process for a complex part takes up to 50 preforms

for trial-and-error improvements. Current production processes are thus not yet adequate to cover the expected volumes of several 100.000 parts per year. The project aims at shortening process development times by 90% and allowing automatic 100% quality control of fibre orientation.

The industry-led consortium consists of European key partners in draping simulation, manufacturing of carbon parts for the automotive industry, sensor developers and robotic experts. It is complemented by a group of interested end users, e.g. European car manufacturers that are associated to the project.

### PARTNERS

**Coordinator:** Profactor GmbH

**Participants:** Advance Composite Fibers SL, Esi Group S.A, Institut National des Sciences Appliquees de Lyon, Benteler Sgl Composite Technology GmbH, It+Robotics Srl, Università degli Studi di Padova



## UP-SCALED PRODUCTION OF GRAPHENE REINFORCED THERMOSETTING POLYMERS FOR COMPOSITE, COATING AND ADHESIVE APPLICATIONS

REFERENCE	604143
CALL	FP7-NMP-2013-LARGE-7
THEME	nmp
SCIENTIST	Michele Modesti
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	7,200,308 €
EU FUNDING	5,031,164 €
E-MAIL	michele.modesti@unipd.it

### PROJECT DESCRIPTION

The concept of PolyGraph is to develop new production techniques which will deliver industrial-scale quantities of graphene-reinforced thermosetting polymers, suitable for use in a number of key applications where improvements are needed in the strength, stiffness, toughness, electrical conductivity and thermal properties; such as fibre-reinforced composite resins, coatings and adhesives.

The ultimate aim of PolyGraph is to develop a process in which graphene can be produced and dispersed “in-situ” within thermosetting polymer resins, using relatively inexpensive expanded graphite as a starting material.

We propose a staged approach to reach this ambitious goal, starting with production of graphene via new chemical and mechano-chemical methods and its subsequent dispersion in thermosetting resins. We will then further develop and modify existing mixing and dispersion equipment to enable the exfoliation of expanded graphite to be carried out directly in thermosetting resins. A further aim is to optimise techniques for the production of fibre-reinforced composites, adhesives and coatings, to ensure that the graphene remains well distributed in the final part.

As a result, we will significantly lower the overall cost of these materials and make them viable for use in the composites, coatings and adhesives industries.

### PARTNERS

**Coordinator:** Netcomposites Limited  
**Participants:** Sp Sveriges Tekniska Forskningsinstitut Ab, Queen Mary and Westfield College, University of London, Centro Ricerche Fiat Scpa, Ytron Process Technology GmbH & Cokg, Bae Systems (Operations) Ltd, Robnor Resins Limited, Sairem Societe pour l'Application Industrielle de la Recherche en Electronique et Micro Ondes Sas\*Sairem, Institute of Occupational Medicine, Netzsch Feinmahltechnik GmbH, Avanzare Innovacion Tecnologica Sl, Timcal Sa, Università degli Studi di Padova





## MODULAR DETECTION SYSTEM FOR SPECIAL NUCLEAR MATERIAL

REFERENCE	284842
CALL	FP7-SEC-2011-1
THEME	security
SCIENTIST	Giuseppe Viesti
DEPARTMENT	Physics and Astronomy
UNIPD	coordinator
TOTAL COST	3,282,051 €
EU FUNDING	2,411,633 €
E-MAIL	giuseppe.viesti@unipd.it

### PROJECT DESCRIPTION

The MODES\_SNM project aims to carry out technical research in order to develop a prototype for a mobile, modular detection system for radioactive and Special Nuclear Materials (SNM). To maximize the detection capability for SNM the project will develop new detectors for fast and thermal neutrons, as well as gamma-rays, based on the technology of high pressure scintillation cells using noble gases (as 4-He and Xe) recently developed by ARKTIS. The proof-of-principle of the new detectors has already been recently demonstrated.

The goal of the project is to deliver a tested prototype of a modular mobile system capable of passively detecting weak or shielded radioactive sources with accuracy higher than that of currently available systems. The identification of the gamma-ray emitter is also possible by using the spectroscopic analysis performed by high pressure Xe cells whereas the ratio between fast and thermal neutrons will bring information about the eventual shielding around the source. The R&D aims at improve the current detectors (i.e. at designing, constructing and testing robust, safe, and lightweight high pressure cells with an advanced read-out system) so that they can be used as basic components of the modular mobile system. A suitable Information System will be also developed to manage the detectors, integrate and

analyze the data, and provide to the user simple information derived by a decision tree utilizing the data from the three types of detectors. The prototype detection system is the major deliverable of the project. The project also includes the qualification of this detection system in laboratory condition to quantify its detection performance and ultimate limits, as well as a demonstration phase in which the detection system will be field-tested by the end-user group established within the project.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Narodowe Centrum Badan Jadrowych, Arktis Radiation Detectors AG, The University of Liverpool, The Revenue Commissioners, Università degli Studi dell'Insubria, Eidgenössische Technische Hochschule Zürich, Costruzioni Apparecchiature Elettroniche Nucleari C.A.E.N. Spa



## **A BIO-MIMICRY ENABLED ARTIFICIAL SNIFFER**

REFERENCE	285203
CALL	FP7-SEC-2011-1
THEME	security
SCIENTIST	Carla Mucignat
DEPARTMENT	Molecular Medicine
UNIPD	participant
TOTAL COST	4,837,982 €
EU FUNDING	3,493,820 €
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### **PROJECT DESCRIPTION**

The capture and analysis of odours offers significant potential for border security applications related to the detection and analysis of persons, illegal substances and in particular explosives. Dogs - the most effective “tool” for detecting and analysing odours - can only be trained for a small sample of odours, get easily tired and are often perceived as intrusive by the public.

The SNIFFER project proposes a highly innovative one-stop shop approach to complement dogs and leverage their capabilities. This approach is based on state-of-the-art technologies centred on a new generation of olfactory biosensors. The SNIFFER devices to be developed combine in a one-stop shop sampling, pre-concentration and pre-treatment with bio-mimicry, synthetic diamond sensor technology and multi-parametric training software. This will enable the detection of odours arising out of security threats which may occur in a panel of border security applications. This flexible technology allows users to continuously keep improving the “olfactory scope” of their “artificial sniffers” quickly and at low additional cost, even once they have been deployed.

This concept results from a multidisciplinary collaboration of several years between research teams from Italy, the UK, France and Switzerland. Users involved in the SNIFFER project will

provide a representative set of usage cases, all related to border control security in the large sense - such as the detection of illegal substances carried by people and in suitcases (open or on a luggage belt) and cars or the detection of hidden people in containers. EADS, the integrator partner will build dedicated systems for these usage cases to allow for a comprehensive assessment in view of progressively improving the technology. The project will hence open the road towards a promising market place for “artificial sniffing” centred border security solutions and for olfactory applications in general.

### **PARTNERS**

**Coordinator:** Commissariat a l’Energie Atomique et aux Energies Alternatives

**Participants:** Ecole Polytechnique Federale de Lausanne, The University of Manchester, Genikon Aeroporikon Efarmogon Ae Idiotiki Epicheirisi Parochis Ypiresion Asfaleias, Eads Deutschland GmbH, Centre For Science, Society And Citizenship, Chambre de Commerce et d’industrie de Paris, Ministere de L’interieur, Tracotech Security Ltd, Gtp Technology Sa, Ministry of Public Security, Association pour la Recherche et le Developpement des Methodes et Processus Industriels – Armines, Arttic, Università degli Studi di Padova



## TAP WATER RADIOACTIVITY REAL TIME MONITOR

REFERENCE	312713
CALL	FP7-SEC-2012-1
THEME	security
SCIENTIST	Marcello Lunardon
DEPARTMENT	Physics and Astronomy
UNIPD	coordinator
TOTAL COST	3,414,864 €
EU FUNDING	2,564,554 €
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### PROJECT DESCRIPTION

The TAWARA\_RT project aims at developing a complete platform to control the quality of the tap water with respect to the radioactivity content. The platform will provide a real time measurement of the activity in the water (measuring the gross alpha and beta activity) to verify whether the distributed water is far from the limits set by the EU legislation (see Directive 98/83/CE of the European Council) reaching thresholds that require rapid actions. In case of an alarm due to an activity in the water larger than the defined thresholds, a warning message is sent to the water plant management to verify the need of stopping the water distribution. At the same time, a second part of the system is activated, to determine the nature of the contamination by gamma ray spectroscopy, defining the nature of the contamination and the corresponding counter-measures. Moreover, the determination of the contaminants is needed to establish the effects on the population and produce a full information report to the Civil Security Authorities. The prototypes of a real time monitoring system and spectroscopy analyzer will be designed, built, tested under laboratory condition and finally installed at the water plant in the North Waterworks Plant [Zakład Wodociągu Północnego] of Warsaw managed by the Warsaw Waterwork Company (Miejskie Przedsiębiorstwo Wodociągów i Kanalizacji

w m.st. Warszawie S.A. – MPWIK), for the demonstration campaign. The site selected for the demonstration is particularly problematic for possible radioactivity contamination being communicating through the network of rivers and canals with the Chernobyl region and being close to a Polish National Nuclear Waste storage site. The TAWARA\_RT project will include the development of the complete platform including the fast real-time monitor system (RTM), the spectroscopic system (SPEC) as well as the Information and Communication System that will be designed to include in future also chemical and biological sensors.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Costruzioni Apparecchiature Eletttroniche Nucleari C.A.E.N. Spa, Scionix Holland Bv, Narodowe Centrum Badan Jadrowych, Agenzia Nazionale per le Nuove Tecnologie, l'Energia e lo Sviluppo Economico Sostenibile, Miejskie Przedsiębiorstwo Wodociągów i Kanalizacji W M. St. Warszawie Spolka Akcyjna, Università di Pisa, Wardynski i Wspolnicy Spk



## SECURITY SYSTEM FOR LANGUAGE AND IMAGE ANALYSIS

REFERENCE	607691
CALL	FP7-SEC-2013-1
THEME	security
SCIENTIST	Maria Teresa Musacchio
DEPARTMENT	Linguistic and Literary Studies
UNIPD	participant
TOTAL COST	3,822,088 €
EU FUNDING	2,942,445 €
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### PROJECT DESCRIPTION

Project Slándáil will demonstrate a cost-effective and ethically-correct way in which social media information can be used by an emergency management system. The social media landscape consists of a range of digitized documents in a variety of formats, updated by a diverse and geographically distributed people and organisations.

During an emergency, authorities use websites and the population, empowered by social media systems, can broadcast for help or to inform others of their well-being. The burden of search and interpretation in the social media space, however, is largely on the end-users that is the authorities and the citizens. Information obtained during emergencies may contain personal details and the details may or not be correct – there are no protocols for dealing with the ethical and factual provenance of such data. Social media users deploy different modalities of communications, including language, visual icons, and associated meta data. Human beings integrate the information in different modality seamlessly to infer meaning and to make decisions. There are no systems that (a) could aggregate the information in different modalities, and (b) deal with multi-lingual communications during an emergency.

Project Slándáil is collaboration of emergency

operatives, academics, ethics- and security-oriented NGO and four SMEs. Their common purpose is to make maximum ethical use of the information available in the social media to enhance the performance of emergency management systems. The Project will undertake research in text and image analysis, in ethical and factual provenance of data, together with SME's specialising in selling systems for social media monitoring and for emergency monitoring. There are experts in human multi-lingual human communication working in the team. This is an Irish-led, Italian, German and British collaboration which will deliver next generation of emergency management systems.

### PARTNERS

**Coordinator:** The Provost, Fellows, Foundation Scholars & the Other Members of Board of the College of the Holy & Undivided Trinity of Queen Elizabeth near Dublin

**Participants:** Institut für Angewandte Informatik Ev, University of Ulster, Cid GmbH, Stillwater Communications Limited, Centre for Irish and European Security Limited, Police Service of Northern Ireland, Datapiano Srl, Bundesministerium der Verteidigung, Pintail Ltd, An Garda Síochána, Università degli Studi di Padova



## INSTITUTIONAL CHANGES AND TRAJECTORIES OF SOCIO-ECONOMIC DEVELOPMENT MODELS

REFERENCE	225349
CALL	FP7-SSH-2007-1
THEME	ssh
SCIENTIST	Stefano Solari
DEPARTMENT	Economics and Management
UNIPD	participant
TOTAL COST	1,572,456 €
EU FUNDING	1,188,000 €
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### PROJECT DESCRIPTION

The aim of the project is to analyse, within a comparative institutional analytical framework, the trajectories of socio-economic development models. Comparative analyses of forms of capitalism have underlined the diversity in institutional configurations. Within the EU, it is assumed that four types of socio-economic models exist: market-oriented, continental, Nordic, and Southern, with the position of transitional CEEC under discussion.

The project will reconstitute the historical trajectories of these socio-economic models, in order to understand how their institutional configuration mediates the synergies and trade-offs between the economic, social and environmental dimensions of development. By focusing on complementarities and conflicts as well as changes in socio-political compromises, by contesting the hypothesis of convergence towards a specific European model and by analysing the impacts of globalisation and structural reforms, the possible future for these models will be discussed. The project will combine three approaches. Firstly, a quantitative analysis of the trajectories of socio-economic models. Using long-term data bases for industrialized countries, statistical and econometrical analyses will allow for a quantitative historical analysis of trajectories

for the period 1975-2005.

The analysis will be completed with analysis of CEEC and emerging countries for the period 1990-2010. Secondly, a comparative analysis of socio-political dynamics and institutional changes. Twelve European and four non-European countries will be examined in order to identify, from an historical perspective, the evolution of socio-political compromises and their influence on the dynamics of institutional changes. Thirdly, sectoral analyses of institutional configurations and industrial dynamics, which will combine statistical and socio-political approaches in order to analyse the long term dynamics of four industries within different socio-economic models.

### PARTNERS

**Coordinator:** Université Montesquieu-Bordeaux IV

**Participants:** Freie Universität Berlin, University of Bath, King's College London, Wissenschaftszentrum Berlin für Sozialforschung, University of Limerick, Centre pour la Recherche Economique et ses Applications, Kozep-Eurpai Egyetem, Università degli Studi di Padova



## PATHWAYS FOR CARBON TRANSITIONS

REFERENCE	225503
CALL	FP7-SSH-2007-1
THEME	ssh
SCIENTIST	Silvio Scanagatta
DEPARTMENT	Political Science, Law, and International Studies
UNIPD	participant
TOTAL COST	1,801,883 €
EU FUNDING	1,374,466 €
E-MAIL	silvio.scanagatta@unipd.it

### PROJECT DESCRIPTION

Most «business-as-usual scenarios» built up till now have shown that hydrocarbon resources scarcity and the growing release of greenhouse gases will bring the world far away from sustainability over the next decades. Then, deep changes in behaviours away from «BAU» are unavoidable long before the turn of the century in a move towards a post-carbon society. Urbanisation and mobility are probably the domains where these changes might be the most important and they will be necessarily driven and limited by socio-economic and cultural forces that will dominate the century.

They will induce further deep changes in behaviours of consumers and producers and are likely to deeply impact the use and production of bulk materials, large energy consumers and GHG emitters. To address these challenges, key milestones were defined by the EU : - A 20% reduction (minimum) of CO<sub>2</sub> emissions by 2020 (compared to 1990) in Europe - A reduction of the GHG emissions by 2050 and after, so as to limit the increase of the temperature due to climatic change within 2°C. In this framework, the PACT project objective is to provide strategic decision-support information to decision makers to achieve these milestones.

It will focus on 3 themes:

- What shape the energy demand, and how this

should evolve towards post-carbon concept, from the infrastructures viewpoint, in relation to urbanisation and land-use schemes, and that of the life-styles and behaviours, in relation to the available technologies.

- The question of urbanisation and land-use from the renewable energy perspective, including that of the systems.
- The role of social forces, actors, stakeholders in the transition process.

PACT will address these issues in two phases: first, by developing the necessary analytical and conceptual framework, second in attempting to quantify scenarios of post-carbon societies at EU and world level by 2050 and beyond, using enhanced versions of the VLEEM and POLES models.

### PARTNERS

**Coordinator:** Enerdata SA

**Participants:** Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung E.V, Université Pierre Mendes France, Turun Yliopisto, Max Planck Gesellschaft zur Förderung der Wissenschaften E.V., Arcelormittal Maizières Research Sa, Energeticka Agentura Vysociny Sdruzeni, Swerea Mefos AB, Budapesti Corvinus Egyetem, Istituto di Studi per l'Integrazione dei Sistemi (Isis), Laboratorio di Scienze della Cittadinanza – Lsc, Università degli Studi di Padova



## CHANGING FAMILIES AND SUSTAINABLE SOCIETIES: POLICY CONTEXTS AND DIVERSITY OVER THE LIFE COURSE AND ACROSS GENERATIONS

REFERENCE	320116
CALL	FP7-SSH-2012-1
THEME	ssh
SCIENTIST	Maria Letizia Tanturri
DEPARTMENT	Statistical Sciences
UNIPD	participant
TOTAL COST	8,361,008 €
EU FUNDING	6,495,142 €
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### PROJECT DESCRIPTION

The main objectives of this project are to investigate the diversity of family forms, relationships, and life courses in Europe; to assess the compatibility of existing policies with these changes; and to contribute to evidence-based policy-making. The project will extend our knowledge on how policies promote well-being, inclusion and sustainable societal development among families. Our approach relies on three key premises. First, family life courses are becoming more diverse and complex. Second, individual lives are interdependent, linked within and across generations. Third, social contexts and policies shape individual and family life courses. Building upon these premises we a) explore the growing complexity of family configurations and transitions, b) examine their implications for men, women and children with respect to inequalities in life chances, intergenerational relations and care arrangements, c) investigate how policies address family diversity, d) develop short- and longer-term projections, and e) identify future policy needs. Transversal dimensions that are integrated into the project are gender, culture, socioeconomic resources and life stages. Our approach is multidisciplinary combining a wide

range of expertise in social sciences, law and the humanities represented in the consortium of 25 research partners from 15 European countries, old and new member states, and three transnational civil society actors. We will conduct comparative analyses applying advanced quantitative methods to high quality register and survey data, and qualitative studies. The project will also develop a database of the legal content of family forms available in European countries, suitable for comparative analyses. Together with various stakeholders, government agencies, national and local policy-makers, non-governmental organizations and additional members of the scientific community across Europe, we will identify and disseminate innovation and best policy practices.

### PARTNERS

**Coordinator:** Stockholms Universitet

**Participants:** Deutsches Jugendinstitut EV, Universidad Nacional de Educacion a Distancia, Tallinn University, Age Platform Europe Aisbl, European University Institute, Federacion Internacional para la Orientacion Familiar (Fiof) Asociacion, Magyar Tudomanyos Akademia Tarsadalomtudomanyi Kutatokozpont, Rijksuniversiteit Groningen, Universitt Wien, Universitatea Babes Bolyai, Institut National d'Etudes Demographiques, Agencia Estatal Consejo Superior de Investigaciones Cientificas, Universiteit Leiden, Max Planck Gesellschaft zur Frderung der Wissenschaften E.V., Universit de Lausanne, London School of Economics and Political Science, Collegio Carlo Alberto - Centro di Ricerca e Alta Formazione, Coordinadora Europea de Familias Numerosas, Vaestoliitto Ry, The University of Edinburgh, Katholieke Universiteit Leuven, The University of Liverpool, sterreichische Akademie der Wissenschaften, Szkola Glowna Handlowa w Warszawie, Erasmus Universiteit Rotterdam, Universiteit Antwerpen, Universit degli Studi di Padova





## SMART SPECIALISATION FOR REGIONAL INNOVATION

REFERENCE	320131
CALL	FP7-SSH-2012-2
THEME	ssh
SCIENTIST	Fiorenza Belussi
DEPARTMENT	Economics and Management
UNIPD	participant
TOTAL COST	2,749,851 €
EU FUNDING	2,344,222 €
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Nauwelaers Claire Christiane E M G, University of Newcastle Upon Tyne, Rijksuniversiteit Groningen, Universiteit Utrecht, Fundacion Deusto, Lunds Universitet, European Regions Research and Innovation Network, Association Européenne des Agences de Développement, Università degli Studi di Padova

### PROJECT DESCRIPTION

The aim of SmartSpec is to provide substance, guidance and practical support to the EU Smart Specialisation Platform, based on the combination of leading academic and practical expertise present in the consortium.

The goal is directed at operationalising the concept of smart specialisation in a manner which will be useful to actors in different regional contexts. It will do this by strengthening the analytical underpinnings of the smart specialisation concept, providing methodological guidance for practice and generating strategic intelligence for policy-makers.

Through an integrated, multi-dimensional and place-based approach focused on 8 Work Packages, SmartSpec develops robust practical and analytical findings to strengthen the implementation of smart specialisation strategies. With a strong emphasis on knowledge exchange and facilitated learning, SmartSpec will deliver useful results to inform practitioners and policymakers in the development and assessment of smart specialisation strategies, whilst extending the state of the art.

### PARTNERS

**Coordinator:** Cardiff University

**Participants:** Univerzita Karlova V Praze,



## MEDITERRANEAN MOUNTAINOUS LANDSCAPES: AN HISTORICAL APPROACH TO CULTURAL HERITAGE BASED ON TRADITIONAL AGROSYSTEMS

REFERENCE	613265
CALL	FP7-SSH-2013-2
THEME	ssh
SCIENTIST	Gian Pietro Brogiolo
DEPARTMENT	Cultural Heritage: Archaeology and History of Art, Cinema and Music
UNIPD	participant
TOTAL COST	2,959,834 €
EU FUNDING	2,499,773 €
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### PROJECT DESCRIPTION

The project is an interdisciplinary approach to cultural landscapes of Mediterranean mountainous areas, taking as a central axis the historical study of two natural resources essential to generate agro-systems: water and soil. The proposal focuses on Sierra Nevada (Spain), Monti di Trapani (Italy), Colli Euganei (Italy) and Vjosa Valley (Albania). Landscapes and their structure are strongly conditioned by the need to ensure the livelihood of rural communities over time. Essentially they are the spatial representation of production and reproduction strategies of societies over time. Understanding them necessarily requires knowledge of the historical processes that have led to specific relationships with nature: mainly extraction and use of resources. These uses have largely shaped the medium, generating not only its shape, but also the culture that makes possible its management and maintenance.

The various exploitation strategies have resulted in different landscapes and forms of cultural expression throughout Europe and the Mediterranean, but have also produced very important common areas. Agro-systems represent

one of their greatest expressions. Agricultural traditions and the different ways of exploiting natural resources including management over time are crucial for conservation of the landscape and its ability to adapt to current global changes: globalisation and agrarian industrialisation, loss of peasant knowledge, loss of rural population and climate change. Conservation can be achieved through the exploitation of this heritage to generate environmental and cultural conservation strategies for sustainable development in rural areas; with the aim of protecting this cultural heritage and, at the same time, increasing and transmitting knowledge about it in order to benefit the local and wider European society.

### PARTNERS

**Coordinator:** Universidad de Granada

**Participants:** Agencia Estatal Consejo Superior de Investigaciones Científicas, Arqueoandalusi Arqueología y Patrimonio SL, Eachtra Archaeological Projects Limited, The University of Sheffield, Centro Unesco de Andalucía, Agjencia e Sherbimit Arkeologjik, Universidad de Córdoba, Università degli Studi di Palermo, Università degli Studi di Padova



## HELICON PLASMA HYDRAZINE COMBINED MICRO

REFERENCE	218862
CALL	FP7-SPACE-2007-1
THEME	space
SCIENTIST	Daniele Pavarin
DEPARTMENT	Industrial Engineering
UNIPD	coordinator
TOTAL COST	4,873,436 €
EU FUNDING	3,572,011 €
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### PROJECT DESCRIPTION

The objective of the research program is to design, optimize and develop a space plasma thruster based on helicon-radio-frequency technology and its application to a nano-satellite for attitude and position control. Moreover a detailed feasibility study will be also conducted to evaluate the possibility of using the plasma thruster to heat and decompose a secondary propellant. The feasibility study will assess the possibility of building up a combined-two-mode-thruster able to operate in the low-thrust high-efficiency plasma-mode and high-thrust low-efficiency secondary-propellant-plasma-enhanced mode. Only the plasma thruster will be developed and fully tested during this study. The main characteristics of the thruster are: Power 50 W, Weight within 1.5 kg, Thrust > 1.5 mN, Specific Impulse (Isp) >1200 s. The program will develop through the following steps:

- Deep numerical-theoretical investigation through dedicated plasma-simulation tools.
- Extensive experimental campaign to validate codes, to investigate the physics phenomena involved and to proof thruster performance.
- Development of a thruster-prototype to be mounted on board of a mini-satellite to demonstrate technology feasibility,
- Study of all the critical issues related to the application to a mini-satellite

- Design and manufacturing of the mini-satellite mock up including all critical components
- Analysis of scaling law to lower and higher power.

As a final results of the project, a detailed analysis will be conducted in order to evaluate the possible application of the thruster in space missions requiring low thrust accurate attitude and position control.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Aoes Group Bv - Advanced Operations and Engineering Services Group Bv, Bradford Engineering Bv, Centre National de la Recherche Scientifique, Office National d'Études et de Recherches Aéronautiques, Studio Progettazione e Realizzazione di Apparecchi Elettronici di Selmo Antonio, Università degli Studi di Roma La Sapienza, Lms Imagine Sa, National Aerospace University Kharkiv Aviation Institute Named By N Zukovskiy, Thales Alenia Space Italia Spa, Alma Mater Studiorum – Università di Bologna, Universidad Politécnica de Madrid, Rovsing A/S, Agenzia Nazionale per le Nuove Tecnologie, l'Energia e lo Sviluppo Economico Sostenibile, Keldysh Institute of Applied Mathematics of the Russian Academy of Sciences, Università degli Studi di Padova



## ALGAN AND INAIN BASED MICROWAVE COMPONENTS

REFERENCE	242394
CALL	FP7-SPACE-2009-1
THEME	space
SCIENTIST	Gaudenzio Meneghesso
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	3,368,361 €
EU FUNDING	1,953,471 €
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### PROJECT DESCRIPTION

This proposal is focused on the development of a new generation of wide band gap (WBG) GaN technology and devices for which strong impacts in term of performances, reliability and robustness are expected. AL-IN-WON will explore two main disrupting routes: - Next generation of WBG device based on new epi material (InAlN/GaN) for strong improvement in term of performances and reliability. - High efficiency / High Power generation in Ku / Ka bands It proposes to evaluate in 2 phases next generation of WBG material up to Ka Band. The InAlN/GaN hetero-structure offers the following advantages: As InAlN/GaN is lattice matched, it offer the possibility to growth very thin layer in the range of 10nm or below which is the most relevant to overcome short channel effect and go towards high frequency range up to millimetre wave range. In 0.18 Al<sub>0.82</sub>N /GaN is a new hetero-structure able to give twice the drain current available from a more conventional AlGaIn/GaN hetero-structure. Breakdown voltage is comparable for the two hetero-structures. In 0.18 Al<sub>0.82</sub>N is latticed matched to GaN and higher reliability is therefore expected compared to AlGaIn/GaN. Passivation is currently a major limitation to device operation. InAlN/GaN MOSHEMT are very promising with strong current drain improvement compared to HEMT (UltraGaN). We plan to evaluate CW Ku and Ka

Band MMIC High Power Amplifiers (HPA) and Low Noise Amplifiers (LNA). Demonstrators in Ka band will be designed based on devices coming from the run 2.

The final objective being the evaluation of InAlN/GaN compared to more conventional AlGaIn/GaN very high power HEMT technology with very high breakdown voltage, high current and compliant with high power density. Regarding space application for which reliability and robustness are of major concerns, we expect to demonstrate the major breakthrough offered by GaN technology, and especially InAlN if successful.

### PARTNERS

**Coordinator:** United Monolithic Semiconductors SAS

**Participants:** MEC - Microwave Electronics for Communications Srl, III V LAB, Thales Alenia Space France, Université de Limoges, United Monolithics Semiconductors GmbH, Università degli Studi di Padova



## DEVELOPMENT OF RAD HARD NON VOLATILE FLASH MEMORIES FOR SPACE APPLICATIONS

REFERENCE	262890
CALL	FP7-SPACE-2010-1
THEME	space
SCIENTIST	Alessandro Paccagnella
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	1,543,760 €
EU FUNDING	1,052,478 €
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### PROJECT DESCRIPTION

The project aims to realise a strong methodology for the development and design of non volatile memories using standard CMOS silicon process actually used for consumer electronics. Since standard silicon memories, such as other silicon devices for consumer market, fails under irradiation two different approaches are envisaged: the first one is to develop specific technological processes able to sustain heavy ions and other charged particles while the second one is more devoted to use specific design and architectures.

The first approach, also known as Radiation Hardening by Process (RHBP), is very expensive and tied to technological issues which can be faced only by large corporations and, due to the very low amount of final devices to be realised, very difficult to follow (great deal of effort for a small niche market).

The second approach, also known as Radiation Hardening by Design (RHBD), takes the best from standard CMOS consumer processes and, using very accurate design methodologies, mitigates radiation effects on silicon processes.

Semiconductor memories, among rad hard integrated circuit scenario, are one of the most critical topic and non volatile memories in particular.

Actually both volatile and non volatile memories, excluding few exceptions, are integrated using standard processes and standard architectures. This means that the final device is typically at least Rad Tolerant and not Rad Hard and failure during mission is avoided using Error Correcting Code techniques including redundancy (more devices of the same type are used in voting manner) at board level.

The basic goal of the project is to give a methodology for the development of a generic rad hard non volatile memory with the features actually used in consumer market (good retention, re-programmability and cycling) and realise a prototype (1Mbit Flash Memory) in order to validate the approach.

### PARTNERS

**Coordinator:** Redcat Devices SRL

**Participants:** Universidade de Santiago de Compostela, Università degli Studi di Milano, Jyväskylä Yliopisto, Tower Semiconductor Ltd, Uppsala Universitet, University of Cyprus, Università degli Studi di Padova



## PROPELLANTLESS DEORBITING OF SPACE DEBRIS BY BARE ELECTRODYNAMIC TETHERS

REFERENCE	262972
CALL	FP7-SPACE-2010-1
THEME	space
SCIENTIST	Enrico Lorenzini
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	2,337,317 €
EU FUNDING	1,772,801 €
E-MAIL	enrico.lorenzini@unipd.it

### PROJECT DESCRIPTION

Concern about the growth of space debris, aggravated by the increase in the number of countries with direct access to space, made the SPA. 2010. 2. 3-02 Call Topic suggest "preventing generation of new debris and de-orbiting upper stages and spacecraft after mission completion". The Project proposed involves Research and Technology Development of an efficient deorbit system, to be carried in the future by every launched spacecraft. A dedicated system is needed because satellites naturally orbit at ionospheric altitudes where air drag is very weak. The system considered involves magnetic drag on a current-carrying conductive tether, uses no propellant and no power supply, and generates power on board. It beats alternative systems (enhanced air drag, and rocket and electrical thrust) in simplicity and in the combined basic metrics: Frontal Area x Deorbit Time and System-to-Spacecraft Mass Ratio. Like air drag, magnetic drag is a dissipative mechanism arising from the orbital tether motion relative to the corotating magnetized plasma, which induces the current in the tether. The Work Programme includes studies of plasma-tether interaction under ambient-plasma variations along orbit, performance dependence on orbital altitude/inclination, and trade-off against alternative systems; numerical simulations of current to a bare tether; and studies of orbit/

tether dynamics, and of both tether survival and the tether itself as debris. Deorbiting a satellite representative in both orbit and mass in Low Earth Orbit is considered. Tasks involve i) Design and manufacturing the tether as a tape with possible materials-structure both lengthwise and in its cross section, and a study of materials; ii) deployment strategy, and design / manufacturing of subsystems: tether-deployment mechanism, end mass, electric control and driving module, electron-ejecting plasma contactor, and interface elements; and iii) microgravity, and hypervelocity-impact and tether-current laboratory tests.

### PARTNERS

**Coordinator:** Universidad Politecnica de Madrid  
**Participants:** Board of Governors of the Colorado State University System, Embedded Instruments and Systems S.L., Fundacion Tecnalia Research & Innovation, Office National d'Études et de Recherches Aérospatiales, Deutsches Zentrum für Luft - und Raumfahrt EV, Università degli Studi di Padova



## SPACE EXPLORATION RESEARCH FOR THROTTLEABLE ADVANCED ENGINE

REFERENCE	262837
CALL	FP7-SPACE-2010-1
THEME	space
SCIENTIST	Daniele Pavarin
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	3,038,358 €
EU FUNDING	1,926,631 €
E-MAIL	daniele.pavarin.1@unipd.it

### PROJECT DESCRIPTION

The SPARTAN research aims at developing a throttleable propulsion technology, which is mandatorily needed for any planetary soft and precision landing. It relies on the hybrid engine technology, exploiting its capability of being throttled and its proper performances. This research is complementary to ESA TRP and Piedmont Regional development programs. It implements and strengthens the technological base in view of the future robotics and manned space exploration missions. The outcomes from the SPARTAN development can be reflected also in many other Earth/Space civilian applications, exploiting both the throttling capability of the propulsion system and the peculiar characteristics of the hybrid engine technology, like: safety, minimum environmental impact (green propellants), lower life cycle costs, responsiveness, competitive Performances, increased reliability, soft ignition and shutdown. The hybrid propulsion system is formed by two major constitutors: the engine itself, housing the fuel, and the oxidizer injection system. The research focuses on three major objectives, needed to achieve the soft and precision landing capabilities:

- The engine design, specific for throttling functionality
- The oxidizer throttleable device development
- The design of the landing case: test bench

and testing procedures Development will be supported by establishing an advanced coding, enabling the definition of the fuel and the throttling behavior of the hybrid engine. Engine definition will be supported by development tests: cold injection case on subscale model, dedicated to the throttling device, and hot firing on lab model, merging the throttling device and the engine model. In parallel a landing test and associated landing model (flying test bed) will be developed, providing for proven landing model and landing test capabilities. These capabilities will allow demonstrating the soft landing features of a throttleable hybrid propulsion technology.

### PARTNERS

**Coordinator:** Thales Alenia Space Italia SPA

**Participants:** Politecnico di Milano, Bradford Engineering BV, Nammo Raufoss AS, Studiel, Vysoke Ucení Technické v Brně, GmV Aerospace and Defence sá Unipersonal, Università degli Studi di Padova





## MEASURING ETA\_EARTH: CHARACTERIZATION OF TERRESTRIAL PLANETARY SYSTEMS WITH KEPLER, HARPS-N, AND GAIA

REFERENCE	313014
CALL	FP7-SPACE-2012-1
THEME	space
SCIENTIST	Giampaolo Piotto
DEPARTMENT	Physics and Astronomy
UNIPD	participant
TOTAL COST	2,957,200 €
EU FUNDING	1,994,359 €
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### PROJECT DESCRIPTION

We propose to carry out an FP7 collaborative project to provide the first ever quantitative answer to one fundamental age-old question of mankind: 'How common are Earth analogs in our Galaxy?'. We will achieve our goal by combining the unprecedented photometric precision of NASA's Kepler mission, the unrivalled precision of ground-based radial-velocities from the HARPS-N spectrograph, and ESA's Gaia mission exquisitely accurate parallaxes. Ours is a transnational collaboration between European countries and the US setup to optimize the synergy between space- and ground-based data whose scientific potential can only be fully exploited when analyzed together. We ask for manpower and resources to carry out a GTO program with HARPS-N@TNG (80 nights/yr for 5 years) to measure dynamical masses of terrestrial planet candidates identified by the Kepler mission. With the unique combination of Kepler and HARPS-N data we will learn for the first time about the physics of their interiors. Some of these planets will have characteristics (masses, radii) similar to Earth, and they might be orbiting within the habitable zone of stars much like our Sun. We will search for planets similar to Earth orbiting a carefully selected sample of

nearby bright solar-type stars and red M dwarfs, providing suitable candidates for spectroscopic characterization of their atmospheres with next-generation space observatories. We will combine Kepler, HARPS-N, and Gaia data products of stars in the Kepler field to underpin the occurrence rates of terrestrial planets ( $\eta_{\oplus}$ ) as a function of stellar properties with unprecedented accuracy. Our unique team expertise in observations and modelling of exoplanetary systems will allow us to fully exploit the potential for breakthrough science intrinsic to this cutting-edge, multi-techniques, interdisciplinary project, making the best use of data of the highest quality gathered from NASA and ESA space missions and ground-based instrumentation.

### PARTNERS

**Coordinator:** Istituto Nazionale di Astrofisica

**Participants:** Université de Genève, The University of Edinburgh, The University Court of the University of St Andrews, The Queen's University of Belfast, The University of Warwick, Smithsonian Institution, Università degli Studi di Padova



## 2-WHEELER BEHAVIOR AND SAFETY

REFERENCE	218703
CALL	FP7-SST-2007-RTD-1
THEME	transport
SCIENTIST	Roberto Lot
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	5,282,341 €
EU FUNDING	3,800,000 €
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### PROJECT DESCRIPTION

Powered Two Wheeler (PTW) users are greatly over-involved in serious and fatal crashes. They have between 5 and 25 times the risk of having a fatal crash compared to car drivers, depending on the country. The number of PTWs on European roads has more than doubled over the last two decades. The recent MAIDS (Motorcycle Accident In-Depth Study) study of PTW crashes in Europe found that behavioural and ergonomic issues were major contributing factors to PTW crashes: the primary accident cause for PTW crashes was the failure of drivers to perceive two-wheelers; and human error was a major contributing factor to most crashes, for both PTW and car drivers. The majority of PTW crashes involved a collision with a car. Many large-scale research programs have been undertaken to understand the behavioural and ergonomic factors that contribute to crashes involving 4-wheeled vehicles. These have been effective in informing countermeasure development, which has led to significant reductions in crashes. To our knowledge, no comparable human factors and behavioural research programs have been initiated in the PTW domain, in Europe or elsewhere. The high rate of motorcycle-related deaths and injuries calls for new and refined countermeasures, deriving from solid behavioural and ergonomics research. In this proposal we outline an innovative program of research, involving partners from Europe,

Israel and Australia, that directly targets those behavioural and ergonomic factors cited in the MAIDS study as contributing to PTW crashes. This includes research on crash causes and human error, the world's first naturalistic riding study involving instrumented PTWs, research on motorcycle rider risk awareness and perception, the development of new research tools to support the research program, in-depth research on the factors that underlie driver failures to see PTWs and their riders, and the development of recommendations for practical countermeasures for enhancing PTW rider safety.

### PARTNERS

**Coordinator:** Europe Recherche Transport  
**Participants:** Trl Limited, Bundesanstalt für Strassenwesen, The University of Nottingham, Università degli Studi di Modena e Reggio Emilia, Piaggio & C S.P.A., Institut Francais des Sciences et Technologies des Transports, de l'Amenagement et des Reseaux, Teknologian Tutkimuskeskus Vtt, Centre Europeen d'Etudes de Securite et d'Analyse des Risques E.E.S.A.R. et d'Analyse des Risques, Ben-Gurion University of the Negev, National Technical University of Athens, Università degli Studi di Firenze, Fundacion Cidaut, Api Sa, Technische Universität Dresden, Universidade Tecnica de Lisboa - Utl, Factum Chaloupka & Risser Ohg, Kuratorium für Verkehrssicherheit, Universität Wien, Monash University, Panepistimio Thessalias (University of Thessaly), Federation of European Motorcyclist' Associations, Centrum Dopravniho Vyzkumu V.V.I., Institute of Communication and Computer Systems, Centre for Research and Technology Hellas, Österreichisches Forschungs- und Prüfzentrum Arsenal Ges.M.B.H., Università degli Studi di Padova



## MULTIENVIRONMENT AIR CUSHION OIL SPILL FAST RESPONSE & POST EMERGENCY REMEDIATION SYSTEM

REFERENCE	234209
CALL	FP7-SST-2008-RTD-1
THEME	transport
SCIENTIST	Ernesto Benini
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	3,446,713 €
EU FUNDING	2,598,021 €
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### PROJECT DESCRIPTION

HoverSpill driving force is based on the concept that the greatest part of oil spills has a strong impact on coasts, beaches and shoals. Even if the pollution takes place at open sea, vessels usually don't reach the location in short time to contain the spot, which rapidly expands. Moreover the oil hits those areas which can not be easily reached by traditional vehicles/vessels, nor by land nor by sea, for the lack of water depth or for the muddy land. The main objective of HoverSpill system is the development of an innovative procedure for oil spill emergencies, with the greatest immediacy and efficiency possible during the intervention and effectiveness during the following remediation activities. HoverSpill project is mainly focused to operate on the transitional areas between land and sea, where shoals, difficult access areas, long distance from ports, make difficulties more relevant. The project will study the best approach for the prevention and for the remediation and will use a specific air cushion vehicle, completely amphibious and capable of working on land and water, in areas with high and soft mud, which can be used as a pontoon in floating conditions: the vessel will be designed to be cheap and with easy maintenance, capable of high operative speed (>30 kn.) and spilled oil storage. It can be transported quickly

on the road and can be parked on land or beaches near potential oil spill dangers with no need of harbours or other special structures necessary for traditional vessels. New operational procedures and protocols will be defined in order to match the new technological approach and the vehicle characteristics. The hovercraft could be positioned on ships or oil tankers deck and used during oil transfer operations for a preventive action. Intervention on the water will foresee a double separation system and the remediation intervention will use the same air-cushion platform as a power supplier for tools and separator for polluted or washing water.

