CEI-PRAISE – A Programme to Promote Research and Innovation through Centres of Scientific Excellence and Advanced Research Groups in Member Countries
## CEI–PRAISE Programme to Promote Research and Innovation through Centres of Scientific Excellence and Advanced Research Groups in Member Countries

### Basic information

<table>
<thead>
<tr>
<th><strong>Title</strong></th>
<th>Programme to Promote Research, Technology Transfer and Innovation through centres of scientific excellence and advanced research groups in CEI Member Countries thus facilitating their participation to Horizon 2020.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Acronym</strong></td>
<td>CEI–PRAISE</td>
</tr>
<tr>
<td><strong>Promote Research And Innovation through Scientific Excellence</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Location</strong></td>
<td>Centres of scientific excellence and advanced research groups in CEI Member Countries as well as institutions of the CEI Science and Technology Network in the Region Friuli Venezia Giulia, acting as a hub.</td>
</tr>
</tbody>
</table>

### Implementing arrangements

<table>
<thead>
<tr>
<th><strong>Implementing Agency</strong></th>
<th>Central European Initiative - CEI acting as overall coordinator with the support of the institutions belonging to the CEI Science and Technology Network.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beneficiaries</strong></td>
<td>CEI Member Countries¹ and their respective scientific communities as well as industries, including SMEs.</td>
</tr>
</tbody>
</table>

### Financing

<table>
<thead>
<tr>
<th><strong>Overall cost estimate</strong></th>
<th>Overall estimate at the level of Euro 45 million over a period of 7 years, coinciding with the EU financial programming period 2014-2020, only indicative of full potential; but planning includes modular/step by step approach for implementation with less resources.</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Funding</strong></td>
<td>From variable geometry of funds/instruments made available by the EU, depending on different eligibility of CEI Member Countries according to their institutional status vis-à-vis the EU, as well as from other sources.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Expected date of start</strong></th>
<th>October 2014 - preliminary activities (networking, fundraising, responding to calls H-2020 already started; pilot activities expected to start before the end of 2014).</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dedicated e-mail address</strong></td>
<td><a href="mailto:PRAISE@cei.int">PRAISE@cei.int</a></td>
</tr>
</tbody>
</table>

---

¹18 countries belonging to CEI: Albania, Austria, Belarus, Bosnia and Herzegovina, Bulgaria, Croatia, the Czech Republic, Hungary, Italy, Macedonia, Moldova, Montenegro, Poland, Romania, Serbia, Slovakia, Slovenia and Ukraine. 10 are also EU members, 5 are EU candidate or pre-candidate countries, 3 are part of Eastern Neighbourhood. Therefore they are eligible for different EU instruments of financial support.
Preface

This proposal presents a unique approach to tackling key issues in the development of the scientific community through its immediate involvement in the envisaged activities. It intends to pull through of innovation into industry in the countries of the Central European Initiative. Its particular strength lies in the fact that it proposes a coordinated and integrated framework programme, funded by various financial streams from EC and elsewhere throughout the countries concerned. This approach has the benefit of cost efficiency and a whole integrated and logical approach rather than a piecemeal approach to the development of science and its outcomes in the countries concerned.

Throughout this document CEI-PRAISE is referred to as the Programme: it is comprehensive Framework Programme with a unity of objectives, overall management and visibility. Within its Framework CEI-PRAISE Programme will promote and manage several disciplinary projects, each of which will have one of the institutions belonging to the CEI Science and Technology Network as project leader. In case of project with strong interdisciplinary character, there will also be a co-project leader, who will ensure the most appropriate scientific leadership to the project concern. Within each project a broad spectrum of activities will be carried out according to the basic indications contain in this present document, but adding modifications and improvements which will be considered necessary or appropriate during the implementation phase. Pilot activities will start according to specific resources acquired by fundraising. The nine institutions belonging to the CEI Science and Technology Network will implement the scientific projects in the framework of the CEI-PRAISE Programme through a partnership consisting of institutions of scientific excellence or other advanced research groups in all 18 CEI Member Countries.

25 November 2014
I. Executive Summary

Science and Technology are called to play a crucial role in order to support growth and overall economic development in 18 Member Countries of the Central European Initiative. Accordingly, Science and Technology are stated among the priorities of the CEI Plan of Action 2014-2016 adopted by the Heads of Government in December 2013. In this perspective, CEI-PRAISE is a Framework Programme for the promotion of research, technology transfer and innovation through centres and other advanced groups of scientific excellence, expressing the best potential of the communities in these countries. This Programme is based on the strengths of the institutions belonging to the CEI Science and Technology Network which are either international by statute, or Italian by statute and international by vocation. More specifically, they have several decades of experience in international cooperation in the fields of physics, geophysics, biology, biotechnology, chemistry, mathematics and other related fields, representing collectively a unique interdisciplinary hub where advanced research infrastructures are traditionally open for collaboration from outside.

This Network has an impressive record of results in participation in the EU Framework Programme FP7: with a success rate of 24%. Regional cooperation between CEI S&T Network and the scientific communities of Countries in Central, Eastern and South Eastern Europe, which is already established, since decades, may therefore facilitate the participation of the latter to Horizon 2020, providing at the same time a strong anti brain drain contribution.