### PARTNERS

**Coordinator:** Innova SPA

**Participants:** Servizi Operativi Anfibi S.R.L., Terra Mediu S.R.L., Admarin Denizcilik Muteahhitlik Muhendislik Musavirlik Ticaret Sanayi Ltd. Sti., Centro Ricerche Fiat Scpa, Ylec Consultants, Cedre, Hovertech Ltd, Università degli Studi di Padova



## DESIGN, SIMULATION AND FLIGHT REYNOLDS NUMBER TESTING FOR ADVANCED HIGH-LIFT SOLUTIONS

REFERENCE	233607
CALL	FP7-AAT-2008-RTD-1
THEME	transport
SCIENTIST	Ernesto Benini
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	7,078,821 €
EU FUNDING	4,992,335 €
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### PROJECT DESCRIPTION

DeSiReH focus on both, the numerical design tools and the experimental measurement techniques for cryogenic conditions, with the objective to improve the industrial design process for laminar wings in terms of product quality, efficiency, and development cost reduction. The work focuses on the design of high lift devices.

- DeSiReH addresses the following quantified objectives which will make a significant contribution to meeting Vision 2020 goals: Reduction of industrial A/C development costs by 5% by reduced and more efficient Wind Tunnel Testing
- Decrease time-to-market by 5% by improved aerodynamic design turn-around time
- Improve industrial High-Lift design process efficiency by 15%
- Reduce A/C drag by 5% by enabling NLF though compatible High-Lift-Design.

To accomplish these objectives the project is planned for a period of 4 years and a budget of 7.6 Million Euro.

The consortium consists of 6 industry partner, 7 research establishments, 3 universities, 2 small and medium-sized enterprises and the European Transonic Wind tunnel (ETW). Existing and validated high-fidelity numerical tools are composed to an efficient High-Lift design and

optimization process chain in WP1.

The strategies and tools developed are applied in WP 2 to the aerodynamic design of a high lift system for the future pointing HARLS wing (High Aspect Ratio Low Sweep) with the constraint to maintain Natural Laminar Flow at cruise to the best possible extend.

WP3 focuses on the improvement of the experimental measurement technique for cryogenic testing. The objectives here are to enhance the measurement accuracy of the results and to generate the capability to apply different important techniques (e.g. transition measurement & deformation measurement). These techniques are finally applied in the ETW at High-Reynolds-Numbers on the HARLS model equipped with the High-Lift-System, designed in WP2.

### PARTNERS

**Coordinator:** Deutsches Zentrum für Luft - und Raumfahrt EV

**Participants:** Stichting Nationaal Lucht- En Ruimtevaartlaboratorium, Instituto Nacional de Tecnica Aeroespacial, European Transonic Windtunnel GmbH, Office National D'etudes et de Recherches Aéropatiales, Centro Italiano Ricerche Aerospaziali Scpa, Aircraft Development and Systems Engineering (Adse) B.V., Totalforsvarets Forskningsinstitut, Technische Universität Braunschweig, Dassault Aviation Sa, Università degli Studi di Napoli Federico II, Piaggio Aero Industries Spa, Eads - Construcciones Aeronauticas S.A., Airbus Operations Sas, Asco Industries N.V., Ibk Ingenieurbuero Hauptsitz, Federal State Unitary Enterprise the Central Aerohydrodynamic Institute Named After Prof. N.E. Zhukovsky, Dr. Dziomba Bernhard - Dziomba Aeronautical Consulting, Airbus Operations GmbH, Università degli Studi di Padova



## AERODYNAMIC SURFACES BY ADVANCED MULTIFUNCTIONAL COATINGS

REFERENCE	266029
CALL	FP7-AAT-2010-RTD-1
THEME	transport
SCIENTIST	Anna Lante
DEPARTMENT	Agronomy, Food, Natural Resources, Animals and the Environment
UNIPD	participant
TOTAL COST	5,769,133 €
EU FUNDING	3,772,261 €
E-MAIL	anna.lante@unipd.it

Microtechnique Sa - Recherche et Developpement,  
Centro Italiano Ricerche Aerospaziali Scpa, Photon  
Et Polymers, University of Food Technologies,  
Saab Aktiebolag, Dublin Institute of Technology,  
Università degli Studi di Padova

### PROJECT DESCRIPTION

The main objective of the multi-disciplinary AEROMUCO project is to develop and evaluate a number of alternative and highly innovative active and passive multi-functional surface protection systems for future generation of aircrafts, leading to a significant improvement in fuel efficiency and reduction in emissions. Two technological routes to achieve this goal will be explored:

- The reduction of the energy consumption for inflight de-icing through the development of coatings that exploit the use of a new generation of low-energy consuming active de-icing systems.
- The development of durable and effective active and passive surface protection systems that will facilitate and maintain laminar boundary layers on aerodynamic surfaces. These coatings will reduce insect adhesion through novel, low-surface-energy concepts and remove insect residue through anti-contamination enzymatic solutions, environmentally benign.

### PARTNERS

**Coordinator:** EADS Deutschland GmbH

**Participants:** University of Limerick, Alenia Aermacchi Spa, Dassault Aviation Sa, Hef R&D Sas, Csem Centre Suisse D'électronique et de



## PACKAGING OF FUTURE INTEGRATED MODULAR ELECTRONICS

REFERENCE	265413
CALL	FP7-AAT-2010-RTD-1
THEME	transport
SCIENTIST	Claudio Zilio
DEPARTMENT	Management and Engineering
UNIPD	participant
TOTAL COST	6,338,307 €
EU FUNDING	3,766,448 €
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### PROJECT DESCRIPTION

Affordable transport for the citizen relies on innovative solutions and technologies that will result in lower costs and lead-time of the aircraft and its systems. In this area, the packaging of on-board computers is an important contributor. The Packaging of future Integrated Modular Electronics (PRIMAE) objective is to develop a new flexible, robust and open aeronautical packaging for the next generation of electronics and particularly to Integrated Modular Avionics. This new concept after standardization will be able to replace the 35 year old ARINC 600 standard.

PRIMAE technical objectives are:

- Reduce electronics packaging in terms of volume (50%) and weight (30%) and offer flexibility and growth capability
- Reduce costs (20%) using market standard components
- Enhance reliability (50%) through thermal and vibratory breakthrough
- Mitigate EMC protection penalties in composite fuselage environment
- Ensure fast production ramp up and support rapid final assembly on aircraft
- Improve availability and reduce maintenance cost.

In these domains significant technological studies, beyond the state of the art (cooling,

lightweight composite materials, electromagnetic interferences, power supply, connectivity), will be carried out in respect to airworthiness regulations.

To achieve the PRIMAE objectives, 3 steps are required:

- Definition phase of air framers and suppliers requirement - Research and evaluation of advanced packaging technologies
- Specification and development of representative mock-up to integrate different technologies.

The concept once harmonized among the main European players participating in this project, will be proposed as a standard for the future generation of large and regional aircraft, and helicopters. The new packaging concept will strengthen competitiveness of the market and will support the effort of industrial avionics suppliers to improve costs and environmental impacts.

### PARTNERS

**Coordinator:** Thales Avionics SA

**Participants:** Institut National des Sciences Appliquées de Lyon, Emcons Dr Rasek GmbH & Co Kg, Vyzkumny a Zkusebni Letecký Ústav A.S., The Institute of Thermal Physics of the Ural Branch of the Russian Academy of Science, Alenia Aeronautica Spa, Dau Ges. m.b.h. & Co. Kg., Atm Przedsiębiorstwo Produkcyjne Sp. Z O.O, Tyco Electronics Uk Ltd, Bae Systems (Operations) Ltd, Diehl Aerospace GmbH, Radiall, Dassault Aviation Sa, Kontron Modular Computers Sas, Latelec, Aalto-Korkeakoulusaatio, Dutch Thermoplastic Components Bv, Celestica Valencia Sa, Airbus Operations SAS, Università degli Studi di Padova



## EFFICIENT SYSTEMS AND PROPULSION FOR SMALL AIRCRAFT

REFERENCE	284859
CALL	FP7-AAT-2011-RTD-1
THEME	transport
SCIENTIST	Fabrizio Dughiero
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	37,685,112 €
EU FUNDING	24,999,800 €
E-MAIL	fabrizio.dughiero@unipd.it

### PROJECT DESCRIPTION

The ESPOSA project will develop and integrate novel design and manufacture technologies for a range of small gas turbine engines up to approx. 1000 kW to provide aircraft manufacturers with better choice of modern propulsion units. It will also deal with engine related systems which contribute to the overall propulsion unit efficiency, safety and pilot workload reduction. Through the newly developed design tools and methodologies for the engine/aircraft integration the project will also contribute to the improved readiness for new turbine engines installation into aircraft. New technologies and knowledge gained through the ESPOSA project will provide European general aviation industry with substantially improved ability to develop and use affordable and environmentally acceptable propulsion units and reliable aircraft systems minimizing operating costs, while increasing the level of safety. The new engine systems and engine technologies gained from ESPOSA should deliver 10-14% reduction in direct operating costs (DOC) and reduce significantly the pilot workload. The ESPOSA project is oriented on turbine engine technologies tailored for a small aircraft up to 19 seats (under CS-23/FAR23) operated on the scheduled and non-scheduled flights. The research work comprises performance improvements of key engine components, their

improved manufacture in terms of costs and quality. New engine component technologies will be backed by novel modern electronic engine control based on COTS, pioneering the engine health monitoring for small engines and providing new more electric solutions for fuel and propeller control systems. Project activities will include extensive validation on the test rigs. The most appropriate technologies according to value/cost benefit will be selected and integrated into functional complexes and further evaluated on the engine test beds. The functionality of certain project outcomes will also be demonstrated and validated-in-flight conditions.

### PARTNERS

**Coordinator:** Prvni Brnenska Strojirna Velka Bites A.S.

**Participants:** Stichting Nationaal Lucht- En Ruimtevaartlaboratorium, Technische Universität München, Avio S.P.A, Budapesti Muszaki Es Gazdasagtudományi Egyetem, Atard Savunma Ve Havacilik Sanayi Ileri Teknoloji Uygulamalari Arastirma Ve Gelistirme A.S., Vyzkumny a Zkusebni Letecky Ustav A.S., Zollern GmbH & Co Kg, Teknologian Tutkimuskeskus Vtt, Centro Italiano Ricerche Aerospaziali Scpa, Tusas Motor Sanayi As, Evекtor, Spol. S.R.O., Winner Scs, Motor Sich Jsc, Materials Engineering Research Laboratory Limited, Politechnika Warszawska, Technical University Kosice, Zaporozhye Machine-Building Design Bureau Progress State Enterprise Named After Academician A.G. Ivchenko, Politechnika Rzeszowska Im Ignacego Lukasiewicza Prz, Tobb Ekonomi Ve Teknoloji Universitesi, Institutul National de Cercetare-Dezvoltare Turbomotoare-Comoti, Université Libre de Bruxelles, Institutul National de Cercetari Aerospaziale Elie Carafoli - I.N.C.A.S. Sa, Honeywell International Sro, Wytownia Sprzetu Komunikacyjnego Pzl - Rzeszow Sa, Technische Universiteit Delft, Central Institute of Aviation Motors, Piaggio Aero Industries Spa, Instytut Lotnictwa, Grob Aircraft Ag, Fundacion Tecnalia Research & Innovation, Centre de Recherche en Aéronautique Asbl – Cenaero, Sysgo Ag, Unis As, Vysoke Ucení Technické V Brne, Zaklady Lotnicze Marganski & Myslowski Sp Zoo, Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung E.V, Jihostroj As, Università degli Studi di Padova





## THERMAL OVERALL INTEGRATED CONCEPTION OF AIRCRAFT

REFERENCE	604981
CALL	FP7-AAT-2013-RTD-1
THEME	transport
SCIENTIST	Claudio Zilio
DEPARTMENT	Management and Engineering
UNIPD	participant
TOTAL COST	26,506,764 €
EU FUNDING	15,166,972 €
E-MAIL	claudio.zilio@unipd.it

### PROJECT DESCRIPTION

Thermal behaviour of aircraft has recently become a crucial subject due to many factors: increasing number of complex systems required by modern, more electric, commercial aircraft, the introduction of hotter engines with higher by-pass ratios, the increased use of composite material in aircraft structures, or the finement of highly dissipative equipment and systems in smaller areas to earn space for passengers and cargo. New advanced techniques to manage the aircraft thermal behaviour at the very early stages of development are essential to take the right figuration decisions while meeting market demands. To work efficiently and on emerging innovative solutions, it is essential to perform thermal management at the global aircraft level. Today, thermal studies are performed for sizing and risk analyses.

The TOICA project intends to radically change the way thermal studies are performed within aircraft design processes. It will create and manage a thermal aircraft architecture which today does not exist. This will be shared in the extended enterprise with design partners through a collaborative environment supporting new advanced capabilities developed by the project, namely the architect cockpit, which will allow the architects and experts to monitor the thermal assessment of an aircraft and to perform trade-off

studies. Super integration will support a holistic view of the aircraft and allow traditional design views and the related simulation cascade to be challenged. Six use cases illustrating new thermal strategies will demonstrate the benefits of the TOICA approach on realistic aircraft figurations. Plateaus will be organised with architects for the definition, selection and evaluation of thermally optimised aircraft figurations. These plateaus will drumbeat the project. In parallel, technology readiness evaluations will assess the maturity of the developed technologies and support the deployment and exploitation of the TOICA results.

### PARTNERS

**Coordinator:** Airbus Operations Sas

**Participants:** Thales Avionics Sas, Samtech Sa, Dassault Aviation Sa, European Aeronautic Defence and Space Company Eads France Sas, The Chancellor, Masters and Scholars of the University of Cambridge, Epsilon Ingenierie, Dassault Systemes Sa, Airbus Operations GmbH, Chalmers Tekniska Högskola Ab, Maya Heat Transfer Technologies Ltd., Deutsches Zentrum für Luft - und Raumfahrt Ev, Siemens Industry Software Limited, Office National d'Etudes et de Recherches Aérospatiales, Xrg Simulation GmbH, Stichting Nationaal Lucht-En Ruimtevaartlaboratorium, Arttic, Alenia Aermacchi Spa, Eurocopter Sas, Atherm, Snecma Sa, Msc Software GmbH, Inter technique Sas, Centre de Recherche en Aéronautique Asbl - Cenaero, Airbus Operations Limited, Cranfield University, Eurostep Ab, The Queen's University of Belfast, Liebherr Aerospace Toulouse Sas, Lms Imagine Sa, Gkn Aerospace Sweden Ab, Università degli Studi di Padova



# CAPACITIES

It strengthens the research capacities that Europe needs if it is to become a thriving knowledge-based economy.



## IDEA-FOOT: INNOVATIVE DESIGN AND MANUFACTURING SYSTEMS FOR SMALL SERIES PRODUCTION FOR EUROPEAN FOOTWEAR COMPANIES

REFERENCE	232585
CALL	FP7-SME-2008-1
THEME	research for the benefit of smes
SCIENTIST	Stefano Debei
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	1,452,029 €
EU FUNDING	1,100,254 €
E-MAIL	stefano.debei@unipd.it

### PROJECT DESCRIPTION

European SMEs working in the footwear market segment of classical and casual shoes, due to global competition, asks for the reduction of Time to Market, increase of products diversification also with a small batch production while keeping a high fashion and quality content of the product. The actual design and production processes are not suitable for this production. In particular the actual design and industrialization processes follow a serial model and the production process has still an handicraft connotation. In this context the objectives of the project IDEA-foot are:

- the introduction of a new method for the integrated design and production, in which the key elements are the standardization of the geometrical information and its transfer from the design to the production in a digital standard data format;
- the development of CAD software modules to ease the design of components according to the standards;
- the development of a CAM software which transfers the production parameters from the CAD models to the production and is able to integrate the machineries with the manipulation system;
- the development of an automated production

cell, whose lay-out will be defined comparing different solutions in terms of production time and work in progress. An automatic manipulation system is going to be used for the handling of the semifinished shoes.

The use of standards in the CAD design allows this phase to be faster. Moreover the development of the shoe components will be made according to a parallel model, saving up to 50% of the design time.

The main expected benefits for SMEs are the reduction of the time necessary for the design and industrialization phases and of the time to market, the reduction of the production costs and the increase of productivity.

A final validation of the integrated design and production process is foreseen in order to evaluate the expected benefits in terms of time savings for the design and production processes, and product quality.

### PARTNERS

**Coordinator:** BZ Moda Srl

**Participants:** Politecnico Calzaturiero SCARL, Red 21 SL, Rosi-Ita Uno Srl, C212 Calzado, Componentes, Investigación and Innovación A.I.E., Consiglio Nazionale delle Ricerche, Istituto Tecnologico del Calzado y Conexas, Brustia-Alfameccanica srl, Università degli Studi di Padova



## EFFICIENT 3D COMPLETENESS INSPECTION

REFERENCE	262009
CALL	FP7-SME-2010-1
THEME	research for the benefit of smes
SCIENTIST	Emanuele Menegatti
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	1,126,817 €
EU FUNDING	862,408 €
E-MAIL	emanuele.menegatti@unipd.it

### PROJECT DESCRIPTION

In Europe there are about 3000 SMEs working in the field of machine vision. These SMEs provide services and products to another 300.000 SMEs in the machine building and automation sector. One important application of machine vision is quality control and in particular checking the completeness (presence/absence of parts, correct type, position, orientation, ) of assemblies. Existing systems usually apply 2D cameras that provide a monochrome or color image. These images lack the information of depth and consequently have problems when dealing with non-rigid objects (hoses, cables) or low contrast between background and part and they often do not provide an optimal view on each single part of the assembly. This project aims at developing efficient 3D completeness inspection methods that exploit two different technologies. The first one is based on calculating arbitrary views of an object given a small number of images of this object, the second one aims at combining 3D shape data with color and texture information. Both of the technologies will cover the full chain from data acquisition via pre-processing to the final decision-making. They will focus on using standard hardware to create a cost efficient technology. The participating SMEs all have substantial resources for R&D and long experience in their own research activities, however, in order to

develop 3D completeness inspection they want to subcontract RTD performers working in image acquisition, 3D/2D data combination and pattern recognition/matching. 3D Completeness inspection is a technological gap in the machine vision market. The SMEs expect substantial growth from entering into this market by integrating this new technology in their range of existing products. They expect a total additional turnover of more than 3 Mio EUR per year. Furthermore, this technology will strengthen the European machine vision market with its 3000 SMEs.

### PARTNERS

**Coordinator:** Profactor GmbH

**Participants:** Universidad de Oviedo, Ardoran OU, Metria Digital SL, IT+Robotics Srl, Fundacion Pro dintec, Università degli Studi di Padova



## ULTRA-LIGHTWEIGHT STRUCTURES WITH INTEGRATED PHOTOVOLTAIC SOLAR CELLS: DESIGN, ANALYSIS, TESTING AND APPLICATION TO AN EMERGENCY SHELTER PROTOTYPE

REFERENCE	314891
CALL	FP7-SME-2012
THEME	research for the benefit of smes
SCIENTIST	Roberto Scotta
DEPARTMENT	Civil, Environmental and Architectural Engineering
UNIPD	participant
TOTAL COST	1,386,650 €
EU FUNDING	1,045,000 €
E-MAIL	roberto.scotta@unipd.it

### PROJECT DESCRIPTION

The introduction of new technologies in the fabrication of light-weight high-performance materials for civil-engineering applications opens many new possibilities for the design of extremely lightweight structures. In particular, the inclusion of photo-voltaic cells together with the use of carbon-fiber cables will allow new design concepts combining an extreme lightness with an excellent structural performance while preserving the sustainability. Even if the new technology constitutes a potential breakthrough, in order to allow a successful impact on the market the properties of the novel materials need to be investigated in detail so to understand their behaviour with respect to fatigue, aging, or other long-term effects. The wide adoption of such new solutions, will on the other hand imply the definition of an improved computer-based design approach. New tools will be needed to allow modeling to structural behaviour of ultra-lightweight structures and to realize them in conceptual designs.

### PARTNERS

**Coordinator:** Buildair Ingenieria y Arquitectura Sa

**Participants:** Naizil Spa, Sl Rasch GmbH Special & Lightweightstructures, Reglass Spa, Centre Internacional de Metodes Numerics en Enginyeria, Technische Universität München, Università degli Studi di Padova



## INNOVATIVE SYSTEMS FOR EARTHQUAKE RESISTANT MASONRY ENCLOSURES IN RC BUILDINGS

REFERENCE	606229
CALL	FP7-SME-2013
THEME	research for the benefit of smes
SCIENTIST	Francesca Da Porto
DEPARTMENT	Civil, Environmental and Architectural Engineering
UNIPD	coordinator
TOTAL COST	2,697,131 €
EU FUNDING	1,827,000 €
E-MAIL	francesca.daporto@unipd.it

### PROJECT DESCRIPTION

The project aims at developing innovative systems for masonry enclosures, to be used for façades, envelopes and internal partitions of reinforced concrete framed buildings, to derive sound concepts for their analysis and to develop reliable, simple and efficient methods for their design in the everyday engineering practice. Masonry enclosure systems have excellent, yet still improvable, performance with respect to healthy indoor environment, temperature, noise, moisture, fire and durability. However, they have been considered for long time as non-load-bearing, non-structural elements. In reality, they can play a structural role in the overall seismic behaviour of buildings. Enclosure walls need to be checked against excessive damage and potential out-of-plane collapse. Under this respect, as proven by recent earthquakes, if they are not properly detailed to accommodate seismic loads and correctly designed, they represent a significant hazard and can result in extensive economic losses as well as in a source of danger for human lives. Hence, it is necessary to reconsider the structural role of enclosures, in order to establish reliable analysis and design procedures

and to provide background for an update of current structural codes.

The adopted approach starts from material and technology development. Technical and economical feasibility of the envisaged construction systems will be demonstrated by performing parallel experimental and theoretical studies and will be validated by prototypes construction. Experimental and numerical characterization will be aimed at deriving structural requirements of masonry infill walls, as well as tools and methods for their assessment. The research will offer innovative solutions to scientific and technological problems which have a broad-spectrum impact. The experience of SME associations involved in the project, with the aid of all the partners, will ensure that the needs of large communities of SMEs are met.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Tiles and Bricks Europe Aisbl, H.I. Struct S.R.L., Vavouliotis-Gounaris-Mitakis Abee Eidon Keramopoiias, Tugla Ve Kiremit Sanayicileri Dernegi, Associacao Portuguesa da Industria de Ceramica, Arbeitsgemeinschaft Mauerziegel, Sda-Engineering GmbH, Ruredil Spa, Associazione Nazionale degli Industriali dei Laterizi, Centro Tecnologico da Ceramica e do Vidro Pcup, Middle East Technical University, Universitaet Kassel, Universita degli Studi di Pavia, National Technical University Of Athens – Ntua, Universidade do Minho





## UPGRADING THE SURVEY OF HEALTH, AGEING AND RETIREMENT IN EUROPE - PREPARATORY PHASE

REFERENCE	211909
CALL	FP7-INFRASTRUCTURES-2007-1
THEME	research infrastructures
SCIENTIST	Guglielmo Weber
DEPARTMENT	Economics and Management
UNIPD	participant
TOTAL COST	3,743,601 €
EU FUNDING	2,499,842 €
E-MAIL	guglielmo.weber@unipd.it

### PROJECT DESCRIPTION

The Survey of Health, Ageing and Retirement in Europe (SHARE) has been selected by the ESFRI roadmap process as one of the 35 crucial pillars of the European Research Area. This project will prepare a major upgrade of SHARE for all 27 EU members plus associated Switzerland and Israel during the decade 2010-2020. SHARE builds an infrastructure of micro data necessary to understand individual and societal ageing as a process in time that is strongly influenced by pension, health care and labour market regimes and their reforms. It is designed by researchers for researchers and integrates economics, medicine, and social sciences. Research based on this infrastructure will also serve as a feedback mechanism to support fact-based EU policies, such as the open method of coordination and the Lisbon agenda, to help meeting the challenges of population ageing in all countries of the EU. The major upgrade of SHARE will have two dimensions. First, it will prolong SHARE over time and generate a genuine panel that follows individuals as they age and react to the changes in the social and economic environment. From a research viewpoint, the time dimension is crucial since ageing is a process that can only be understood if we observe the same individual

at different points in time. Second, SHARE will expand to all EU member states. Ageing in the accession states is a particular challenge as these countries are ageing before their social and health institutions are brought to the same level of maturity as in the EU15 countries. Aim of the preparatory phase is to bring the SHARE prototype to the level of financial, legal, governance and technical maturity required to fill important knowledge gaps in individual and population ageing. It involves all stakeholders necessary for the major upgrade, among them research institutes and universities; national science ministries and foundations; two Directorates General of the European Commission; and the U.S. National Institute on Aging.

### PARTNERS

**Coordinator:** Universität Mannheim

**Participants:** Universität Linz, The Hebrew University of Jerusalem, Panteion University of Social and Political Sciences, Uniwersytet Warszawski, Syddansk Universitet, Università Ca' Foscari Venezia, Narodohospodarsky Ustav Akademie ved Ceske Republiky Verejna Vyzkumna Institute, Université de Lausanne, Fundacion Centro de Estudios Monetarios y Financieros, Institut de Recherche et Documentation en Economie de la Santé Association, University College of Dublin, National University of Ireland, Dublin, Universiteit Antwerpen, Stichting Katholieke Universiteit Brabant Universiteit van Tilburg, Institut za Ekonomska Raziskovanja, Università degli Studi di Padova



## STRUCTURING INFRASTRUCTURES FOR THE ANALYSIS AND EXPERIMENTATION ON ECOSYSTEM

REFERENCE	212723
CALL	INFRA-2007-2.1-01
THEME	research infrastructures
SCIENTIST	Antonio Berti
DEPARTMENT	Agronomy, Food, Natural Resources, Animals and the Environment
UNIPD	participant
TOTAL COST	1,170,611 €
EU FUNDING	893,976 €
E-MAIL	antonio.berti@unipd.it

### PROJECT DESCRIPTION

This Design Study aims at implementing a new concept of integrated research infrastructures in Europe for research on agro-ecosystems and natural ecosystems and environment.

This infrastructure consists in interfacing three types of platforms:

- (i) The in situ Long Term Experimental Platforms which consists in developing experiments for the main type of land use systems (arable crops, grasslands, forest, marchlands, heathlands), where different types of land management are imposed for a long term and where the state variables of the system are monitored for long term in conjunction with the measurement of the environmental fluxes to atmosphere and hydrosphere.
- (ii) The in vitro ECOTRON equipments where blocks of ecosystems of different size could be introduced within controlled environment. Since feedbacks between the plants and the soil responses take time to establish, experiments often need to last a few years. An alternative use of Ecotrons is to analyse the physiology of blocks of ecosystems which have been subjected in situ for years to various treatments within

LTEP platforms. In that case, Ecotrons can be seen as ecological analysers receiving samples for analysis.

- (iii) The in silico Database and Modelling platform should complete the system by developing facilities for sharing data bases among Europe

### PARTNERS

**Coordinator:** Institut National de la Recherche Agronomique CNRS - INRA

**Participants:** Centre Nationale de la Recherche Scientifique, Consejo Superior de Investigaciones Cientificas, Friedrich-Schiller-Universität Jena, Rothamsted Research Limited, Università degli Studi di Napoli Federico II, Università degli Studi di Padova



## LONGITUDINAL ENHANCEMENT AND ACCESS IMPROVEMENT OF THE SHARE INFRASTRUCTURE

REFERENCE	227822
CALL	FP7-INFRASTRUCTURES-2008-1
THEME	research infrastructures
SCIENTIST	Guglielmo Weber
DEPARTMENT	Economics and Management
UNIPD	participant
TOTAL COST	4,141,233 €
EU FUNDING	2,999,999 €
E-MAIL	guglielmo.weber@unipd.it

### PROJECT DESCRIPTION

Population ageing is among the most pressing challenges of the 21st century in Europe. Addressing this challenge scientifically demands an infrastructure of micro data of the changing health, economic and social living conditions of individuals as they go through the ageing process. SHARE, the Survey of Health, Ageing and Retirement in Europe, is an infrastructure of multidisciplinary, longitudinal, and cross-nationally harmonized micro data that has been created in response to these demands. Currently, SHARE contains two waves of data for about 32,000 respondents aged 50+ in 17 European countries. SHARE became a great success: More than 2300 researchers are working with the data, and SHARE has been elected to be one of the future ESFRI infrastructures. This project is the essential device to enhance the longitudinal stability of the SHARE panel and to improve access and consulting services to users in the years 2009 and 2010. It will:

- enhance the longitudinal stability of the panel by keeping in touch with the panel members, monitoring moves, re-interviewing “lost” panel members, and ascertaining last year of life events of deceased panel members. The scientific value of SHARE critically depends on continuous panel care.
- improve the research potential from the SHARE

infrastructure by adding imputed values for missing variables, calibrated weights, geo-coded and environmental variables, and meta/para-statistics derived from IT-driven survey methods.

- enhance the SHARE survey instrument in response to user feedback, to changes in the institutional environment, and to new survey technologies recently developed, making the interview more effective and less burdensome for the respondents. Such enhancements need to be implemented in 2009/early 2010 to be in time for the ESFRI-financed fourth wave of data collection. -improve and maintain the much applauded user-friendly access for SHARE data users through services provided by central and national support points.

### PARTNERS

**Coordinator:** Universität Mannheim

**Participants:** Institut za Ekonomska Raziskovanja, National Centre for Social Research, Syddansk Universitet, Universität Linz, The Hebrew University of Jerusalem, Uppsala Universitet, Uniwersytet Warszawski, Stockholms Universitet, Institut de Recherche et Documentation en Economie de la Santé Association, Panteion University of Social and Political Sciences, Stichting Katholieke Universiteit Brabant Universiteit van Tilburg, University College Dublin, National University of Ireland, Dublin, Narodohospodarsky Ustav Akademie ved Ceske Republiky Verejna Vyzkumna InSTITUTE, Université de Lausanne, Università Ca' Foscari di Venezia, Fundacion Centro de Estudios Monetarios y Financieros, Université de Liege, Università degli Studi di Padova



## DISTRIBUTED DYNAMIC DIVERSITY DATABASES FOR LIFE

REFERENCE	238988
CALL	FP7-INFRASTRUCTURES-2008-2
THEME	research infrastructures
SCIENTIST	Lucio Bonato
DEPARTMENT	Biology
UNIPD	participant
TOTAL COST	3,688,571 €
EU FUNDING	3,300,000 €
E-MAIL	lucio.bonato@unipd.it

### PROJECT DESCRIPTION

A coherent classification and species checklist of the world's plants, animals, fungi and microbes is fundamental for accessing information about biodiversity. The Catalogue of Life provides the world with a unique service: a dynamically updated global index of validated scientific names, synonyms and common names integrated within a single taxonomic hierarchy.

The Catalogue of Life was initiated as a European Scientific Infrastructure under FP5 and has a distributed knowledge architecture. Its federated e-compendium of the world's organisms grows rapidly (now covering well over one million species), and has established a formidable user base, including major global biodiversity portals as well as national biodiversity resources and individual users worldwide.

Joint Research Activities in this 4D4Life Project will establish the Catalogue of Life as a state of the art e-science facility based on an enhanced service-based distributed architecture. This will make it available for integration into analytical and synthetic distributed networks such as those developing in conservation, climate change, invasive species, molecular biodiversity and regulatory domains. User-driven enhancements in the presentation of distribution data and bio-data will be made.

In its Networking Activities 4D4Life will strengthen the development of Global Species

Databases that provide the core of the service, and extend the geographical reach of the programme beyond Europe by realizing a Multi-Hub Network integrating data from China, New Zealand, Australia, N. America and Brazil.

Service Activities, the largest part of 4D4Life, will create new electronic taxonomy services, including synonymy server, taxon name-change, and download services, plus new educational and popular services, for instance for hand-held devices.

### PARTNERS

**Coordinator:** The University of Reading

**Participants:** Agencia Estatal Consejo Superior de Investigaciones Cientificas, Leibniz-Institute für Meereswissenschaften an der Universität Kiel, Royal Botanic Garden Edinburgh, Deutsches Krebsforschungszentrum, Universiteit van Amsterdam, Kobenhavns Universiteit, Universiteit Utrecht, The Cancellor, Masters and Scholars of the University of Oxford, Cardiff University, National University of Ireland-Galway, Wageningen Universiteit, Universität Wien, Natural History Museum, Stichting Expertisecentrum voor Taxonomische Identificaties, Chinese Academy of Science, Botanic Gardens Conservation International, Land Oberösterreich, Bayerische Staatministerium für Wissenschaft, Forschung und Kunst, TSJ BVBA, Species 2000, Smithsonian Institution National Museum of Natural History, Narodni Muzeum, Museum and Institute of Zoology – Polish Academy of Science, Vlaams Instituut voor Zee VZW, National Museum Wales, Stichting Nationaal Natuurhistorisch Museum Naturalis, Centro de Referencia em Informacao Ambiental, Institut Royal des Sciences Naturelles de Belgique, Commonwealth Scientific and Industrial Research Organisation, Museum für Naturkunde – Leibniz Institut für Evolutions und Bioversitätsforschung an der Humboldt – Universität zu Berlin, Museum National d'Histoire Naturelle, Landcare Research New Zealand LTD, Royal Botanic Gardens kew, International Trust for Zoological Nomenclature, CAB International, Institut de Recherche pour le Developpement, Università degli Studi di Padova



## MULTINATIONAL ADVANCEMENT OF RESEARCH INFRASTRUCTURES ON AGEING

REFERENCE	261982
CALL	FP7-INFRASTRUCTURES-2010-1
THEME	research infrastructures
SCIENTIST	Guglielmo Weber
DEPARTMENT	Economics and Management
UNIPD	participant
TOTAL COST	7,663,671 €
EU FUNDING	5,499,991 €
E-MAIL	guglielmo.weber@unipd.it

### PROJECT DESCRIPTION

This proposal includes all tasks that are essential to maintain the European added value of the Survey of Health, Ageing and Retirement in Europe (SHARE) and to keep the 16 national surveys well integrated. It complements the national financing mode of data collection as result of the ESFRI process by keeping its centrifugal forces in bounds. It will keep up our excellence in service provision as well as in science by:

1. Fostering the culture of cooperation between designers and users of SHARE by organizing user conferences, offering specialized training courses for users and interviewers, expanding web services and developing standards and procedures within the network that will make more efficient use of the research infrastructure.
2. Improving the multinational services for users in EU member countries, associated countries and third countries by a more efficient centralized data base management that will provide detailed synopses and concordances across member countries. We will coordinate this work with our sister surveys in the UK, US, China, India, Japan, Korea and Thailand, thereby providing a platform for global access to ageing data.
3. Pushing the state-of-the-art in interdisciplinary panel construction further such that SHARE will maintain its status as a leading edge

research infrastructure.

The project will leverage our research on response behaviour to minimize attrition; it will develop a multi-mode interviewing facility tailored to the 50+ in order to reduce survey costs; it will develop innovative questionnaire modules on biomarkers, physical health, social networks, pension claims, time use and nutrition that will keep SHARE at the forefront of empirical science; and, with the help of EUROMOD, it will harmonizes income concepts across EU-surveys, notably EU-SILC in order to facilitate the measurement of material well-being in times of rapid demographic change with its complex implications for old-age income provision.

### PARTNERS

**Coordinator:** Max Planck Gesellschaft zur Förderung der Wissenschaften e.v.

**Participants:** Syddansk Universiteit, The Hebrew University of Jerusalem, University of Essex, Universität Mannheim, Erasmus Universitair Medisch Centrum Rotterdam, Stichting Katholieke Universiteit Brabant Universiteit van Tilburg, Centrum Analiz Ekonomicznych, Narodohospodarsky Ustav Akademie ved Ceske Republiky Verejna Vyzkumna Institute, Stichting Centerdata, University College Dublin, National Universtiy of Ireland, Dublin, Università Ca' Foscari Venezia, Institut de Recherche et Documentation en Economie de la Santé, Università degli Studi di Padova



## THE PREPARATORY PHASE FOR THE CHERENKOV TELESCOPE ARRAY (CTA –PP)

REFERENCE	262053
CALL	FP7-INFRASTRUCTURES-2010-1
THEME	research infrastructures
SCIENTIST	Mosè Mariotti
DEPARTMENT	Physics and Astronomy
UNIPD	participant
TOTAL COST	8,003,301 €
EU FUNDING	5,197,776 €
E-MAIL	mose.mariotti@unipd.it

### PROJECT DESCRIPTION

The Cherenkov Telescope Array CTA will be the first open facility for gamma-ray astronomy in the very-high-energy domain, with a performance which is dramatically improved over existing instruments in terms of sensitivity, energy coverage, survey capability and flexibility.

CTA will probe non-thermal phenomena in the Universe ‘ known to have comparable energy content to other forms of energy such as thermal radiation ‘ both in our own Galaxy and at cosmological distances, addressing questions in astrophysics, astro-particle physics, particle physics, plasma physics, cosmology, and fundamental physics.

The CTA preparatory phase ‘ CTA-PP ‘ will address a number of crucial prerequisites for the approval, construction and operation of CTA:

- the legal framework, governance schemes, and financial regulations under which CTA will be constructed and operated
- the preparation of funding agreements between potential funding agencies
- the preparation of contracts with potential host countries for the CTA instrument
- the detailed technical design and costing of the CTA observatory
- the selection of sites where CTA will be deployed, and detailing and cost-estimation of

the required site infrastructure

- the schemes for procurement and industry involvement in the technical design and construction of CTA
- the required linking with relevant science communities regarding the detailed definition of the science program, the corresponding final optimisation of the observatory layout, and the definition of user services and data access.

For CTA-PP, support is sought primarily for work on the legal, governance and financial issues, for the installation of a project office coordinating and supporting management of CTA-PP as well as the design of CTA and the planning of the implementation, and for studies regarding the optimisation and production of CTA components by industry. The ultimate delivery of CTA-PP will be a detailed implementation plan for the CTA infrastructures.

### PARTNERS

**Coordinator:** Max Planck Gesellschaft zur Förderung der Wissenschaften E.V.

**Participants:** Instituto de Fisica de Altas Energias, University of Leeds, University of Tokio, Stiftung Deutsches Elektronen-Synchrotron Desy, Universität Innsbruck, Turun Yliopisto, Commissariat à l'Energie Atomique et aux Energies Alternatives, University of Namibia, Stockholms Universitet, Noordwes Universiteit, Comision Nacional de Energia Atomica, Istituto Nazionale di Astrofisica, Universität Zurich, Uniwersytet Jagiellonski, Ruprecht-Karls Universität Heidelberg, Centre National de la Recherche Scientifique, Università degli Studi di Padova



## ADVANCING MEDITERRANEAN FOREST RESEARCH CAPACITIES

REFERENCE	245482
CALL	FP7-REGPOT-2009-2
THEME	research potential of convergence region
SCIENTIST	Davide Matteo Pettenella
DEPARTMENT	Land, Environment, Agriculture and Forestry
UNIPD	participant
TOTAL COST	1,191,800 €
EU FUNDING	986,433 €
E-MAIL	davide.pettenella@unipd.it

### PROJECT DESCRIPTION

In order to avoid an irreversible situation for Mediterranean forests in MPCs, a coordinated approach throughout the Mediterranean basin to improve forest management and policy-making based on reliable information and tools is required. AGORA will update and enlarge the scientific knowledge on the sustainable management of forests in selected MPCs through scientific cooperation and networking and targeted capacity building that uses efficiently the existing multidisciplinary knowledge and resources available in different European forest research institutions of the Mediterranean region. Coordinated forest research partnerships between centres of excellence (located in EU and an associated country) and MPCs entities with the highest research potential will be developed. This will be realised by improving scientific relationships, networking and exchanging of know-how and experience as well as by upgrading the research capacities of the MPCs forest research entities. In addition, the forest scientific strategies of the MPCs research entities' will be adjusted based on upgraded capacities.