Taking into consideration all the above mentioned aspects, the CEI-PRAISE Programme is meant to provide a comprehensive and unique framework for a wide and interdisciplinary spectrum of scientific activities which include for each specific project: fellowships in the Trieste hub, scholarships to young scientists and grants to group leaders at home laboratories, financial support to partners (centers and advanced research groups) for collaborative scientific activities, travel and major events at regional level, e-learning and web-based training, etc. The overall cost has been estimated at Euro 45 million coming from different sources, over a period of seven years, coinciding with the EU financial programming period 2014-2020. This estimate only represents an order of magnitude referred to the full potential of the Programme. In fact, it has been drafted considering a modular flexibility, as in any case it will be implemented according to the resources actually available during the period. While promoting a unity of objectives and a single management approach in its implementation, the CEI-PRAISE Programme will be funded from different financial sources and specifically, but not only, from various funding instruments of the European Commission through a variable geometry according to the respective eligibility of CEI Member Countries. The eligibility depends on their status vis-à-vis the European Union: i.e. Horizon 2020, EU Structural Funds, IPA II - Instrument for Pre-accession Assistance, ENI (European Neighbourhood Instrument), others. The CEI Secretariat is already engaged in a fundraising campaign to finance appropriate pilot activities for the various components of CEI-PRAISE Programme: these pilot activities will already involve centres of excellence in country/region or and advanced groups not reached critical mass, aiming at the establishment of a regional cluster of laboratories for each CEI-PRAISE project.

The Central European Initiative has a consolidated experience and expertise in promoting, designing and managing EU co-funded projects in different fields: this experience qualifies it for the role of implementing agency for CEI-PRAISE Programme with the essential support of institutions belonging to the CEI Science and Technology Network acting as a hub. There will be therefore no need for a new management structure for this programme. The fundraising will be the prime responsibility of the

---

2 Without considering the Universities of Trieste and Udine and IOM-CNR, which joined the Network in 2014. If these three institutions are also included, the total amount of projects approved becomes 206, out of total number of 1,118 projects proposals collectively submitted, with a rate of success of approximately 20%: still a quite remarkable achievement!
CEI Secretariat and the project leaders from the institutions participating to the CEI S&T Network will be responsible for the scientific implementation of each envisaged project, in cooperation with a respective Project Committee including representatives of the concerned centers of excellence and research groups in CEI Member Countries. An Advisory Committee will support the overall implementation of the Programme: an estimated number up to 5000 scientists with different levels of experience and involvement might be directly or indirectly associated to the implementation of this Programme over the years.

The CEI Secretariat, in coordination with the institutions belonging to the CEI Science and Technology Network, has identified 73 full fledged partners and over 200 potential partners (centres of excellence or other groups of advanced research in CEI Member Countries) which are candidates to be proactively associated to the implementation of the CEI-PRAISE Programme. This does not mean that the participation to CEI-PRAISE will be limited to the above partners: on the contrary, it may be extended to other highly qualified partners. On the occasion of the CEI Ministerial Meeting on Science and Technology, which took place in Trieste on 24 September 2014, the CEI-PRAISE Programme was formally endorsed.

II. Introduction

After five years of global economic crisis, dramatically affecting growth perspectives and employment rates in CEI Member Countries, Science and Technology are called to play a crucial role in advancing overall economic development and creating opportunities for sustainable growth, both at regional level in Central, Eastern and South Eastern Europe as well as in the wider EU and global markets.

With job creation at a low level and economic growth stalled, CEI Member Countries have intensified need to create knowledge-based economies that can generate higher-value-added jobs and stronger growth. In order to complement other networking and technology-transfer initiatives involving CEI Member Countries, the CEI-PRAISE Programme will strengthen centres of excellence in science and technology, as well as groups of advanced research which have a strong potential but have not yet attained critical mass: cooperation among them is natural and necessary in a regional perspective. In the region covered by the CEI, several centres of excellence do exist, yet they offer potential for further scientific enhancement and integration into a wider scientific community. Fostering cooperation among stakeholders and a special focus on Smart Specialisation Strategies could make a valuable contribution to integrating their assets and activities in a macro-regional perspective. In this respect there is a broad scope of coordinating efforts and relevant priorities which will emerge in the framework of macro-regional strategies starting with the Danube Strategy. Research groups and local centres of

---

3 Smart Specialisation Strategies [S3] – Essentially, S3 is connected to supporting regional competitiveness and focuses on developing regions’ innovative capacity to achieve improved economic growth. It encourages regions to consider how investing in regional assets (including skills, research capacity, clusters and niche products and services, approaches to finance and investment and partnership/governance structures) can support long-term, sustainable growth. Integral to this is a clear analysis of how a region creates, absorbs and utilises knowledge. The regional ‘knowledge cycle’ is considered to be a key factor in influencing a region’s approach to innovation. S3 encourages regions to consider how best to position and optimise their regional innovation system. Smart Specialisation Strategies should incorporate at least five elements, namely they should: focus on each country’s/region’s priorities, challenges and needs for innovation and knowledge based development; aim to stimulate private sector investment in research and technological development; build on each country’s/region’s capabilities, competitive advantages and potential for excellence. Such an example is the Alsace, which was labelled a French “pôle de compétitivité”; get stakeholders fully involved and encourage innovation and experimentation; be evidence-based and include sound monitoring and evaluation systems.
excellence have therefore strong potential as catalysts of future development, especially through the exploitation of Knowledge Triangle. Clearly, further investment is needed in order to achieve the necessary critical mass. Also, in the view of objectives set by the Innovation Union Flagship Initiative of the Europe 2020 Strategy, such as strengthening Europe’s knowledge base and reducing fragmentation by promoting excellence in education and skills development.