### PARTNERS

**Coordinator:** European Forest Institute

**Participants:** Institut National de la Recherche Agronomique, Karadeniz Teknik Universitesi, Instituto Superior de Agronomia, Ecole Nationale Forestière d'Ingénieurs, Institut National de Recherches en Genie Rural, Eaux et Forests, Università degli Studi di Padova

## ETHICAL AND REGULATORY CHALLENGES RAISED BY SYNTHETIC BIOLOGY

REFERENCE	230464
CALL	FP7-SCIENCE-IN-SOCIETY-2008-1
THEME	science in society
SCIENTIST	Elena Pariotti
DEPARTMENT	Political Science, Law, and International Studies
UNIPD	participant
TOTAL COST	770,608 €
EU FUNDING	531,276 €
E-MAIL	elena.pariotti@unipd.it

### PROJECT DESCRIPTION

SYNTH-ETHICS addresses the ethical, legal and social implications of the emerging field of synthetic biology, with a special focus on biosafety and biosecurity and on notions of life. The project starts with discerning relevant ethical issues in close collaboration with the synthetic biology community. Next, the public debates around these issues are analyzed. The current ethical and regulative frameworks existing in synthetic biology and closely related fields like nanobiotechnology and genetic engineering will then be reconstructed and assessed for their ability to deal adequately with existing and newly emerging ethical issues in synthetic biology. On that basis, challenges for current regulatory and ethical frameworks will be identified and recommendations for dealing with these challenges will be formulated targeted at three relevant groups: 1) the synthetic biology community, 2) EU policy makers and 3) NGOs/ the public. The project is at the intersection of ethics, technology assessment and foresight, law, and new technologies, and expertise from all relevant fields is included in the project team. The project will build on insights and discussions from other fields such as biotechnology and nanotechnology. It will also try to assess which aspects of synthetic biology might give rise to





ethical problems of a different nature, specific to the field.

In turn, it will contribute significantly to a more adequate and proactive broadly applicable approach to the ethical aspects of new technology. It will contribute to a common understanding of synthetic biology and the ethical, legal and social issues involved in EU member states, and to the shaping of a distinct European approach without ignoring the discussions and developments in the US and elsewhere. Stakeholders views will be solicited during the project and will be taken into account, and the project will help to prepare for a rational and informed public dialogue on synthetic biology.

## PARTNERS

**Coordinator:** Technische Universiteit Delft

**Participants:** Nederlandse Organisatie Voor Toegepast Natuurwetenschappelijk Onderzoek – TNO, Karlsruher Institut für Technologie, The Australian National University, Università degli Studi di Padova

## ETHICS IN PUBLIC POLICY MAKING: THE CASE OF HUMAN ENHANCEMENT

**REFERENCE** 266660

**CALL** FP7-SCIENCE-IN-SOCIETY-2010-1

**THEME** science in society

**SCIENTIST** Fabio Grigenti

**CENTRE** Centre for Environmental Law Decisions and Corporate Ethical Certification

**UNIPD** participant

**TOTAL COST** 1,477,603 €

**EU FUNDING** 1,150,012 €

**E-MAIL** fabio.grigenti@unipd.it

## PROJECT DESCRIPTION

EPOCH aims both to broaden and deepen knowledge of the role of ethics in the governance of science and technology, focusing on ethical aspects of new and emerging bio-, neuro- and nanotechnologies and specifically related to the topic of human enhancement (i.e. any modification of the human body aimed at improving performance and realized by scientific-technological means). On the basis of comparative analyses of current governance and normative frameworks at European and national level (including non-EU countries), a comprehensive approach to the governance of contentious developments in science, technology and society will be outlined. It will include guidance and strategic options for governance activities in Europe, but also specific proposals regarding public policies on selected enhancement technologies, focusing on physical enhancement in sport.

The research will cover

- (i) academic, policy and public discourses;
- (ii) the institutional landscape of ethical policy advice;
- (iii) the multi-disciplinary expertise involved in it;
- (iv) procedures and mechanisms for a participatory, socially inclusive, and reflexive



- governance of science and technology;
- (v) specific ethical and governance challenges raised by the use of new technologies for human enhancement.

EPOCH aims to generate new insights into the role of ethical expertise in European policy making on science and technology, coherent with national and other European projects.

The comprehensive governance approach adopted will facilitate the integration of emerging technologies in an open, effective and democratic knowledge-based society. It will have a strong and critical participatory element, embedded in a broader multidisciplinary and reflexive governance framework. It will also include suggestions on how to foster, in the European Union and beyond, cross-national reflection and well-informed discussions on ethically contentious scientific and technological developments.

## PARTNERS

**Coordinator:** University of Bristol

**Participants:** Aarhus Universiteit, Universiteit Maastricht, Univerza v Ljubljani, Karlsruher Institut für Technologie, National University of Singapore, Swansea University, Centre National de la Recherche Scientifique, University of Calgary, Università degli Studi di Padova

## TRANSFERING IMPLEMENTING MONITORING EQUALITY

REFERENCE	321491
CALL	FP7-SCIENCE-IN-SOCIETY-2012-1
THEME	science in society
SCIENTIST	Silvana Badaloni
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	3,329,404 €
EU FUNDING	2,328,077 €
E-MAIL	<a href="mailto:silvana.badaloni@unipd.it">silvana.badaloni@unipd.it</a>

## PROJECT DESCRIPTION

The aim of the GenderTime project is to identify and implement the best systemic approach to increase the participation and career advancement of women researchers in selected institutions where self-tailored action plans are implemented. Institutions involved in GenderTime are intentionally very different in terms of size, discipline, history, etc. in order to experiment in various situations and to create a synergy among scientific partners. The plans will involve activities as recruitment, retention and promotion policies, supporting work-life balance measures, updated management and research standards, supporting policies for dual careers-couple, etc. To guarantee the real implementation of structural change in each Institution a central role will be assumed by the transfer agents. A crucial point will be the real commitment of organizational heads of each participant. Among the 10 partners, there are 8 scientific partners across Europe, they implement self-tailored action plans in their institutions. An external partner is in charge of the evaluation. A technical partner coordinates the project. The consortium will cooperate on common actions to transfer knowledge between relative newcomers and institutions with experience on gender aware management. Besides a measurable change in the participating institutions through evaluation instruments such as tailor-made indicators,



the outcome of the project will be to produce tested toolbox and management tools for future action plans in institutions interested in similar approaches. Comparative analysis of GenderTime experiences will identify the best self tailored actions according to cultural contexts, disciplines, etc. and the factors for a successful sustainable implementation. GenderTime objective is to contribute to an organizational and structural change in European research and to disseminate at all levels the tools to implement it.

## PARTNERS

**Coordinator:** Egalité des Chances dans les Etudes et la Profession d'Ingénieur en Europe Association

**Participants:** Interdisziplinäres Forschungszentrum für Technik, Arbeit und Kultur, Linköping University, Université Paris Est Créteil Val de Marne, Mihajlo Pupin Institute, Bergische Universität Wuppertal, Loughborough University, Fundacion Tecnalia Research&Innovation, Donau-Universität Krems, Università degli Studi di Padova

## RESPONSIBLE RESEARCH AND INNOVATION A DISTRIBUTED ANTICIPATORY GOVERNANCE FRAME. A CONSTRUCTIVE SOCIO-NORMATIVE APPROACH

REFERENCE	321427
CALL	FP7-SCIENCE-IN-SOCIETY-2012-1
THEME	science in society
SCIENTIST	Elena Pariotti
CENTRE	Centre for Environmental Law Decisions and Corporate Ethical Certification
UNIPD	participant
TOTAL COST	3,708,885 €
EU FUNDING	3,008,406 €
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## PROJECT DESCRIPTION

The EU seeks to become a genuine Innovation Union in 2020 striving for excellent science, a competitive industry and a better society without compromising on sustainability goals as well as ethically acceptable and socially desirable conditions. Europe thus needs to develop a normative and comprehensive governance framework for Responsible Research and Innovation (RRI). This is the major goal of Res-AGorA.

The Res-AGorA framework will build on existing RRI governance practices across and beyond Europe. It will be reflexive and adaptable to enable the inherent tensions in all governance of RRI to be actively addressed by procedural means aiming to facilitate constructive negotiations and deliberation between diverse actors.

The project will achieve these objectives through a set of work packages providing an empirically grounded comparative analysis of a diverse set of existing RRI governance arrangements and their theoretical/conceptual underpinnings across different scientific technological areas (WP2 and WP3), a continuous monitoring of RRI trends and developments in selected countries (WP5) ►



and, based on the cumulative insights derived from these work packages, co-construct with stakeholders the central building blocks and procedures of an overarching future governance framework for RRI (WP4).

This governance framework will deliver cognitive and normative guidance that can be applied flexibly in different contexts. Res-AGorA will thus have direct impact on RRI practices (science, industry, policy), and strategic impact in terms of the political goals (Horizon 2020) and competitiveness (Lead Market through growing acceptance of new technologies).

Res-AGorA will ensure intensive stakeholder interaction and wide dissemination of its tangible and intangible outputs in order to maximise impact, including comprehensive and interactive stakeholder engagement, liaisons with other ongoing RRI activities funded by the SiS Work Programme, and a final conference.

## PARTNERS

**Coordinator:** Fraunhofer Gesellschaft zur Förderung der angewandten Wissenschaften E.V.  
**Participants:** University of Twente, Danish Board of Technology, Institut für Höhere Studien, University of Manchester, Aarhus University, Université Paris-Est Marne-la-Vallée, Università degli Studi di Padova

## SYNTHETIC BIOLOGY - ENGAGING WITH NEW AND EMERGING SCIENCE AND TECHNOLOGY IN RESPONSIBLE GOVERNANCE OF THE SCIENCE AND SOCIETY RELATIONSHIP

REFERENCE	321488
CALL	FP7-SCIENCE-IN-SOCIETY-2012-1
THEME	science in society
SCIENTIST	Federico Neresini
CENTRE	Centre for Environmental Law Decisions and Corporate Ethical Certification
UNIPD	participant
TOTAL COST	4,590,081 €
EU FUNDING	3,960,810 €
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## PROJECT DESCRIPTION

Synthetic biology (SynBio) offers huge potential for applications in energy, health and the environment. It also brings with it various challenges such as regulatory issues of biosafety, biosecurity and intellectual property rights, as well as potential environmental and socio-economic risks in developing countries. As yet, however, there is scant public knowledge about the technology. It is thus essential to establish an open dialogue between stakeholders concerning SynBio's potential benefits and risks and to explore possibilities for its 'collaborative shaping' on the basis of public participation. SYN-ENERGY will organise a wide range of mobilisation and mutual learning processes relating to these challenges. Besides a number of well-established European and international networks, the consortium encompasses and can mobilise a wide variety of stakeholders from science, industry, civil society, policy, education, art and other areas. Learning processes will contribute to a better understanding of SynBio research and innovation and to enhanced public engagement, while at the same time stimulating

reflection on novel approaches to an inclusive governance framework that is capable of fostering responsible research and innovation. The processes will involve citizens and specific publics through well-established and innovative means of engagement, and will support the convergence of stakeholders and perspectives. Activities will be structured by four platforms, highlighting SynBio's future, public, cultural and research & innovation perspectives. The iterative mutual learning process within SYN-ENERGY will be open to change in order to accommodate the dynamics of an emergent field. By dint of its approach, design and consortium, SYN-ENERGY will be a Science in Society activity with significant impact, raising public awareness of SynBio and yielding benefits for involved stakeholders, public discourse and European policy making in an international context.

## **PARTNERS**

**Coordinator:** Karlsruher Institut für Technologie

**Participants:** Österreichische Akademie der Wissenschaften, University of Bristol, Université Paris I Pantheon-Sorbonne, Technische Universiteit Delft, Syddansk Universitet, Koninklijke Nederlandse Akademie van Wetenschappen - Knav, Universitätsklinikum Freiburg, Biofaction Kg, Vivagora, Woodrow Wilson International Center for Scholars, Zebalog GmbH & Co Kg, Eidgenössische Technische Hochschule Zürich, Technische Universität Darmstadt, De Vriend Hubrecht Cornelis, Universiteit Utrecht, Suomen Biotaiteiden Seura ry Foreningen for Biokonst i Finland Finnish Society of Bioart Fbas, Association Européenne des Expositions Scientifiques, Techniques et Industrielles, Geneart Ag, L'union Européenne des Associations de Journalistes Scientifiques Association, Univerza v Ljubljani, Rowe Eugene John - Gene Rowe Evaluations, Universitetet i Bergen, Stichting Vu-Vumc, Stadt Freiburg, Hallstrom Anders Niclas, Università degli Studi di Padova



# PEOPLE

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## GOLD (III)-BASED ANTICANCER AGENTS: DITHIOCARBAMATO-PEPTIDE DERIVATIVES AS IMPROVED INTRACELLULAR DRUG TRANSFER AND DELIVERY SYSTEMS SUPPORTED BY TRASPORTER PROTEINS

REFERENCE	204828
CALL	FP7-PEOPLE-2007-2-2.ERG
THEME	individual fellowships
MARIE CURIE FELLOW	Luca Ronconi
SCIENTIST	Dolores Fregona
DEPARTMENT	Chemical Sciences
UNIPD	coordinator
EU FUNDING	45,000 €
E-MAIL	dolores.fregona@unipd.it

### PROJECT DESCRIPTION

The ultimate objective of this research work is the preparation and evaluation of novel gold(III)-di/tripeptidedithiocarbamate complexes for combating cancer through their enhanced selective delivery at the tumor target site supported by transporter proteins. Platinum(II) drugs are now established as effective antitumour agents, the archetypal example of these being cisplatin. However, their usefulness is limited by their narrow spectrum of activity (not active enough against several types of cancer), and by both the development of acquired resistance after continuous treatment and toxicity (in particular, nephrotoxicity).

Thus, several third-generation metal-based drugs have been prepared and tested. In this contest, gold(III) compounds are emerging as a new class of metal complexes with outstanding cytotoxic properties, and are presently being evaluated as potential antitumor agents. In particular, some gold(III)-dithiocarbamate derivatives were proved to be much more cytotoxic in vitro than cisplatin, and showed encouraging results in terms of both high in vivo effectiveness and lack of nephrotoxicity. This research project is

concerned with the synthesis and characterization of new gold(III)-dithiocarbamate derivatives of di/tripeptides as improved peptide-based delivery systems, to be evaluated as antitumor drugs.

The rationale behind our proposal is to design gold(III) complexes of the type  $[\text{AuX}_2(\text{pdtc})]$  ( $\text{X} = \text{Cl}, \text{Br}$ ;  $\text{pdtc} = \text{di/tripeptidedithiocarbamate}$ ) which can be able to both maintain the antitumor properties and the lack of nephrotoxicity of the previously reported gold(III) analogues, together with an enhanced bioavailability through the di/tripeptide-mediated cellular internalization promoted by transporter proteins. Thus, the enormous potential impact of this new class of gold(III) chemotherapeutic agents relies in their possible site-specific delivery in localized cancers strongly improving their cellular uptake and minimizing unwanted side-effects.



## SMAD4 – UBIQUITINATION BY OPPOSING E3 AND DUB ACTIVITIES: A CENTRAL CONTROL ELEMENT IN TGF – BETA SIGNALING

REFERENCE	221008
CALL	PEOPLE-2007-4-2.IIF
THEME	individual fellowships
MARIE CURIE FELLOW	Masafumi Inui
SCIENTIST	Stefano Piccolo
DEPARTMENT	Chemical Sciences
UNIPD	coordinator
EU FUNDING	162,985 €
E-MAIL	stefano.piccolo@unipd.it

### PROJECT DESCRIPTION

The research here outlined deals with the relevance of ubiquitination in TGF-beta growth factor signalling. As outlined below (subchapters) TGF-beta signalling is fundamental for embryonic development and for a variety of human pathologies. In particular, recent data showed that tuning TGF-beta signalling is essential for differentiation of pluripotent cells and for cancer and metastasis. The proposal is therefore highly relevant not only scientifically but also for the socio-economic reasons.

We will place emphasis of monoubiquitination as a mechanism to regulate protein function, which is a new concept emerging in signal transduction. Multidisciplinarity. As TGF-beta is such a pleiotropic cytokine, the research is highly multidisciplinary, ranging from biochemistry of the Smad4 signal transducer, to identification of new enzymes impinging on Smad4 ubiquitination levels, and how these events ultimately impact on the embryonic development and proliferative behaviour of adult cells. The reason for me to apply to this incoming international fellowship is to linked my specific expertise, that is, the ability to carry out special type of manipulations such as depletion of maternal mRNA in *Xenopus* oocytes (that are simply not present in Europe) or

generation of transgenic frogs (poorly diffused). These technologies will be of help to the characterization of the embryonic phenotype of Smad4 modifying enzymes that are supplied maternally to the conceptus. Being the hosting laboratory a world leader in the TGF-beta signalling and embryonic development field, these expertise will now be able to spread in Europe. My own expertise will therefore integrate with those of the hosting group leading to a mutually beneficial and synergistic approach to a very complex and daring biological problem.



## TGF-BETA SIGNALING IN COLORECTAL CANCERS

REFERENCE	239528
CALL	FP7-PEOPLE-ERG-2008
THEME	individual fellowships
MARIE CURIE FELLOW	Mamidi Anant
SCIENTIST	Stefano Piccolo
DEPARTMENT	Molecular Medicine
UNIPD	coordinator
EU FUNDING	30,000 €
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### PROJECT DESCRIPTION

Colorectal cancer (CRC) is a leading cause of cancer-related death in western countries. TGFb are a family of signalling molecules delivering crucial tumor-suppressive signals to different cell types. Lack of TGFb induced cytostasis is a hallmark of cancer, and mutations of key transducers of TGFb in Colorectal cancer (CRC), albeit found only in a subset of tumors, indicates a leading role for these signals in limiting tumor progression.

In our lab we identified Ectodermin, a molecule that antagonizes TGFb responses by controlling Smad4 ubiquitination. Interestingly, Ectodermin is expressed in the normal and neoplastic human colon, and it plays a causative role in limiting the anti-mitogenic effects of Smad4 in tumor cells. Our preliminary data point at a fundamental role of Ectodermin in vivo as Smad4/TGF-b inhibitor, both during embryonic development and for adult tissue homeostasis. We propose here to exploit the genetic inactivation of Ectodermin in models of CRC progression to test if raising cellular responsiveness to tumor-suppressive signals (i.e. by disabling a key endogenous inhibitor) can oppose tumor formation/progression.

Moreover, as part of the previous Marie Curie Fellowship to the applicant, we recently characterized the function of a novel Smad4 deubiquitinating enzyme (SADE), required for TGFb signaling, opposing Ectodermin functions

in multiple cellular and development systems. We propose here to test the potential role of SADE as tumor-suppressor in CRC and to develop genetic tools to study the function of SADE in mammalian tissue homeostasis. This approach has the potential to generate novel genetic models of CRC, and to open the way for new avenues of therapeutic intervention targeting these novel enzymatic druggable targets.



## FUNCTORIAL AND ALGEBRAIC METHODS IN THE STUDY OF SYSTEMS OF LINEAR PARTIAL DIFFERENTIAL EQUATIONS

REFERENCE	273992
CALL	FP7-PEOPLE-2010-IOF
THEME	individual fellowships
MARIE CURIE FELLOW	Giovanni Morando
SCIENTIST	Andrea D'Agnolo
DEPARTMENT	Mathematics
UNIPD	coordinator
EU FUNDING	160,592 €
E-MAIL	andrea.dagnolo@unipd.it

### PROJECT DESCRIPTION

A first aim of the research project FUNALGPDE is to let the applicant get in a long contact with the Research Institute for Mathematical Sciences, Kyoto, Japan. At RIMS Dr Morando will learn new interdisciplinary methods in the algebraic study of differential equations and their applications to other fields of mathematics (representation theory, differential geometry, Hodge theory, algebraic geometry and mirror symmetry) from many internationally acknowledged mathematicians. In a second period, the project aims to reintegrate Dr Morando in the European scientific community letting him to develop his research in Europe. Moreover, the Università degli Studi di Padova will benefit of all the knowledge Dr Morando would have acquired in Japan. In particular, Dr Morando will be able to connect different research groups at the Università di Padova coming from algebra, geometry, analysis and physics. These groups seems to be heterogeneous and slightly related at a first sight but recent advances in mirror symmetry, algebraic geometry and differential equations have deepened the interconnections between them, linking very different problems and methods in mathematics and physics. Such recent techniques and results have been developed mainly in Japan and by mathematicians of the RIMS.

Dr Morando is the perfect candidate for this project. He developed very good abilities in the processes of learning, teaching and cooperating in many different countries. He already established very good cooperations with Japanese or other foreign researchers which led to important scientific achievements. He will be able to pass the acquired knowledge to various research groups inside the Università di Padova even of different scientific nature.

This project allows Dr Morando to highly increase his value inside the Università di Padova and the international scientific world in general as an expert in new interdisciplinary methods and areas at the forefront of the scientific research.



## THE ROLE OF AGEING IN THE MAINTENANCE OF VARIABILITY IN MALE REPRODUCTIVE SUCCESS

REFERENCE 272613

CALL FP7-PEOPLE-2010-IOF

THEME individual fellowships

MARIE CURIE FELLOW Clelia Gasparini

SCIENTIST Andrea Augusto Pilastro

DEPARTMENT Biology

UNIPD coordinator

EU FUNDING 267,500 €

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I will examine the consequences of fertilization by aged sperm on offspring fitness and I will study the effects of sperm ageing on sperm competitive fertilization ability. I will use a quantitative genetic approach to investigate trade-offs between males pre- and postcopulatory reproductive investment in relation to age, and reveal the genetic basis of such life-history trajectories. This work will provide new insights into the factors that maintain high variability in male reproductive success and the evolutionary process of ageing, thus addressing a key unresolved problem in evolutionary biology.

## PROJECT DESCRIPTION

Sexual selection is expected to generate intense directional selection on pre- and post-copulatory traits, however such traits typically exhibit considerable variation. This presents a paradox because directional selection is expected to progressively erode genetic variation in sexually-selected traits by driving them to fixation. Understanding how variance in male reproductive success is maintained, despite persistent directional selection for certain phenotypes, constitutes one of the major challenges in evolutionary biology. An increasing body of work shows that senescence is a biologically relevant evolutionary force, but its consequences at an evolutionary level remain poorly understood as it is a surprisingly under-investigated source of variation in reproductive success. The broad aim of this project is to study the role of ageing in the maintenance of variability in male reproductive success. The proposed experiments are designed to investigate the effects of sperm ageing and male ageing on male reproductive success with a specific focus on postcopulatory traits, using the guppy (*Poecilia reticulata*) as a model species. I will investigate the evolutionary implications of sperm senescence by determining how ageing influences sperm performance and by identifying age-related damage to sperm DNA and structure.



## HYDROMETEOROLOGICAL CONTROLS AND WARNING PROCEDURES FOR SHALLOW LANDSLIDES IN AN ALPINE REGION

REFERENCE	302720
CALL	FP7-PEOPLE-2011-IEF
THEME	individual fellowships
MARIE CURIE FELLOW	Efthymios Nikolopoulos
SCIENTIST	Marco Borga
DEPARTMENT	Land, Environment, Agriculture and Forestry
UNIPD	coordinator
EU FUNDING	193,726 €
E-MAIL	marco.borga@unipd.it

### PROJECT DESCRIPTION

Landslides are among the most widespread geological hazards on Earth. Every year in Europe, landslide-related disasters result in fatalities, property losses and environmental degradation. The tremendous societal and economical impact of this hazard necessitates the need for measures to mitigate the risk. This work is primarily focused on shallow landslides and debris flows triggered by rainfall with the ultimate goal to advance early warning procedures for this type of hazards. The spatial distribution, duration, and intensity of precipitation play an important role in triggering landslides. A long history of development in radar-based precipitation estimation has culminated in sophisticated technology and techniques to produce reliable rainfall estimates at the ground. However, the radar error structure which is important at the local scale (i.e debris flow location) is still poorly known. One of the main objectives of this proposal is the development and implementation of comprehensive algorithms to improve the accuracy of radar-rainfall estimates at scales relevant to landslide studies.

Another important aspect related to the link between rainfall and landslide initiation is the

role of soil wetness. Past studies have generally overlooked the importance of the dynamics of soil moisture on triggering landslides and treated rainfall as the only hydrometeorological control. To advance our understanding and thus prediction of landslides we need to account for the effect of both variables. To address this issue, application of a hydrologic model will be carried out to derive information on the hydrologic state variables during landslide initiation and investigate the combined role of soil moisture and rainfall characteristics on the occurrence of landslides. Finally, a set of procedures will be developed to incorporate improved radar estimates and soil moisture information to provide warnings and assist landslide risk management in an alpine region.



## PRIVACY AND SECURITY FOR MOBILE DEVICES

REFERENCE	321980
CALL	FP7-PEOPLE-2012-CIG
THEME	individual fellowships
SCIENTIST	Mauro Conti
DEPARTMENT	Mathematics
UNIPD	coordinator
EU FUNDING	100,000 €
E-MAIL	mauro.conti@unipd.it

### PROJECT DESCRIPTION

We propose PRISM CODE project (PRIVacy and Security for Mobile COoperative DEvices). The aim of this project is to design some of the fundamental tools for privacy and security of the upcoming distributed services, which are built upon the cooperation of mobile personal devices like smartphones, PDAs, or tablets. In analogy with the geometric prism which is built on two parallel bases, we believe that a wide adoption of cooperative services for mobile devices is possible only on the following two bases, to be present at the same time: privacy, to give to the users and other stakeholders some confidence that no private information will be disclosed by taking part in those services; and security, to guarantee (to some extent) that the services will not be exploited in a malicious way (e.g. having no money loss for stakeholders).

This four-year project will be executed by Dr. Mauro Conti (as Principal Investigator) at the University of Padua, Italy, which recently granted him a stable research post as Assistant Professor. This position is subject to an evaluation after the third year. Upon a positive evaluation, the position will become permanent. This grant will improve considerably the research results of the fellow, hence the prospects for his permanent integration.

## EXTENDING THE OPTIC ATROPHY 1 DEPENDENT CRISTAE REMODELING: FROM MODELS TO A RATIONALE FOR THERAPY OF AUTOSOMAL DOMINANT OPTIC ATROPHY

REFERENCE	618697
CALL	FP7-PEOPLE-2013-CIG
THEME	individual fellowships
SCIENTIST	Luca Scorrano
DEPARTMENT	Biology
UNIPD	coordinator
EU FUNDING	100,000 €
E-MAIL	luca.scorrano@unipd.it

### PROJECT DESCRIPTION

Autosomal dominant optic atrophy (ADOA) is caused by mutations in Optic Atrophy 1 (OPA1), a dynamin-related protein of the inner mitochondrial membrane. During the last years, we clarified that OPA1 is a multifunctional protein participating in genetically distinct pathways of mitochondrial fusion and cristae remodelling, both impaired by pathogenetic mutations. We extended our investigation on the (dys)function of OPA1 and our preliminary results indicate that (i) OPA1 is a key modulator of apoptosis and autophagy in vivo; (ii) OPA1 is a master regulator of mitochondrial cristae architecture, impacting on respiratory chain supercomplex assembly and mitochondrial metabolism; (iii) increased autophagy in axons of retinal ganglion cells carrying pathogenic OPA1 depletes them of mitochondria; (iv) OPA1 resides in multimolecular complexes that comprise potential keyregulators of its multiple functions. We therefore hypothesize that by engaging in interactions with different partners, OPA1 regulates mitochondrial functions. Its mutations increase autophagy and susceptibility to apoptosis, especially in RGCs. These multiple regulatory points offer several potential targets for therapeutic strategies that can interfere with





the natural course of the disease. In order to verify our hypothesis, we plan to address: (i) how OPA1 regulates mitochondrial metabolism from the cristae; (ii) how changes in OPA1 levels and function impinge on autophagy, especially in RGC; (iii) if the changes in mitochondrial metabolism and autophagy can be exploited therapeutically in vitro and in vivo. This integrated approach aims at unravelling the pathogenesis of ADOA, and therefore to pave the way for its treatment. At the same time, we expect to clarify how mitochondria participate in key cellular metabolic and quality control processes.

## LANGUAGE, COGNITION AND GENDER

REFERENCE	237907
CALL	FP7-PEOPLE-ITN-2008
THEME	networks
SCIENTIST	Anne Maass
DEPARTMENT	Developmental Psychology and Socialisation
UNIPD	participant
EU FUNDING	4,106,379 €
E-MAIL	anne.maass@unipd.it

### PROJECT DESCRIPTION

The Initial Training Network - Language, Cognition, and Gender (ITN LCG) investigates European languages from an interdisciplinary perspective to expand current knowledge of how language influences and forms the cognitive representations of women and men. The diversity of Europe offers a unique opportunity to investigate the impact of language and culture in establishing and maintaining gender inequality. This issue has not yet been systematically addressed on a large scale, although the reduction of gender inequality is generally considered an important issue within Europe. Therefore, ITN LCG will provide a structured interdisciplinary research training programme for young researchers in the emerging supra-disciplinary field of language, cognition, and gender to enhance the scientific understanding of this topic and improve the quality of initial research training in Europe. For the first time, these lines of research will be investigated from cross-language and cross-cultural perspectives by bringing together 10 complementary providers of research-training and 12 associated partners from public and private sectors.

ITN LCG has four interrelated research objectives:

- deriving indices for selected European languages that reflect the extent to which the features of a language result in gender related representations in speakers/listeners, ►



- investigating to what extent gender equality in formal standards of language and the use of gender-fair language correlates with higher levels of socio-economic gender equality,
- analyzing the impact of language on gender stereotyping in social judgment and decision making, and
- developing and evaluating scientifically-based prototypes of guidelines and training tools for gender-fair communication in European languages.

ITN LCG will strengthen the capability of its young fellows to contribute effectively to our knowledge-based economy and society, and will add to their intersectoral and transnational employability.

## PARTNERS

**Coordinator:** Universität Bern

**Participants:** Università degli Studi di Modena e Reggio Emilia, BCBL – Basque Center on Cognition Brain and Language, Université de Fribourg, Jihočeská Univerzita v Českých Budejovicích, Ruprecht-Karls-Universität Heidelberg, NTNU – Norges Teknisk-Naturvitenskapelige Universitet, University of Sussex, Freie Universität Berlin, Università degli Studi di Padova

## EUROPEAN RESEARCH TRAINING NETWORK OF NEW MATERIALS: INNOVATIVE CONCEPTS FOR THEIR FABRICATION, INTEGRATION AND CHARACTERIZATION

REFERENCE	238409
CALL	FP7-PEOPLE-ITN-2008
THEME	networks
SCIENTIST	Eugenio Tondello
DEPARTMENT	Chemical Sciences
UNIPD	participant
EU FUNDING	3,697,708 €
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## PROJECT DESCRIPTION

The multi-site European initial training network ENHANCE New Materials: Innovative Concepts for their Fabrication, Integration and Characterization will be established to deal with the mid and long term issues of concern to the European industry encompassing the whole spectrum of functional materials for microelectronics, nano-electronics, data storage, photovoltaic, with emphasis on emerging nano-technologies.

This network consisting of 3 academic groups from chemistry 1 from physics, 3 from Material Science and Engineering and 1 industrial partners from 6 different countries of Germany, Finland, Netherlands, Italy, Denmark and Austria. Despite the exceptional importance of thin film processing of many new materials and their integration in emerging nanotechnologies, there is no systematic interdisciplinary training of students in the traditional courses of chemistry, materials science and engineering. ENHANCE aims to close this gap by combining the classical knowledge of chemistry, materials science, physics and engineering i.e. the knowledge of precursor molecules, materials properties, study of physical phenomena, to electronic devices and circuit integration.



The training of ENHANCE fellows will be based on a structured 3 year academic curriculum, including, generic skills workshops and on-site research training at the state of the art laboratories, facilities under clean room conditions and a training at the industrial laboratories. This will provide the young scientists with necessary in-depth knowledge in materials synthesis and thin film processing as well as experimental skills in operating the instruments and analytical skills in different materials characterization techniques.

The training concludes with European doctoral examination and will be reviewed by external experts in the field and their remarks will be addressed during the final disputation.

## PARTNERS

**Coordinator:** Ruhr Universität Bochum

**Participants:** Teknologisk Institut, Technische Universiteit Eindhoven, Aixtron AG, Forschungszentrum Juelich GmbH, Technische Universität Wien, Helsingin Yliopisto, Università degli Studi di Padova

## CONSTRUCTIVE MATHEMATICS: PROOF AND COMPUTATION

REFERENCE	230822
CALL	FP7-PEOPLE-IRSES-2008
THEME	networks
SCIENTIST	Giovanni Sambin
DEPARTMENT	Mathematics
UNIPD	participant
EU FUNDING	57,600 €
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## PROJECT DESCRIPTION

The proposed programme focuses on constructive analysis, algebra and topology, the extraction and implementation of programs from formal proofs, and constructive reverse mathematics. Through a network of three European and two third-country institutes, all of them among the leading groups in the relevant research, we aim at facilitating the interplay between the above branches of constructive mathematics, which range from the foundations of mathematics to real-world applications in computer science.

## PARTNERS

**Coordinator:** Ludwig-Maximilians-Universität München

**Participants:** Università degli Studi di Padova



## MUSCLE Z-DISK PROTEIN COMPLEXES: FROM ATOMIC STRUCTURE TO PHYSIOLOGICAL FUNCTION

REFERENCE	238423
CALL	FP7-PEOPLE-ITN-2008
THEME	networks
SCIENTIST	Gerolamo Lanfranchi
DEPARTMENT	Biology
UNIPD	participant
EU FUNDING	2,672,772 €
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### PROJECT DESCRIPTION

Movement is vital to all living organisms, from the transport of single molecules in cells to the movement of entire organisms. Sarcomeres are the smallest cellular unit behind the operation of skeletal and heart muscles. Furthermore, dysfunctional sarcomeres are responsible for a long list of diseases that reduce the quality of life and burden the health care sector throughout the world. Understanding the function of sarcomere Z-disk the focus of MUZIC - requires knowledge ranging from cellular dynamics to structural details of individual molecules and complexes. Such knowledge of molecular and cellular mechanisms, in healthy and diseased muscle cells, should lead to novel treatments of muscle diseases. Generating such knowledge - at the interface between cellular and structural biology - requires research workers with a much broader training than is currently available. To provide this, a unique blend of cellular and structural biology laboratories with a focus on muscle research, united in the MUZIC network, will aim to bridge the gap between cellular and structural biology by training young researchers as "Cellular Structural Biologists". A training program will be created that meshes these disciplines and provides young researchers with a unique set of skills in methods, management and communication. Mentoring will play a crucial role in the training process.

Critically advance knowledge of the molecular components and the cellular mechanisms involved in the function, dynamics and regulation of the muscle Z-disk. This will be achieved by studying the Z-disk at different levels of complexity, from atomic structure to physiological function, by combining molecular and cell biology approaches, together with investigation of the molecular structures. Through training a new type of scientist with a unique set of skills, and through studies on muscles in both health and disease, this network shall have a profound impact on and future research in this area.

### PARTNERS

**Coordinator:** Universität Wien

**Participants:** Technische Universität München, University of Leeds, King's College London, Materials Evitraproteoma AB, Rheinische Friedrich-Wilhelms Universität Bonn, Jyväskylä Yliopisto, European Molecular Biology Laboratory, Università degli Studi di Padova



## RECOGNITION AND CLEAVAGE OF BIOLOGICAL PHOSPHATES MOLECULAR RECOGNITION, MECHANISM AND BIOMEDICAL APPLICATIONS

REFERENCE	238679
CALL	FP7-PEOPLE-ITN-2008
THEME	networks
SCIENTIST	Paolo Maria Scrimin
DEPARTMENT	Chemical Sciences
UNIPD	participant
EU FUNDING	2,535,051 €
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### PROJECT DESCRIPTION

Chemical Biology is a new, supra-disciplinary field that unites the classically separate disciplines of Chemistry and Biology. This network is centred around understanding the central biological process of phosphate transfer and combines leading experts in synthetic chemistry, enzyme model building, kinetic analysis, protein chemistry and directed evolution in a concerted effort to gain a quantitative understanding of transition states that are key to understanding how biological systems can achieve phosphate transfer with unrivalled efficiency. The quantitative language (i.e. kinetic and molecular recognition studies) used to describe and improve natural enzymes unites all participants and provides the theme for our training programme on analysis of phosphate transfer catalysis. Training in this area is highly interdisciplinary in nature requiring a joint effort of chemists and biologists centred around mechanistic thinking, which is at the core of this proposal. Ultimately our understanding of this central bio-reaction should lead to useful applications on the long term, e.g. as artificial nucleases, with potential roles in gene regulation, if efficient catalysis can be combined with selective recognition. This proposal is part of a long-term strategy aimed at developing reagents which act by binding

or catalytically (thus as artificial enzymes) to interfere with the expression of specific genes. This can be achieved through selective binding eventually (but not necessarily) followed by cleaving the nucleic acid backbone. Crucially for therapeutic success these reagents have to be delivered into the cell, which is why delivery issues are also addressed. The incorporation of industrial partners ensures that the full life-span of drug development is covered in this training programme.

### PARTNERS

**Coordinator:** The Chancellor, Masters and Scholars of the University of Cambridge

**Participants:** The University of Sheffield, Johann Wolfgang Goethe Universität Frankfurt am Main, Wallac Oy, Karolinska Institutet, Avaris Ab, Turun Yliopisto, Universiteit Gent, Università degli Studi di Padova



## QUANTUM CONTEXTUAL INFORMATION ACCESS AND RETRIEVAL

REFERENCE	247590
CALL	FP7-PEOPLE-2009-IRSES
THEME	networks
SCIENTIST	Massimo Melucci
DEPARTMENT	Information Engineering
UNIPD	participant
EU FUNDING	208,800 €
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### PROJECT DESCRIPTION

The huge number and diversity of the users, the advertising products and services, the rapid growth of online resources have imposed new challenges to the conventional search. Queries are becoming even more broad and complex essentially due to context of the search process (e.g. the system, user, language, the word and action meaning, socio-psychological dimensions, interface and interaction methods). Over the past three decades, the research in IAR had led to various search engine models, such as vector space and probabilistic models. Unfortunately there has been no comprehensive investigation at the theoretical level for effectively integrating elements of context to create advanced search technology. The key issue preventing such research is a lack of a unified theoretical framework to seamlessly integrate the dimensions of context into the search engine models and into the evaluation protocols. This proposal is hinged on the belief that the dimensions of context can be naturally integrated into a generic and fundamental framework. To address the challenges of the dimensions of context in IAR this proposal shows a new vision of the IAR paradigm based on Quantum Theory (QT). This proposal starts from Van Rijsbergen's seminal book. QT allows to measure relevance and context via projection, and probability of relevance via the trace, to logically reason through

lattice of document structures and links, to change context via unitary operators, to handle correlations dependencies as density operators, to represent composite, entangled documents and features for which classical correlations cannot straightforwardly be used. The work independently done so far for some years by the partners suggest that more effective results can be obtained only if the expertises are exchanged through a network which would allow the partners to work together and exchange a wide range of expertises which is hardly possessed by a single team.

### PARTNERS

**Coordinator:** Università degli Studi di Padova  
**Participants:** The Robert Gordon University, Vrije Universiteit Brussel, University of Glasgow, The Open University



## FUNCTIONAL NITRIDES FOR ENERGY APPLICATIONS

REFERENCE	264873
CALL	FP7-PEOPLE-2010-ITN
THEME	networks
SCIENTIST	Paolo Colombo
DEPARTMENT	Industrial Engineering
UNIPD	participant
EU FUNDING	3,057,346 €
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### PROJECT DESCRIPTION

The FUNEA vision is to develop an integrated and multidisciplinary research and training programme in the field of inorganic nitrides for energy applications. In terms of fundamental research, the FUNEA aims to advance the state-of-the-art knowledge and understanding of inorganic nitrides and mixed nitride-anion systems by achieving the ability to synthesise, manipulate, characterize, understand and model binary and ternary nitrides and oxonitrides with functional properties. By this a breakthrough in the nitride chemistry will be achieved steering in a new era for materials with advanced functionality and exceptional levels of performance. In terms of technological applications, the FUNEA focuses on the energetic applications of novel nitride-based materials with this addressing the main needs of the 21st century.

To meet this vision, eight European academic research groups with complementary expertise in the synthesis, processing and characterization of materials and five industrial partners, each of whom have made a commitment to study these new functional nitrides, have decided to create a network of scientific cooperation with the following goals: (i) to create an interdisciplinary approach to the synthesis, processing and characterization of novel nitrides for energy applications, (ii) to train high-quality young researchers, experienced in the interdisciplinary science of the nitrides. These young professionals

will lead the field forward and onward to its bright future in the European science and technology. Specifically, FUNEA aims to train 11 ESRs and 2 ERs with an overall target of 40% women researchers, and (iii) to establish a European network of scientists in academic institutes and industry in the field of inorganic nitrides, that will continue to grow and enhance European competitiveness over the next years.

### PARTNERS

**Coordinator:** Technische Universität Darmstadt

**Participants:** Stockholms Universitet, MDA Ileri Teknoloji Seramikleri Sanayi Ticaret Limited Sirketi, AZ Electronic Materials GmbH, Università degli Studi di Trento, Université Montpellier 2 Sciences et Techniques, Universität Bayreuth, Ustav Anorganickej Chemie Slovenskaakademia Vied, Faurecia Emissions Control Technologies Germany GmbH, Centre National de la Recherche Scientifique, Università degli Studi di Padova





## GLASS AND CERAMIC COMPOSITES FOR HIGH TECHNOLOGY APPLICATIONS

REFERENCE	264526
CALL	FP7-PEOPLE-2010-ITN
THEME	networks
SCIENTIST	Enrico Bernardo
DEPARTMENT	Industrial Engineering
UNIPD	participant
EU FUNDING	3,887,077 €
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### PROJECT DESCRIPTION

The aim of this project is to offer a multidisciplinary training in the field of high-tech glasses and composites, in tight contact with companies and universities within this consortium. Our scientific goals are to develop advanced knowledge on glass based materials and to develop innovative, cost-competitive, and environmentally acceptable materials and processing technologies. The inter/multi-disciplinary characteristic is guaranteed by the presence, within this consortium, of five academic partners and five companies, from six countries, having top class expertise in glass science and technology, modelling, design, characterization and commercialization of glass and composite based products. Beside, new high-tech glass-based materials (glasses, glass-ceramics, glass- and glass-ceramic composites and fibbers) are themselves an emerging supra-disciplinary field: expertise on these new materials bring competitiveness in strategic fields as medicine (bioactive glasses as bone replacement and drug delivery systems), telecommunications (glass devices for broad-band applications), photonics (glass based photonic sensors), clean energy (Solid Oxide Fuel Cells glass sealants), waste management (vitrification and re-use of wastes). The scientific quality of the research programme is guaranteed by the quality of the academic and industrial partners, as well as from their

proven success stories in previous EU projects participation and international ranking. The originality of the research programme is to be seen in the supra-disciplinary approach to new glass-based materials and their applications: recruited researchers can benefit of a complete set of equipments and expertise able to develop advanced knowledge in highly strategic fields for EU, such as medicine, telecommunications, photonics, clean energy production and waste management.

### PARTNERS

**Coordinator:** Politecnico di Torino

**Participants:** Nanoforce Technology Limited, Friedrich – Alexander Universität Erlangen Nurnberg, Colorobbia Italia SPA, Materials Engineering Research Laboratory Limited, Ustav Fyziky Materialu-Akademie ved Ceske Republik, Centre National de la Recherche Scientifique, Università degli Studi di Padova



## SENSITIVITY ANALYSIS FOR DETERMINISTIC CONTROLLER DESIGN

REFERENCE	264735
CALL	FP7-PEOPLE-2010-ITN
THEME	networks
SCIENTIST	Fabio Ancona
DEPARTMENT	Mathematics
UNIPD	participant
EU FUNDING	5,700,591 €
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### PROJECT DESCRIPTION

Optimisation-based design of control systems is concerned with determination of control strategies for complex, dynamical systems, to optimise some measures of best performance. It has the potential for applications to a wide range of fields, including aerospace, chemical processing, transportation systems and resource economics. The multi-partner initial training network SADCO aims at: Training young researchers and future scientific leaders in the field of control theory with emphasis on two major themes sensitivity of optimal strategies to changes in the model specifications, and deterministic controller design; Advancing the theory and developing new numerical methods; Conveying fundamental scientific contributions within European industrial sectors. In order to achieve these objectives, SADCO establishes a collaborative research and training network of eleven full partners from both the academic and industrial sectors, and gathers participants with expertise in complementary disciplines in mathematics and engineering. The network also offers a complete range of theoretical, practical and complementary training. SADCO will work together with the young researchers to develop and implement effective training plans tailored to each individual requirements. Multi-disciplinary training based on the integrated scientific programme,

secondments, regular meetings, active networking, will ensure the success of this project. The development of new 'clean' technologies in power, transportation and other domains is a major opportunity for EU industries. The proposed research programme will help place EU universities in the forefront of Optimal Control, a field of mathematics that supports these technologies. The training programme, based on institutions covering the principal areas of the field, will provide a new generation of young mathematicians and engineers with broad skills in Optimal Control, which are not readily acquired at one institution alone.

### PARTNERS

**Coordinator:** Institut National de Recherche en Informatique et en Automatique

**Participants:** Imperial College of Science, Technology and Medicine, Katholieke Universiteit Leuven, Universidade do Porto, Astrium S.A.S, Université Pierre et Marie Curie – Paris 6, Università degli Studi di Roma La Sapienza, Universität Bayreuth, Astos Solutions GmbH, Volkswagen AG, Università degli Studi di Padova



## SOLUTIONS FOR ADAPTED FOREST MANAGEMENT STRATEGIES UNDER THE THREAT OF CLIMATE CHANGE- LEARNING FROM A CLIMATE GRADIENT FROM GERMANY OVER ITALY TO SOUTH AFRICA

REFERENCE	295136
CALL	FP7-PEOPLE-2011-IRSES
THEME	networks
SCIENTIST	Raffaele Cavalli
DEPARTMENT	Land, Environment, Agriculture and Forestry
UNIPD	participant
EU FUNDING	205,800 €
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### PROJECT DESCRIPTION

Forests play an important role in carbon fixation and in providing CO<sub>2</sub> neutral raw materials. Due to predicted climate changes it is important to know to what extent European forests will be impacted by climate change, how best to mitigate these potential changes through adaptive forest management strategies, maintain current carbon fixation rates and minimize carbon emissions by forest operations. By utilizing the unique temperature and moisture gradient along a north-south orientation from Germany to Italy and South Africa, and with South Africa's warmer climate and arid conditions, it is potentially possible to simulate future predicted climatic conditions in Europe. This methodology will also allow observations of the characteristics and behaviour of close-to-nature forests versus plantation forests as found in each of the partner countries under climate change conditions. As deliverable, existing management tools will be adapted and improved to be able to provide predictions for suitable management strategies under climate changes conditions.

### PARTNERS

**Coordinator:** Technische Universität München  
**Participants:** Berner Fachhochschule, Università degli Studi di Padova

## MULTISCALE MODELLING OF LANDSLIDES AND DEBRIS FLOWS

REFERENCE	289911
CALL	FP7-PEOPLE-2011-ITN
THEME	networks
SCIENTIST	Bernhard Schrefler Lorenzo Sanavia
DEPARTMENT	Civil, Environmental and Architectural Engineering
UNIPD	participant
EU FUNDING	4,318,727 €
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### PROJECT DESCRIPTION

Landslides and debris flows are serious geo-hazards common to countries with mountainous terrains. The high speed and the enormity of debris mass make debris flows one of the most dangerous natural hazards. Debris flows are often triggered by landslides partially or completely mobilizing into debris flows. Globally, landslides cause billions of dollars in damage and thousands of deaths and injuries each year. The numerous devastating events worldwide have made us aware of the complexity of landslides and debris flows and our insufficient knowledge to make reliable predictions. Traditional tools for prediction and design are based on limit equilibrium analysis for landslides and shallow water model with Finite Difference solver for debris flows. Usually soil and debris are modelled as single phase materials with constant material properties. That the simple models are unable to account for the complex behaviour of landslides and debris flows, which can be best described as multiphase and multiscale, is well known to researchers and stakeholders. Obviously there is an urgent need for better understanding of the triggering mechanisms, for reliable prediction of runout dynamics, deposition pattern and impact forces and for rational design of stabilization and protection structures. The last decade saw



rapid developments in advanced constitutive models, experimental techniques in laboratory and in-situ, mechanics of multiphase media, localized deformation analysis, Discrete Element Method (DEM), advanced Finite Element Method (FEM) and Computational Fluid Dynamics (CFD). Training in these subjects has been rather sporadic and scattered in various disciplines. By integrating these advances into a coherent research network we expect to achieve the breakthrough in the research on landslides and debris flows, i.e. a consistent physical model with robust numerical scheme to provide reliable prediction and rational design of protection measures for landslides and debris flows.

## PARTNERS

**Coordinator:** Universität für Bodenkultur Wien  
**Participants:** The University of Nottingham, Itasca Consultants GmbH, Centre Internacional de Metodes Numerics en Enginyeria, Eidgenössische Technische Hochschule Zürich, Ove Arup & partners International Limited, Institut Polytechnique de Grenoble, Baugrund Dresden Ingenieurgesellschaft MBH, Technische Universität Darmstadt, Teerag – Asdag AG, Bundesforschungs – und Ausbildungszentrum für Wald, Naturgefahren und Landschaft, Institut National de Recherche en Sciences et Technologies pour l'Environnement et l'Agriculture, Università degli Studi di Padova

## REPLICATION AND ADAPTATION IN MOLECULAR NETWORKS

REFERENCE	289723
CALL	FP7-PEOPLE-2011-ITN
THEME	networks
SCIENTIST	Leonard Jan Prins
DEPARTMENT	Chemical Sciences
UNIPD	participant
EU FUNDING	3,036,050 €
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## PROJECT DESCRIPTION

Systems Chemistry (the chemistry of complex mixtures of interacting molecules) is a rapidly developing new frontier in the chemical sciences. Where chemistry has for centuries been a firmly reductionist science, Systems Chemistry breaks with this tradition by focussing on complexity and emergent behaviour.

This network brings together nearly all major academic players active in Europe on experimental approaches to Systems Chemistry in general and molecular networks in particular. Our consortium is of exceptional quality and is a balanced mix of highly experienced scientists with multiple publications in Science and/or Nature and talented young scientists of whom four have recently been awarded prestigious ERC starting grants. We have two full partners from industry that provide essential analytical support and the perspective on commercialisation of complex chemical systems. Aim of our high-level consortium is to provide a comprehensive high-quality training program on Systems Chemistry, in the context of a cutting-edge and wide-ranging research program, focusing on two important phenomena: adaptation and replication in molecular networks. These subjects will be developed towards application in enantioselective organoautocatalysis, molecular Boolean logic protocols, self-synthesising materials that exhibit electronic conductivity and adaptive biological functionality, sensing of bio-analytes, assessing

molecular similarity and materials for anti-counterfeiting.

Our comprehensive training and research program will deliver a new generation of young researchers eager to push the frontiers of the rapidly emerging field of Systems Chemistry, expanding European lead in this exciting new area.

## PARTNERS

**Coordinator:** Rijksuniversiteit Groningen

**Participants:** Ecole Polytechnique Federale de Lausanne, Ruhr-Universität Bochum, Centre Nationale de la Recherche Scientifique, The University Court of the University of St Andrews, NMRTEC SAS, Ben-Gurion University of the Negev, Informium AG, University of Strathclyde, Università degli Studi di Padova

## VENETO RESEARCHERS' NIGHT

REFERENCE	287344
CALL	FP7-PEOPLE-2011-NIGHT
THEME	networks
DEPARTMENT	Int. Research Office
UNIPD	participant
TOTAL COST	273,995 €
EU FUNDING	85,000 €
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## PROJECT DESCRIPTION

On the wave of the success of the 2010 Researchers Night in Venice, other two extraordinary cities of the Veneto region, Padua and Verona, will join the 2011 Veneto Researchers Night. Venice, Padua and Verona host four of the most prestigious Italian universities together with the research centres, companies and local institutions that will be part of the projects consortium.

On 23rd September several activities will be organized in the three historical city centres. Researchers will be performers, guides, animators, always interacting with the public at large. The key focus will be to discover all aspects of life and scientific career of the researchers, showing that they are ordinary people with an amazing job. The events will be different for each location, taking advantage of the diverse characteristics and contexts: a soccer championship, artistic and scientific laboratories, treasure hunts, concerts, discos, guided tours to the cities and to their cultural centres, readings in the cafes, poster exhibitions, activities for children, informal conferences. Six European corners, settled in strategic points of the cities, will host games, videos, music, demonstrations and interactive activities, encouraging the participants to approach the Research World and its European dimension.

The project will bring researchers face-to-face with the broad public by shading light on how researchers life and work are closely related to society and common people. The communication



campaign, common for the three cities involved, will be planned and tailored to the event in order to reach at least 300.000 people.

General public and researchers will be involved before the event, encouraged to post on the website individual messages or questions they would like to send to the researchers of the future. 10000 participants and an effective media coverage are expected. A reinforced impact assessment will include questionnaires and interviews on the event.

## PARTNERS

**Coordinator:** Università Ca' Foscari Venezia

**Participants:** Università IUAV di Venezia, Università degli Studi di Verona, Comune di Venezia, Fondazione Eni Enrico Mattei, Unione Regionale delle Camere di Commercio Industria Artigianato e Agricoltura del Veneto, Università degli Studi di Padova

## HYDRODYNAMIC TRANSPORT IN ECOLOGICALLY CRITICAL HETEROGENEOUS INTERFACES

REFERENCE	316546
CALL	FP7-PEOPLE-2012-ITN
THEME	networks
SCIENTIST	Andrea Marion
DEPARTMENT	Industrial Engineering
UNIPD	coordinator
EU FUNDING	3,770,019 €
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## PROJECT DESCRIPTION

Physical, biochemical and ecological processes in natural water bodies have been the subject of intense research over the past decades by scientists of different expertise. Environmental studies related to natural water bodies are a relatively new area of research, spanning over no more than fifty years. The dawning of environmental studies in the late 20th century has seen developments mainly confined to individual classical areas of expertise, with relatively small degree of interactions among specialities. The development of a truly interdisciplinary approach to environmental studies in a holistic perspective appears one of the main challenges of the new century. This project aims at the training of new technical and scientific figures which can bring innovation in environmental applications and problem solving. The training activity will cover the transport of inorganic and organic matter, including solutes, colloids and sediments in river flows and across the boundary interfaces. Understanding of transport mechanism is a predestined stepping stone towards the ability to assess the vulnerability of the natural environment to anthropogenic stresses. The crucial role of heterogeneities of the stream geometry, of the nature and composition of interfacial matter, and of transported matter, will be emphasized by appropriate experimental and mathematical tools. Direct observations



and measurements of transport and ecological processes, using up-to-date instrumentation and investigation procedures, will play a major part in the research and training programme. The participation of the private sector in the training activities will be a key element to guarantee the direct transfer of methods and results into the professional and technical market. The trainees will build specific competence in modern environmental technologies, achieve state-of-the-art knowledge and practical skills building on an existing academic degree in engineering or environmental sciences.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Centre National de la Recherche Scientifique, Wet Engineering SRL, Stichting Koninklijk Nederlands Instituut voor Zeeonderzoek (NIOZ), University of Bradford, Technische Universität Braunschweig, Politecnico di Milano, Gertsgraser Christoph Gerstgraser Ingenieurbüro für Renaturierung (GIR), The University Court of the University of Aberdeen, GHT Photonics SRL

### INSECT TIMING

REFERENCE	316790
CALL	FP7-PEOPLE-2012-ITN
THEME	networks
SCIENTIST	Rodolfo Costa
DEPARTMENT	Biology
UNIPD	participant
EU FUNDING	3,999,988 €
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### PROJECT DESCRIPTION

INsecTIME seeks to train the next generation of ESRs in the intellectual, technological, complementary and commercial skills required for future European competitiveness in the area of biological timing, an area with considerable commercial potential. The scientific focus will be on circadian and seasonal rhythms in the model insect, *Drosophila*, which has proved particularly relevant for understanding temporal aspects of human health and well-being, plus non-model insects such as the parasitoid wasp and olive fruitfly, two species with major economic implications. The work is multidisciplinary, bringing together scientists from academia and the private sector with different skills in neurogenetics, genomics, life history biology, mathematical modelling, biocomputing, biological control, anatomy and population genetics. Through synergistic interactions via secondments to world class research institutions and to applied entomology and biocomputing SMEs, training workshops, and instruction in transferable skills, young researchers will learn the full-range of cutting-edge technical skills allied to an appreciation of the commercial possibilities of their work. Their obligatory secondments to SMEs will include training in the management, organisation and finance of the private sector, and be buttressed by further workshop courses in general bio-commerce, intellectual property, marketing, raising capital etc. They, and their supervisors will contribute





to outreach programmes, and the ERSs and ERSs will be guided in the development of their own personal career portfolios, with ERSs submitting doctoral theses. Our young researchers will represent the next crop of technically well-trained, but unusually, commercially aware, computer and mathematically literate molecular neurogeneticists, whose versatile skills will enhance pan-European collaborations for years to come.

## PARTNERS

**Coordinator:** University of Leicester

**Participants:** Queen Mary and Westfield College – University of London, Uniwersytet Jagiellonski, Actual Analytics LTD, Oxitec Limited, Julius – Maximilians Universität Würzburg, Rijksuniversiteit Groningen, Centre National de la Recherche Scientifique, Biologiske Centrum AV CR V.V.I., Università degli Studi di Padova

## RADICAL REDUCTION OF OXIDATIVE STRESS IN CARDIOVASCULAR DISEASES

REFERENCE	316738
CALL	FP7-PEOPLE-2012-ITN
THEME	networks
SCIENTIST	Fabio Di Lisa
DEPARTMENT	Biomedical Sciences
UNIPD	participant
EU FUNDING	3,935,721 €
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## PROJECT DESCRIPTION

Cardiovascular disease (CVD) constitutes a major and increasing health burden in developed countries. The prediction is that the prevalence of these conditions will increase by ~60% over the next 20 years. Therefore, the development of novel treatments for patients with CVD becomes more and more urgent. Oxidative stress is an important molecular contributor to the pathogenesis of CVD. However, oxidative stress-related therapeutic strategies are still missing. This ITN consortium links investigators highly active in the field of oxidative stress-signalling, and will strongly enhance collaborative research and integrate complementary interests to obtain innovative science and outstanding in-depth integrative multidisciplinary training possibilities. The scientific aims of this ITN proposal entitled ‘RADical reduction of OXidative stress in cardiovascular disease (RADOX)’ are to characterize the specific sources of reactive oxygen species (ROS) and their interaction in CVD and to use this knowledge to develop diagnostic tools for the detection and quantification of ROS and their subcellular targets. This will lead to new therapeutic strategies which modulate the activity of these specific sources of ROS. This RADOX consortium, containing 9 full partners (7 academic and 2 private) and 7 associate partners (1 academic and 6 private) will train 11ESR and ►



4ER. The mission of this ITN consortium is to create in a period of 4-years the future leaders in this field. Our trainees will receive unequalled multidisciplinary scientific and transferable skills training which will make them ready for leading positions in academia or industry. The training in this programme will be at 3 levels i.e. through research under supervision, transferable skills and secondments and will have a strong intersectoral, international and interdisciplinary character. Afterwards, the RADOX structure will serve as a European platform for outstanding doctoral training and oxidative stress research.

## PARTNERS

**Coordinator:** Charite Universitätsmedizin Berlin

**Participants:** Bayer Pharma AG, University of Glasgow, The Chancellor Masters and Scholars of the University of Cambridge, The Chancellor Masters and Scholars of the University of Oxford, Katholieke Universiteit Leuven, Universidad de Navarra, Università degli Studi di Padova

## RETINAL VASCULAR MODELING, MEASUREMENT AND DIAGNOSIS

REFERENCE	316990
CALL	FP7-PEOPLE-2012-ITN
THEME	networks
SCIENTIST	Alfredo Ruggeri
DEPARTMENT	Information Engineering
UNIPD	participant
EU FUNDING	3,768,601 €
E-MAIL	alfredo.ruggeri@unipd.it

## PROJECT DESCRIPTION

The RETinal VAscular Modeling, Measurement And Diagnosis (REVAMMAD) project will train a new generation of scientists able to effectively translate the latest vascular modeling theory and computerized image analysis techniques into effective interventions for some of the most important chronic medic conditions afflicting the EU, including hypertension and diabetes. It will particularly ensure that there is rich clinical and industrial involvement to ensure that the training is focused with end-users and exploitation in mind.

The vasculature undergoes changes in response to early stages of these diseases, reflecting fundamental physiological processes within the vessels.

The retina provides a unique window onto the vasculature, allowing it to be viewed and measurements made in vivo, and advances in imaging technologies make it increasingly possible to measure subtle changes using computer vision algorithms, including through routine medical checks such as eye tests.

The field is currently fragmented, with many excellent pockets of collaboration focused on defined specialisms, particularly between clinicians and modellers, or clinicians and measurement specialists, but lacking overall structure. Despite the importance and incidence of the diseases and the evidence for the possibility



of better diagnosis through imaging, there has been relatively little translation of theory into clinical practice.

Integrative action is required to train researchers who understand the medical, clinical, technological and commercial aspects of the problem domain and to establish common working methodologies and tools across the field. REVAMMAD will train early careers researchers who combine these skills in order to motivate the introduction of high impact interventions in the future.

## PARTNERS

**Coordinator:** University of Lincoln

**Participants:** University of Dundee, Charité – Universitätsmedizin Berlin, Institut National de Recherche en Informatique et en Automatique, Københavns Universitet, Virtualpie LTD, Orobix SRL, Foundation for Research and Technology Hellas, Aarhus Universitetshospital, Università degli Studi di Padova

## TOWARDS TISSUE ENGINEERING SOLUTIONS FOR CARDIOVASCULAR SURGERY

REFERENCE	317512
CALL	FP7-PEOPLE-2012-ITN
THEME	networks
SCIENTIST	Gino Gerosa
DEPARTMENT	Cardiac, Thoracic and Vascular Sciences
UNIPD	participant
EU FUNDING	3,340,211 €
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## PROJECT DESCRIPTION

The aim of the TECAS ITN is to integrate the major European contributors in the field of cardiovascular tissue engineering (TE) and regenerative medicine (RM), to generate a coherent framework of expertise which will facilitate the training and career development of early stage researchers (ESRs) in the field. In particular, the intention of this ITN is to focus on the clinical needs of cardiac valve replacement/repair, myocardium reconstruction and patch graft angioplasty of the great blood vessels, with a view to developing the underpinning expertise and technology that will be required to manufacture functional TE cardiovascular implants for clinical use in the near future.

The TECAS ITN supports and transfers novel crossdisciplinary and intersectorial training to junior researchers, which is critical to the long-term sustainability of the cardiovascular implant research and industry in Europe, enhancing its competitiveness against the North American sector. The goal of this ITN is to consolidate the extensive multidisciplinary experience in training and research of its academic, clinical and industrial partners to train the new generation of competent and balanced clinicians, scientists, and engineers, who currently are in great demand by the medical devices industry and clinical sector.

This goal will be facilitated through the research ►



projects of the Network which span over the intersectorial innovation pipeline of a number of TE products and technologies from basic science to translational research and beyond. The strategy of the TECAS ITN involves the use of functionalised 3D scaffolds, which have been seeded with either differentiated stromal cells or adult mesenchymal stem cells derived from the intended recipient, and either physically conditioned in the laboratory in bioreactors, with a view to producing biological and biomechanical functionality of the graft prior to implantation, or used unseeded with a view to attracting endogenous cell colonisation after implantation.

## PARTNERS

**Coordinator:** Medizinische Hochschule Hannover

**Participants:** Technische Universiteit Eindhoven, Haverich dr. Axel, Meyer – Kobbe, dr. Clemens GBR, University of Patras, Universitätsklinikum Aachen, Università degli Studi di Padova

## VENETO RESEARCHERS' NIGHT 2012

REFERENCE	316361
CALL	FP7-PEOPLE-2012-NIGHT
THEME	networks
DEPARTMENT	Int. Research Office
UNIPD	coordinator
TOTAL COST	314,778 €
EU FUNDING	150,000 €
E-MAIL	ileana.borrelli@unipd.it

## PROJECT DESCRIPTION

Built on the successful experiences of ResearchersNight in Venice 2010 and ResearchersNight in Veneto 2011, VenetoNight 2012 will ensure a continuity of the event in Veneto Region, in order to reinforce the impact of the past two editions. 2010 and 2011 Researchers Nights created an expectation in the public that science is fun and accessible to everyone, regardless of age and scientific background. Moreover, the project will strengthen the collaboration between the institutions settled in Venezia, Padova and Verona which build the consortium.

On 28th September 2012 several activities will be organized in the three locations. The project focuses on letting citizens directly experience science; in each location the activities will be organized around the five senses: citizens will be invited to touch, listen to, scent out, watch, and taste science. Four European Corners, settled in strategic points of the cities, will encourage participants to approach the Research World and its European dimension.

Researchers will be performers, guides, animators, singers, always interacting with the public at large, showing that their work is closely related to society and that they are ordinary people with an amazing job.

A special attention will be devoted to children and students attending the last two years of secondary



school. Children-targeted events will show that science can be fun, and tailored activities for young people will promote research careers as a concrete opportunity for many of them.

The communication campaign, common for the three cities involved, will be planned in advance, aiming at reaching about 1.500.000 people. A special information campaign is foreseen at regional level within schools.

A reinforced impact assessment will include questionnaires before/during/after the event. A great part of the Impact Assessment will focus on secondary school students.

More than 10.000 participants and an effective media coverage during VenetoNight 2012 are expected.

## PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Istituto Nazionale di Astrofisica, Unione Regionale delle Camere di Commercio Industria Artigianato e Agricoltura del Veneto, Università IUAV di Venezia, Università Ca' Foscari Venezia, Università degli Studi di Verona

## PISCOPIA PROGRAMME

REFERENCE	600376
CALL	FP7-PEOPLE-2012-COFUND
THEME	cofund
SCIENTIST	Silverio Bolognani
DEPARTMENT	Int. Research Office
UNIPD	coordinator
TOTAL COST	2,034,405 €
EU FUNDING	813,762 €
E-MAIL	silverio.bolognani@unipd.it

## PROJECT DESCRIPTION

The “PISCOPIA Programme” is a new programme promoted by the University of Padova and aims at increasing the European-wide mobility possibilities for multisectoral training and career development of experienced researchers, in line with the objectives set out in the “Life-long training and career development” of the People work program. Increasing the amount of incoming young researchers in the University of Padova will provide benefits to the whole Italian and European Research Areas by opening a large and high quality area to transnational research mobility. The programme will further help to reintegrate researchers into a research career in the Member States and Associated Countries. The programme will last 48 months and provides for 3 calls, awarding fellowships lasting from 12 to 24 months and included into 2 mobility schemes: - 2 incoming calls: applicants from any country inside or outside Europe (36 fellow-years). - 1 re-integration call: applicants from Member State or Associated Countries interested in returning to Europe after a mobility experience in a Third Country (10 fellow-years). All the disciplines present at the University will be open for fellowships. Three Scientific macro areas group the disciplines studied at UNIPD and cover the entire spectrum of science and scholarship: Physical Sciences and Engineering, Life Sciences, Social sciences and Humanities. In compliance ►



with the European Charter of Researchers and the Code of Conduct for the Recruitment of Researchers, the University of Padova will ensure that the fellows will be selected following an open, transparent, impartial and equitable selection process and will enter a research contract with the selected fellows which has all the features of an employment contract.

## EUROPEAN NETWORK FOR DURABLE REINFORCEMENT AND REHABILITATION SOLUTIONS

REFERENCE	607851
CALL	FP7-PEOPLE-2013-ITN
THEME	networks
SCIENTIST	Carlo Pellegrino
DEPARTMENT	Civil, Environmental and Architectural Engineering
UNIPD	participant
EU FUNDING	3,870,520 €
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### PROJECT DESCRIPTION

The growth of advanced composites in construction in recent years has been spectacular, doubling in size in the last 10 years. This expansion has been largely due to the use of Fibre Reinforced Polymer reinforcement in structural applications and, although the current economic climate has seen a slowdown of the general construction market, the demand of composite products within the European construction market is estimated to grow and reach €3.1 billion by 2013.

The on-going requirement for more durable structures and more efficient rehabilitation solutions is the key driving force behind the introduction of FRPs in the construction industry as reinforcing or strengthening material for concrete and masonry structures. In Europe alone, the annual cost of repair and maintenance of the infrastructure is estimated to be about 50% of the construction budget.

Composite materials are readily used in a large number of applications and yet, a set of accepted design guidelines does not exist and most construction professionals are unaware of what composites are and rely on specialists who often use their own standards and guidelines.

Moreover, little interaction exists between academia and industry and practical applications



are time and again a reflection of a design approach instructed by conservative guidelines, which hinder innovation.

The aim of the Network is to train researchers in the use of advanced composites for construction so as to develop and maintain a critical mass of research groups that will address the main scientific challenges in the field, enable the development of advanced material standards and design guidelines, co-ordinate European research, and offer a link between academia and industry. The Network will strengthen the European Research Area on composite reinforcements and will contribute to increase the competitiveness of the European construction industry worldwide.

## PARTNERS

**Coordinator:** The University of Sheffield  
**Participants:** Budapesti Muszaki Es Gazdasagtudomanyi Egyetem, Universiteit Gent, University of Bath, Politecnico di Milano, Latvijas Universitates Polimeru Mehanikas Instituts, Universidade do Minho, Lulea Tekniska Universitet, Universitat de Girona, Eidgenössische Materialprüfungs- und Forschungsanstalt, Netcomposites Limited, University of Patras, Technische Universitaet Kaiserslautern, Università degli Studi di Padova

## INTERNATIONAL NETWORK FOR THE TRAINING OF EARLY STAGE RESEARCHERS ON ADVANCED QUALITY CONTROL BY COMPUTED TOMOGRAPHY

REFERENCE	607817
CALL	FP7-PEOPLE-2013-ITN
THEME	networks
SCIENTIST	Simone Carmignato
DEPARTMENT	Industrial Engineering
UNIPD	participant
EU FUNDING	3,850,553 €
E-MAIL	simone.carmignato@unipd.it

## PROJECT DESCRIPTION

The non-destructive quality control of a wide variety of high-added value products, produced by innovative manufacturing techniques, remains a challenge. Examples include additive manufacturing parts, micro parts, and fibre reinforced composite parts. Common to these workpieces is the dependency of their performance on internal and inaccessible elements. Nevertheless, customers in multiple sectors are requesting certified quality and reliability.

For the last few years industrial Computed Tomography (CT) has been regarded as a promising technology, which can evolve towards integrated quality control of complex workpieces combining dimensional metrology and material defect analysis. However, major challenges remain in order to exploit its full potential. Meeting these requires a broad range of expertise, including physics, dimensional metrology, non-destructive testing, material sciences, precision engineering, and manufacturing engineering. Due to the distinct interdisciplinary character, there is a strong need for young researchers with a broad range of competences to achieve the envisaged innovation breakthrough in the EU industry. The INTERAQCT project has been conceived as a pan-European industrial-academic initiative ►





that will provide the unique and encompassing training environment required, by bringing together expertise from industry and academia in each of these domains (CT-equipment, CT-software, NDT, dimensional metrology, additive manufacturing, micro-manufacturing, composite manufacturing).

The research will develop procedures for fast and accurate CT model acquisition, with special emphasis on multi-material parts. Furthermore, INTERAQCT targets quantification and improvement of the reliability of CT measurement results, by determining the probability of detection of material defects as well as by achieving metrological traceability. In addition, CT based quality improvement loops will be targeted for key emerging manufacturing technologies.

#### PARTNERS

**Coordinator:** Katholieke Universiteit Leuven

**Participants:** Volume Graphics GmbH, Materialise Nv, X-Tek Systems Ltd, Physikalisch-Technische Bundesanstalt, Fh Oo Forschungs & Entwicklungs GmbH, Npl Management Limited, Rheinisch-Westfälische Technische Hochschule Aachen, Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung E.V, Danmarks Tekniske Universitet, Università degli Studi di Padova

## MOTORCYCLE RIDER INTEGRATED SAFETY

REFERENCE	608092
CALL	FP7-PEOPLE-2013-ITN
THEME	networks
SCIENTIST	Ugo Galvanetto
DEPARTMENT	Industrial Engineering
UNIPD	participant/coordinator
EU FUNDING	3,725,793 €
E-MAIL	ugo.galvanetto@unipd.it

## PROJECT DESCRIPTION

Powered Two Wheelers (PTWs) are an efficient and flexible transport system and their use is beneficial especially in the more and more congested European cities. Unfortunately the PTW riders are exposed to a high risk of becoming a victim in a crash mainly due to the difficulty to control a PTW under all circumstances but also due to limited conspicuity. In addition when PTW riders are crash victims limited protection is offered to prevent injuries when compared to vehicle occupants. The aim of the research activities within the project is to make the use of PTWs safer such that fewer accidents occur and if an accident is unavoidable the consequences for the rider to sustain injuries are minimal. The project is divided in three work packages (WPs) with three separate but related goals. The first work package aims to improve the rider's skills with training strategies that are derived from in-depth accident data and from a quantification of rider behaviour in critical situations. The second work package aims at developing advanced safety systems that improve the interaction between the rider and the PTW by modelling the rider, also based on the in WP1 quantified rider behaviour. The third work package considers the cases where the crash is unavoidable and will develop personal protective equipment to protect the riders, given the input conditions from WP2 at the moment right before



impact. The end result of this project will be a set of rider training guidelines that are proven to be effective, safety system concepts implemented on PTWs and improved personal protective equipment and accompanying standards. These can be used by PTW industry partners in product development processes and by stakeholders such as ACEM and the EU to educate riders. This will ultimately improve the safety of PTWs and moreover the perceived safety, which will make more people decide to use a PTW as a good alternative to other means of transport.

## PARTNERS

**Coordinator:** Università degli Studi di Firenze  
**Participants:** Technische Universiteit Delft, Ludwig-Maximilians-Universität München, Technische Universiteit Eindhoven, Lms International Nv, Université de Strasbourg, Zapadoceska Univerzita v Plzni, Dainese Spa, Università degli Studi di Padova

## CORRECTNESS BY CONSTRUCTION

REFERENCE	612638
CALL	FP7-PEOPLE-2013-IRSES
THEME	networks
SCIENTIST	Maria Emilia Maietti
DEPARTMENT	Mathematics
UNIPD	participant/coordinator
EU FUNDING	285,600 €
E-MAIL	mariaemilia.maietti@unipd.it

## PROJECT DESCRIPTION

As software becomes ever more ubiquitous in our lives, the need to ensure it runs without error becomes ever more important. Restarting a phone is a simple, if inconvenient task; restarting an aeroplane in mid-flight is not an option! Correct by construction programming offers a revolutionary approach to program verification where programs can contain not just computations as is normal, but also logical proofs of the correctness of these computations. The simple fact that such programs compile provides formal, i.e. mathematical, guarantees of the correctness of the program. In particular, there is no need for post-hoc testing of software etc. Fundamental to the implicit marriage of computation and logic inherent within correct by construction programming is the choice of the right logical systems and concepts upon which programming languages ought to be built. This reflects the symbiotic relationship between logic, programming, and the design of programming languages—any attempt to sever this connection will diminish each component. This proposal brings together internationally leading researchers from both inside Europe and outside Europe to work on exactly what logical structures are needed for correct by construction programming and how those logical structures can then be turned into concrete programming artefacts. In order to produce fundamental work which stands the test of time, we work not with specific programming

languages but with mathematical abstractions of them. The recent development of dependently typed programming languages capable of supporting correct by construction programming makes this a very timely proposal, while the billions spent on software every year makes the potential impact of this proposal very significant.

## PARTNERS

**Coordinator:** University of Leeds

**Participants:** University of Strathclyde, Swansea University, Stockholms Universitet, Universitaet Siegen, Ludwig-Maximilians-Universitaet, Universita degli Studi dell'Insubria, Universita degli Studi di Genova, National University Corporation Japan Advanced Institute of Science and Technology, University of Canterbury, The Australian National University, The Institute of Mathematical Sciences Chennai Society, Carnegie Mellon University, Hankyong National Univeristy, Chennai Mathematical Institute, Universita degli Studi di Padova

## NORTH EAST RESEARCHERS NIGHT - NEAR

REFERENCE	609800
CALL	FP7-PEOPLE-2013-NIGHT
THEME	networks
DEPARTMENT	Int. Research Office
UNIPD	participant
TOTAL COST	355,404 €
EU FUNDING	100,000 €
E-MAIL	lleana.borrelli@unipd.it

## PROJECT DESCRIPTION

The NEAR (Noth EAsT Researchers' Night) project aims to bring the researchers closer to the public at large.

The overall concept of the project is based on the idea of researchers as storytellers giving them the unique opportunity to disclose to everybody the benefits of research, but also themselves and their own story. The storytelling will directly involve the public in a creative and informal manner creating a bidirectional relationship.

The project involve eight partners and many institutions located in five cities of Veneto and Friuli Venezia Giulia regions, both belonging to the North-East Area of Italy: Verona, Padova, Venezia, Trieste and Udine. The previous experiences of European Researchers' Night organised by the partners is a solid ground for the design and implementation of the NEAR project.

During the night of 27th September 2013 several common and local activities will take place in each city, following a common structure based on these four categories:

- "Researchers tell about themselves": researchers will introduce themselves, their life and their interests, ideas and opinions;
- "Let's play...": recreational events with the active participation of researchers and citizens;
- "Around the World in 80 portraits": an event that highlights the international dimension of research;

- “The researchers’ wonderland”: through this activities researchers will show where they work, what is research and which is the daily dimension of research.

The project will address the general public with a special attention to the younger generations and to entrepreneurs, since we consider research as a great occupational opportunity and a pivotal element for a smart and inclusive growth. Also the impact assessment will be focused on general public satisfaction with a particular attention to those specific groups.

The communication campaign aiming at reach about 2.000.000 and more than 30.000 attendees are expected.

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## PARTNERS

**Coordinator:** Università degli Studi di Verona

**Participants:** Università Ca’ Foscari Venezia, Università Iuav di Venezia, Unione Regionale delle Camere di Commercio Industria Artigianato e Agricoltura del Veneto, Università degli Studi di Udine, Università degli Studi di Trieste, Istituto Nazionale di Astrofisica, Università degli Studi di Padova



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## GENERATIVE MODELS OF HUMAN COGNITION

REFERENCE	210922
ERC CALL	ERC-2007-StG
THEME	frontier research
ERC GRANTEE	Marco Zorzi
DEPARTMENT	General Psychology
UNIPD	host institution
EU FUNDING	492,200 €
E-MAIL	marco.zorzi@unipd.it

### PROJECT DESCRIPTION

A fundamental issue in the study of human cognition is what computations are carried out by the brain to implement cognitive processes. The connectionist framework assumes that cognitive processes are implemented in terms of complex, nonlinear interactions among a large number of simple, neuron-like processing units that form a neural network. This approach has been used in cognitive psychology - often with some success to develop functional models that clearly represent a great advance over previous verbal-diagrammatic models because they can produce highly detailed simulations of human skilled performance and its breakdown following brain damage. However, a crucial step for the computational modeling of cognition is to bridge the gap between function and structure. Much of the modeling work has been carried out using connectionist networks that have no biological plausibility beyond the metaphor of neuron-like processing. Most models have one, or more often a combination, of the following undesirable features: i) strictly feed-forward spread of activation (e.g., no feedback and/or lateral connections); ii) implausible learning procedures (e.g., error back-propagation); iii) implausible learning environment (e.g., supervised learning). Researchers have chosen to ignore these problems as it was seen as an essential compromise to achieve efficient learning of complex cognitive tasks. The aim of the present research program is to exploit the latest findings

in neural network and machine learning research to develop generative connectionist models of cognition. Generative models are appealing because they represent plausible models of cortical learning that emphasize the mixing of bottom-up and top-down interactions in the brain. Moreover, generative models of cognition would offer a unified theoretical framework that encompasses classic connectionism and the emerging Bayesian approach to cognition, as well as a means to bridge the gap between neurons and behaviour.