In recent years, the CEI has promoted various initiatives in the field of Research and Innovation, both at institutional and technical level. As to the former, ministerial meetings were organised (2011, 2012 and 2013), thus providing the Organisation with a well-defined strategy to promote scientific cooperation among its Member States in the forthcoming years, politically endorsed at a highest level.

Besides enhancing institutional ties with the relevant Ministries for Science and Research, the CEI developed fruitful contacts with the DG for Research and Innovation and for the Joint Research Centre of the European Commission (EC). Furthermore, the CEI was invited to participate, as observer, in two important multilateral fora, namely the Steering Platform on Research for the Western Balkans and the Steering Group of Priority Area 7 (Development of the Knowledge Society through Research, Education and Information Technologies) of the EU Strategy for the Danube Region.

At technical level, the CEI supported a number of activities through its Cooperation Fund, such as international conferences, workshops and seminars. In this regard, the CEI Science and Technology Network has proven to be a useful tool for developing joint activities. In particular, the CEI Research Fellowship Programme (CERES), co-funded by the EC Seventh Framework Programme for Research and Technological Development (FP7), focused on the promotion of transnational mobility of researchers.

The Priorities for CEI-PRAISE Programme

Based on previous experience and achievements, CEI intends to develop and enhance its actions by focusing on a few specific priorities – in line with the provisions of the EU2020 Strategy, placing research and innovation on top of its agenda - as well as on the related flagship initiative “Innovation Union”. Therefore, while taking part in the on-going policy dialogue, aimed at bridging gaps between and among CEI countries within and outside the European Research Area (ERA), during 2014-2016 and beyond the CEI will focus on the following main priorities and relevant actions as emphasized in its Plan of Action.

- **Bridging between European countries** by promoting the participation of non-EU, non-ERA CEI countries in collaborative research projects, by making full use of existing funding opportunities (Horizon 2020, IPA, COST, EUREKA...), as well as by supporting transnational mobility of researchers in line with the European as well as by supporting transnational mobility of researchers in line with the European policies und under the principles to be found in the European Charter for Researchers and the Code of Conduct for their Recruitment.

- **Promoting cooperation along the lines of the Triple Helix Model** for innovation by elaborating joint projects and activities with the CEI Business Dimension, the Science and Technology Network and the CEI University Network, in order to facilitate links between science, academia and entrepreneurship, as well as by supporting the elaboration of Smart

---

4 Knowledge Triangle - The knowledge triangle refers to the interaction between research, education and innovation, which are key drivers of a knowledge-based society. In the European Union, it also refers to an attempt to better link together these key concepts, with research and innovation already highlighted by the development of the Lisbon Strategy.

In particular, the contribution of scientific research to jobs and growth, and its international attractiveness, can be enhanced through links between education, research and innovation/business; the three sides of the “knowledge triangle”, stimulating the development of entrepreneurial, creative and innovative skills in all disciplines, and promoting innovation in higher education through more interactive learning environments and increased knowledge-exchange. Elsewhere the expression Triple Helix model is also currently used.

5 The Triple Helix symbolizes a union between government, business and university, which are the key elements of innovative system in any country. The Triple Helix model presents interaction of certain institutions at every stage of innovative product development. Government and university interact at the initial stage, i.e. conception of an idea. Thereafter university cooperates with business in technology transfer. Eventually, a final product is commercialized in the market by joint effort of government and business.
Specialisation Strategies in non-EU CEI Member States in order to identify the overall potential of the CEI region in terms of Research and Innovation excellence.

- **Facilitating access to the research infrastructure of the institutions of the CEI Science and Technology Network** by promoting advanced research and related technology transfer, based on their internationally recognised strengths. The related activities will optimize resources through regional networking of Western Balkan Countries, the Danube macro-region and Eastern neighbours, as well as by raising awareness on specific instruments such as the European Research Infrastructure Consortium (ERIC).

**In summary**

In other words, against this background the CEI-PRAISE Programme intends to provide a realistic framework of regional cooperation in the field of Science and Technology based on the internationally recognized disciplinary strength of the centres of excellence which are part of the CEI S&T Network through a set of specific concrete activities revise that the said Network will definitely be in position to organize and support for the benefit of the scientific communities of the CEI Member Countries. The prime objective consists in facilitating their participation in highly qualified research and innovation projects in the framework of Horizon 2020. Indeed the CEI-PRAISE Programme provides a comprehensive vision of what may be done in this field in the years to come. Needless to say that the actions and activities described in this document intend to be an educated and focused contribution to policy options and decisions at various level which need to be taken in beneficiary countries.

Furthermore, concerning the global cost of the CEI-PRAISE Programme it may be emphasized that tentative/preliminary figures are indicated herewith with the sole purpose to provide an order of magnitude about activities which could be carried out, provided that an appropriate level of resources can be secured through the variable geometry of funding described below. In any case all the measures/actions described herewith have to be considered with an intrinsic modular character and flexibility and only the mid-term evaluation of this Programme at the end of 2016, in coincidence with the conclusion of the CEI Action Plan, will provide the opportunity for a thorough revision, and if necessary redefinition of targets and consequent planning of a further implementation of actions, specifically in view of the resources which will have been secured by the time from different sources.

In fact the CEI PRAISE Programme offers an integrated and consolidated approach, supporting several policy requirements of CEI Member Countries grouped in three geographical areas according to their status vis-à-vis the EU: Danube Region, Western Balkans, and Eastern Neighbourhood. The opportunities for enhanced cost effectiveness are obvious. Clearly, the programme resources raised for the implementation of CEI-PRAISE Programme will be applied to different CEI Member Countries through a variable geometry approach depending on their eligibility for different EU funded instruments.

CEI recognises that this dynamic political landscape offers various opportunities for supporting regional cooperation in Science and Technology, with the said variable geometries, but at the same time it bears an intrinsic risk of fragmentation, due to the potential creation of new dividing lines in Europe. In this regard, CEI has all credentials (including a mandate by Ministers of Science and Technology of its Member Countries) as well as a specific experience to actively participate in the implementation of regional cooperation processes, thereby addressing its core mission of acting as “a bridge between macro-regions”. Such experience can be transferred to other new initiatives, starting from the evolving EU Strategy for the Adriatic and Ionian Region (EUSAIR).

The CEI Network for Science and Technology has designed project contents identifying priorities for policy strategies. In fact, the planning of CEI-PRAISE Programme is detailing key research and development projects to be implemented, built on the strengths of the institutions of CEI Network.
Based upon an assessment of needs and potential, the stakeholders have identified different actions that merit to be considered at regional level. The proposed initiatives are:

- additional resources for research to extend international collaboration of the scientific community,
- support to regional centres of excellence and advanced research groups, in selected fields,
- promotion of regional technology transfer facilities.

In other words, building upon the internationally recognised competences and experience of its Science and Technology Network, the CEI intends to support centres of scientific excellence and other advanced research groups so that they can attract more resources, beyond current levels by increasing substantially resources already existing for cooperation activities. Table 1 at page 18 describes the full spectrum of scientific competence of the CEI Science and Technology Network with project proposals in which they are respectively ready to take a leading role.

The CEI-PRAISE Programme involves a range of different approaches to research which will be integrated across CEI Member Countries. The Programme will create a much stronger critical mass which in turn will enhance participation of the beneficiaries in Horizon 2020 through closer integration of the scientific communities involved.

In particular, the individual institutions belonging to the CEI S&T Network will lead scientific activities in the disciplines in which their strength is internationally recognized and in which they have accrued several decades of specific experience also in the field of international cooperation. They will have the prime scientific responsibility for the implementation of activities according to their disciplinary competences.

The CEI Science and Technology Network includes: Elettra Sincrotrone Trieste (Elettra and FERMI light sources), IOM-CNR - Institute for Materials Manufacturing (“Istituto Officina dei Materiali”, formerly TASC, belonging to the National Research Council of Italy), the Abdus Salam International Centre for Theoretical Physics - ICTP, the International Centre for Genetic Engineering and Biotechnology - ICGEB, the International School for Advanced Scientific Studies - SISSA, the Italian National Institute of Oceanography and Applied Geophysics – OGS, the Universities of Trieste and Udine and AREA Science Park, a national benchmark for transfer of technology and the promotion of innovation. The profiles of the institutions belonging to the CEI S&T Network are detailed in Annex 1 from page 27.

The above institutions represent an extraordinary and invaluable hub of scientific infrastructure with a set of diversified facilities which is rarely to be found concentrated in such a relatively small territory. The outstanding disciplinary diversification and complementarity of this hub is evident in the existing case of the Elettra Synchrotron and FERMI-Free Electron Laser Lab, which represent state-of-the-art facilities that were originally conceived to serve a wide community of multidisciplinary users, as they have already been doing for decades.

The activities of AREA Science Park in technology transfer are based on its consolidated experience in this field, which will allow tailoring of activities according to specific requirements of CEI-PRAISE. AREA Science Park will contribute with its specific know-how in technology transfer and stimulus for innovation, following a rigorous approach to capitalise specifically upon the results achieved in the framework of the CEI-PRAISE Programme.

Indeed, CEI S&T Network represents a great potential to be shared with the scientific communities of CEI Member Countries. It must be emphasized that in order to enhance such potential, the CEI promoted inter alia the establishment of C-ERIC Consortium, which has been specifically created according to an innovative and complex approach based on infrastructures located in several countries, but also, in this
contexts, to facilitate the access to the infrastructure of this dedicated hub in Trieste by the signatories (at present 9 CEI Member Countries so far).

Through the CEI-PRAISE Programme, CEI will create more opportunities for scientific excellence and research, collaboration in technology transfer as well as increasing the innovative capacity in the countries involved. The expected outcome will be an increased impact of research and innovation which will lead to a more integrated regional research area, greater competitiveness, increased economic growth and, eventually, further job creation. In this respect it may be underlined that CEI has an outstanding record of cost efficiency in its operations.

As outlined above, the CEI-PRAISE Programme covers three macro regions: the Danube Region, the Western Balkans, and the Eastern Neighbourhood. The scientific communities in the Western Balkans and in the Countries of the Eastern Neighbourhood show their own distinctive features and may need specific activities with appropriate priorities. It may be noted here that according to the characteristics and requirements of the different EU Policies/Programmes the participation to the CEI-PRAISE Programme may be extended operationally to scientists, centres of scientific excellence and advanced research groups in non CEI countries at their request: for instance of Greece, in view of the future Adriatic and Ionian Strategy, or Turkey, in view of its special association links with the EU.