## UNCOVERING THE SECRETS OF EARTHQUAKE: MULTIDISCIPLINARY STUDY OF PHYSICO-CHEMICAL PROCESSES DURING THE SEISMIC CYCLE

REFERENCE	205175
ERC CALL	ERC-2007-StG
THEME	frontier research
ERC GRANTEE	Giulio Di Toro
DEPARTMENT	Geosciences
UNIPD	additional participant
EU FUNDING	1,992,000 €
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### PROJECT DESCRIPTION

Southern Europe and Turkey lie within the highest seismic risk areas in the world. Understanding the physico-chemical processes controlling earthquake generation is essential in seismic hazard assessment. Destructive earthquakes nucleate at depth (10-15 km), therefore monitoring active faults at the Earth's surface, or interpreting seismic waves, yields only limited information on earthquake mechanics. We propose to investigate earthquake processes by:

- 1) installing a new world class high velocity rock friction apparatus to perform experiments under deformation conditions typical of earthquakes;
- 2) studying fossil seismic sources now exhumed at the Earth's surface;
- 3) analyzing natural and experimental fault rock materials using a novel multidisciplinary approach involving state of the art techniques in microstructural analysis, mineralogy and petrology;
- 4) producing new theoretical earthquake models calibrated (and tightly constrained) by field observations, mechanical data from rock-friction experiments and analyses of natural and experimental fault rocks.

The integration of such an original and complementary data set shall provide an unprecedented insight into the mechanics of seismic faulting. The installation of the new dedicated rock friction apparatus will allow the

European Union to become a key world player competing at the top scientific level in the study of earthquake mechanics. The proposed study has additional implications for understanding other friction-controlled processes important in Earth sciences and hazard mitigation (e.g., rock landslides). Friction also has broad applications in the industry, including innovative but poorly understood production processes. Our experimental results will help to improve industrial milling techniques and investigate the mechanical-chemical transformations induced during milling. The latter is the basis of a new technique for the production of hydrocarbons and hydrogen from inorganic and organic materials.

**Host Institution:** Istituto Nazionale di Geofisica e Vulcanologia



## DYNAMIC COVALENT CAPTURE: DYNAMIC CHEMISTRY FOR BIOMOLECULAR RECOGNITION AND CATALYSIS

REFERENCE	239898
ERC CALL	ERC-2008-StG
THEME	frontier research
ERC GRANTEE	Leonard Jan Prins
DEPARTMENT	Chemical Sciences
UNIPD	host institution
EU FUNDING	1,400,000 €
E-MAIL	leonard.prins@unipd.it

monolayers on nanoparticles for multivalent recognition and cleavage of biologically relevant targets in vivo and to the development of new screening methodology for measuring chemical equilibria and, specifically, for the discovery of new HIV-1 fusion inhibitors.

### PROJECT DESCRIPTION

Molecular recognition plays a fundamental role in nearly all chemical and biological processes. The objective of this research project is to develop new methodology for studying and utilizing the noncovalent recognition between two molecular entities, focusing on biomolecular receptors and catalysts. A dynamic covalent capture strategy is proposed, characterized by the following strongholds. The target itself self-selects the best component out of a combinatorial library. The approach has a very high sensitivity, because molecular recognition occurs intramolecularly, and is very flexible, which allows for an easy implementation in very diverse research areas simply by changing the target.

The dynamic covalent capture strategy is strongly embedded in the fields of supramolecular chemistry and (physical) organic chemistry. Nonetheless, the different work programmes strongly rely on the input from other areas, such as combinatorial chemistry, bioorganic chemistry, catalysis and computational chemistry, which renders the project highly interdisciplinary. Identified targets are new synthetic catalysts for the selective cleavage of biologically relevant compounds (D-Ala-D-Lac, cocaine and acetylcholine, and in a later stage peptides and DNA/RNA). Applicative work programmes are dedicated to the dynamic imprinting of



## PATTERNING THE SURFACE OF MONOLAYER-PROTECTED NANOPARTICLES TO OBTAIN INTELLIGENT NANODEVICES

REFERENCE	259014
ERC CALL	ERC-2010-StG_20091028
THEME	frontier research
ERC GRANTEE	Fabrizio Mancin
DEPARTMENT	Chemical Sciences
UNIPD	host institution
EU FUNDING	1,499,000 €
E-MAIL	fabrizio.mancin@unipd.it

### PROJECT DESCRIPTION

While chemical science is still striving in the search for such molecular machinery, real and perfectly working molecular machines have been developed millions of years ago by Nature. When biological systems are considered, one striking feature that emerges is their intrinsic functional simplicity, since only a few building blocks are used to build complex structures. Apparently, what matters is not chemical complexity but the ability to precisely control the spatial arrangement and organization. Functional nano-particles offer an unmatched opportunity to build complex structures with simple building blocks and relatively simple manipulations.

The main goal of the Mosaic project is to gain the ability to hierarchically control the self-assembling of metal nano-particles coating mono-layers and take advantage from such ability to obtain complex function from the materials realized. This objective will require reaching a complete understanding of the structure and dynamic of nano-particles coating mono-layers developing new tools, mainly based on NMR spectroscopy, for their investigation. Then, we plan to learn how to use supra-molecular interactions to control the monolayer organization and to gain, in this way, the ability to program functional groups patterns on the surface of the particles. In this way, it will be possible to achieve

a degree of organization comparable to that of biologic systems, such as enzymes or membranes. This organization of functional groups will be then used to obtain highly sophisticated function by these nano-systems, such as recognition, sensing, in particular NIR sensing, catalysis and transport.

**Additional Participant:** Alma Mater Studiorum - Università di Bologna



## DROPLETS AND EMULSIONS: DYNAMICS AND RHEOLOGY

REFERENCE	279004
ERC CALL	ERC-2011-StG_20101014
THEME	frontier research
SCIENTIST	Matteo Pierno
DEPARTMENT	Physics and Astronomy
UNIPD	additional participant
EU FUNDING	1,170,923 €
E-MAIL	matteo.pierno@unipd.it

### PROJECT DESCRIPTION

The applications of micro- and nanofluidics are now numerous, including lab-on-chip systems based upon micro-manipulation of discrete droplets, emulsions of interest in food and medical industries (drug delivery), analytical separation techniques of biomolecules, such as proteins and DNA, and facile handling of mass-limited samples. The problems involved contain diverse nano- and microstructures with a variety of lifetimes, touching atomistic scales (contact lines, thin films), mesoscopic collective behaviour (emulsions, glassy, soft-jammed systems) and hydrodynamical spatio-temporal evolutions (droplets and interface dynamics) with complex rheology and strong non-equilibrium properties. The interplay of the dynamics at the different scales involved still remains to be fully understood. The fundamental research I address in this project aims to set up the unified framework for the characterization and modelling of interfaces in confined geometries by means of an innovative micro- and nanofluidic numerical platform.

The main challenging and ambitious questions I intend to address in my project are: How the stability of micro- and nanodroplets is affected by thermal gradients? Or by boundary corrugation and modulated wettability? Or by complex rheological properties of the dispersed and/or continuous phases? How these effects can be tuned to design new optimal devices for

emulsions production? What are the rheological properties of these new soft materials? How confinement in small structures changes the bulk emulsion properties? What is the molecular-hydrodynamical mechanism at the origin of contact line slippage? How to realistically model the fluid-particle interactions on the molecular scale? The strength of the project lies in an innovative and state-of-the-art numerical approach, based on mesoscopic Lattice Boltzmann Models, coupled to microscopic molecular physics, supported by theoretical modelling, lubrication theory and experimental validation.

**Host Institution:** Università degli Studi di Roma Tor Vergata

**ERC Grantee:** Mauro Sbragaglia



## MOLECULAR ANATOMY AND PATHOPHYSIOLOGY OF THE ENDOPLASMIC RETICULUM-MITOCHONDRIA INTERFACE

REFERENCE	282280
ERC CALL	ERC-2011-StG_20101109
THEME	frontier research
ERC GRANTEE	Luca Scorrano
DEPARTMENT	Biology
UNIPD	host institution
EU FUNDING	1,499,995 €
E-MAIL	luca.scorrano@unipd.it

### PROJECT DESCRIPTION

Organelles are not randomly organized in the cytoplasm of the cell, but often are orderly arranged in mutual relationships that depend on physical, protein bounds. Understanding the molecular nature of the tethers that regulate relative position and juxtaposition of the organelles is one of the main quests of cell biology, given their functional importance. For example, the juxtaposition between mitochondria and endoplasmic reticulum (ER) has been suggested by us and others to crucially impact on Ca<sup>2+</sup> signalling and apoptosis. We recently identified the first structural ER-mitochondrial tether in mitofusin 2 (Mfn2), a pro-fusion mitochondria-shaping protein. A fraction of Mfn2 is also located on the ER regulating its morphology, and acting in trans to tether it to mitochondria. The tethering function of Mfn2 impacts on the transmission of Ca<sup>2+</sup> signals between the two organelles and is regulated by the oncosuppressor trichoplein/mitostatin. Mfn2 is likely only one of the tethers, as others exist in yeast. Furthermore, the dynamicity of the ER-mitochondria contact is known, but remains poorly understood. Therefore, a clear picture of the anatomy and pathophysiology of ER-mitochondrial connection is far from being reached. Here we hypothesize that ER-mitochondrial contacts are crucial specialized hubs of cellular signalling whose

architecture is modulated by cellular cues, impacting on integrated signalling cascades and ultimately affecting cellular function. To address this hypothesis we wish to setup a research project that aims at (i) increasing our knowledge on the molecular nature of tethers and modulators of ER-mitochondrial tethers in mammalian cells; (ii) clarifying how mitochondrial and ER function are controlled by the tethering; (iii) addressing how juxtaposition influences complex cellular responses including autophagy and cell death; (iv) elucidating the role of tethering in vivo by generating animal models with defined ER-mitochondrial distance.

**Additional Participant:** Université de Genève



## QUANTUM – COHERENT DRIVE OF ENERGY TRANSFER ALONG HELICAL STRUCTURES BY POLARIZED LIGHT

REFERENCE	278560
ERC CALL	ERC-2011-StG_20101014
THEME	frontier research
ERC GRANTEE	Elisabetta Collini
DEPARTMENT	Chemical Sciences
UNIPD	host institution
EU FUNDING	1,479,480 €
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### PROJECT DESCRIPTION

Electronic energy transfer (EET) is a ubiquitous photophysical process that plays a crucial role in the light-harvesting capabilities of natural antenna complexes. Emerging experimental breakthroughs indicate that the dynamics of light harvesting is not fully described by a classical random-walk picture, but also quantum coherent transfer takes place. Interestingly, coherent EET processes were recently detected also in a conjugated polymer at room temperature, suggesting that coherent EET may play a key role in artificial systems, as well. This suggests a new way to think about the design of future artificial photosynthetic systems and can potentially open a revolutionary avenue for the effective use of biological systems and conjugated polymers as quantum devices or resources for quantum information processing.

The main goal of the project is to give an important contribution in this breakthrough field, looking for a piece of information still missing: the possible presence of a relation between structure and coherent mechanisms. The main challenge is to develop new spectroscopic tools able to unveil the presence and the nature of vibrational modes acting during the energy migration and possibly driving coherent mechanisms. To this aim, a new 2D technique is proposed, which merges together the sensitivity of circular dichroism to structural

deformations and the power of 2D photon echo in detecting coherent effects. Instead of natural light-harvesting antennae, the objects of this project will be model systems, more stable and easier to manipulate and modify ad hoc. The attention will be mainly focused on multichromophoric systems with helical arrangements because they mimic a ubiquitous motif that nature exploited to develop highly efficient EET. The helical core can act indeed as a wire, directionally driving the energy migration and, perhaps, preserving long-lived coherences.



## BIOTECHNOLOGICAL OPTIMIZATION OF LIGHT USE EFFICIENCY IN ALGAE PHOTOBIOREACTORS

REFERENCE	309485
ERC CALL	ERC-2012-StG_20111109
THEME	frontier research
ERC GRANTEE	Tomas Morosinotto
DEPARTMENT	Biology
UNIPD	host institution
EU FUNDING	1,257,600 €
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### PROJECT DESCRIPTION

New renewable energy source are highly needed to compensate exhausting fossil fuels reserves and reduce greenhouse gases emissions. Some species of algae have an interesting potential as feedstock for the production of biodiesel thanks to their ability to accumulate large amount of lipids. Strong research efforts are however needed to fulfil this potential and address many issues involving optimization of cultivation systems, biomass harvesting and algae genetic improvement. This proposal aims to address one of these issues, the optimization of algae light use efficiency. Light, in fact, provides the energy supporting algae growth and must be exploited with the highest possible efficiency to achieve sufficient productivity and make their cultivation competitive.

In a photobioreactor algae are highly concentrated and this cause a inhomogeneous light distribution with a large fraction of the cells exposed to very low light or even in the dark. Algae are also actively mixed and they can abruptly move from dark to full illumination and vice versa. Depending on the mixing speed such an alternation of strong light and dark can be beneficial, reducing the damages due to excess irradiation, or harmful, not allowing the time for the activation of photoprotection mechanisms. This proposal aims to assess how

these peculiar conditions affect algae growth and functionality of photosynthetic apparatus, analysing the influence of the intensity, duration and frequencies of the light pulses both in batch and continuous cultures. In collaboration with the Chemical Engineering department, experimental data will be exploited to build a model describing the photobioreactor, a fundamental tool to design a system where cells mixing is optimized to have the best photosynthetic efficiency.

Conditions found in a photobioreactor are different from the ones cells are evolutionary adapted to and the other main scope of this proposal is the isolation of genetically improved strains. This work will focus on algae of the genus *Nannochloropsis*, which are highly interesting for biofuels. A first part of the work of setting up protocols for transformation will be followed by a second phase for generation and selection of mutants. Analysis of transcriptome in different light conditions will also be instrumental to identify genes to be targeted by genetic engineering.

In order for both previous parts to be effective there is also the need to investigate at the molecular level the composition of *Nannochloropsis* photosynthetic apparatus composition and regulation which is still poorly investigated.

Finally data on light use efficiency obtained in laboratory conditions will be compared with the ones coming from an outdoor pilot scale photobioreactor.



## INCLUSIONS IN DIAMONDS: MESSENGERS FROM THE DEEP EARTH

REFERENCE	307322
ERC CALL	ERC-2012-StG_2011012
THEME	frontier research
ERC GRANTEE	Fabrizio Nestola
DEPARTMENT	Geosciences
UNIPD	host institution
EU FUNDING	1,423,464 €
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### PROJECT DESCRIPTION

Diamonds and their inclusions are the deepest materials originating from the Earth's interior reaching the surface of our planet. Their study plays a key role in understanding and interpreting the geodynamics, geophysics, petrology, geochemistry and mineralogy of the Earth's mantle and those processes which governed through the time the evolution of the Earth. The most abundant mineral inclusions in diamonds are olivines, orthopyroxenes, clinopyroxenes, garnets, spinels, and sulfides. All of these mineral phases have been identified by X-ray diffraction or electron microprobe analysis since the 1950s almost always after their extraction from the diamonds. However, a non-destructive in-situ investigation of an inclusion in diamond is useful and important because: (a) some mineral inclusions under pressure could have a different crystal structure, and thus different petrologic significance compared to that at ambient pressure; (b) the internal pressure on the inclusion can provide information about the formation pressure of the diamond; (c) the morphology and growth relationships of the inclusion with the host diamond can provide indications about its protogenetic vs. syngenetic and/or epigenetic nature.

In this project a new experimental approach, based on X-ray diffraction technique, will be used in order to determine, for the first time, the

crystal structure of the inclusions still trapped in their host diamonds allowing to obtain chemical information capable to provide the inclusion remnant pressure and, from this, the pressure of formation of the diamond-inclusion pair. At the same time, our approach will allow to obtain any possible epitaxial relationship between diamond and its inclusions in order to provide strong constraints about the syngenetic or protogenetic nature of minerals included in diamond solving a 50 years old debate. Several geochemical and geodynamical models are based on the assumption of syngensis but this has yet to be demonstrated.





## LIFE EXPERIENCE MODULATIONS OF EXECUTIVE FUNCTION ASYMMETRIES

REFERENCE	313692
ERC CALL	ERC-2012-StG_20111012
THEME	frontier research
ERC GRANTEE	Antonino Vallesi
DEPARTMENT	Neurosciences
UNIPD	host institution
EU FUNDING	1,475,950 €
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### PROJECT DESCRIPTION

Executive functions are a set of cognitive processes underlying goal-directed behaviour. Two crucial executive functions are criterion-setting, the ability to form new rules, and monitoring, the capacity to evaluate whether those rules are being applied correctly. They differentially engage left and right prefrontal regions. Determining the impact of experience on these key functions will help understand individual differences and, crucially, reveal the available degrees of freedom for active intervention in case of decline or deficit. The central goal of LEX-MEA proposal is to unveil which neural and experiential factors shape these high-level functions across the life-span. The specific aim of the proposal is threefold. First, by using a multimodal neuroimaging approach, it will unveil how prefrontal hemispheric asymmetries underlying executive functions change depending on the task context, and whether this division of labour is advantageous. Second, it will study how significant real-life experiences, such as practicing a skill that entails a specific executive function, modulate these functions and their neural underpinning. We will target 2 groups of professionals, simultaneous translators and air traffic controllers, who make extensive use of criterion-setting and monitoring, respectively, to test whether, in different stages of

skill acquisition, they show a generalized benefit for the specific executive function trained. Third, we will test whether having practiced a skill requiring a certain executive function throughout life constitutes a compensatory factor against cognitive aging. The ultimate objective is to lay the cognitive and neural foundation for a full understanding of these extraordinary abilities not only in normal conditions but also in diverse diseases and to boost particular executive functions with tailored, theory-guided training programs.



## G-QUADRUPLEXES IN THE HIV-1 GENOME: NOVEL TARGETS FOR THE DEVELOPMENT OF SELECTIVE ANTIVIRAL DRUGS

REFERENCE	615879
ERC CALL	ERC-2013-CoG
THEME	frontier research
SCIENTIST	Sara Richter
DEPARTMENT	Molecular Medicine
UNIPD	host institution
EU FUNDING	1,989,471 €
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### PROJECT DESCRIPTION

G-quadruplexes (G-4) are polymorphic nucleic acid structures identified in gene promoters where they act as transcription regulators. G-4s have been found in eukaryotic and prokaryotic organisms, while very little information is available on viruses. The applicant research group has recently shown that HIV-1, which integrates into the human chromosomes and exploits cellular factors to activate transcription, takes advantage of G-4-mediated transcription regulation. G-4 disruption stimulates promoter activity while G-4 stabilization by small molecules inhibits it, showing a striking parallelism between HIV-1 LTR and eukaryotic promoter G-4s. Preliminary results indicate that similar G-4 structures form also in the viral RNA genome before retrotranscription. Available G-4 ligands, developed as anticancer drugs targeting DNA G-4, recognize both viral and cellular G-4s. Therefore, they cannot be straightforwardly used as anti-HIV compounds. The aim of this project is to develop highly specific anti-HIV-1 drugs targeting LTR DNA and/or RNA G-4s, using both reversible G-4 ligands and G-4-selective alkylating/cleaving agents, triggered by external stimuli. These approaches will be taken: a) to increase selectivity by 1) screening of ligands against LTR G-4s to select the best hits among libraries of G-4 ligands; 2) conjugation of the

most promising leads to modified nucleic acids complementing LTR G-4 loop/flanking regions, to deliver the drug to its target; b) to stabilize binding by conjugation of the ligands to 3) an alkylating/cleaving subunit, and 4) an activable moiety (such as quinone methides) that alkylates the target only once the drug has reached it. Physico-chemical, biomolecular, cellular and viral assays will be used to test the compounds. This approach should deliver reversible and irreversible ligands that selectively inhibit viral transcription and/or reverse transcription, thus preventing virus production and/or integration into the host genome.

**Additional Participant:** Università di Pavia



## NEW OUTLOOK ON SEISMIC FAULTS: FROM EARTHQUAKE NUCLEATION TO ARREST

REFERENCE	614705
ERC CALL	ERC-2013-CoG
THEME	frontier research
ERC GRANTEE	Giulio Di Toro
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UNIPD	host institution
EU FUNDING	1,963,800 €
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### PROJECT DESCRIPTION

With an average toll of 80.000 deaths per year over the last decade, earthquakes remain one of the most dreadful geohazards. The advancement of earthquake risk assessment and forecasting methods (probability estimates that a mainshock may occur in terms of hypocentre location, magnitude and time) calls for a sound physical basis. The nucleation, propagation and arrest of an earthquake rupture results from the interplay of stress perturbations, micro- to macro-scale friction- and rupture-related processes and fault zone geometrical complexity. Most of the information about these parameters is out of reach of seismic waves and geophysical analysis. Here we aim at enhancing our knowledge of earthquake physics (from nucleation to arrest) by means of a multidisciplinary approach that includes:

1. experiments to investigate earthquake nucleation by reproducing crustal (pressure, temperature, presence of fluids, stress perturbations, etc.) deformation conditions with the most powerful earthquake simulator installed worldwide (SHIVA);
2. experiments to investigate rupture propagation on simulated faults using natural rocks and small-scale analogue models;
3. field studies of exhumed seismogenic sources to quantify the geometrical complexity of natural fault zones;
4. advanced numerical simulation techniques

that will integrate the above information and allow up-scaling to natural faults. The numerical models will produce physically-based earthquake simulations that will be compared with high-resolution seismic data.

By reproducing crustal deformation conditions (stress, temperature, fluid pressures, etc.) in the laboratory and by monitoring acoustic emissions, gases, electromagnetic waves, etc., produced by the rock samples during deformation, a by-product of our research will be the systematic investigation of precursory phenomena (seismic, chemical, and electromagnetic) associated to earthquake nucleation processes.

**Additional Participant:** INGV (Istituto Nazionale di Geofisica e Vulcanologia, Durham University



## SOLVING THE TP-AGB STAR CONUNDRUM: A KEY TO GALAXY EVOLUTION

REFERENCE	615604
ERC CALL	ERC-2013-CoG
THEME	frontier research
ERC GRANTEE	Paola Marigo
DEPARTMENT	Physics and Astronomy "Galileo Galilei"
UNIPD	host institution
EU FUNDING	1,930,628 €
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### PROJECT DESCRIPTION

Models of the Thermally Pulsing Asymptotic Giant Branch (TP-AGB) stellar evolutionary phase play a critical role across astrophysics, from the chemical composition of meteorites in the pre-solar nebula up to galaxy evolution in the high-redshift Universe. In spite of its importance, the modelling of TP-AGB phase is still affected by large uncertainties which propagate into the field of extragalactic astronomy, degrading the predicting power of current population synthesis models of galaxies. The major goal of my proposal is to remedy this persistent condition of uncertainty and controversy. The solution to the TP-AGB star conundrum will be provided by a new approach, which builds on the combination of a) state-of-the-art theoretical tools to account for the extraordinarily complex physics of TP-AGB stars (evolution, nucleosynthesis, pulsation, winds, dust condensation and growth, etc.), and b) exceptionally high-quality observations of resolved TP-AGB stellar populations in stars clusters and nearby galaxies (Magellanic Clouds, M31, dwarf galaxies up to 4 Mpc) with reliable measurements of their star formation histories. We will adopt a global calibration method, in which TP-AGB evolution models are required to simultaneously reproduce a set of well-defined observational constraints (star counts, distributions of luminosities, colors, pulsation

periods, dust mass-loss rates, expansion velocities of dusty envelopes, etc.). This project will deepen our understanding of TP-AGB physics profoundly, and provide widespread community benefits as well. We will publicly release well-tested and reliable "TP-AGB deliverables", including stellar tracks, isochrones in all relevant photometric systems, extended libraries of stellar spectra, new wind and pulsation models for long period variables, and chemical yields for both gas and dust. Eventually, these products will be embedded in the stellar population synthesis models which are routinely used to analyze the integrated galaxy observables that probe the extragalactic Universe. The project is extremely challenging and is expected to produce massive breakthroughs in various branches of astrophysics.



## ELECTROWEAK SYMMETRY BREAKING, FLAVOR AND DARK MATTER: ONE SOLUTION FOR THREE MYSTERIES

REFERENCE	267985
ERC CALL	ERC-2010-AdG_20100224
THEME	frontier research
SCIENTIST	Fabio Zwirner
DEPARTMENT	Physics and Astronomy
UNIPD	additional participant
EU FUNDING	1,439,400 €
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### PROJECT DESCRIPTION

In the next five years, experiments will give us a unique opportunity to unravel the mysteries of Electroweak Symmetry Breaking, Flavor and Dark Matter. The LHC at CERN will push the Energy frontier well into the TeV region and shed light on electroweak symmetry breaking. The LHCb experiment, super-B factories and other dedicated experiments, also in the lepton sector, will push forward the Intensity frontier and test the Standard Model description of flavor and CP violation with unprecedented accuracy. Earth- and space-based experiments will push forward the Astroparticle frontier, in particular direct and indirect searches for Dark Matter. My goal is to identify a coherent explanation of the three mysteries, as complete and as unique as possible, by combining the vast information coming from the Energy, Intensity and Astroparticle frontiers. This requires a global strategy, making use of highly qualified competences in the relevant branches of theory and phenomenology. I will put together some of the leading particle theorists operating in SISSA, Padua and Rome into a unique and extraordinarily strong team. The variety of competences, ranging from phenomenological fits and data interpretation to unified models and fundamental theories, will be used to interpret the results coming from a wide range of experiments and to formulate a

coherent framework to account for them. With the essential contribution of the researchers paid on the project funds, the project will catalyze results going much beyond what the team members could individually achieve. The main support requested to the ERC is for hiring six experienced researchers, the rest of the funds are for optimizing the effectiveness of the team and the research environment.

**Host Institution:** Scuola Internazionale Superiore di Studi Avanzati  
**Erc Grantee:** Guido Martinelli



## MITOCHONDRIAL CALCIUM SIGNALLING: MOLECULES, ROLES AND PHARMACOLOGICAL TARGETING

REFERENCE	294777
ERC CALL	ERC-2011-ADG_20110310
THEME	frontier research
ERC GRANTEE	Rosario Rizzuto
DEPARTMENT	Biomedical Sciences
UNIPD	host institution
EU FUNDING	2,432,400 €
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### PROJECT DESCRIPTION

Mitochondrial  $\text{Ca}^{2+}$  homeostasis is an important component of the calcium-mediated cellular response to extracellular stimuli. It controls key organelle functions, such as aerobic metabolism and the induction of apoptotic cell death, and shapes the spatio-temporal pattern of the cytosolic  $[\text{Ca}^{2+}]$  increase. While its physiological and pathological relevance is now fully appreciated, lack of molecular insight has severely limited mechanistic understanding and pharmacological targeting. We have now identified the long sought mitochondrial  $\text{Ca}^{2+}$  uniporter (MCU). This project stems from this ground-breaking result, and with a multidisciplinary approach investigates the biological role of MCU, tackling also its structure/function relationship and possible pharmacological exploitation. Specifically, the project will be divided in five major tasks

- i) The elucidation of the subcellular distribution of MCU and of the supramolecular organization of the mitochondrial  $\text{Ca}^{2+}$  influx machinery;
- ii) The clarification of the cross-talk with other signaling pathways, with major focus on regulatory mechanisms based on post-translational modifications (phosphorylation, acetylation, oxidation);
- iii) The development of suitable heterologous

systems, in which wild-type MCU or mutants can be expressed; the purified protein (or the isolated mitochondria) will be utilized in electrophysiological studies to investigate the functional properties of the channel;

- iv) the elucidation of the protein structure, with the aim of developing specific inhibitors, based on molecular modelling and crystallization of the protein produced in the appropriate heterologous system;
- v) the generation of conditional and tissue-specific knockout models for investigating MCU function in vivo; the analysis of the phenotype, including the sensitivity to genetic or environmental causes of disease, will provide insight into the role of mitochondrial  $\text{Ca}^{2+}$  dysregulation in the pathogenesis and treatment of human disorders.



## SIGNALLING COMPARTMENTALIZATION AND VESICLE TRAFFICKING AT THE PHAGOCYTOTIC SYNAPSES

REFERENCE	322823
ERC CALL	ERC-2012-ADG
THEME	frontier research
ERC GRANTEE	Antonella Viola
UNIPD	Host Institution
EU FUNDING	2,350,342 €
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### PROJECT DESCRIPTION

A key feature of the immune response is its specificity and macrophages must be able to discriminate precisely between an infectious stimulus and a non-infectious one and tune their response in accordance with the molecular context in which the target particle is recognized. In recent years, scientists have proposed the concept of the phagocytic synapse, to stress the fact that a particle does not engage only one receptor on the cell surface; instead, an array of receptors interacts with a specific pathogen, either sequentially or simultaneously. Indeed, the tightly controlled and specific responses of macrophages require the establishing of checkpoints for signalling and the phagocytic synapse represent an exquisite site for cross-talk among several signalling pathways. Although we can describe detailed signalling pathways for most of the single receptors acting at the phagocytic synapse, we still do not know how these pathways are integrated during the various phases of macrophage responses. An integrated view of phagocytic synapse signalling would allow us to understand the contribution of each ligand-receptor pair to macrophage dysfunctions in pathology and to design novel immunotherapeutic strategies. The aim of STePS is to provide a deeper understanding of the molecular interactions leading to the orchestration of phagocytic synapses for phagocytosis and activation, two

events crucial for immune responses to pathogens as well as for inflammation. In particular, we will focus on three fundamental aspects that bring together the fields of immunology and cell biology: establishment of dynamic platforms for recognition and signalling at the plasma membrane; vesicle trafficking to the plasma membrane; signalling compartmentalization for specific cell functions. Importantly, these mechanisms will be analysed in the context of physiological and pathological conditions, thus providing answers to both basic and translational biomedical research questions.







The Joint Technology Initiatives are  
long-term public-private  
partnerships that pursue ambitious  
common research objectives.



## COMPOSITION WITH GUARANTEES FOR HIGH-INTEGRITY EMBEDDED SOFTWARE COMPONENTS ASSEMBLY

REFERENCE	100022
CALL	ARTEMIS-2008-1
SCIENTIST	Tullio Vardanega
DEPARTMENT	Mathematics
UNIPD	participant
TOTAL COST	6,080,000 €
EU FUNDING	1,990,538 €
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### PROJECT DESCRIPTION

The development of Real-Time Embedded systems increasingly leans toward the adoption of Component-based Development and Model Driven Engineering approaches. The combination of these two approaches promises better mastery of complexity, increased reuse, and easier maintenance, thus reducing the costs and risks of development and deployment. That very combination however also creates unique challenges for the development of high-integrity software. Two such challenges especially stand out:

- to develop components that can be certified or qualified individually for provably guaranteed delivery of the required level of service in operation;
- to preserve those guarantees in an assembly of heterogeneous software components on the target execution platform.

Current component-based run-time environments and their associated software development infrastructures (modelling languages, model transformation engines, and code generators) address the functional dimension of components, but do not address their non-functional characteristics satisfactorily. The developer should not only consider the functional behaviour and the internal structure of components, but also

their non-functional requirements (e.g., timing, input and output accuracy, robustness). Such non-functional requirements should be: mapped onto the architectural model; captured by the expression of extra-functional properties attached to components; and then preserved at run time.

CHESS seeks industrial-quality research solutions to problems of property-preserving component assembly in real-time and dependable embedded systems, and supports the description, verification, and preservation of non-functional properties of software components at the abstract level of component design as well as at the execution level. CHESS develops model-driven solutions, integrates them in component-based execution frameworks, assesses their applicability from the perspective of multiple domains (such as space, railways, telecommunications and automotive), and verifies their performance through the elaboration of industrial use cases.

### PARTNERS

**Coordinator:** X/Open Company Ltd

**Participants:** Aicas, Aonix, Atos Origin, Enea, Ericsson, Fraunhofer ESK, FZI, GMV Aerospace and Defence, INRIA, Intecs, ISTI Institute, Italcertifer, Maelardalens University, Polytechnic University of Madrid, Thales Alenia Space, Thales Communications, Università degli Studi di Padova



## IMPLEMENTING MANUFACTURING SCIENCE SOLUTIONS TO INCREASE EQUIPMENT PRODUCTIVITY AND FAB PERFORMANCE

REFERENCE	120005
CALL	ENIAC-2008-1
SCIENTIST	Alessandro Beghi
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	35,990,216 €
EU & OTHER FUNDING	17,674,733 €
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### PROJECT DESCRIPTION

Maintaining cost decrease per function, reducing cycle times, improving reproductibility and equipment effectiveness while reducing the environmental impact of the factories are key challenges to be addressed to keep the competitiveness of European SC manufacturers. Manufacturing Science is the main enabler that will allow overcoming these challenges. IMPROVE (Implementing Manufacturing science solutions to increase equipment pROductivity and fab pERformance) is a focused 36 month project that answers to the “advanced line operations” industrial project of the sub-programme SP8 “Equipment & Materials for Nanoelectronics” of the present ENIAC call. IMPROVE aims to improve European semiconductor fabs efficiency by providing methods and tools to better control the process variability, reduce the cycle time and enhance the effectiveness of the production equipment. To achieve these objectives, IMPROVE will focus on 3 major development axes.

- The development of Virtual Metrology techniques allowing the control of the process at wafer level whilst suppressing standard metrology steps.
- The development of Predictive Equipment Behaviour techniques to improve the process

tools reliability whilst optimizing the maintenance frequency and increasing the equipment uptime.

- The development of Dynamic Risk Assessment and Dynamic Control Plan concepts, suppressing unnecessary measurements steps whilst dynamically improving the control plan efficiency.

For these 3 topics, models will be developed and assessed for different process steps and equipment platforms in different manufacturing lines leading to the development of generic solutions.

The impact of the integration of the developed techniques in the various line decision systems and IT infrastructure will also be evaluated and assessed.

To that end, a strong consortium of industrialists, SMEs, academia and institutes has been made-up, including the major european actors.

### PARTNERS

**Coordinator:** STMicroelectronics (Crolles 2) Sas

**Participants:** STMicroelectronics (Rousset) Sas, STMicroelectronics Srl, Numonyx Italy Srl, Infineon Technologies Ag, Infineon Austria, Intel Performance Learning Solutions Limited, Atmel Rousset Sas, Austriamicrosystem Ag, Pdf Solutions Sas, CamLine Datensysteme für die Mikroelektronik GmbH, Probayes, Techno Fittings Fraunhofer-Gesellschaft zur Förderung der Angewandten Forschung e.V., Commissariat à l’Energie Atomique, Lexus Research, University of Pavia, University of Milano, Ecole des Mines de Saint Etienne -Centre Microélectronique de Provence, Institut Polytechnique de Grenoble, Lam Research Srl, Critical Software, Italian National Council of Research, Ltm Cnrs, Fachhochschule Wiener Neustadt für Wirtschaft und Technik GmbH, iSyst Intelligente Systeme GmbH, InReCon Ag, AP - Technologies, Dublin City University, Infineon Technologies Dresden, Friedrich-Alexander-Universität Erlangen-Nürnberg, Straatum, Universität München, Università degli Studi di Padova



## SURROGATE MARKERS FOR MICRO- AND MACRO-VASCULAR HARD ENDPOINTS FOR INNOVATIVE DIABETES TOOLS

REFERENCE	115006
CALL	IMI_Call_2008_1_08
SCIENTIST	Claudio Cobelli
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	32,600,000 €
EU FUNDING	13,999,979 €
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### PROJECT DESCRIPTION

SUMMIT (Surrogate markers for micro- and macro-vascular hard endpoints for innovative diabetes tools) is a pan-European research consortium funded by the Innovative Medicines Initiative (IMI). SUMMIT brings together the scientific expertise and clinical resources from 19 leading universities and research institutes, six pharmaceutical companies and one small/medium sized enterprise (SME). The project started on November 1, 2009. Project duration will be five years.

SUMMIT plans to systematically identify genetic risk factors for chronic diabetic complications. A collection of patient samples from a variety of cohorts will be analyzed by high-throughput techniques, e.g. genotyping, and both patient samples and newly discovered genotypes will be applied for biomarker discovery. The goal is to deliver at the end of the project's lifetime a set of biomarkers able to better predict disease progression and drug effects and thereby to shorten clinical trials. In addition, SUMMIT will develop optimized imaging technologies suitable to monitor progression and reduction of vascular complications in diabetic patients as well as new animal models that better mimic human disease progression. All SUMMIT activities will be supported through computational methods and in silico models for biomarker assessment

and prediction of diabetic complication to be developed by the consortium.

In accordance with the IMI research agenda, SUMMIT will help to accelerate the process of bringing new medicines to patients by increasing the efficiency of medicine development.

### PARTNERS

**Coordinator:** Boehringer-Ingelheim Pharma GmbH

**Participants:** Lund University, Biocomputing Platforms, Karolinska Institute, Helmholtz Zentrum München - Forschungszentrum für Gesundheit und Umwelt GmbH, Istituto di Ricerche Farmacologiche "Mario Negri", The University of Cambridge, University of Dundee, The University of Exeter, Goeteborgs Universitet, Folkhälsan - Helsinki, The National Institute for Health and Welfare - Finland, University of Kuopio, The University of Oxford, Università degli Studi di Pavia, Università di Pisa, Università Cattolica del Sacro Cuore - Rome, University of Turku, University of Edinburgh, Eli Lilly, AstraZeneca AB, Hoffmann-La Roche, Università degli Studi di Padova



## EFFICIENT SHAPE OPTIMIZATION OF INTAKE AND EXHAUST OF A TILTROTOR NACELLE

REFERENCE	267309
CALL	SP1-JTI-CS-2009-02
SCIENTIST	Ernesto Benini
DEPARTMENT	Industrial Engineering
UNIPD	coordinator
TOTAL COST	381,600 €
EU FUNDING	286,200 €
E-MAIL	ernesto.benini@unipd.it

### PROJECT DESCRIPTION

The present proposal describes the methodology to be used for an efficient optimization of both the intake and exhaust geometry of a tiltrotor nacelle. Specific objectives of such activity are the following: i) to set up of a comprehensive and fully automatic optimal design tool, integrating the software in use at the GRC consortium and in-house optimizer already developed by the applicant; ii) to implement efficient and robust optimization strategies which help the obtainment of optimal geometry using reasonable computing time; iii) to implement, test and run such tool within the industrial design procedure currently available at the GRC consortium; iv) to apply such tool for the efficiency improvement of both the nacelle intake and the exhaust ducts in order to achieve a significant reduction in the nacelle installation losses.

Methodology Objectives i) and iii) will be achieved by means of a dedicated programming activity where the software tools will be interfaced together and with the proprietary optimization tool by the applicant. The result will be a procedure where meshing, geometrical/grid manipulation, as well as CFD analyses will form an automatic loop. Objective ii) will be guaranteed by the capability of the optimizer to efficiently handle complex multiobjective problems; the optimization chain will be conceived in such a

way that the user can interact with the optimizer and monitor the whole process as it takes place. Objective iv) will be pursued by applying the optimization tool to review the basic intake and exhaust design, with the aim of minimizing any detrimental effects on both drag and engine installation. Finally, the optimized geometry will be checked for compliance with feasibility constraints in order to accomplish industrial needs for prototyping and testing.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** HIT09 Srl



## CONTRIBUTION TO DESIGN OPTIMIZATION OF TILTROTOR COMPONENTS FOR DRAG REDUCTION

REFERENCE	270609
CALL	SP1-JTI-CS-2010-01
SCIENTIST	Ernesto Benini
DEPARTMENT	Industrial Engineering
UNIPD	coordinator
TOTAL COST	849,600 €
EU FUNDING	670,500 €
E-MAIL	ernesto.benini@unipd.it

### PROJECT DESCRIPTION

Objectives. This proposal describes a methodology to be used for efficient optimization aimed at drag reduction of some components of a tiltrotor fuselage, i.e. nose, wing/fuselage junction, sponsons and tail surfaces. Specific objectives of such activity are to:

- i. set up a comprehensive and automatic design tool, integrating the software in use at the GRC Consortium and an in-house optimizer already developed by the applicants;
- ii. implement efficient and robust optimization strategies for obtainment of optimal geometries using reasonable computing time;
- iii. implement, test and run such tool within the industrial design procedure currently available at the GRC Consortium;
- iv. apply such tool for drag reduction of the above mentioned components in order to improve the overall aircraft aerodynamic efficiency, while guaranteeing compliance with industrial constraints and needs.