The full implementation of the CEI-PRAISE Programme will require **resources estimated at EUR 45 million over a period of seven years**, coinciding with the EU financial programming period 2014-2020. Funding will be raised through appropriate EU instruments and other available sources according to individual eligibility of CEI Member Countries depending on their respective status vis-à-vis the EU. This approach will make a significant, integrated and cost effective contribution to the implementation of EU Horizon 2020.

**Opportunities for CEI Member Countries**

The main assumption of the CEI-PRAISE Programme is based on the vision that Science & Technology has a critical role to play in advancing overall economic development and creating opportunities for sustainable growth both at regional level and in the larger EU and global markets. With job creation at a low level and economic growth almost stalled, the CEI Member Countries face an intensifying need to create knowledge-based economies that can generate higher-value-added jobs, enhanced and enlarged skills and stronger growth. Expenditure on research and development (R&D) is typically considered to be the best single measure of the commitment of resources to inventive activity on the improvement of technology, particularly where a potential base already exists. Investing in Science and Technology leads to employment growth, more qualified and better paid jobs and reduces any drain of local talent and skills. Training and infrastructure services easily available outside the country also help creating and sustaining reasonable benefits thereby raising productivity and diversified employment opportunities.

The CEI Science & Technology Network, launched at the beginning of 2004 provides support for the organization of seminars, conferences, workshops and training courses. Already young scientists from CEI Member Countries, especially non-EU Member States, are currently offered the opportunity to attend such activities and carry out scientific research on various topics in one of the centres in Trieste.

Experience indicates that increasing local capacities to adopt and adapt foreign technologies is important to the committee that it represents a systematic and more effective approach to knowledge transfer. Consistently, public support to S&T initiatives is critical in most CEI Member Countries particularly in the context of stagnant economies, and mainstreaming S&T initiatives is still a priority. For that to happen, local Governments, international organizations and donors will need to spend more and better in science dissemination and technology transfer initiatives, also aiming at effectively scout and develop locally produced knowledge and research results.
Despite a number of important initiatives undertaken at national level during the last two decades, the Research and Innovation sector in several CEI Member Countries is still characterized by a legacy of unfinished reforms from their former command economies to free market systems. The contribution of national innovation systems to economic growth and job creation is too low. In addition, the scientific performance of many countries of the region is still below their potential and technology transfer is very limited if not practically non-existent (according to most indicators). In fact, available public funding has declined and become more uncertain in recent years. As consequence, a large number of highly qualified researchers have emigrated and research infrastructure has deteriorated significantly.

Whilst there are isolated success stories, Research and University systems as well as national Academies of Science still experience profound structural and institutional limitations coupled with a lack of a strategic vision to better impact regional economies. Universities still lack a consistent institutional approach for technology transfer and strong industry-science interactions are essentially missing. Clearly these legacies from former days need to be overcome rapidly and as far as possible, at a regional level. Through the CEI-PRAISE Framework Programme CEI intends to offer its Member Countries the concrete opportunities related to catalyzing effort to create a scientific critical mass in different fields and with an interdisciplinary approach, from which they all will benefit.

On the other hand, shared priorities, such as excellence in science and enhanced industrial leadership are the same priorities emphasized by Horizon 2020. Furthermore the CEI-PRAISE Programme by facilitating less performing CEI Member Countries to participate Horizon 2020 relevant projects will in fact support their contribution to meet the societal challenges which are also in the fields of health, food security and bio-economy, secure and clean energy, transport, climate change.

Technology transfer and S&T collaboration amongst CEI Member Countries are critical for achieving enhanced economic impact of public R&D. The CEI aims through this Programme to create opportunities for scientific excellence, research, commercialization and strengthening collaboration in technology transfer and for increasing the innovative capacity of the countries involved. The expected result is an increase impact of research and innovation which will lead to more integrated research area, better competitiveness, effective economic growth and job creation.

It should also be noted that the number of regional initiatives and country-based initiatives with a regional scope is constantly growing and increasing the risks of overlapping and wasting skills and resources without adequate capitalization upon experiences and results. Thus the CEI-PRAISE Programme is envisaging a coordination which could provide a contribution to the valorisation of existing R&D initiatives. A revitalized, long-lasting regional Science and Technology cooperation will contribute to placing R&D as a priority action on the national political agendas as already mentioned above. The implementation of this CEI-PRAISE Programme may contribute to the target by very concrete and focused actions.

In reality the CEI-PRAISE Programme may contribute significantly to an overall, comprehensive regional R&D Strategy for Innovation to meet similar requirements the Danube region, for the Balkans or for the countries of the Eastern Neighbourhood. What is more relevant is that it will be possible to actually start the Programme, even with step by step approach, as soon as the first instalment of financial resources is made available, since the basic research structure to implement the envisaged research projects is already well established within the Trieste hub: that is, the institutions belonging to the CEI Science and Technology Network. The CEI-PRAISE Programme will prepare for the framework conditions necessary to engage in effective collaborative research, and in doing so contributing to Europe's scientific base and excellence. In other words, it will provide a very relevant example on how cooperation in research and innovation would be organized and carried out in the region.
III. The CEI-PRAISE Programme: Objectives, Activities and Outcomes

Objectives

The proposed CEI-PRAISE Programme takes into consideration the opportunity to link to other relevant initiatives in the CEI Member Countries. It will complement on-going efforts occurring both locally and through already established regional strategies with the specific purposes:

- to implement research projects also according to the guidelines which may have been endorsed by other regional initiatives, strengthening of Science and Technology cooperation between the CEI S&T Network and the selected centres of excellence as well as other advanced research groups in CEI Member Countries;
- to increase and develop the stock of S&T human capital through a number of activities such as
  - fellowships for the most promising young talents to provide them with the opportunity to get enhanced and more specialist training in the laboratories of the CEI S&T Network or of their own countries or of countries nearby;
  - grants to be spent at the CEI S&T Network also for training programs for technology transfer specialists;
  - scholarships and grants to group leaders in selected associate centres and other research groups of scientific excellence in CEI Member Countries;
  - grants encouraging the return of national researchers from the diaspora to the region;
  - support for the organization of scientific events, scientific travel, subscription to literature, consumables, software packages, other similar relevant expenditures;
  - visiting and post-doc fellowships;
  - e-learning support and virtual e-laboratory, e-conferencing, e-tutoring, scientific podcasting.

The CEI has developed the vision of the CEI-PRAISE Framework Programme as a comprehensive and integrated instrument for strengthening centres of excellence and advanced research groups and at regional level, well aware of the need to establish appropriate links with other EU initiatives in order to avoid duplications and enhance synergies. In fact, in the Western Balkans as well as in the regions covered by the EU Danube Strategy and the Eastern Neighbourhood Policy (the same applies to the Adriatic and Ionian Region for which an European strategy is currently under definition), several centres of excellence already exist, but they present weaknesses that can affect their overall performance; this and other factors cause significant brain-drain and then, loss of scientific competitiveness. Many of them have limited scientific infrastructure which could sometimes be obsolete. The CEI-PRAISE Programme will support these groups and centres so that they may increase significantly their critical mass, thanks to assistance of different nature and at different levels, and through the CEI Hub. The CEI-PRAISE Programme actually involves all the above regions but might be extended to other eligible neighboring countries: the Programme will create the preconditions that will facilitate the allocation of dedicated funds from different sources to stakeholders, mainly through the participation to the diversified Programme’s activities carried out within fifteen scientific projects.

One of the priorities of the EU strategy for the Danube Region is to foster smart skills and competences
through better lifelong learning opportunities and at every level of education and training. Therefore capacity-building and new approaches in initial and continuing education and training are needed to empower and equip citizens with more and better skills and enhanced competences. Moreover, in the framework of EUSDR work has begun to collect and harmonize data on common challenges such as environmental protection, navigability, irrigation and agricultural development and energy production, in order to improve integrated and coordinated decision making in the region, underpinned by the scientific support of JRC. The application of innovative results from advanced applied research represents a great challenge in this respect. Preparatory work has also begun to establish a Danube Research and Innovation Fund, pooling national and regional investment. The CEI-PRAISE Programme will support stakeholders in integrating the "smart specialization" concept, optimizing their capacities in the priority projects which have been selected, thus enhancing the overall scientific potential and impact of the region.

In fact the CEI-PRAISE Programme will offer a **complementary short-medium term opportunity** to involve directly the relevant scientific communities in state-of-the-art research and facilitate their early participation to Horizon 2020.

**Concurrence with EC policies**

The EU Cohesion Policy, which is financed by the Regional Fund and the Social Fund, may significantly support the CEI Member Countries and regions in investing in research and innovation. To make sure that the funding of the regional cooperation in R&D activities is really efficient CEI Member Countries will be particularly keen to implement **Smart Specialisation Strategies** for research and innovation.

The EU Regional Policy is not totally new in supporting science and technology: widespread experience has been gained by regions in the field of innovation strategies. The Smart Specialisation Strategies are seen as the key instrument to maximise these synergies with Horizon 2020. The Smart Specialisation Strategies will guarantee that Cohesion Policy funds are invested most appropriately and more efficiently, thereby providing funders with better value for money. In particular, they will avoid the duplication and fragmentation in regional support to research and innovation; synchronize different policies and funding programmes; at the same time, they provide a good mix of grants, financial instruments and other support measures, and leverage more private investment directly at the disposal of the partners of the CEI-PRAISE Programme in their own respective countries.

The CEI-PRAISE Programme is also fully in line with the requirements of the European Union Instrument for Pre-accession Assistance (IPA II) - and more specifically, its **multi-beneficiary/regional dimension - for the eligible countries**. The Programme will also facilitate the Regional R&D Strategy for Innovation and contribute significantly to the economic, social and cultural development of the region.

In conclusion, in the main regional areas mentioned above the CEI-PRAISE Programme may contribute to a substantial extent to the realization of a network of scientific excellence based on the specific projects further described: indeed, the additional resources involved through their implementation will facilitate the access of the scientific communities in the CEI Member Countries to Horizon 2020.

**Activities**

The main objective of this CEI-PRAISE Programme is to improve the overall performance of Science and Technology sector in CEI Member Countries by undertaking activities that promote scientific research and technological innovation in an efficient manner. The knock-on effect of this will be improved economic growth at national and regional levels.

Activities will fall into the following categories:

- scientific cooperation in a specific research project among those being envisaged: upon the
results achieved Area Science Park will offer a tailor-made transfer of technology in order to provide innovation;

- synergic research initiatives between selected centres and promising advanced research groups in CEI Member and CEI S&T Network of centres of excellence in Trieste: sharing common infrastructure facilities and services with centres specializing in selected research areas;
- trans-national mobility of scientists and researchers to carry out their research in one of the CEI S&T Network’s leading institutions in Trieste: enhancing the potential of young scientists and strengthening the capacity to fully participate in European programs and initiatives;
- local capacity development through scholarships/fellowships to ensure stemming of brain drain: encouraging talents abroad to return and link with local innovation systems;
- scientific events, training courses and high level conferences, also to be broadcasted through the web.

The Programme is conceived as results-oriented and will focus primarily upon specific activities that could be replicated independently by participating institutions at regional level (associate partners) to enhance R&D innovation in CEI Member Countries.

- **Fellowships:** contributing to the overall objectives of promoting innovation and mobility, CEI-PRAISE fellowships will represent a significant landmark in young scientists’ careers. The programme will finance doctoral and postdoctoral studies at CEI S&T Network’s institutions in Trieste, including interdisciplinary topics. Candidates proposed by research centres from the CEI Member Countries will be selected on a competitive base by the responsible project leader in consultation with the Advisory Committee as appropriate, paying particular attention to avoidance of duplication and reaching appropriate critical mass in R&D in the CEI region.

- **Dissemination of scientific knowledge** and capability: besides trans-national mobility, the CEI-PRAISE Programme will contribute to enhance exchange of know-how through promotion of dedicated communication channels such as e-learning and e-laboratory, e-conferencing, e-tutoring to sharing common infrastructure facilities and programs with others in selected research areas, creation of podcasts for advanced seminars and teaching activities. Collaborative learning, up-to-date exchange of information and web-based training at local and international levels will promote economies of scale and avoid unnecessary duplication of efforts and costs. When needed the institutions of the CEI S&T Network of centres of excellence will consider providing further assistance and capacity building to CEI Member Countries in order to ensure their involvement in innovative and newly introduced research lines.

- **Promotion of research excellence** and related policies: the CEI-PRAISE Programme focuses on the transfer of know-how and best practice in S&T amongst the CEI centres of excellence in both CEI Member Countries and the Network in Trieste. This would fit within a common R&D regional strategy and could bring a number of benefits for the CEI region at large. Specific attention will be required at a later stage on intellectual property rights (IPR) implication.

The CEI-PRAISE Programme will support actively the development of such specific measures to encourage both research excellence and academic entrepreneurship as well as its spin off to industry.

**Strong interdisciplinary connection within and between the projects**

The CEI-PRAISE Programme, research projects have in common strong interdisciplinary aspects meant to further consolidate the on-going collaboration and open horizons for new collaboration with partner centres in CEI Member Countries. Institutions of the CEI S&T Network have a range of curricula experience that reflects both specific disciplines and interdisciplinary orientation complementary to the
other centres within the CEI Network. Thus, centres of the CEI S&T Network will design and implement research initiatives based on the scope and sequence of the integrated disciplines and be flexible enough to cooperate with and support selected associate centres and advanced research groups in CEI Member Countries, according to the candidates’ needs and the priorities of their respective institutions. This interdisciplinary approach will obviously offer to fellows the opportunity to see connections and relevance between topics and will provide a variety of perspectives in order to multiply the real impact of applied science, research and innovation on overall development of their respective countries.

**Credits and certificates**

Certificate of Attendance: CEI and/or S&T centres in Trieste will award a certificate of attendance upon successful completion of each fellowship. In order to achieve this certificate, participants will be expected to attend and actively participate in the envisaged fellowship in Trieste and Udine and complete the required assignments. Assessments of performance and certification will be provided by the project leaders in consultation with the Advisory Committee. At a later stage programme management may consider implementing a formal an peer review system in consultation with the Advisory Committee.

Academic Credit: CEI will negotiate the possibility of offering academic credit points, such as the European Credit Transfer and Accumulation System (ECTS), which may be accepted for credit transfer by the participants’ home universities. Those who wish to obtain these credits must inquire about the possible transfer at their home institution prior to their fellowship enrolment. A full fledged PhD programme will also be available at the Universities of Trieste and Udine as well as at SISSA.

**Potential partners of the CEI-PRAISE Programme and assessment of real needs and priorities of CEI Member Countries: S&T excellence and the infrastructure of the CEI Network**

CEI, as overall coordinating/facilitating Agency, will supervise and coordinate the implementation of all activities and ensure accomplishment of proposed strategic objectives to contribute to the smooth running of effective research, development and innovation in the CEI Member Countries.

Individual projects proposed here will be managed under the responsibility of the project leader(s) assisted by a co-leader if a project has a very strong interdisciplinary connotation and involves more than one institution of the CEI S&T Network; operational rules and procedures in compliance with the prevailing rules of each Institution participating in the CEI S&T Network.

The proposed activities will be closely linked to both the CEI Science and Technology Network in Trieste and local partner centres and other research groups in CEI Member Countries based on their needs and priorities, and will especially concentrate on key components of research excellence, commercialization and innovation in order to increase opportunities for job-creation and economic growth.

To strengthen research capabilities in the CEI Member Countries and promote S&T excellence, with the direct participation of the directors of the institutions belonging to CEI S&T Network CEI will identify, select and valorise a number of **partner centres of excellence and advanced research groups** in the region, being aware of the initial challenges connected with the launch of a complex and multilateral cooperation programme such as this one. Each will have the role of increasing scientific collaboration within the region, expanding opportunities for young researchers, intensifying research activities with the CEI Network in Trieste. Each advanced research group may be in a position to submit a project to consolidate its own activities and to grow up to become an established Centre of Excellence. The CEI-PRAISE Programme will be also an opportunity to foster the competition within the region amongst participating countries before exposure to Europe-wide competition.