Methodology. Objectives i) and iii) will be achieved by means of a dedicated programming activity where the software tools will be integrated together and with the proprietary optimization tool by the applicants. This will result in a procedure where geometrical and grid manipulation, as well as CFD analyses will form an automatic loop.

Objective ii) will be guaranteed by the capability of the optimizer to handle complex multiobjective problems; the optimization chain will be conceived in such a way that the user can interact with the optimizer and monitor the whole process as it takes place.

Objective iv) will be pursued mainly by means of shape modifications for drag reduction, but, due to the product oriented character of this activity, also complementary techniques (i.e. riblets, vortex generators, Hybrid Laminar Flow Control, gaster bump, sweeping jets, winglets, wing strakes, upper surface spoilers) may be considered and discussed with the leading industry, if a pure numerical shape optimization would lead to unfeasible solutions with respect industrial constraints.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** HIT09 Srl



## CONTRIBUTION TO OPTIMIZATION OF HEAVY HELICOPTER ENGINE INSTALLATION DESIGN

REFERENCE	278416
CALL	SP1-JTI-CS-2010-04
SCIENTIST	Ernesto Benini
DEPARTMENT	Industrial Engineering
UNIPD	coordinator
TOTAL COST	439,200 €
EU FUNDING	329,400 €
E-MAIL	ernesto.benini@unipd.it

### PROJECT DESCRIPTION

#### Goals

The proposal describes the methodology to be used for engine installation design optimization in heavy helicopters. Specific objectives of such activity are the following:

- i) to set up of a comprehensive and fully automatic optimal design tool, integrating the software suitable for engine installation analysis and in-house multi-objective optimization algorithms already developed by the applicant;
- ii) to apply such tool for the efficiency improvement of engine installation components based on the boundary conditions given by the manufacturer, in order to achieve a significant reduction in the engine installation losses.

#### Methodology

Objectives will be achieved by means of a dedicated programming and simulation activity, where the software tools available at the consortium premises for the design and analysis of engine installation performance will be interfaced together and with the optimization tool proposed by the applicant. The result will be a robust procedure where only the initial geometry importation and parametrization will be carried out off-line, while meshing, geometrical/grid manipulation, as well as CFD analyses will form an automatic loop.

#### Expected results

- a) Final optimized geometries of engine installation components will be provided according to the design objectives and constraints defined by the Topic Manager. Benefits of the final optimized geometries will be determined.
- b) A quantification of overall margins of improvement with respect to the baseline configuration will be provided.
- c) Recommendations for the ultimate design and manufacturing of practical engine installation systems will be provided.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** MDA Srl, HIT09 Srl



## HIGH EFFICIENCY ELECTRONICS COOKING SYSTEMS

REFERENCE	270716-2
CALL	ENIAC CALL 2010
SCIENTIST	Fabrizio Dughiero
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	4,993,378 €
EU FUNDING	1,733,584 €
E-MAIL	fabrizio.dughiero@unipd.it

### PROJECT DESCRIPTION

The HEECS project will answer the need to increase energy efficiency, developing a smart, controlled and highly efficient Solid state cooking device and give significant contributions to standards.

This cooking appliance will represent a breakthrough innovation which currently does not exist on the market. HEECS will deliver a new concept Microwave Oven.

The main project scope is to enhance energy efficiency by more than 25% in Microwave ovens (MWOs) across any range of food to be heated or cooked at home. According to this scope, breakthrough technologies will be researched and developed according to 4 HEECS main project objectives: 1) New and improved semiconductor technologies mainly focused on innovative high frequency power solid state devices. 2) Improved thermal management systems to efficiently cool the high frequency power transistor package, and make use of the dissipated heat energy in an efficient way. 3) Intelligent electromagnetic (EM) field adjustment and high frequency controls, in order to better distribute the field intensity within differing food types, thereby heating the food appropriately and decreasing losses. 4) Optimized MWO technology configuration and system architecture delivering optimum feeding and efficiency of the MWO through enhanced signal conditioning. Matching the overall ENIAC objectives, all the electronic parts of the solid

state cooking device, including small signal board (frequency synthesizer, High speed RF switching, micro controller), Switched mode power supply unit, high frequency power amplification stages, RF sensing and coupling, will be built with miniaturised circuits. The thermal management of the RF power devices will also incorporate thermal / material aspects relevant to ensure reliability and miniaturisation within the hybrid transistor package. The project will also deliver TCAD, and multi-physics tools enabling design of new technologies related to RF Hybrid circuit integration, phased array controls, and thermal design of High Frequency power transistor packages.

### PARTNERS

**Coordinator:** Whirlpool Sweden Ab

**Participants:** Nxp Semiconductors Netherlands B.V, Chalmers Tekniska Hoegskola Ab, Whirlpool Europe Srl, ComHeat Microwave AB, Technische Universiteit Delft, Bergh Hybrid Circuits BV, Plextek Limited, Politechnika Warszawska, Università degli Studi di Padova





## DESIGN AND MANUFACTURING OF SMART COMPOSITE PANELS FOR WING APPLICATIONS AND DEVELOPMENT OF STRUCTURAL HEALTH MONITORING TECHNIQUES

REFERENCE	270625
CALL	SP1-JTI-CS-2010-01
SCIENTIST	Ugo Galvanetto
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	119,933 €
EU FUNDING	88,899 €
E-MAIL	ugo.galvanetto@unipd.it

### PARTNERS

**Coordinator:** Mare Engineering Spa

**Participants:** Sonora Srl, Università degli Studi di Padova

### PROJECT DESCRIPTION

The goals of the call will be achieved by means of a multilevel approach, combining local damage propagation mechanisms with guided waves propagation modeling, and designing a dedicated optimization methodology aimed at finding the best actuators/sensors positioning in order to enhance the tool sensitivity to forecasted impact damages.

The final results will be a numerical tool (or a family of tools) developed in high level programming language and capable of driving commercial codes (F.E. codes like MSC/ NASTRAN ad LS-DYNA) within an optimization strategy. The consortium is made by two SMEs and the Department of Structural and Transportation Engineering of the University of Padova; the partners include all the needed expertise in the fields of numerical simulation (explicit and implicit F.E.) described above, as well as in the field of Structural Health Monitoring approaches based on guided waves and optimization tools. The production of GFR Panels will be supplied by external subcontracting to a primary supplier of composite structural components for aeronautical use.

Within the NDE techniques special attention will be dedicated to the virtual implementation of a novel damage detection method based on the Proper Orthogonal Decomposition.



## NOVEL CATALYST MATERIALS FOR THE CATHODE SIDE OF MEAS SUITABLE FOR TRANSPORTATION APPLICATIONS

REFERENCE	303492
CALL	FCH-JU-2011-1
SCIENTIST	Gaetano Granozzi
DEPARTMENT	Chemical Sciences
UNIPD	participant
TOTAL COST	3,074,558 €
EU FUNDING	1,895,862 €
E-MAIL	gaetano.granozzi@unipd.it

### PROJECT DESCRIPTION

Novel low temperature fuel cell (FC) cathode catalyst and support systems will be designed and synthesized.

The focus will be on highly active catalyst materials for polymer electrolyte membrane fuel cells (PEMFC) for transportation applications. These materials will be fully characterized, benchmarked and validated with a multi-scale bottom up approach in order to significantly reduce the amount of precious metal catalyst loadings ( $< 0.15$  g/kW) and to vastly improve fuel cell efficiency and durability. Thereby, materials compatible and stable under automotive fuel cell environment and conditions will be investigated in order to reach a FC lifetime of 5000h. These targets are highly relevant to the call topic requesting ambitious, highly novel concepts for next generation European membrane electrode assemblies (MEAs) for transportation applications.

Numerical simulations will be used in order to identify which alloy compositions to strive for in the experimental work. These alloys will be synthesized both in the form of well defined model compounds as well as in the form of nanoparticles. Different modified support materials will be studied. For the NPs, there will be two stages of preparation, the small

scale preparation to create well defined NPs for preliminary assessment of their performance and stability, and, subsequently, up-scaling for MEA production. Supported NP catalysts and model catalysts will be tested using electrochemical methods and Surface Science approaches.

After up-scaling MEAs based on improved cathode catalysts and improved supports will be assembled using advanced Nafion- based and high temperature membrane based electrolytes. These will be tested for performance and durability using procedures established in automotive industry and previous EU projects.

### PARTNERS

**Coordinator:** Technische Universität München

**Participants:** Joint Research Center – European Commission, Université de Poitiers, Danmarks Tekniske Universitet, Chalmers Tekniska Högskola, Ion Power Inc Corp, Advanced Energy Technologies Ae Ereunas & Anaptyxis Ylikon & Proiontonananeosimon Pigon Energeias & Synafon Symvouleftikon y Piresion\*Adven, Toyota Motor Europe, Adam Opel AG, Università degli Studi di Padova



## GUARANTEED COMPONENT ASSEMBLY WITH ROUND TRIP ANALYSIS FOR ENERGY EFFICIENT HIGH-INTEGRITY MULTI-CORE SYSTEMS

REFERENCE	333053
CALL	SP1-JTI-ARTEMIS-2012-ASP1
SCIENTIST	Tullio Vardanega
DEPARTMENT	Mathematics
UNIPD	participant
TOTAL COST	9,630,857 €
EU FUNDING	3,968,702 €
E-MAIL	tullio.vardanega@unipd.it

### PROJECT DESCRIPTION

Emerging embedded systems platforms harnessing new heterogeneous, multicore architectures to enable the next generation of powerful mission-critical applications are demanding across-the-board advances in all areas of design and development to fulfil their promise. The integration of component-based design with model-driven development creates a potent combination especially capable of mastering the complexity of these new systems. CONCERTO will deliver a reference multi-domain architectural framework for complex, highly concurrent, and multi-core systems, where non-functional properties (including real-time, dependability, and energy management) will be established for individual components, derived for the overall system at design time, and preserved by construction and monitoring at run-time. The CONCERTO framework will integrate: + Correctness-by-construction for multicore systems with innovative model-to-code transformation techniques targeted at their special characteristics + A multi-view, hierarchical cross-domain design space sufficiently rich to enable a compositional approach to the next generation of complex, heterogeneous platform architectures. + Support for iterative and incremental development of multicore systems through simulation and

early model-based analysis, with fully automated back propagation of results to the user model. + Hardware modeling facilities equipped to cope with the new generation of heterogeneous, multicore platforms. + Advances in run-time monitoring of mission- and operation-critical non-functional properties such as energy consumption on partitioned and multicore processor architectures. The applicability of the CONCERTO solutions to multiple industrial domains (including aerospace, telecoms, automotive, and medical) will be ensured through the elaboration of representative industrial use cases. CONCERTO builds on the CHES project (ARTEMIS-2008-1-100022) results, as well as the results of several other related projects.

### PARTNERS

**Coordinator:** Intecs Informatica e Tecnologia del Software Spa

**Participants:** Università degli Studi di Firenze, Technolabs Spa, Thales Communications & Security Sas, Atego Sas, European Aeronautic Defence and Space Company Eads France Sas, Aicas GmbH, The Open Group (X/Open Company), University of Technology and Economics Knowledge Centre, Instituto Politécnico do Porto, Critical Software, Stiftelsen Sintef, Oilfield Technology Group, Maelardalens Högskola, Università degli Studi di Padova



## OPTIMAL HIGH-LIFT TURBINE BLADE AERO-MECHANICAL DESIGN

REFERENCE	323301
CALL	SP1-JTI-CS-2012-01
SCIENTIST	Ernesto Benini
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	839,100 €
EU FUNDING	629,325 €
E-MAIL	ernesto.benini@unipd.it

### PROJECT DESCRIPTION

The need for high speed low pressure turbine modules to be used with innovative aircraft engine concept establishes critical mechanical constraints with very high hub stresses for the rotor blades, thus representing a real challenge for the design. In order to assist the designer with reliable tools it is mandatory to assess the performance of turbine rotor blades of innovative concept with both numerical and experimental investigations. Starting from a baseline configuration, representative of the state-of-the-art of LPT high-lift rotor blades, an aerodynamic optimization will be performed exploiting modern optimization techniques. These techniques are based on the coupling between fast and flexible parametric handling of the geometries, CFD computations and meta-models like Artificial Neural Networks (ANN) or Radial Basis Functions (RBF). Such an approach will accomplish a multi-objective design aimed at enhancing the aerodynamic performance while meeting mechanical and geometrical constraints. Tests will be performed on both baseline and optimized rotors within a cold-flow, large-scale laboratory turbine. Tests on turbine configuration will ensure the reproduction of the correct radial equilibrium effects as well as of the rotor-stator aerodynamic interaction. The Reynolds number will be investigated in the range between 50000 and 300000, which represents

the operative range of the LP rotor blades of the engine. The large scale of the facility will allow detailed aerodynamic investigations, and an accurate performance analysis. The numerical and experimental frameworks will allow one to validate and verify the optimized solution and to highlight the key features of the new design with respect to the baseline. The validation of the design and optimization procedures will be accomplished with the availability of detailed experimental data obtained for the innovative rotor blade row in a realistic environment.

### PARTNERS

**Coordinator:** Università degli Studi di Genova

**Participants:** Università degli Studi di Firenze,  
Università degli Studi di Padova



## ASSESSMENT OF TILTROTOR FUSELAGE DRAG REDUCTION BY WIND TUNNEL TESTS AND CFD

REFERENCE	336439
CALL	SP1-JTI-CS-2012-03
SCIENTIST	Ernesto Benini
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	599,000 €
EU FUNDING	405,500 €
E-MAIL	ernesto.benini@unipd.it

### PROJECT DESCRIPTION

The DREAM-TILT project is focused on the assessment of drag reduction achieved through the aerodynamic optimization of some critical components of the ERICA tiltrotor fuselage. This will be accomplished both from an experimental and a numerical point of view. A CFD-based optimization activity has been carried out in GRC2, and proper shapes of some fuselage components (i.e. wing/fuselage junction, wing/nacelle junction, nose, landing gear sponson and empennage) have been identified, that contribute to reduce aircraft drag and enhance aerodynamic efficiency. In DREAM-TILT, the benefits obtained from the aerodynamic optimization in terms of drag reduction will be thoroughly assessed through a dedicated wind tunnel campaign: specifically, the final optimized fuselage will be tested and the drag reduction with respect to the original configuration will be determined. All the optimized components will be tested sequentially with the aim of getting an accurate drag breakdown and identifying the contribution of each component to the overall aerodynamic performance of the fuselage. Additional classical flow visualization runs and infrared thermography will be finally carried out to enhance knowledge on the transition and separation regions for the different drag reduction configurations. Moreover, a CFD activity will be

carried out on both the model scaled and the full scale aircraft in order to evaluate rotor effects and the full scale (Mach dependent) characteristics. In a first phase, a series of blind test simulations at wind tunnel conditions will be performed for both basic and optimized configurations. In a second stage, the numerical results on both the baseline and optimized ERICA geometries will be compared with the acquired wind tunnel data. Finally, the numerical models already tested and validated will be used for the assessment of the aerodynamic performance of the optimized ERICA fuselage at full scale conditions (Mach = 0.58), including the rotor effects.

### PARTNERS

**Coordinator:** HIT09 Srl

**Participants:** Ruag Schweiz Ag, Università degli Studi di Padova



## IMPLEMENTATION OF THE LIQUID INFUSION IN THE MANUFACTURING OF AEROSPACE STRUCTURES

REFERENCE	338413
CALL	SP1-JTI-CS-2012-03
SCIENTIST	Marino Quaresimin
DEPARTMENT	Management and Engineering
UNIPD	coordinator
TOTAL COST	249,351 €
EU FUNDING	187,013 €
E-MAIL	marino.quaresimin@unipd.it

### PROJECT DESCRIPTION

Liquid infusion process has been proved by recent researches to be suitable for the manufacturing of structural aeronautical components. The aim of this proposal is to develop a detailed analysis of the technical, economical and environmental impact of the extrapolation to industrial condition of the liquid infusion manufacturing technique. This analysis is deemed to be a necessary step in the successful scaling-up of the process for the fabrication of aeronautical components. The activity planned to achieve the aim of the proposal is organised in several work packages oriented to:

- clarify the applicability of the process in the real industrial environment
- identify the requirements to implement the process and to start the production phase
- quantify the technical and economical impact of the new process
- prepare a risk assessment and a manufacturing plan
- define the optimum process procedures and an operative manual

The research team is formed by two universities and a private research center, all with a large experience in the field of composite and the analysis proposed will be carried out by using the state-of-the art techniques in the different areas, taking advantage of the synergistic

competences of the partners in the key areas of the proposal (aeronautic composites manufacturing processes, realization of feasibility studies of industrial plants and processes, analysis of the environmental impact of industrial processes) and the data/information provided by the Topic Manager Company.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Montanuniversität Leoben, Swerea Sicomp Ab

# EURATOM

It promotes pacific use of nuclear  
research and technology.



## FUSENET - THE EUROPEAN FUSION EDUCATION NETWORK

REFERENCE	224982
CALL	FP7-Fusion-2007
SCIENTIST	Piero Martin
DEPARTMENT	Centro Interdipartimentale di ricerca "Centro Ricerche Fusione"
UNIPD	participant
TOTAL COST	2,314,673 €
EU FUNDING	1,852,480 €
E-MAIL	piero.martin@unipd.it

### PROJECT DESCRIPTION

This aim of the FUSENET project is the establishment of a European Fusion Education Network (FUSENET) for education in fusion science and technology, as part of a comprehensive package of coordination actions, in order to increase, enhance, and broaden fusion training and education activities in Europe. The project consists of eleven focused work packages, with a total proposed budget of 2,000,000. The project brings together a broad representation of the European fusion community with 36 participants from 18 countries, of which 22 Universities and 14 Euratom Associations.

The project consists of four groups of coordination actions: the establishment and running of the FUSENET network; development of individual learning opportunities and common educational goals; development of educational materials and hands-on experiments; and funding of joint educational activities. The FUSENET project will cover all education levels, from secondary school through Bachelor and Master level, to PhD. The actions of FUSENET build upon the already strongly coordinated European Fusion Research programme, coordinated under the European Fusion Development Agreement EFDA. The network will be given a permanent identity by the establishment of the FUSENET Association, which will provide a platform for the coordination of existing actions, the initiation, development

and implementation of new EU-wide actions, and for the exchange and dissemination of fusion education information.

The envisioned concrete end result of the FUSENET project is an integrated fusion education system in Europe, with strong links between fusion institutes and higher education institutes. Through a central website, the programme will offer a transparent structure of coherent educational actions, accessible and inviting, in which students and teachers can easily find their way to a variety of attractive ways to participate in the fusion research programme.

### PARTNERS

**Coordinator:** Technische Universiteit Eindhoven

**Participants:** Centro de Investigaciones Energeticas, Medioambientales y Tecnologicas-Ciemat, Commissariat Energie Atomique Cea, Consiglio Nazionale delle Ricerche, Ente per le Nuove Tecnologie, l'Energia e l'Ambiente, Stichting voor Fundamenteel Onderzoek der Materie – FOM, Université Henri Poincaré Nancy 1, Danmarks Tekniske Universitet, Università degli Studi di Milano-Bicocca, The University of Warwick, Ceske Vysoke Ucení Technické v Praze, Queen's University Belfast, Ecole Polytechnique Federale de Lausanne, Tampereen Teknillinen Yliopisto, National Technical University of Athens, Budapesti Muszaki és Gazdaságtudományi Egyetem, Université Libre de Bruxelles, Universiteit Gent, Universität Innsbruck, Forschungszentrum Jülich GmbH, Karlsruher Institut für Technologie, Ecole Polytechnique, Max Planck Gesellschaft zur Förderung der Wissenschaften E.V., Ústav Fyziky Plazmatu Av R-V. V. I., Instytut Fizyki Plazmy i Laserowej Mikrosyntezy Im. Sylwestra Kaliskiego, Szechenyi Istvan University, Universitatea Alexandru Ioan Cuza, Univerzita Karlova v Praze As, Sofijski Universitet Sveti Kliment Ohridski, Mta Kfki Reszecske-Es Magfizikai Kutatóintézet, Universidade Tecnica de Lisboa – Utl, United Kingdom Atomic Energy Authority, Cranfield University, Aristotelio Panepistimio Thessalonikis, Università degli Studi di Padova







OTHER  
EUROPEAN  
PROJECTS





# AAL (AMBIENT ASSISTED LIVING)

It aims to create better condition of life for the older adults and to strengthen the industrial opportunities in Europe through the use of information and communication technology (ICT).



## AN INTERACTIVE DIGITAL TV CHANNEL FOR PROMOTING SOCIAL INTERACTION AMONGST ELDERLY PEOPLE

CALL	AAL-2009-2-090
SCIENTIST	Luciano Gamberini
DEPARTMENT	General Psychology
UNIPD	participant
TOTAL COST	4,336,084 €
EU & OTHER FUNDING (I.A.)	2,060,072 €
E-MAIL	luciano.gamberini@unipd.it

### PROJECT DESCRIPTION

SeniorChannel will give elderly care professionals an innovative approach to developing and managing the specific social needs of the elderly in the wider community.

To achieve this goal, SeniorChannel will develop an Interactive Internet Protocol Television Channel (SENIORCHANNEL) that will not only provide elderly people with a method of interacting but also with a unique means of access to the range of diverse activities in their community including the opportunity to share knowledge and experience, the ability to participate in topical debates, entertainment services, work-shops and discussion groups regardless of their geographical location. The integrated system will be tested and evaluated, setting up a TV studio and production centre in Spain and broadcasting programs to a pilot user group. The feedback generated during user testing will provide the basis for modification and refinement thus bringing the design of the application more into line with the preferences and needs of those involved

### PARTNERS

**Coordinator:** Indra Software Labs

**Participants:** Brainstorm Multimedia, Audemat, Asociación Parque Galicia, M31 Spa, Università degli Studi di Padova

# CIP COMPETITIVENESS AND INNOVATION FRAMEWORK PROGRAMME

It supports innovation activities  
(including eco-innovation),  
provides better access to finance  
and delivers business support services in the region



## A CODE OF PRACTICE ON ENVIRONMENT ORIENTED SUSTAINABILITY

REFERENCE	<b>S12.ACGRACE033902800</b>
CALL	<b>ENT/CIP/09/B/N06S00</b>
SCIENTIST	<b>Antonio Scipioni</b>
DEPARTMENT	<b>Industrial Engineering</b>
UNIPD	<b>participant</b>
TOTAL COST	<b>284,030 €</b>
EU FUNDING	<b>198,821 €</b>
E-MAIL	<b>scipioni@unipd.it</b>

### PROJECT DESCRIPTION

EOS CODE is a friendly and easy to use Code of Practice. It aims at contributing to the enhancement of the competitiveness of -mainly- small and micro tour operators and travel agencies who will choose to implement it voluntarily in their enterprises, and especially in the package travels they are organising or selling.

Its philosophy, for achieving this goal, is based on the introduction of sustainability elements to the participating enterprise and on the improvement of the quality of its services and products.

More and more travelers embrace sustainable tourism nowadays, many of which would select the tour operator or travel agency with which to travel or their travel itself based on the policies of the enterprise with regard to the environment, the protection of destinations etc. On the other hand, more and more travel enterprises become equally sensitive towards sustainability issues and have, to a significant degree, the power to impose their relative policies by choosing, for instance, their collaborators based on whether or not they fulfill certain criteria.

Tour operators and travel agencies implementing the EOS CODE will be presented in this website and will have the right to use the EOS CODE logo. This will gradually make them more recognisable as sustainable enterprises, and thus more competitive in comparison with their colleagues who don't share their sensitivities.

Moreover, the implementation of EOS CODE in the five countries participating in the Project (Greece, Bulgaria, Croatia, Italy and Poland), and subsequently in other European countries too, could open the way for a wider implementation of sustainability in tourism in general, since EOS CODE will introduce its principles to tour operators and travel agencies who possibly were not familiar with them before.

### PARTNERS

**Coordinator:** HATTA (Hellenic Association of Travel & Tourist Agencies)

**Participants:** Federazione Italiana Associazione Imprese Viaggi e Turismo, Research Institute for Tourism, European Association of Travel Agents and Tour Operators, Association of Bulgarian Tour Operators and Travel Agents, Polska Izba Turystyki / Polish Chamber of Tourism, Association of Croatian Travel Agencies, Università degli Studi di Padova





## IMPROVING COLD STORAGE EQUIPMENTS IN EUROPE

REFERENCE	IEE/09/849/SI2.558301- ICE_E
CALL	CIP-IEE-2009
THEME	Intelligent Energy - Europe
SCIENTIST	Claudio Zilio
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	1,519,078 €
EU FUNDING	1,139,308 €
E-MAIL	claudio.zilio@unipd.it

### PROJECT DESCRIPTION

Cold store facilities store food to maintain quality and safety of the food. Stores generally maintain food at chilled temperature (generally between -1 and 5°C) or frozen conditions (generally below -18°C). For some specialised products ultra low temperature (some fish, and specialised foods) or modified atmosphere storage (fruits and vegetables) is used. Cold stores can be owned by retailers or by private companies (often termed 'public cold stores'). This proposal covers all types of food cold stores from small stores of <5 m<sup>3</sup> to large regional distribution centres and public cold stores or up to 250,000 m<sup>3</sup>.

Refrigeration is one of the most energy-intensive technologies used in the food supply chain.

Refrigeration poses a number of sustainability-related challenges related to energy consumption and to loss of refrigerants, many of which are high GWP (Global Warming Potential) greenhouse gasses. Refrigeration accounts for about 35% of electricity consumption in the food industry (Guilpart, 2008). Worldwide this equates to a consumption of about 1300 TWh per year.

The cold chain is believed to be responsible for approximately 2.5% of global greenhouse gas emissions through direct and indirect (energy consumption) effects. Studies have shown that leakage of refrigerants may be higher than 17% in industrial plant (Clodic and Palandre 2004).

In Europe there is at least 45 million cubic

meters of cold storage for food. Much of this space is owned or operated by members of IARW (International Association of Refrigerated Warehouses) who through Cold Chain Experts are involved in this project. In 2002 Duiven and Binard estimated that cold stores use between 30 and 50 kWhm<sup>-2</sup>year<sup>-1</sup>. Surveys carried out by partners in this project have shown that energy consumption can dramatically exceed this figure, often by at least double (see Figure 1). These surveys have also demonstrated that energy savings of 30-40% are achievable by optimising usage of the stores, repairing current equipment and by retrofitting of energy efficient equipment. However, cold store operators are often reluctant to install new equipment without sufficient information on savings that can be achieved. The main aim of ICE-E is therefore to overcome these reservations to the uptake of new technologies within the cold storage sector. Through a combination of knowledge based information packages, mathematical models and education programmes the team will enable cold store operators to make informed decisions on equipment and to select and identify cost efficient paybacks to their businesses. In addition the team will develop a benchmark/labelling system for cold store operators so that they can compare performance against others users within the sector.

In additional to technical barriers to the uptake of new technology there are also non technical barriers preventing uptake of new technologies. Proven technologies are often not taken up due to wider social, political, economic and organisational contextual issues. Partners within this project have already carried out investigations into non technological issues associated with the lack of uptake of new equipment in the cold storage sector. Within this project action researchers will expand past work and investigate the interplay between technological, economic, and human factors which creates conservatism and 'lock-in' in the system as a whole. To



overcome these issues the team need to create change and awareness of the issues and a sense of agency that can initiate relevant change. The overall aim of the ICE-E project is to reduce energy consumption and greenhouse gas emissions from the European food cold storage sector through application of energy efficient equipment choices in line with European policy. The aim is to save at least 720 MWh/year through indirect energy savings and at least 144 MWh/year through direct savings (total 864 MWh/year). Longer term the project will enable savings to be continued after completion of the 24 month project through an energy labelling scheme, tools to enable end users and technicians to identify energy savings and educational packages to train current and future cold store operators and technicians.

## PARTNERS

**Coordinator:** London South Bank University (UK)

**Participants:** KHLim, vzw Katholieke Hogeschool Limburg, Danish Teknologisk Institut, Cold Chain Experts/IARW, Carbon Data Resources Ltd, Food Research Institute Prague, Technical University of Sofia, Università degli Studi di Padova

## LINKED HERITAGE - COORDINATION OF STANDARDS AND TECHNOLOGIES FOR THE ENRICHMENT OF EUROPEANA

REFERENCE	270905
CALL	CIP-ICT-PSP-2009-4
SCIENTIST	Laura Tallandini
CENTRE	University Library Centre
UNIPD	participant
TOTAL COST	3,858,012 €
EU FUNDING	3,086,407 €
E-MAIL	<a href="mailto:laura.tallandini@unipd.it">laura.tallandini@unipd.it</a>

## PROJECT DESCRIPTION

Linked Heritage involves 38 partners from 20 countries, including EU member states, Israel and Russia.

It has 3 main goals:

- to contribute large quantities of new content to Europeana, from both public and private sectors;
- to enhance the quality and richness of Europeana metadata ;
- to improve the functionalities available for search, retrieval and use of Europeana content.

The project seeks to enable a significant expansion and enrichment of Europeana content and services:

- providing access to 3 million new digital objects;
- facilitating the comprehension and spread of key Digital Library concepts through the creation of new dissemination, information and training tools (websites, posters, leaflets and learning objects);
- developing new open source web applications to facilitate the flow of data to Europeana.

The project — launched in 2008 — is funded by the European Commission and housed at the National Library of the Netherlands in the Hague. Europeana is first and foremost a multilingual portal, designed as an interchange, with links to libraries, archives, museums, universities

and research institutes of the European Union, enabling users of the web to share freely in our common cultural memory. These same users can also contribute to the growth and dissemination of this immense digital heritage through the social media and Web 2.0 tools.

From the work of Isaac Newton on the laws of motion to the drawings of Leonardo, from the Divine Comedy to the paintings of Jan Vermeer, from the scores of Beethoven to the Magna Carta, from the Codex Sinaiticus to images of the fall of the Berlin Wall: over 17,500,000 digital objects in the form of texts, images, audio and video clips, can be consulted by students, teachers, researchers and scholars.

## PARTNERS

**Coordinator:** ICCU - Istituto Centrale per il Catalogo Unico delle biblioteche italiane e per le informazioni bibliografiche

**Participants:** Consiglio Nazionale Delle Ricerche, Ministère de la Culture et de la Communication, Eesti Vabariigi Kultuuriministeerium, Hellenic Ministry of Culture, National Technical University of Athens, University of Patras, Collections Trust Lbg, An Chomhairle Leabharlanna, Pintail Ltd, Fundacio Privada I2cat, Internet I Innovacio Digital a Catalunya, Philipps Universitaet Marburg, Stiftung Preussischer Kulturbesitz, Central Library of the Bulgarian Academy of Sciences Cl-Bas, Javni Zavod Republike Slovenije Za Varstvo Kulturne Dediscine, The Cyprus Research and Educational Foundation, Stowarzyszenie Miedzynarodowe Centrum Zarzadzania Informacja, Riksarkivet Ra, Medra S.R.L., Gottfried Wilhelm Leibniz Universitaet Hannover, Editeur Limited Editeur, Mvb Marketing und Verlagsservice des Buchhandels, Orszagos Szechenyi Konyvtar, Koninklijke Musea Voor Kunst En GeschiedenisInstituut Umeni - Divadelniho Ustavu, Instituto Superior Tecnico, Valsts Agentura Kulturas Informacijas Sistemas, Packed - Platform voor de Archivering en Conservering, Van Audiovisuele Kunsten, Cordia As, Università degli Studi di Roma La Sapienza, C.T.F.R. Srl, Generalitat de Catalunya. Departament de Cultura i Mitjans de Comunicació. Direcció

General del Patrimoni Cultural, Promoter di Masi Pietro & C S.N.C., Université de Savoie, Association Dedale, Uma Information Technology GmbH, Digital Heritage Lbg, Università degli Studi di Padova



## INNOVATIVE PLANTS FOR THE INTEGRATED TREATMENT OF DIGESTATE

REFERENCE	Contract n. 332971
CALL	2012
SCIENTIST	Maurizio Borin
DEPARTMENT	Agronomy, Food, Natural resources, Animals and Environment
UNIPD	participant
TOTAL COST	1,406,833 €
EU FUNDING	174,825 €
E-MAIL	maurizio.borin@unipd.it

### PROJECT DESCRIPTION

The aim of the project is the construction of an innovative system for separation and phytoremediation of wastewater – coming from a biomass-fuelled anaerobic digester - and the market uptake of the solution.

Although the proposed system is acting for the treatment of aqueous by-product, it also helps to improve the management of solid fraction to be separated and can be packaged and sold as fertilizer concentrate, helping to solve the problem related to spreading of livestock manure in the territories under Directive 91/676/EEC.

The proposed system for treatment will thus drastically decrease transactions costs and the disposal of the digestate, also reducing CO<sub>2</sub> emissions.

The plant will consist of a) a pre-treatment system based on innovative striping basins b) a filtering system made by recycled refractories, c) an innovative hybrid system of constructed wetlands, including a new technology called Tech-IA technology on through which the liquid digestate will be treated for the purification. The innovativeness of the proposed solution lies in the following factors:

- the whole project is based on an integrated process in which the individual sections may not appear innovative taken individually but their association has not ever been applied for

the treatment of digestate; Phytoremediation has never been used for the treatment of wastewater coming from biogas production plants;

- the use of recycled refractories as filter material for the digestate before treatment and as a substrate for some plant modules in phytodepuration basins;
- in addition to environmental benefits, biogas producer who will adopt the proposed solution can obtain substantial economic benefits such as the recovery and possible commercialisation of ammonia from the treatment of the solid part of digestate, the reuse of mowed plants from phytoremediation basins to feed the anaerobic digester and possibility to commercialise the pelletized part of the solid digestate.

With reference to the environmental benefits, they are related to water and materials recovery and reduction of soil and air pollution.

### PARTNERS

**Coordinator:** New Plant Srl

**Participants:** Contrapo' Biogas Soc. Agr. A R.L., Pirani Srl, Universität für Bodenkultur Wien, Università degli studi di Milano, Università degli Studi di Padova

# CULTURE

It aims to enhance the cultural area shared by Europeans, which is based on a common cultural heritage, through the development of cooperation activities among cultural operators from eligible countries, with a view to encouraging the emergence of European citizenship.



## DIGITAL RE-WORKING/ RE-APPROPRIATION OF ELECTRO-ACOUSTIC MUSIC

REFERENCE	2010-1174
CALL	Call 2009. Strand 1.2.1 Cooperation measures
SCIENTIST	Federico Avanzini
DEPARTMENT	Information Engineering
UNIPD	coordinator
TOTAL COST	300,000 €
EU FUNDING	150,000 €
E-MAIL	avanzini@dei.unipd.it

### PROJECT DESCRIPTION

DREAM is aimed at preserving, reconstructing, and exhibiting the devices and the music of the Studio di Fonologia Musicale di Milano della Rai (SdF hereafter). During the 1950s and 1960s, this was one of the leading places in Europe for the production of electro-acoustic music, together with Paris and Cologne. Most of the devices originally realized to equip the SdF (sinusoidal oscillators, noise generators, filters, and so on) were unique pieces designed and constructed by RAI personnel. These unique pieces of equipment were later substituted with commercial devices. Most of them are now lost, and the few surviving devices are not operational anymore. After the closure of the SdF, its equipment remained for several years in the RAI warehouses. In 2008 the remaining equipment was saved and is now exhibited at the Milan Museum of Musical Instruments.

None of the electrophone instruments of the SdF is currently operational. The project aims at defining an approach to active preservation of these instruments, and is one of the first attempts to address this issue from a multidisciplinary perspective involving engineering, interaction design, and musicological competences. The final goal was to develop an installation consisting of a software-hardware system that re-creates the electronic lutherie of the SdF, allowing users (both musicians and amateurs) to interact with such

lutherie. Also the project had the more general goal of disseminating the legacy of the SdF as one of the most important studios for the production of electro-acoustic music in the 20th century.

These goals have been achieved through

- the recovery of technical and iconographic information from the SdF archives;
- the technical analysis of the equipment of the SdF;
- the musicological analysis of some of the main compositions realized at the SdF;
- the development of prototypical software and hardware that will remain accessible to users and museum visitors even after the end of the project;
- the writing of a book about the SdF and the project results;
- the writing of several other scientific publications, presented at international scientific conference;
- a comprehensive dissemination plan that comprises the organization of several public events and the participation to several more events, as well as a project website.

### PARTNERS

**Coordinator:** Università degli Studi di Padova  
**Participants:** Aalborg University Copenhagen, Middlesex University London, RAI Milano, Museo degli strumenti musicali di Milano

# DG HEALTH AND CONSUMERS

To make Europe a healthier, safer place,  
where consumers can be confident that  
their interests are protected.



## DEMOCRACY, CITY AND DRUGS II

REFERENCE	2007 306
CALL	Health Programme 2008-2013 – call for proposal 2008
SCIENTIST	Luciano Gamberini
DEPARTMENT	General Psychology
UNIPD	participant
TOTAL COST	1,550,844 €
EU FUNDING	900,000 €
E-MAIL	luciano.gamberini@unipd.it

### PROJECT DESCRIPTION

The EU Drugs Strategy aims to create a balanced approach to supply, demand and harm reduction strategies. The project's aim is to help support EU cities develop local, partnership based drug policies involving the relevant stakeholders – local authorities, health services criminal justice services, communities, including visible minority ones, and drug service users – so that a coordinated, participative, targeted, and thus resource effective approach can be developed towards drug-related problems.

In terms of supporting key community strategies on drugs and alcohol, the project supports good practice sharing; promotes integrative approaches across health determinants (alcohol and lifestyle) and urban safety; contributes to the reduction of health inequalities; addresses a gender perspective; targets specific settings such as nightlife; develops best practices to improve access to services for drug users; develops training for professionals.

The DC&D II project is based on 3 pillars: 1 EU wide experimental network of more than 16 partner cities; 4 national networks (FR, IT, PT, RO); 5 thematic work packages based on the findings of the 1st DC&D project.

To support the development of an integrated drug policy among the partner cities and countries 5 European thematic exchange platforms open to the EU experimental network of cities and the 4

national networks of cities will be organised. The exchange platforms will tackle: policies addressing the specific needs of women with drug misuse; - activities for health promotion in nightlife settings; integrated responses related to wandering young drugs users; outreach activities as regards drugs use and sexual infectious diseases; local policies improving access to treatment. The exchange platforms will include sharing seminars, training sessions, refinement meetings and guidelines. Finally the project will develop the DC&D website and organise a dissemination conference.

### PARTNERS

**Coordinator:** Efus

**Participants:** Irefrea; Asociacion Bienestar y Desarrollo; Euro TC; Access; Anitea; Forum Europeen Pour la Sécurité Urbaine; Forum Italiano per la Sicurezza Urbana; Matosinhos; Drug Agency ANA; Irefrea; Università degli Studi di Padova





## EURO-WABB: AN EU RARE DISEASES REGISTRY FOR WOLFRAM SYNDROME, ALSTROM SYNDROME AND BARDET BIEDL SYNDROME

REFERENCE	2010 12 05
SCIENTIST	Roberto Vettor
DEPARTMENT	Medicine
UNIPD	participant
EU FUNDING	900,000 €
E-MAIL	roberto.vettor@unipd.it

### PROJECT DESCRIPTION

Wolfram, Alström and Bardet-Biedl (WABB) syndromes are rare diseases with overlapping features of multiple sensory and metabolic impairments, including diabetes mellitus, which have caused diagnostic confusion. There are as yet no specific treatments available, little or no access to well characterized cohorts of patients, and limited information on the natural history of the diseases. We aim to establish a Europe-wide registry for these diseases to inform patient care and research.

EURO-WABB is an international multicenter large-scale observational study capturing longitudinal clinical and outcome data for patients with WABB diagnoses. Three hundred participants will be recruited over 3 years from different sites throughout Europe. Comprehensive clinical, genetic and patient experience data will be collated into an anonymized disease registry. Data collection will be web-based, and forms part of the project's Virtual Research and Information Environment (VRIE). Participants who haven't undergone genetic diagnostic testing for their condition will be able to do so via the project. The registry data will be used to increase the understanding of the natural history of WABB diseases, to serve as an evidence base for clinical management, and to aid the identification of opportunities for intervention to stop or delay the progress of the disease. The detailed clinical

characterisation will allow inclusion of patients into studies of novel treatment interventions, including targeted interventions in small scale open label studies; and enrolment into multinational clinical trials. The registry will also support wider access to genetic testing, and encourage international collaborations for patient benefit.

### PARTNERS

**Coordinator:** University of Birmingham

**Participants:** University of Glasgow, Centre Nationale de la Recherche Scientifique, Instituto de Investigación Biomédica de Bellvitge, Uniwersytet Medyczny W lodzi, Institut national de la santé et de la recherche médicale, University of Tartu, Alstrom Syndrom UK, Università degli Studi di Padova



## NIGHTLIFE EMPOWERMENT AND WELLBEING IMPLEMENTATION PROJECT

REFERENCE	2010 12 07
CALL	Health Programme 2008-2013 – call for proposal 2010
SCIENTIST	Luciano Gamberini
DEPARTMENT	General Psychology
UNIPD	participant
TOTAL COST	1,500,149 €
EU FUNDING	893,154 €
E-MAIL	luciano.gamberini@unipd.it

### PROJECT DESCRIPTION

Recreational settings are privileged spaces to reach synthetic drugs users. The NEW IMPLEMENTATION project proposes responses to the new challenges in the field of synthetic drugs harm reduction such as partygoers' mobility (party tourism), new youth cultures and trends of drug uses, necessity of improving nightlife community empowerment as well as filling the gap in terms of geographic coverage. Carried out by the community-based NGOs and the cities involved in the Basics Network (PHP 2001CVG2-206) and the DC&D Safer Nightlife Platform (PHP 2004311/2007306), the "Nightlife, Empowerment and Well-being Implementation" project (NEW Implementation) will respond to the situation by reducing synthetic drug-related harm among European youth, using recreational settings as starting outreach spaces to change behaviours. To this end, the project will integrate synthetic drugs use responses into health promotion actions within recreational settings. Concretely, it aims at developing, implementing and exchanging harm reduction guidelines, standards and good practices. Indeed, the scientific community (EMCDDA Best Practice Portal, Healthy Nightlife Toolbox, Club-Health.eu, etc.) and the national policy makers have collected and developed guidelines, standards and regulations that need to be implemented on a

larger scale. Moreover, according to the EU Drug Action Plan 2009-2012, the project will contribute to enhance the quality and effectiveness of drug demand reduction activities, taking account of specific needs of drug users according to their cultural background and age.

The specific objectives of the project are:

- improving field work interventions;
- adapting responses to partygoers mobility; developing innovative responses adapted to youth cultures; developing community empowerment (nightlife and health professionals, local authorities, etc.);
- implementing new projects and enlarging the network (mainly among new member states);
- improving rapidity of responses.

To reach the objectives, the partners will:

- collect, adapt and implement best practices standards and guidelines;
- organise training sessions and study trips;
- organise common field interventions in 6 big international music festivals (180 000 people);
- support the implementation of safer party labels in 12 EU cities involving the local communities ("Party +" network);
- set up a database on synthetic drug checking results and develop an early warning system on dangerous substances and new trends of uses (TEDI project);
- organise the "EU NEW Safer Night" and a dissemination conference.

The expected outcomes are:

- implementing best practice standards and guidelines; improving healthy recreational settings;
- implementing new projects in EU regions in needs;
- reducing the crisis situations during parties and festivals;
- increasing youngsters' knowledge on synthetic drug related harm and how to reduce it;
- changing partygoers' behaviours.
- finally, the project will contribute to the second health programme by:

- improving citizens' health security through the TEDI early warning system;
- promoting health through actions on health determinants (alcohol and drug consumption) as well as environmental determinants (safer party settings);
- generating and disseminating health information and knowledge: TEDI trends reports, new media productions, training seminars, dissemination conference, etc.

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## PARTNERS

**Coordinator:** Asociacion Bienestar y Desarrollo ABD

**Participants:** Modus Vivendi; Jellinek Foundation; Suchtzentrum Leipzig Gmbh; Agenica Piaget Para o Desenvolvimento; Association Techno Plus; Verein Wiener Sozialprojekte, Università degli Studi di Padova



# **DG HOME AFFAIRS**

As part of the European Commission, Directorate-General (DG) Home Affairs prepares EU-level rules in these policy areas and watches over their application. The DG Home Affairs is also responsible for funding related projects in EU States.





## INNOVATIVE NETWORK FOR SECURITY AND PREVENTION THROUGH INTER-REGIONAL EURO-COOPERATION

REFERENCE	JLS/2009/ISEC/AG/036
CALL	ABAC number 30-CE-0281285/00-72
SUBPROGRAMME	prevention of and fight against crime
SCIENTIST	Gianni Riccamboni
CENTRE	Interdepartmental Research Centre of Regional Studies "Giorgio Lago"
UNIPD	coordinator
TOTAL COST	131,261 €
EU FUNDING	78,153 €
E-MAIL	gianni.riccamboni@unipd.it

### PROJECT DESCRIPTION

The free movement of people within the European Union borders, the reduction and smoother border checking activity at the internal borders towards Romania and Bulgaria, set/determined a tremendous expansion of the criminal activities through networks that became transnational, their extremely flexibility are predominantly oriented around/on activities connected to migration flows on the axis East-West. Several specific elements that defines the countries from the last wave of enlargement of EU like poverty, corruption and bribery, lack of effective measures in the judicial systems, explosion of the immigration flows toward countries more developed, situations made further even worse by the financial crisis, breed situations with particular gravity (the case of Romania-Italy) that could not be managed without transversal network collaboration between public and private players with different proficiencies/competencies but in the same time complementary. The project aim is to strengthen an international network created by subjects that collaborate together for a long time through: the identification of good practices to be adopted at interregional and g-local level, the elaboration of several

preventive experiments of interventions but also supplementary ones, in a particular in a territory that has to face the side effects of human beings trafficking, exploitation and sexual exploitation (children in particular) and acts related to micro criminality that are coordinated in great measure at the transnational dimension. All these facts brought a feeling of insecurity among the local populations. As obviously, in the case of Italian-Romanian problems, reckless coordination or non-transversal management of the problems generated by these, allowed situations of racism and violence in front of all the minority groups, crisis that obliged the operators towards giving instantaneous solutions that were mostly political without the warranty of a real control in the territory.

The main objective of the project is to consolidate and extend an international innovative network in order to compare and emphasize in a multilevel and inter-institutional context the reciprocal experiences and the singular good practices of each country/region, particularly in the field of coordinated and harmonized prevention along with the EU countries from the last wave of enlargement. The structure of the project will allow to the individuals to elaborate statistical data, establish the local dynamics in a transnational approach, and will give place to test the prevention models, territorial control and integration into two real contexts in Italy and Romania where the flows of migrants are very large, as well as marginalization and criminal critical situations. In the end, the project intends to create a widespread communication method publicly in the territory, by a process of data computerization and of the results.

### PARTNERS

**Coordinator:** Università degli studi di Padova

**Participants:** Local Health and Social Unit 16

- ULSS 16 Padova, M.a.s.ter. Association West

University of Timisoara, PolicyEuroNetwork

Association, Romanian Association of Penal

Sciences - Timisoara Branch Appeal Court

Timisoara, OKTOFORDVIL Foundation, "Vasile Goldiş" Western University of Arad



## STOP CRIMES ON RENEWABLES AND ENVIRONMENT

REFERENCE	JLS/2009/ISEC/AG/101
CALL	JLS/2009/ISEC/AG
SUBPROGRAMME	prevention of and fight against crime
SCIENTIST	Davide Pettenella
DEPARTMENT	Land, Environment, Agriculture and Forestry
UNIPD	participant
TOTAL COST	573,690 €
EU FUNDING	385,271 €
E-MAIL	davide.pettenella@unipd.it

### PROJECT DESCRIPTION

The production of renewable energy is not only an environmental necessity - it is also a strategic economic sector that records economic growth and generates innovation and employment, even during the period of global economic crisis. However, the expansion of renewable energy production raised certain negative effects, such as the concentration of organized criminality groups. Evidence of this are the recent juridical actions undertaken in different regions of Italy, gaining great media attention. Assuring the legitimacy and making the renewable energy sector "clean" from criminality became a highly important priority. Therefore, Fondazione Culturale Responsabilità Etica (Banca Popolare Etica Group) founded the project "SCORE - Stop Crimes on Renewables and Environment", carried on with a group of qualified partners: ARCI Lombardia, Association Saveria Antiochia Omicron, Centro di Iniziativa Europea, Forest Stewardship Council, Department for Land, Economics, Agriculture and Forestry of University of Padova, and Association Valore Sociale. The "SCORE" project is financed by the Directorate-General for Freedom, Security and Justice of the European Union, under the program "Prevention and Fight against Criminality". The objective of "SCORE" is to promote the direct engagement of enterprises, public administration

and civil society to combat organized crime and illegality in the renewable energy and forest/wood sector by providing the interested actors with the methodologies and tools for assessing, controlling and preventing illegality. In addition, the project "SCORE" is developing a network for exchanging the information on results from research studies and the best practices among various actors involved in renewable energy and forest/wood sector.

- See more at:

<http://www.euscore.eu/eng.aspx#sthash.HQcbBlvs.dpuf>

### PARTNERS

**Coordinator:** FCRE – Cultural Foundation for Ethical Responsibility

**Participants:** Banca Etica, ARCI Lombardia, CDIE, FSC Italia, SAO, Valore Sociale, Università degli Studi di Padova



## AGAINST EMERGING FORMS OF TRAFFICKING IN ITALY: EXPLOITED IMMIGRANTS IN THE INTERNATIONAL PHENOMENON OF FORCED BEGGING

REFERENCE	HOME/2012/ISEC/AG/THB/4000003934
CALL	HOME/2012/ISEC/AG/THB
SUBPROGRAMME	prevention of and fight against crime
SCIENTIST	Paola Degani
CENTRE	University Human Rights Centre
UNIPD	participant
TOTAL COST	269,232 €
EU FUNDING	242,228 €
E-MAIL	paola.degani@unipd.it

### PROJECT DESCRIPTION

In order to explore the new forms of trafficking, especially for begging purposes (priority 5 of the ISEC program), the project foresees to reach the target in the contexts where the phenomenon is more clearly visible (trains, places of worship, towns of artistic interest, shops...) through the implementation of 5 contact units made up of social workers and linguistic-cultural mediators. They will experience models, tools and methodologies of connection, reporting and addressing and identification of trafficked persons, that will be disseminated within the national system of referral for victims of trafficking.

The project, through the involvement of local and national institutional partners, aims to raise awareness about the transformation of the begging phenomenon related to trafficking and smuggling, so that the policy-makers could improve the policies contrasting human trafficking. Furthermore, the project aims to respond to priority 6, creating four multi-agency training courses. Two courses will be addressed to public social workers engaged in the contact of populations at risk, both from NGOs and from community police, whereas the other two courses will be addressed to social workers and to detective,

engaged in the identification and in the protection of the victims of trafficking. The training courses, aimed at codifying of good practices, will be human rights oriented and based on a multi-agency approach.

The project aims to strengthen the local referral system, through the action research and the multi-agency training between social workers and police officers, creating a network of specialized workers in the phenomenon of trafficking for begging purposes. The outcomes will be spread through the website and the final conference to promote a project for the construction of a transnational network that involves some EU countries of origin and destination of the people involved in begging. The project aims to promote the cooperation and the multi-agency work among law enforcement agencies, public agencies and NGOs, with the goal of preventing and fighting the new phenomenon of trafficking for begging purposes and protecting victims.

### PARTNERS

**Coordinator:** Regione del Veneto, Unità Progetto Flussi Migratori

**Participants:** Comune di Venezia, Vicenza, Verona, Padova, Rovigo, Regione Friuli Venezia Giulia, Comunità dei Giovani, Associazione Volontarius, Cooperativa Equality, Caritas di Udine, Associazione Etnoblog, Associazione Nuovi Vicini onlus, Provincia Autonoma di Bolzano;  
- associated partners: Comune di Pordenone, Ambito Distrettuale Urbano 6.5, Dipartimento per le Pari Opportunità- Presidenza del Consiglio dei Ministri, Questure di Belluno, Venezia, Vicenza, Rovigo, Treviso, Gorizia, Università degli Studi di Padova





## TRAFFICKED AND EXPLOITED MINORS BETWEEN VULNERABILITY AND ILLEGALITY

REFERENCE	HOME/2013/ISEC/ AG/ THB/4000005491
CALL	Targeted Call 'THB' 2013 - CIPS/ ISEC 2013 Action Grants – 30/10/2013
SCIENTIST	Paola Degani
DEPARTMENT	University Human Rights Centre
UNIPD	coordinator
TOTAL COST	482.112,12 €
COST UNIPD	207.569,91 €
TOTAL EU FUNDING	432.213,52 €
FUNDING UNIPD	190.980,36 €
E-MAIL	paola.degani@unipd.it

### PROJECT DESCRIPTION

The project focuses on the knowledge and the development of best practices in the field of trafficking and forms of severe exploitation of minors within forced criminal activities. The general objective is to create a European network, operating in FR, IT, RO and HU, aiming at developing knowledge, training, best practices as well as disseminating the products and expected results of the project. More specifically the project intends to:

- collect and share data on the phenomenon and the interventions in the countries involved;
- realize a work of analysis and exchange of the national operational procedures;
- organize a training involving social workers, police forces or other subjects on the operational procedures for victims of forced criminal activities aimed at the development of an transnational prototype as well as at the conception of models of multi-agency operational protocols to improve contact, identification, referral and assistance of victims of trafficking and exploitation in forced criminal activities;
- carry out a local experimentation addressed to Roma minors involved in forced criminal activities

to test the adaptability and the feasibility of the operational protocols;

- realize a video able to raise awareness among institutions and citizens in the involved countries.

The project will reach these goals through the following actions:

1. A research to be carried out in the 4 countries involved to detect the number of minors and adults possible victims of severe exploitation within forced criminal activities, in order to obtain a first monitoring of their biographical and social characteristics and a collection of the existing practices on recognition-identification, referral and protection;
2. Analysis and exchange of the results of the research on the phenomenon and on the practices identified, to be carried out through 3 transnational meetings, 2 of which (before the training) aimed at the construction of a transnational prototype (agency-specific and multi-agency) of best practices on recognition-identification, referral and protection, and 1 (after the training) to share the methodology for developing operational protocols to help victims;
3. Multi-agency training to be implemented through 8 training modules for each country, whose direct beneficiaries are 144 social workers, police officers or other subjects in order to identify human rights-oriented and multi-agency operational procedures;
4. Development of models of operational multi-agency protocols to help victims of forced criminal activities, with particular reference to Roma minors, to be conceived through 2 workshops in the 4 countries that will be validated by stakeholders so to be potentially adopted in different territories;
5. Implementation of the operational procedures identified for Roma minors possible victims of trafficking and serious exploitation in forced criminal activities through the antitrafficking framework of Triveneto Area (Italy, 3 Regions), as well as adaptation of such practices to

possible adult victims (15 persons in the protection system);

6. Raising awareness among stakeholders and population through the production of a video on minors trafficked in forced criminal activities and on national anti-trafficking helpline, to be disseminated in the media thanks to different agencies involved in fighting trafficking;
7. Dissemination of the project's results and deliverables that include the publication and the video, among the target group and the direct and indirect beneficiaries: NGOs, social workers, police forces, foreign affairs officers, the judiciary, universities and other institutions.

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## **PARTNERS**

**Coordinator:** Università degli Studi di Padova

**Participants:** Comune di Venezia, Association ALC (France) Hungarian Baptist Aid (Hungary), ADPARE The Association for Developing Alternative Practice (Romania), Equality cooperativa Sociale Onlus, Associazione Volontarius Onlus, Nuovi Vicini ONLUS, Associazione La Strada - Der Weg ONLUS, Azalea Cooperativa Sociale Onlus, Comunità dei Giovani, Ministero della Giustizia - Direzione Nazionale Antimafia, Cinformi - Dipartimento Lavoro e Welfare - Provincia Autonoma Trento, Gruppo R, Provincia Autonoma di Bolzano, Punto d'Approdo, Centro Caritas dell'Arcidiocesi di Udine, La Tenda Onlus, Associazione WELCOME, International Organisation for Migration, Mission in Hungary, Comune di Trento - Servizio Attività Sociale

# DG JUSTICE

The Directorate-General Justice aims to improve the everyday lives of EU citizens, offering practical solutions to cross-border problems, so that citizens feel at ease when moving around the EU and businesses can make full use of the Single Market.



## EUROPEAN RIPOSTE AGAINST ILLICIT TR@CFFICKING

REFERENCE	30-CE-0179232/00-41
CALL	JLS/2007/ISEC/550
SUBPROGRAMME	prevention of and fight against crime
SCIENTIST	Giuseppe Viesti
DEPARTMENT	Physics
UNIPD	participant
TOTAL COST	961,437 €
EU FUNDING	673,006 €
E-MAIL	giuseppe.viesti@unipd.it

### PROJECT DESCRIPTION

After the great success of the EURITRACK project in developing new hardware and software tools based on the use of tagged neutron beams for the detection of explosives hidden in cargo containers, the final inspection portal has been fielded in a seaport for a first demonstration run in combination with existing X-ray scanner. The EURITRACK detection system now in operation in Rijeka (CROATIA) will be dismantled in December 2007 at the end of the FP6 funded project. We are asking for a new 2 year long project within the LSF call for activities aimed at transferring the developed technologies to the EU Custom Agencies to improve the European capabilities in the fight against the illicit trafficking and then enhance security.

The benefits coming in the use of the EURITRACK tagged neutron technology in the cargo container inspections are:

- Perform manifest verification by the elemental analysis of the cargo, thus providing direct hints on the transported material;
- Search for threat materials (explosives and drugs) in specific voxels in the container appearing as suspect after the x ray scan.

The proposed project foresees 24 months activities to perform the following tasks:

- Increase the data base of scanned cargo containers (4 months operation in Rijeka)

and up-grade of the Information System to improve the end-user interface and optimize the capability of detecting threat materials different from explosives (as drugs).

- A complete study on the legal aspects related to the licensing of neutron technology in EU, preliminary studies about standardization of such tools and market possibilities.
- A training course for Custom Officers about the use of neutron technology in the contrast of illicit trafficking including field experience in the use of the portal in Rijeka.

All activities will be performed in close contact with an established forum of end-users (i.e. custom agencies) that will monitor continuously the project.

### PARTNERS

**Coordinator:** Atomic Energy Commission

**Participants:** Università di Brescia, IRB, ACT, RC, Università degli Studi di Padova



## CITIZENS IN DIVERSITY: A FOUR-NATIONS STUDY ON HOMOPHOBIA AND FUNDAMENTAL RIGHTS

REFERENCE	Project number: JLS/2008/CFP/
CALL	Action Grants FRC (Fundamental Rights and Citizenship) 2008-1
THEME	Fight against Homophobia
SCIENTIST	Gustavo Guizzardi , Luca Trappolin
DEPARTMENT	Philosophy, Sociology, Education and Applied Psychology
UNIPD	coordinator
TOTAL COST	446.258 €
EU FUNDING	356.977 €
E-MAIL	luca.trappolin@unipd.it

### PROJECT DESCRIPTION

#### Introduction

Homophobia has different qualitative and quantitative features in different European countries and within member States.

On the one hand, in countries with little (or no) legal protection of the rights of gay and lesbian people against hate crimes and speech (such as Italy and Hungary), homophobic public statements and negative attitudes towards homosexuality are widespread, and hate crimes are recurrent. On the other hand, the achievement of some legal progress in protecting (such as Slovenia) and promoting equality of gay and lesbian citizens (such as UK) has a variable impact across different social groups. As an example, British research is beginning to show that ethnic minorities perceive homosexuality as a “Western disease” that needs to be resisted.

Through the involvement of sociological and legal teams of experts of four Member States (Italy, Hungary, Slovenia, UK), the project seeks to understand the European dimension of homophobia and discrimination of gays and lesbians in view of promoting a debate around the links between citizenship and the pluralization of gender identities in multicultural contexts.

#### Activities

Project’s activities are:

- focus group discussions and in-depth interviews with heterosexual students, members of ethnic/religious communities, members of gay and lesbian communities/NGOs and gay and lesbian ethnic/religious communities/NGOs;
- comparative analysis of national laws, judgements, parliamentary debates, Constitutional court’s decisions on specific legal topics regarding the field of fundamental rights and freedoms, as applied to gays and lesbians.

#### Products

Publication of a comparative Report on the understanding of the European dimension of homophobia (both at socio-cultural and institutional-legal level) and its contrast, with a conclusive chapter on the definition of exchangeable good practices and legal recommendations. The Report is freely downloadable at the project’s website [www.citidie.eu](http://www.citidie.eu). The Report has been disseminated through three national conferences (Nottingham, Ljubljana and Budapest) and one international conference in Padua.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** City of Venice, European Study Centre on Discrimination, University of Nottingham – School of Sociology and Social Policy, Peace Institute, Institute of Sociology – Hungarian Academy of Sciences



## EMPOWERMENT OF WOMEN ENVIRONMENT RESEARCH

REFERENCE	JUST/2010/DAP3/AG/1348
CALL	JLS/2009-2010/DAP/AG Action Grants
SUBPROGRAMME	daphne III
SCIENTIST	Ines Testoni
DEPARTMENT	Philosophy, Sociology, Education and Applied Psychology ( FISPPA)
UNIPD	coordinator
TOTAL COST	607,394 €
EU FUNDING	482,994 €
E-MAIL	ines.testoni@unipd.it

### PROJECT DESCRIPTION

EMPoWER is an innovative project aims to empower three levels in the field of gender violence: Women, Environment and Research. It is aimed at empowering women victim of violence in European territory where violence against women is still possible, since local cultures promotes hostile sexist strategies for their subjugation. In particular, it intervened in the mother-daughter relationship, in order to interrupt the processes of primary socialization that for centuries passed down the subordination from mothers to daughters.

The Countries involved where the following: Albania, Austria, Bulgaria, Italy, Portugal, Romania;

The operationalization of EMPoWER took place respecting the following traits:

Analysis and detection of factors that constitute the process of “victimization” of women, based on the female disqualification passed from mother to daughter;

Action and reflection aimed at overcoming learned helplessness and promotion of the self-efficacy;

Detection and analysis of the ambivalent persecutor/victim role/position, internalized by women through the identification with the aggressor;

Integration and personal discovering of new

female models.

The techniques of intervention were the following the Psychodrama and the Ecological counselling, promoting the consciousness raising processes with women victim of violence:

In each Country, the psychodrama treatment realized 25 session of 2 hours each, while the ecological treatments kepted in touch with the victims for 1 year.

Administration of tests: the longitudinal effect of the intervention was measured administrating the test CORE-OM and SAI-R instrument at the beginning and at the end.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Aipsim, Iside Cooperativa, Comune di Rovigo, Romanian Association of Classic Psychodrama, Home of Hope, Bulgarian Society for Psychodrama and Group Therapy, Nadja Center, Sociedade Portuguesa de Psicodrama, Umar, University of Klagenfurt, Karntner Caritasverband für Wohlfahrstpflege und Fursoge Caritas Karnten



## SPEAK OUT! EMPOWERING MIGRANT, REFUGEE AND ETHNIC MINORITY WOMEN AGAINST GENDER VIOLENCE IN EUROPE

REFERENCE	JUST/2010/DAP3/AG/1396
CALL	JLS/2009-2010/DAP/AG for Action Grants
SUBPROGRAMME	daphne III
SCIENTIST	Franca Bimbi
DEPARTMENT	Philosophy, Sociology, Pedagogy and Applied Psychology - FISPPA
UNIPD	coordinator
TOTAL COST	529,706 €
EU FUNDING	418,874 €
E-MAIL	franca.bimbi@unipd.it

### PROJECT DESCRIPTION

The main goal of the Speak Out! project is to support migrant, refugee and ethnic minority women to improve their personal abilities and capabilities in order to find individual and collective ways to prevent and combat any form of gender violence.

The project aims at facilitating the setting-up and lasting of transcultural networks among migrant, refugee and ethnic minority women as well as between them and local services. It would also enhance full participation of migrant women in the society and promote their citizenship in the host societies and within their communities as well as in the framework of the European cross-cultural context.

“Speak Out!” will especially help empower women who are, or at risk of becoming, victims of violence to protect themselves and their peers through training, counselling, formal and informal support group mechanisms and innovative ideas.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Franca and Franco Basaglia Foundation, Comune di Padova, SURT

Foundation, CEPAIM Foundation, Aleksanteri Institute, University of Helsinki, Multicultural Resource Center MONIKA, IYE International



## EMPOWERMENT OF WOMEN ENVIRONMENT RESEARCH

REFERENCE	JUST/2012/JCIV/AG/3420
CALL	JUST/2011-2012/JCIV/AG
SUBPROGRAMME	civil justice
SCIENTIST	Gian Piero Turchi
DEPARTMENT	Philosophy, Sociology, Education and Applied Psychology ( FISPPA)
UNIPD	participant
TOTAL COST	417,195 €
EU FUNDING	333,756 €
E-MAIL	<a href="mailto:gianpiero.turchi@unipd.it">gianpiero.turchi@unipd.it</a>

### PROJECT DESCRIPTION

EIRENE designs and implements an European communication strategy on mediation as a recommended tool to solve conflicts and disputes in Europe. The project intends to deepen the culture of mediation as a sign of identity of European countries. The strategy will address this issue for three specific target groups: young people, businesses and legal practitioners, using cities of the participating countries as a testing ground, using mainly new technologies. Specific objectives to be accomplished could be described as follows:

- Improve knowledge of, and how to use mediation as an effective and cost efficient tool to resolve disputes between the groups selected.
- Build a culture of dialogue and promotion of active listening.
- To achieve a reduction in conflicts by the use of pre-conflict resolution tools.
- Provide the target groups with the appropriate tools to solve their problems and an understanding of the how conflicts can escalate to a situation where formal Conflict Resolution is required.
- Create new opportunities where conflict resolution is seen as the best way to resolve complex disputes.

“EIRENE” is the name of the Goddess of peace in ancient Greece and Mediation could be considered

as an optimal way to fight against conflicts and violence. According to generale and specific objectives, EIRENE basically promotes the existence of an European Culture of Mediation, through the design of effective and efficient communication and awareness actions.

### PARTNERS

**Coordinator:** Andalusian Public Foundation “Center for Mediation and Arbitration of Andalusia”

**Participants:** Pragmata Politika Mediation Organism; Program for the Development of Judicial System; Chamber of Commerce of Suceava; University Stefancel Mare; Hellenic Mediation and Arbitration Center; The Foundation for European Initiatives; Institute PIP – Legal and Information Center; Università degli Studi di Padova.





## EUROPEAN PRISON OBSERVATORY. DETENTION CONDITIONS IN THE EUROPEAN UNION

REFERENCE	JUST/2011/JPEN/AG/2933
CALL	JUST/2011-2012/JPEN/AG - Criminal Justice
SUBPROGRAMME	criminal justice
SCIENTIST	Francesca Vianello
DEPARTMENT	Philosophy, Sociology, Education and Applied Psychology
UNIPD	participant
TOTAL COST	722,337 €
EU FUNDING	80,736 €
E-MAIL	francesca.vianello@unipd.it

### PROJECT DESCRIPTION

The main objective of the project is to discuss the problems of prison administration and develop prison management; sensitize penitentiary systems to human rights issues; suggesting mechanisms to monitor prison conditions effectively and ensure accountability in respect of violation of human rights. For that reasons the research wants to promote the collection of data on prisons in Europe. The project wants to study, through quantitative and qualitative analysis, the present condition of the national prison systems and the related systems of alternatives to detention in Europe, underlining their peculiarities and weakness.

The project started in January 2013 and is comprised of three strands:

- Detention in Europe: Involving the collection and collation of data on prison and penal conditions in eight European countries.
- European guidelines on detention: Involving the identification of local practices and dissemination of different models in prison management. This strand will also include local workshops.
- Monitoring bodies: Mapping in every country of activities and reports of the NPMs and of other monitoring bodies. Organising a

National workshop to present and discuss the collected materials and the comparison results with local and national prison ombudsmen, monitoring bodies and other relevant institutions.

### PARTNERS

**Coordinator:** Associazione Antigone

**Participants:** Observatoire international des prisons, Special Account of Democritus University of Thrace Department of Social Administration (EL DUTH), Latvian Centre for Human Rights, Helsinki Foundation for Human Rights, ISCTE-Instituto Universitário de Lisboa, Observatory of the Penal System and Human Rights - Universidad de Barcelona, Università degli Studi di Padova



## COMMUNITY BONDING FOR SENTENCED PEOPLE SUPERVISION

REFERENCE	JUST/2013/JPEN/AG/4571
CALL	Criminal Justice – Action grants 2013
SCIENTIST	Francesca Vianello
DEPARTMENT	Philosophy, Sociology, Education and Applied Psychology
UNIPD	participant
TOTAL COST	305.953 €
EU FUNDING	244.533 €
E-MAIL	francesca.vianello@unipd.it

### PROJECT DESCRIPTION

The project name CoBS(2) comes from the idea of trying a new and a second reading of the Community Based Sanctions, which would start from enquiring on a specific interlocutor, to whom many people in alternative measure are compared to: cooperatives and social associations responsible for designing, monitoring and evaluating the pathways of external detention. The project wants to encourage the exchange of good practice on the subject, questioning the methods and processes of community bonding supervision. The project idea begins with an experimental project taking place since 2011, in Italy, in the Lombardy Region, attended by Consorzio Tenda and Cooperativa A&I, as leaders of the provincial territories of Brescia and Milan. From the results achieved and monitored over the past 18 months of the project, the partners established a core project shared with public bodies (such as the Supervisory Courts of Brescia and Milan), supported by the experience of national (Confcooperative -- Federsolidarietà) and international (Cecop) cooperative networks, the University of Padua and the Association Antigone, for a total of 6 partners in the world of social intervention, 1 Association active internationally in raising awareness, 2 networks, 1 University, 4 Institutional partners.

Specific objectives of this partnership are:

- to map the role given to private social bodies in the institutional supervision and in monitoring and evaluation procedures adopted by social workers in custom pathways in 8 European Countries;
- to create opportunities for exchange and mutual learning among 4 Countries and 6 private social organizations, who have direct experience, past or ongoing, with the target of the people in community-based sanction.

The need addressed by the project is an absence, to date, of studies that are able to focus not only on the operating procedures, but also on all parties involved in the supervision, with an emphasis on the need to think not from the perspective of individual interventions, but community connections between sanctioned, social worker and judicial operator.

For this reason, the action proposed wishes to respond to the priority of JUSTPEN/2013 with regards to improving conditions relating to detention, focusing on alternative measures, starting from the interpretation of the “European Prison Rules” and questioning on existing experience in field of economics and social support, with regard to procedures offering housing, employment, training and social reintegration. From these issues, the project aims to share practical experience that can be enhanced in the process of a judicial area characterized by mutual trust and mutual recognition, not only relative to the plane of the laws and conventions, but transversely as a shared responsibility, communal, for the safety of all people involved, directly or indirectly. CoBS(2) intends, therefore, to:

- obtain 1 European map of cooperative entities operating in the pathways of external detention, their experiences and their links with the institutional world,
- promote the exchange of good practice and mutual learning, organizing 4 exchange visits in 4 countries, each one with a specific focus among those selected by the “European Prison Rules”. At the end of the project,

the partnership aims to propose and share between different stakeholders (private social institutions, government agencies and research institutions) implementation to the “European Prison Rules”, with attention to alternative measures and to interpret them as an opportunity of the offender’s autonomy defence, such as procedures that require mutual trust, recognition and cooperation between stakeholders with different features and tasks in a vision for the enhancement of community bonding. The materials developed will be available on the project website and they will be promoted through the two large cooperative networks of reference (CeCop and Confcooperative-Federsolidarietà).

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## **PARTNERS**

**Coordinator:** Tenda Solidarietà e Cooperazione  
Brescia Est – Consorzio di Cooperative Sociali

**Participants:** Pragmata Politika Mediation  
Organism; A&I Società Cooperativa sociale  
ONLUS, Antigone Associazione ONLUS,  
Associazione Don bosco  
Insercoop, Ex-cell Solution, European  
Confederation of Coworkers’ Co-operatives,  
Social Cooperatives and Social & Participative  
Enterprises (CECOP-CICOPA -EUROPE),  
Università degli Studi di Padova



# EUROPEAN INSTITUTE FOR GENDER EQUALITY (EIGE)

It supports the EU and its Member States in their efforts to promote gender equality, to fight discrimination based on sex and to raise awareness about gender equality issues.



## STUDY ON AREA J OF THE BEIJING PLATFORM FOR ACTION: WOMEN AND THE MEDIA IN EUROPEAN UNION

REFERENCE	EIGE/2012/OPER/07
SCIENTIST	Claudia Padovani
DEPARTMENT	Law, Politics and International Studies
UNIPD	participant
EU FUNDING	400,000 €
E-MAIL	claudia.padovani@unipd.it

### PROJECT DESCRIPTION

In 1995, the Fourth World Conference on Women took place and out of that momentous conference came the Beijing Platform for Action (BPfA), a wide-ranging agenda for promoting gender equality. In December of that same year, the European Council committed the EU to the principles of the BPfA, stating its intention to review their implementation on a yearly basis. The BPfA's strategic aims in relation to women and media (defined as critical Area J) is as follows, to: a) increase the participation and access of women to expression and decision-making in and through media and new technologies of communication; and b) promote a balanced and non-stereotyped portrayal of women in the media. In response to the recommendations of Area J, EIGE's report, 'Advancing gender equality in decision-making in media organizations' (<http://eige.europa.eu/content/document/advancing-gender-equality-in-decision-making-in-media-organisations-report>), now comprises an analysis of the position of women in major media organisations in EU-27 + Croatia (HR.), at both strategic and operational levels and proposes three indicators which could be used to measure the extent to which the European media industry is advancing the gender equality agenda.

The underpinning research had three aspects: (1) a substantial literature review was undertaken, drawing on a very wide-range of sources, both

academic and policy-related, written in both English and in all other EU community languages – this constitutes a significant resource for future use by researchers and policy-makers; (2) a survey of 99 major media organisations, including all the public service broadcasters in EU-27+HR, together with a range of private sector and mixed-funded organisations which have significance in terms of size or popularity or influence. The survey intended to explore the extent to which women and men occupy decision-making positions across major media industries, including as board members, together with identifying the existence of internal policies and practices which have been initiated to enhance and promote gender equality. The organisations surveyed comprise all the public service broadcasters and a number of the major media organisations which operate in each Member State and are thus indicative if not representative of the wider EU media landscape; (3) interviews with 65 senior women media professionals from the EU-27+HR, many of whom currently work in the same media organisations which were surveyed. The Report has been adopted by the Council of the European Union in June 2013. While providing data concerning all major media organizations in the EU, it also includes a set of indicators to be implemented through sustained monitoring exercises" (Council conclusions - "Advancing Women's Roles as Decision-makers in the Media", EMPLOYMENT, SOCIAL POLICY, HEALTH and CONSUMER AFFAIRS, Council meeting, Brussels, 20-21 June 2013.)

### PARTNERS

**Coordinator:** European Institute for Gender Equality (EIGE)

**Participants:** University of Liverpool, University of Szeged, Osservatorio di Pavia, Università degli Studi di Padova

# ERANET

Networking of research activities  
conducted at national or regional level,  
and mutual opening of national and  
regional research programmes.



## COORDINATION OF EUROPEAN TRANSNATIONAL RESEARCH IN ORGANIC FOOD AND FARMING SYSTEMS

REFERENCE	249667
CALL	FP7-ERANET-2009-RTD
SCIENTIST	Vasco Stanislaio Boatto
DEPARTMENT	Land, Environment, Agriculture and Forestry
UNIPD	participant
TOTAL COST	1,607,082 €
EU FUNDING	999,976 €
E-MAIL	vasco.boatto@unipd.it

### PROJECT DESCRIPTION

Organic agriculture and food markets have grown considerably and organic agriculture addresses important challenges of European agriculture, such as sustainable production of high quality food, reducing dependency on high energy inputs, improving environmental and nature conservation, climate change adaptation, animal welfare and rural livelihoods. Organic farming and food systems still have a big potential for innovation and improved solutions. Research activities will be important for this. Coordinated transnational research has the potential to create a less fragmented research area in this fast growing sector. CORE Organic II builds on the outcome of the first CORE Organic to aim at an effective and sustainable transnational research programme. It will identify common research priorities for the organic sector where a transnational approach will give added value, launch at least two transnational calls, initiate research projects, organize project monitoring and dissemination of results, and consider funding models.

CORE Organic II will also develop all components to continue the transnational research activities beyond the ERA-NET. The results of CORE Organic II will be a strong and sustainable network of funding bodies, all components for the effective continuation of collaboration, a

series of on-going research projects and a plan to support dissemination. The expected benefits for Europe will be to reinforce its leading status and excellence in organic research, enhance the European research area on organic agriculture, increase the efficiency in use of organic research funds and improve the impact of research on the organic sectors development. Initiating projects on topics identified as common priorities will allow the sector to better meet the demand for organic food and products. This will contribute to sustainable development in food production and improve the general competitiveness of the European agriculture.

### PARTNERS

**Coordinator:** Aarhus Universitet

**Participants:** Fonds National de la Recherche, Ministerie van Economische Zaken, Landbouw en Innovatie, Ministry of Food Agriculture and Livestock, Bundesministerium für Ernährung, Landwirtschaft und Verbraucherschutz, Bundesanstalt für Landwirtschaft und Ernährung, Ministry of Agriculture and Forestry, Instituto Nacional de Investigacion y Tecnologia Agraria y Alimentaria, The Secretary of State for Environment, Food and Rural Affairs, Lietuvos Respublikos Zemes Ukio Ministerija, Ministrstvo Za Kmetijstvo, Gozdarstvo in Prehrano, Norges Forskningsrad, Forskningsradet För Miljö, Areella Näringar Och Samhällsbyggande, Ministero delle Politiche Agricole Alimentari e Forestali, Institut National de la Recherche Agronomique, Bundesministerium für Land- und Forstwirtschaft, Umwelt und Wasserwirtschaft, Eigen Vermogen Van Het Instituut Voor Landbouw En Visserijonderzoek, Vlaams Gewest, Department of Agriculture, Fisheries and Food, Ministry of Agriculture of the Czech Republic, Pollumajandusministeerium, Ministère de l'Alimentation, de l'Agriculture et de la Pêche, Eidgenössisches Volkswirtschaftsdepartement, Forschungsinstitut für Biologischen Landbau Stiftung, Latvian State Institute of Agrarian Economics, Ministry of Food, Agriculture and Fisheries, Danish Food Industry Agency, Università degli Studi di Padova





## CHEMO-HYPERTHERMAL DELIVERY - COMBINED CHEMO-HYPERTHERMAL CONTROL OF HEPATIC TUMORS, BASED ON MICROWAVE-ACTIVATED SUBENDOTHELIAL-TARGETED NANO-ASSEMBLIES

**CALL** ERA-Net EuroNanoMed JTC-3 2011

**SCIENTIST** Emanuele Papini

**DEPARTMENT** Biomedical Sciences

**UNIPD** participant

**TOTAL COST** 1,697,130 €

**EU FUNDING** 1,086,480 €

**E-MAIL** emanuele.papini@unipd.it

### PROJECT DESCRIPTION

The project intends to synergetically combine nano-theranostics principles with targeted chemo-thermal-delivery, by use of customized microwave energy. Effective retention of nano-theranostics in diseased tissues, especially neoplastic ones, is one of the essential prerequisite for their successful applications, along with non-toxic, bio-compatible and stealth properties. Customised active retention and accumulation of nano-assemblies in the tumors to obtain a specific therapeutic concentration diminishes the risks of secondary effects on healthy organs. A combined methodology is foreseen to achieve active nano-assemblies retention, by conferring them a selective high affinity by binding to altered neoplastic cells, i.e. coupling with tumor antigen specific ligands - like monoclonal antibodies, and due to passive accumulation via EPR effect. The first research purpose is to design and develop several classes of bio-compatible - targeted as further thermo-activable - nano-therapeutics, for the improved treatment of deadly human primary and secondary hepatic tumors, by the 1). Development of nano-magnetic carrier particles, coupled with monoclonal antibodies to inflamed endothelial (P-selctetin) and/or

sub-endothelial (collagen IV, I) antigens, able to focalize microwave energy and generate upon irradiation local heat at tailored temperatures around 40°C, 2). Development of liposomes entrapping chemotherapeutics at physiological temperatures but releasing them at higher temperatures as such or, if necessary, also derivatized with antibodies as above, and 3). Development of different polymeric/lipid nanoparticles for the selective delivery to the site of action, with anticancer drugs and adapted to the encapsulation of nano-magnetic particles. The physicochemical characterization will mainly focus on drug loading and hydrophilicity of the surface. The second research purpose is to functionalise the nano-assemblies by focalized microwave irradiation in two stages, obtained through an apparatus that will be developed within the present network: 1. The first irradiation, performed before nano-assemblies administration, is intended to sensitize the tumor by inducing a hyperthermic effect increasing blood supply and by enhancing endothelial damage/permeation and inflammatory activation: the procedure should allow an enhance EPR effect and therefore an increased diffusion/retention of nano-assemblies in the tumor, and 2. The second microwave irradiation will be performed after the injection in the hepatic artery and diffusion in the tumor of the activated nano-assemblies, to further determine a strong, but localized and focalised hyperthermic action. Nano-magnetic assemblies hyperthermia will accomplish the proposed chemo-thermal-delivery, i.e. would act per se on the tumor but would also destabilize co-administered liposomal-based nano-particles load with chemotherapeutics, which would be consequently released locally in the most efficient way. The project has foreseen to realise, both in vitro and in vivo, a vast panel of toxicological tests, including cyto-genotoxicity, transcritomic approach, pro-inflammatory and procoagulant potential, to exclude or minimize secondary risks of developed chemo-thermally-customised



nano-assemblies. A final feasibility analysis upon clinical successful transferring of the research results in a further stage towards human patients will conclude the study.

## PARTNERS

**Coordinator:** University of Medicine and Pharmacy „Gr.T. Popa” Iasi

**Participants:** Regional Institute of Oncology Iasi, “Gheorghe Asachi” Technical University of Iasi, Latvian Institute of Organic Synthesis (LIOS), University of Franche-Comté, Besancon, Università degli Studi di Padova

## INTERFACING ADVANCED NANOCONJUGATES AND THE $\text{Na}^+/\text{K}^+$ -ATPASE (THE SODIUM PUMP)

CALL	NanoSci-E+
SCIENTIST	Stefano Salmaso
DEPARTMENT	Pharmaceutical and Pharmacological Sciences
UNIPD	participant
TOTAL COST	220,000 €
EU FUNDING	220,000 €
E-MAIL	stefano.salmaso@unipd.it

## PROJECT DESCRIPTION

Functional materials and devices at length-scales of less than 1 micron are topics of profound scientific and technological interest, as they lie at the interface between ‘bottom-up’ construction (chemical synthesis) and ‘top-down’ processing (materials engineering). Nano length-scales become especially significant at cell surfaces where signaling across membranes is coupled to interfaces between macromolecular and supramolecular assemblies. Here we set out to develop new nanoscale devices that operate precisely at these levels, aiming to prepare functional materials with controllable size to interface with membrane-bound proteins and from these to transduce signals of biomedical significance. Our system will interface with the  $\alpha 1$ -Na/K ATPase, a key natural component of cellular processes, which represents a novel oncology target if its activity can be controlled. Our synthetic nano-devices will target specifically a sub-set of  $\alpha 1$ -Na/K ATPases, and will be engineered to assemble and interact at the local sites and length-scales where the ATPase operates in a disease state. The innovations in our nanodevice stem from three recent advances in our individual laboratories:

i- New degradable biomimetic polypeptides of precisely controlled structures and architecture;  
 ii- New biocompatible responsive polymers with environmentally-triggered assembly properties that can be prepared under mild and 'biofriendly' conditions; iii- New bioconjugation strategies that enable hybrid synthetic-natural macromolecules to be prepared with high degrees of positional control and site specificity.

The publication in late 2007 of the crystal structure of the Na/K ATPase and the development of real-time screening techniques at our collaborating group (Unibioscreen (UNBS/ULB)) now affords us an unprecedented opportunity to design, characterize and evaluate systems that can tune the activity of this trans-membrane pump. It is our hypothesis that multi-component and hence nanoscale devices will be the most effective modulators of  $\alpha 1$ -Na/K ATPase, because the ubiquity of the parent protein means that carrier devices and in situ activation of the therapeutic will be needed at specific, local and disease-defined target sites. Conceptually, our interfacing device has three components; a- a 'carrier module' of a biocompatible polymer block that promotes long circulation in order to access tumour sites, but, crucially, which promotes association and retention in tumour environments due a polymer chain phase transition; b- a 'switch module' of an inner biodegradable polymer block, containing side-chains that encode for self-assembly of chains into vesicular nano-scale objects but which cleave in the target environment to activate the device. In this way the nano-device flips open at the target site to switch on the interfacing activity. c- a 'signal module' of a biomolecule e.g. the ATPase antibody fragment that can interface with the  $\alpha 1$ -Na/K ATPase and/or si RNA precursors that can silence the signal to deactivate its role in disease. This component delivers the message to the cell to invoke a behavioural change – i.e. interfacing the device from the exterior of the cell across the membrane to the cellular machinery inside.

The combination of recently accessible target models with the ability through INANONAK partner expertise of generating functional nanomaterials of precisely controlled structure and dynamic activity at sub-micron scales, affords us a new and unique route to generate innovative devices that could be a platform technology not just for cancer therapeutics but also for many other nanoscale interface targets.

## PARTNERS

**Coordinator:** Centro de Investigacion Principe Felipe

**Participants:** University of Nottingham, Unibioscreen s.a., Università degli Studi di Padova



# EUROSTARS

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to gain competitive advantage.



## CELL-DIAGNOSTICS SAMPLE-PREPARATION POLYMER BIOMEMS

REFERENCE	E! 4809
CALL	Cut-Off 2
SCIENTIST	Paolo Francesco Bariani
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	1,495,530 €
E-MAIL	paolo.bariani@unipd.it

### PROJECT DESCRIPTION

New microfluidic devices for cell sample-preparation are conceived and validated. Unprecedented cell yield and quality enables rare-cell diagnostics. An new single-digit micron-scale, high-aspect ratio manufacturing process for polymer-based BioMEMS is developed to reach a low-cost implementation.

### PARTNERS

**Coordinator:** Silicon Biosystems Spa  
**Participants:** Mildendo Gesellschaft für mikrofluidische Systeme mbH, Università degli Studi di Padova

## MEASUREMENT OF COMPLEX AND FREEFORM SHAPED PARTS AT ELEVATED TEMPERATURE

CALL	Eurostars Cut-off 6 (2011)
SCIENTIST	Enrico Savio
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	1,653,651 €
E-MAIL	enrico.savio@unipd.it

### PROJECT DESCRIPTION

The aim of the project is the development and validation of a measuring system capable to identify the shape and the dimensions of a freeform shaped part immediately after being processed at elevated temperatures and to monitor its geometrical evolution during cooling in calm air. The new system will be an enabling technology for entirely new applications in the forging industry and other manufacturing processes (e.g. profile ring rolling, glass forming) for complex freeform parts processed at elevated temperature, including:

- identification of geometrical distortions due to phase transformation and other material-related phenomena during cooling
- identification of geometrical distortions due to die misalignments or non-optimal settings of process parameters
- first part inspection, quicker setup of the process (towards lean manufacturing, "SMED - single minute exchange of dies"). In some processes, 30% or more of production may result scrap due to the delay between process parameter setting and inspection.

The availability of the new measuring system on the market, after its engineering, will enable:

- new process control capabilities for the forging process
- reduction of machining processes and additional operations after forging
- cleaner and more efficient manufacturing process for complex freeform shaped parts



## PARTNERS

**Coordinator:** Zumbach Electronic AG

**Participants:** Pietro Rosa TBM srl, Interstaatliche Hochschule für Technik Buchs, Università degli Studi di Padova

## PROCESS MINING FOR BUSINESS PROCESS IMPROVEMENT

CALL	Eurostars Cut-off 6 (2011)
SCIENTIST	Alessandro Sperduti
DEPARTMENT	Mathematics
UNIPD	participant
TOTAL COST	2,043,264 €
E-MAIL	alessandro.sperduti@unipd.it

## PROJECT DESCRIPTION

The current economic situation increasingly requires organizations to speed up the rate at which they respond to market needs and to service or product innovation. This demand can be only met by increasing the ability to adapt to the requirements arising from the marketplace. Efficient governance of the core business processes therefore is a key success factor. Governing business processes, however, is not easy. Business processes are cross-functional and involve multiple actors and heterogeneous data. Such complexity calls for a structured and planned approach, requiring a substantial amount of competence and human resources.

In this context, it is important to develop tools for the definition and improvement of business processes. Process mining is a research area that can give a substantial contribution to the design and the development of these tools. Under the umbrella of process mining, many techniques have been developed to, among others, check if a current operational process conforms to a given process model, discover process models describing the operational processes in detail, or analyze the social relationships among workers involved in the process. All these techniques use execution logs extracted from various process aware information systems.

The focus of process mining research however has, so far, mainly been on the technical aspects of algorithms and techniques, i.e. the conditions under which techniques can be applied are known ►

and the correctness of algorithms is typically shown, but the techniques require expert users to interpret the results. Furthermore, little to no research has been performed on how process mining can continuously lead to business improvement.

SIAV and Pallas-Athena (Pallas), the industrial partners of the project team, develop information systems that support the execution of business processes. From their standpoint, they share the same view about the importance of process mining as an enabling technology for the development of effective tools for continuous improvement of business processes.

Especially Pallas-Athena is leading in the commercial application of process mining, for example recognized by Gartner as a top 25 BPMS (Business Process Management System) vendor (see <http://www.cmswire.com/cms/information-management/what-is-driving-dynamic-case-management--010196.php>).

SIAV and Pallas-Athena already have established research collaborations in the area of process mining with leading Universities, i.e. University of Padua (UniPD) and Eindhoven University of Technology (TU/e), respectively. TU/e can be considered as the birth-place of process mining research, as well as the world-leading institute in Business Process Management research.

University of Padua, on the other hand, holds strong competence in machine learning, data and process mining, formalisms for the specification of distributed and concurrent systems, as well as on model-driven engineering.

In this project, these four partners (SIAV, Pallas, UniPD, and TU/e) join forces to develop techniques, methods and tools for analysis and continuous improvement of businesses. In particular, the project consortium aims to embed process mining techniques firmly into business process improvement methodologies, especially for businesses that are currently not process aware.

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## **PARTNERS**

**Coordinator:** SIAV spa

**Participants:** Pallas Athena, Technische Universiteit Eindhoven, Università degli Studi di Padova



# FET FLAGSHIP

are ambitious large-scale, science-driven, research initiatives that aim to achieve a visionary goal. The scientific advance should provide a strong and broad basis for future technological innovation and economic exploitation in a variety of areas, as well as novel benefits for society.



## GRAPHENE AND RELATED MATERIALS AS SUPPORTS FOR INNOVATIVE METAL CARBON NITRIDE ELECTROCATALYSTS FOR ANION EXCHANGE MEMBRANE FUEL CELLS

REFERENCE	14-GRPH-196
CALL	Additional beneficiaries in the FET Flagships Project 604391 GRAPHENE
THEME	Energy
SCIENTIST	Vito Di Noto
DEPARTMENT	Chemical Sciences
UNIPD	Coordinator
TOTAL COST	600,000 €
EU FUNDING	400,000 €
E-MAIL	vito.dinoto@unipd.it

### PROJECT DESCRIPTION

This project is focused on the preparation of electrocatalysts constituted by: (a) nano-platelets of graphene and related materials (GRMs), covered with (b) a thin, porous carbon nitride layer including nitrogen heteroatoms, which (c) will give rise to “coordination nitrogen nests” meant to stabilize (d) metal coordination species and/or metal/metal alloy nanoparticles bearing the active sites. The electrocatalysts will not include platinum-group metals (PGMs), are meant to promote the oxygen reduction reaction (ORR) and will be integrated in the cathodic electrodes of prototype anion exchange membrane fuel cells (AEMFCs), which will be extensively characterized and tested to demonstrate performance and durability in operating conditions.

### PARTNERS

**Coordinator:** Università degli Studi di Padova

**Participants:** Università di Varsavia, BRETON S.p.a

# LIFE +

It contributes to the implementation, updating and development of EU environmental policy and legislation by co-financing pilot or demonstration projects with European added value.



## IMPROVEMENT OF POLICIES TOWARD LOCAL VOLUNTARY CARBON MARKETS FOR CLIMATE CHANGE MITIGATION

REFERENCE	LIFE07/ENV/IT/000388
CALL	2007
THEME	environment policy and governance
SCIENTIST	Tommaso Anfodillo
DEPARTMENT	Land, Environment, Agriculture and Forestry
UNIPD	participant
TOTAL COST	1,088,028 €
EU FUNDING	544,014,00 €
E-MAIL	tommaso.anfodillo@unipd.it

### PROJECT DESCRIPTION

The overall objective of the project is to promote a local Voluntary Carbon Market (VCM) to trade carbon credits. The initiative will strengthen the European Union policies contrasting climate change.

Carbomark activities are aimed at setting up a local market for carbon credits by developing robust and transparent carbon offset methodologies and by defining the legal aspects of the market. Also the project main objective is to actively involve local actors like forest owners, local authorities and SMEs in the carbon market.

### PARTNERS

**Coordinator:** Regione Veneto – Direzione foreste ed economia montana

**Participants:** Regione Autonoma Friuli Venezia Giulia – Servizio Gestione Forestale e Antincendio, Università di Udine, Università degli Studi di Padova

## ENNOBLING MIXTURE OF WASTE FOR FULL LOW- ENERGY REPLACEMENT OF EXHAUSTIBLE NATURAL RESOURCES IN BUILDING MATERIALS OUTPUT

REFERENCE	LIFE11 ENV/IT/000036
CALL	2011
THEME	environment policy and governance
SCIENTIST	Antonio Scipioni
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	2,207,166 €
EU FUNDING	960,683 €
E-MAIL	scipioni@unipd.it

### PROJECT DESCRIPTION

Ceramic tile production consumes large quantities of non-renewable materials, including sand, feldspars, alumina, zirconia, mullite and clay. Substantial amounts of water are also used, particular in the milling of raw materials and in the finishing of the fired tiles (cutting, polishing). To produce 1 000 square metres of tiles, between 8-18 cubic metres of water are needed for milling, 7-15 cubic metres to prepare the enamels to glaze the tile surfaces, and 800 cubic metres are required for cutting, grinding and polishing.

Tile production also generates waste, especially in the form of exhausted lime (about 15 kilogrammes per 1 000 square metres of tiles). Most exhausted lime is sent to landfill. The tile industry also produces glass waste, derived from glass-ceramics or ceramic materials. The complete recycling of glass waste is hindered by the extreme variability of glass composition and by the extremely high content of refractory ceramic or glass-ceramic materials.

#### Objectives

The objectives of the “Low resources Low energy” project are: To drastically reduce the use of non-renewable resources by

manufacturing a new family of ceramic-tile-like wall and floor coverings; To implement a process capable of recycling waste, such as exhausted lime, which is difficult to re-use because of its heterogeneous composition; To convert waste into coverings using an innovative waterless recycling practice for glass-based waste, lime and natural stone cuttings. Lime is a glass modifier, and can be used as part of a process to enable the firing of the new tiles in kilns at lower temperatures; To reduce water and energy consumption in the manufacturing of wall and floor covering. Lower energy consumption will also mean reduced carbon dioxide emissions.

Expected results:

A reduction in the use of non-renewable raw materials by up to 82% by weight compared to conventional ceramic tiles; Demonstration of the conversion of glass-based waste, exhausted lime and natural stone cuttings into low-temperature fired wall and floor coverings, with a production volume of up to 500 m<sup>2</sup> per day; Reduced energy consumption during firing of the coverings: currently 1.16 kWh are required to fire 1 kilogramme of stoneware at 1250°C. The new process will require less than 0.8 kWh/kg due to the lower firing temperature. This amounts to a reduction of more than 30% in energy consumption, as well as significant CO<sub>2</sub> emission reductions;

The replacement of natural or synthetic raw materials (such as silica, alumina, mullite, kaolin) with waste glass and sandstone or marble cuttings;

The complete recyclability of the product at its end of life, with the possibility of re-milling and reintroduction into the same manufacturing process, depending on the glazes used;

Lower manufacturing costs because production of the coverings will involve low-cost recycled materials, faster milling, more rapid drying and firing, and energy and material savings.

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## PARTNERS

**Coordinator:** Majorca S.p.A.

**Participants:** Mamma Rosa's Project S.r.l.,  
Università degli Studi di Modena e Reggio Emilia,  
Università degli Studi di Padova



## WASTE ELIMINATING AND WATER-FREE NEW REVOLUTIONARY TECHNOLOGY FOR SURFACE TREATMENT OF MARBLES, STONES AND TILES

**REFERENCE** LIFE11 ENV/IT/000110

**CALL** 2011

**THEME** environment policy and governance

**SCIENTIST** Antonio Scipioni

**DEPARTMENT** Industrial Engineering

**UNIPD** participant

**TOTAL COST** 2,251,342 €

**EU FUNDING** 969,821 €

**E-MAIL** scipioni@unipd.it

### PROJECT DESCRIPTION

The ceramic tile industry, and in particular ceramic-tile finishing operations, use an extremely high volume of water. Some 72% of EU tile production is porcelain stoneware, which is typically subjected to high water-use finishing operations.

Some 800 litres of water are needed to polish 1 square metre of tiling.

Finishing operations also generate sludge from levigation, or the grinding of an insoluble substance into powder while wet. Wastewater makes up 30% by weight of the levigation sludge. Because ceramic tile manufacturing is concentrated in specific areas, those areas are potentially highly affected by water extraction and the requirement to deal with wastewater.

In Italy, for example, 90% of tile production takes place between the towns of Modena and Reggio Emilia, which are 30 km apart.

The waste levigation sludge is temporarily stored in open-air storage systems at the ceramics plants, or can be disposed of at considerable expense. At present, this waste cannot be recycled back into the ceramic tile manufacturing process, because of the chemical, physical, mineralogical and thermal

incompatibility of its main components.

Objectives

The main objectives of the W-LAP project are to drastically reduce (more than threefold) water consumption in tile finishing, and to minimise levigation sludgethreefold) water consumption in tile finishing, and to minimise levigation sludge production.

The main specific objectives are:

- To demonstrate that through the controlled application of a polymer-based layer on tile surfaces it is possible to achieve the same aesthetic result that is produced
- by ceramic tile surface grinding and polishing, while simultaneously sealing the tiles;
- To obtain tile surfaces that are easier to clean and are less prone to bacterial proliferation;
- To reduce the quantity of water and surfactants necessary for cleaning and maintenance of tiles, during indoor and outdoor use;
- To save energy as the process of additive polishing will require less use of grinding and polishing wheels and discs, and there will be no requirement for final drying of the product;
- To demonstrate that the tools used to apply the polymer-based layer will be less subject to broken machine parts, giving an increase in productivity and a reduction in waste production; and
- To set up a demonstration line able to process 100 m<sup>2</sup> of tiling per day.

Expected results:

- Reduction of water consumed during the surface finishing of ceramic tiles;
- The current waste output of up to 0.6 kg of levigation sludge/m<sup>2</sup> of finished materials per square metre of finished materials will be reduced to zero without affecting tile weight;
- A 25% reduction in energy consumption



during manufacturing;

- Manufacture of a high-quality, easy-to-clean product with optimum aesthetic properties and reduced weight;
- No over-spraying of water or polymeric precursors;
- Tiles that require less ongoing cleaning, thereby reducing water and chemical use; and Reduction in the number of broken tiles during polishing.

## PARTNERS

**Coordinator:** Ceramica Fondovalle SpA

**Participants:** IRIDE S.r.l., Università degli Studi di Padova

## RECONCILING AGRICULTURE WITH ENVIRONMENT THROUGH A NEW WATER GOVERNANCE IN COASTAL AND SALINE AREAS

REFERENCE	LIFE11/ENV/IT/035
CALL	2011
THEME	environment policy and governance
SCIENTIST	Luca Palmeri
DEPARTMENT	Department of Industrial Engineering
UNIPD	participant
TOTAL COST	1,579,522 €
EU FUNDING	686,210 €
E-MAIL	lpalmeri@unipd.it

## PROJECT DESCRIPTION

The main project objective is to implement and demonstrate the efficacy of an innovative process that optimises the use of meteoric water in coastal rural areas. This process includes structural works to monitor water quality in real time and adjust the hydraulic flow accordingly, as well as participatory activities to share the choices regarding the governance of fresh water with major stakeholders.

## PARTNERS

**Coordinator:** Veneto Agricoltura

**Participants:** GAL Venezia Orientale, Consorzio per il Canale Emiliano Romagnolo, Università degli Studi di Padova



## BIO-INSPIRED THERMO/UV CURABLE MONOMERS AND POLYMERS

**REFERENCE** RLIFE12 ENV/IT/000600

**CALL** 2012

**THEME** environment policy and  
governance

**SCIENTIST** Antonio Scipioni

**DEPARTMENT** Industrial Engineering

**UNIPD** participant

**TOTAL COST** 1,866,176 €

**EU FUNDING** 867,212 €

**E-MAIL** scipioni@unipd.it

### PROJECT DESCRIPTION

The LIFE BiMoP project will target the applications of itaconic acid (IA) and its derivatives:

- As reactive diluents for thermo- and photo-initiated radical polymerisation in the production of coatings and inks and adhesives;
- As curing agents of epoxy resins to replace hazardous chemicals and environmentally harmful polyamines and polyamidoamines;
- To synthesise bio-based unsaturated polyester resins by polycondensation reactions to replace maleic anhydride (MA), which is both harmful to the environment and to human health;
- As a safer and sustainable alternative to styrene, which is toxic and harmful to human health;
- As a derivative for the polymer modification of commodities (such as PP and PE) to eliminate the use of MA; and
- As unsaturated polyester for polymer matrix composites, such as laminates with glass fibres, eliminating styrene as a reactive diluent.

### PARTNERS

**Coordinator:** Advanced Polymer Materials Srl

**Participants:** POLYNT SpA, Imperial Srl,  
Università degli Studi di Padova

## ORIGINAL ENNOBLING RECYCLING PROCESS OF GFRP WASTE TO RE-PRODUCE GFRP REPLACING ENERGYINTENSIVE CONSTRUCTION ELEMENTS

**REFERENCE** LIFE12 ENV/IT/000579

**CALL** 2012

**THEME** environment policy and  
governance

**SCIENTIST** Antonio Scipioni

**DEPARTMENT** Industrial Engineering

**UNIPD** participant

**TOTAL COST** 1,743,768 €

**EU FUNDING** 840,259 €

**E-MAIL** scipioni@unipd.it

### PROJECT DESCRIPTION

The project will show how GFRP waste can be processed to create fireproof, sound-absorbing, insulating, antishock and easy-to-clean panels to be used in sustainable buildings. The panels will be easily removable and reusable – they will be “designed for deconstruction”, thus contributing to reductions in emissions and energy consumption from the adaptation and demolition of buildings. The panels will also offer improved building thermal insulation, and therefore reduced energy consumption for heating and cooling

### PARTNERS

**Coordinator:** Bra Servizi S.r.l.

**Participants:** Università degli Studi di Padova





## MINIMISE THE WATER FOOTPRINT OF THE IMPACTFUL H<sub>2</sub>O WASTE IN THE CUTTING CYCLE OF NATURAL STONE BLOCKS

**REFERENCE** LIFE12 ENV/IT/000419

**CALL** 2012

**THEME** environment policy and  
governance

**SCIENTIST** Antonio Scipioni

**DEPARTMENT** Industrial Engineering

**UNIPD** participant

**TOTAL COST** 1,206,612 €

**EU FUNDING** 603,306 €

**E-MAIL** scipioni@unipd.it

## PROJECT DESCRIPTION

The main objective of the project is to drastically reduce water consumption during the cutting of natural stone, and in particular during the cutting process of pietra serena (a type of sandstone).

The project will demonstrate a new cutting tool, equipped with small micronising nozzles that inject the pressurised water exactly into the contact area between the blade teeth and the sandstone. Two positive effects are expected: the required cooling of the metallic blade and the removal of the abraded powders in a form of dense slurry. Due to the blade's higher resistance to wear, the pietra serena abraded particles will be smaller in size, which will make them easier to recycle in other manufacturing processes related to the pietra serena sandstone, such as in the formulation of sealants and adhesives for pietra serena installation. Thus, the new process aims to save water and to produce recyclable powders, as well as improving working conditions by reducing the amount of sprayed water and avoiding the creation of local micro- climates due to the high moisture content.

## PARTNERS

**Coordinator:** La Borghigiana S.r.l.

**Participants:** Peglio S.r.l., Università degli Studi di Padova

## TEST 1.0 OF CHEMICAL INDUSTRY FOR GLOBAL SUSTAINABLE ORGANIZATION AS INDUSTRIAL TOTAL SYMBIOSIS AND LOW ENERGY AND WATER

**REFERENCE** LIFE12 ENV/IT/000436

**CALL** 2012

**THEME** environment policy and  
governance

**SCIENTIST** Antonio Scipioni

**DEPARTMENT** Industrial Engineering

**UNIPD** participant

**TOTAL COST** 2,417,161 €

**EU FUNDING** 1,034,930 €

**E-MAIL** scipioni@unipd.it

## PROJECT DESCRIPTION

The project objective is the demonstration of an innovative zero-solid and liquid waste emission approach to ceramic tiles manufacturing, while using recycled raw materials to create optimized large surface tiles for walls and floor coverings. Such product, identified in the following as NW-Tiles (No- Waste Tiles), will be manufactured pursuing also the minimum energy consumption and CO<sub>2</sub> emissions, thanks to the lower firing and milder finishing operations required. This innovation, defined "green polishing", uses the term "green" both to indicate the environmental friendliness of the new process, as well as that the polishing and cutting is performed before tile firing. As a matter of fact, cutting on fired tiles currently leads to the generation of sludge, debris and scraps whose recycling is impossible or requires dedicated energy intensive preliminary operations. This tile manufacturing will undergo a complete revolution made possible by the new composition using up to 70% recycled waste with a high percentage of glass formers. The better thermal properties of the composition (lower processing temperature, ability of achieving a shiny surface after firing) will allow to conduct



all the finishing operations on unfired tiles and hence generating waste easily reintroduced in the manufacturing process, avoiding the use of water and minimizing the energy consumption. Such benefits will be extended up to the firing stage: lower sintering temperature, lower energy consumption, minimization of defects (typical of high temperature processes). Hence benefits in terms of reduction of defective parts and complete recyclability (previous milling) of the final product. The new tiles will also be able to be recycled at the end of life: its high content of glass former will make it suitable as an addition to the new ceramic body composition up to 40% levels.

## PARTNERS

**Coordinator:** Italgraniti Group S.p.A.

**Participants:** Università degli Studi di Padova

## ZERO EMISSION FIRING STRATEGIES FOR CERAMIC TILES BY OXY-FUEL BURNERS AND CO<sub>2</sub> SEQUESTRATION WITH RECYCLING OF BYPRODUCTS

REFERENCE	LIFE12 ENV/IT/000424
CALL	2012
THEME	environment policy and governance
SCIENTIST	Antonio Scipioni
DEPARTMENT	Industrial Engineering
UNIPD	participant
TOTAL COST	1,256,701 €
EU FUNDING	593,475 €
E-MAIL	scipioni@unipd.it

## PROJECT DESCRIPTION

The objective of the LIFE ZEF-tile project is to demonstrate the feasibility of applying oxy-fuel technologies to the firing stage of ceramic tile production in order to facilitate CO<sub>2</sub> sequestration. By using pure oxygen to burn hydrocarbons such as methane, the exhaust gases will contain only CO<sub>2</sub> and water vapour. As a result, it will no longer be necessary to heat the inert gases contained in air. Moreover, it will lead to a reduction in the volume of exhaust gas, which can then be processed easily due to its simple composition. The project will set up a demonstrative roller kiln with burners modified in order to use pure oxygen. Water vapour will be condensed in order to leave a stream of almost pure CO<sub>2</sub>, which will then be subjected to sequestration techniques. The project team will assess the effect of using part of the CO<sub>2</sub> flux to boost plants and vegetable growth in a greenhouse, and will compress and store another part in liquid form to be used in different ways. A further objective will be to speed up the firing curve of the emerging thin tiles and glass-based materials through the use of higher flame temperatures.



## PARTNERS

**Coordinator:** Ceramica Alta S.r.l.

**Participants:** Università degli Studi di Padova

## INNOVATIVE PLASTIC POLLUTANTS REMOVAL FOR EFFICIENT RECYCLED WOOD PANELS PRODUCTION

REFERENCE	LIFE12 ENV/IT/000374
CALL	2012
THEME	environment policy and governance
SCIENTIST	Piergiorgio Nicolosi
DEPARTMENT	Information Engineering
UNIPD	participant
TOTAL COST	1,874,423 €
EU FUNDING	880,818 €
E-MAIL	piergiorgio.nicolosi@unipd.it

## PROJECT DESCRIPTION

The increasing demand for recycled wood to produce particleboard and MDF panels has resulted in the need to improve the cleaning process of post-consumer wood (e.g. pallets\ wood packaging material, demolition waste, used furniture), eliminating in a more effective and efficient way plastic impurities. Now MDF panels are mainly obtained from virgin wood and only a small number of producers use post-consumer recycled wood because

- i) the process requires multiple steps of cleaning that are not enough to completely remove impurities
- ii) MDF panels are of low quality and not compliant with EN 622-5 and EPF Standard for delivery conditions of recycled wood.
- iii) there are not systems in the market capable of achieving a good removal of impurities

LIFE+ PLASTIC KILLER main objective is to substitute current x-ray detection-based machine in the recycled wood cleaning process with a near infrared (nir) and visible optical detection system. This project will contribute to

- pave the way for a new generation of more sustainable and affordable MDF panels produced by up to 60% of post-consumer recycled wood, compliant with EN 622-5 and



EPF Standards;

- produce “purified” post-consumer wood that can be also introduced in the EU market as biomass for energy production, reducing the dioxin produced during the combustion;
- limit the use of virgin wood, supporting the non deforestation through the prolonged lifecycle of the recycled wood;
- foster the post-consumer wood recycle approach in the EU, open up new business and jobs opportunities; this also will contribute in the middle perspective to decongesting dumps.
- demonstrate the socio-economic and environmental sustainability, the potentialities of market replication and penetration of the proposed pilot plant.

## PARTNERS

**Coordinator:** PAL Srl

**Participants:** Cepra, Università degli Studi di Padova

## AN INTEGRATED APPROACH TO THE SUSTAINABLE CONSERVATION OF INTERTIDAL SALT MARSHES IN THE LAGOON OF VENICE

REFERENCE	LIFE12 NAT/IT/001122
CALL	2012
THEME	nature 2000
SCIENTIST	Luca Palmeri
DEPARTMENT	Industrial Engineering
UNIPD	coordinator
TOTAL COST	2,024,295 €
EU FUNDING	1,396,763 €
E-MAIL	lpalmeri@unipd.it

## PROJECT DESCRIPTION

Erosion from human and natural causes is intensely impacting the whole Venice lagoon.

A progressive deterioration of boundaries, elevations, bottoms and vegetated surfaces is impacting all tidal landforms, and the surface of salt marshes has markedly decreased over recent decades. Even the most interior, best-conserved salt marshes are highly affected and these unique ecosystems providing key eco-services are disappearing.

The causes of erosion are linked to the current models of development and lifestyles, such as waves caused by motorboats and the altered lagoon hydrodynamics resulting from the excavation of deep channels for large ships. Since it is not feasible to act upon these factors in the short term to stop erosion, effective actions to protect the salt marshes are urgently needed, taking into consideration also that current methods to combat coastal erosion cannot be applied in the interior salt marshes.

This LIFE VIMINE project aims to demonstrate an integrated approach to the conservation of interior salt marshes based on prevention through routine, temporally-continuous and spatially-diffuse actions of monitoring and maintenance, as opposed to one-off protection actions.



The regular identification and repair of the small, numerous eroded spots on salt marsh boundaries will be carried out to stop erosion before it becomes irreversible, using low-impact soil bioengineering works (e.g. fascines) and manual labour. This cost-effective method will be merged with participatory processes to involve stakeholders in conservation works, increase environmental awareness and promote sustainable local economic activities based on salt marsh services. Eventually, the demand for salt marsh conservation will emerge naturally from local communities given the key benefits that they will derive from salt marsh services and from conservation activities (employment), thus addressing also the socio-economic drivers of erosion.

## PARTNERS

**Coordinator:** Università degli Studi di Padova  
**Participants:** SELC Società Cooperativa, Agenda 21 Consulting srl, Consorzio di Bonifica Acque Risorgive, AttivaMente Cooperativa Sociale Onlus, Comune di Venezia, Foundation for Sustainable Development, Magistrato Alle Acque

## INTRODUCING INNOVATIVE PRECISION FARMING TECHNIQUES IN AGRICULTURE TO DECREASE CARBON EMISSIONS

REFERENCE	LIFE13ENV/IT/000583
CALL	2013
SCIENTIST	Luigi Sartori
DEPARTMENT	Department of Land, Agriculture, Environment and Forestry participant
UNIPD	
TOTAL COST	2,577,825.00 €
EU FUNDING	1,390,593.00 €
E-MAIL	luigi.sartori@unipd.it

## PROJECT DESCRIPTION

The overall goal of the LIFE-AGRICARE project is to demonstrate that the introduction of new integrated agriculture applications, incorporating precision farming technologies, have significant potential in terms of energy saving and GHG reductions.

The project's specific objectives are to:

Test and demonstrate, in four different crop systems, the GHG mitigation potential of five types of new electronic and mechanical machines for minimum tillage and sustainable soil management;

Compare innovative types of equipment for precision farming with traditional types, to benchmark their effective potential for energy saving and GHG mitigation;

Analyse the barriers to the diffusion of new techniques in different Italian rural areas and to assess the economic convenience for farmers of introducing advanced precision farming systems, taking into account the driving forces towards changes (e.g. increasing yields, energy reductions and overall economic benefits);

Evaluate, using modelling systems and GIS analysis, the long-term effects of technology introductions upon the effects of climate change patterns in agriculture, as well as defining the



Italian rural surfaces that are most suitable for the introduction of the tested technologies; Introduce on a large scale low-emission, precision farming techniques, along with agro-environmental indicators, by implementing a technology transfer strategy at regional, national and European levels.

## PARTNERS

**Coordinator:** Veneto Agricoltura

**Participants:** ENEA, Maschio Gaspardo SpA, Università degli Studi di Padova, Dipartimento Territorio e Sistemi Agro-Forestali

## SUSTAINABLE RECYCLING IN POLYVALENT USE OF ENERGY SAVING BUILDING ELEMENTS

**REFERENCE** ENV/IT/000535

**CALL** 2013

**THEME** Climate change - Energy - Energy efficiency , Waste - Waste recycling

**SCIENTIST** Antonio Scipioni

**DEPARTMENT** Department of Industrial Engineering

**UNIPD** participant

**TOTAL COST** 1,803,583 €

**EU FUNDING** 884,690 €

**E-MAIL** scipioni@unipd.it

## PROJECT DESCRIPTION

The overall objective of the LIFE in SustainaBuilding project is to demonstrate an effective process for using various waste materials, including unsorted glass waste. It specifically aims to recycle this waste to produce innovative construction materials – such as bricks, panels, wall coverings, and internal and external flooring. The project plans to set up a demonstration production line for the valorisation of various waste materials that are currently sent to landfill. The process will use glass mixtures with a high percentage of waste materials, regardless of their colour or contamination level. These will include silica vitreous phases (dusts from steelworks and heterogeneous glass from different production sectors) and reactive blowing agents (carbonates, carbides or compounds containing carbon residue and food industry processing residues) or space holders (sodium chloride).

The technology will entail the application of a low temperature reactive sintering production cycle at temperatures under 750°C, to obtain material for the production of innovative construction materials for use in high-performance buildings, in terms of weight and thermal insulation. The innovative input mixture and low temperature sintering method will make it possible to obtain

these high-performance products in a very short time - maximum 30 minutes - with significant energy savings.

Expected results:

Recycling of 3 m<sup>3</sup> of waste per day (also

contaminated with salts or ceramic materials);

Reduction of unsorted glass waste sent to landfill;

A new product consisting of at least 90% waste;

A low temperature production cycle, ensuring

a low embodied energy (about 5 MJ/kg) and an

energy saving of about 30%; A low weight end

product (apparent density of between 0.4 and 1.2

g/cm<sup>3</sup>);

Low thermal conductivity of the product (between

0.16 and 0.21 W/m K);

A product with a compressive strength that makes

it suitable for structural applications with low

loads (at least 2.7 MPa);

The new product will be obtained in a very short

time (max. 30 minutes);

The new product will be much safer than rock

fibre or glass fibre panels;

The new product will be completely recyclable at

the end of its life;

It will be possible to stain the new product with

natural colours or to have it superficially coloured,

also with glazes.

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## **PARTNERS**

**Coordinator:** Mamma Rosa's Project S.r.l.

**Participants:** Ceramica Fondovalle S.p.A.,  
Università degli Studi di Modena e Reggio Emilia





**RESEARCH FUND**  
**FOR COAL AND**  
**STEEL**



## MUON SCANNERS TO DETECT RADIOACTIVE SOURCES HIDDEN IN SCRAP METAL CONTAINERS

REFERENCE	RFSR-CT-2010-00033
CALL	Research Fund for Coal and Steel
SCIENTIST	Gianni Zumerle
DEPARTMENT	Physics and Astronomy Department "G. Galilei"
UNIPD	participant
TOTAL COST	1,100,478 €
EU FUNDING	660,288 €
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### PROJECT DESCRIPTION

Accidental melting of radioactive material creates large economical losses in the steel industry and problems in the environment. Orphan sources are not detectable with radiation portals when shielded. The Mu-steel project will design an inspection gate using the scattering of a radiation naturally falling on earth, the cosmic ray muons, therefore without any radiation hazard. This technique has been developed recently, and is able of detecting and classifying materials inside a container. Relevant hardware and software components of the system will be designed to be cost-effective and ready for industrial production. Prototypes of components will be delivered and tested.

### PARTNERS

**Coordinator:** Tecnogamma SpA  
**Participants:** Istituto Nazionale di Fisica Nucleare, Università degli Studi di Brescia, S.R.B. Costruzioni srl, AFV Acciaierie Beltrame SpA, Università degli Studi di Padova

## STUDY OF THE CAPABILITY OF MUON TOMOGRAPHY TO MAP THE MATERIAL COMPOSITION INSIDE A BLAST FURNACE

REFERENCE	RFSR-CT -2014-00027
CALL	Research fund for Coal and Steel
SCIENTIST	Gianni Zumerle
DEPARTMENT	Physics and Astronomy Department "G. Galilei"
UNIPD	coordinator
TOTAL COST	896,123 €
EU FUNDING	537,672 €
E-MAIL	gianni.zumerle@unipd.it

### PROJECT DESCRIPTION

The aim of present proposal is to explore the capability of muon scattering tomography for 3D imaging of different components present in the blast furnace burden (coke, burden and reduced metal), during operation. This would give important on-line information about the blast furnace process that cannot be accessed by other methods, and potentially be an important tool to improve efficiency and decrease fuel consumption. The imaging will make use of naturally occurring muons, i.e. high energetic elementary particles formed in the upper atmosphere, present at all points of the earth's surface, and will hence not present any safety issue.

### PARTNERS

**Coordinator:** Università degli Studi di Padova  
**Participants:** Istituto Nazionale di Fisica Nucleare, Centro Sviluppo Materiali SpA, Luossavaara-Kiirunavaara AB, Università degli Studi di Brescia, Swerea Mefos AB



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§§802-1569

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2007-2014

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# FRAMEWORK OF THE RESEARCH

AT THE UNIVERSITY OF PADOVA

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