Within the institutions existing with the support of the CEI Network, significant scientific and technical developments have occurred over time. These developments have, of necessity, led to specialisation and
specialisation in turn, to the development of specific state of the art facilities. Clearly, unnecessary replication of such facilities would not be a cost-effective option. However the development of an integrated science and technology infrastructure within the CEI Network offers a particularly effective option for anyone needing such facilities.

**Expected outcomes**

The implementation of the CEI-PRAISE Programme through the CEI Science and Technology Network will increase research activity and its quality in the CEI Member Countries, primarily in view of strengthening their capability to participate to Horizon 2020 and other similar research funding opportunities.

The following outcomes are expected:

- an increased number of collaborative research projects and co-publications with the CEI S&T Network in Trieste and amongst associate centres and other advanced research groups in CEI Member Countries as well as larger number of scientific (co) publications in high impact journals;
- increased numbers of trained young researchers and a larger number of (co) publications by young researchers;
- larger number of applications for the productive adoption of innovation, its pull-through to industry and consequent economic growth;
- increased overall regional scientific collaboration and stemming any future “brain drain”;
- a number of initial activities in technology transfer and in promoting innovation, including spin-off based startups, by the centres of excellence involved;
- enhanced cooperation with institutions in other EU Countries beyond CEI Members.

**Selecting associated partner/centers of excellence**

The identification of the partner centres of excellence and of advanced research groups in the beneficiary countries will be conducted with the CEI Network of centres in Trieste and Udine, and endorsed by the CEI National Focal Points on Science and Technology, supervised by the respective Ministries. CEI also intends to involve in this process the RCC and the relevant area coordinator for the EUSDR as appropriate.

The selection criteria will be merit-based prioritizing key areas of science considered a priority for the country/region. A number of existing centres already in collaboration with the CEI S&T Network in Trieste will be strongly encouraged to be part of the CEI-PRAISE Programme. **The aim is to create a virtual critical mass of research in a selected broad spectrum of interdisciplinary research fields by bringing together state of the art science, technology, research and education (training) in the CEI partner centres of excellence in CEI Member Countries. These associate centres will operate as connectivity-hubs with a network of researchers spread across national borders, but within the region, in the selected research fields.**

Thanks to its experience in the region, the CEI Secretariat already has evidence of R/D centres and of advanced research groups that could, potentially, be among the main beneficiaries of this Programme: a database for mapping these relevant centres/groups is being assembled along the lines of the form attached herewith (Annex 7 at page 65): 73 full fledged partners and over 200 potential partners have been identified so far, according to the preliminary mapping in Annex 4 and 5, from page 49 to 52.

In summary, graphic 1 in the next page, provides a graphic elaboration of CEI-PRAISE Programme Structure: it is complemented by the content of Table 1 in page 18 with inventory of the institutions belonging to the CEI Science and Technology Network, their respective institutional status, and the
specific disciplinary area/CEI project for which each of them will play a leading role, indicating collaborations already envisaged within the Network, as appropriate.

Graphic 1 – CEI-PRAISE Programme structure
The overall objective of the CEI-PRAISE Programme is to support regional cohesion in Central, Eastern and South Eastern Europe, and to facilitate the EU enlargement process in the framework of EU 2020 strategy by providing several measures dedicated to the transfer of Science and Technology to stimulating the setting up of R&D innovation opportunities, all following an “anti-brain drain approach” in the CEI Member Countries by turning the process into brain-gain. In this respect, the collective experience of the CEI S&T Network through its participation to EU Seventh Framework Programme (See Table 2 at page 26) shows a concrete basis for the level of research activities to be implemented within Horizon 2020.
Furthermore the cooperation within the scientific projects of the CEI-PRAISE Programme will stimulate/facilitate the participation to Horizon 2020 projects by centers of excellence and other advanced research groups of CEI Member Countries also with the other partners of the individual institutions of the CEI Science and Technology Network which at an initial stage are not directly involved in the CEI-PRAISE Programme. Thus, a further multiplayer effect may be ensured for the benefit of scientific communities of the CEI Member Countries. In fact, on the basis of ongoing collaborative activities and joint projects, for the institutions of the “Trieste Hub” it will be only natural to associate their best partners in the CEI Member Countries to projects in the framework of Horizon 2020 to which they may participate with their prime partners, i.e. highly reputed laboratories in the rest of Europe.

Annex 1 from page 27 illustrates the profiles of the institutions belonging to the CEI Science and Technology Network.

Selected research topics for the CEI-PRAISE Programme have been prioritized in accordance with the existing main strengths of these institutions and appropriate policy and R&D programme needs of the participating partners from the CEI Member Countries. The specific project on technology transfer and promotion of innovation will be focused on the agreed real priorities of the CEI Member Countries, as endorsed by the Advisory Committee. Specific Project Committees will be established under the coordination of the relevant project leader(s) from the institutions belonging to the CEI Science and Technology Network: they will define respective working plans according to the competences and resources available. Fellows working in the institutions of the CEI S&T Network will be requested also to operate as active "trait d'unión" with the scientific community in the home country for the respective disciplinary competence.

Additional topics may be considered according to the needs and requests of the participating countries, but always in order to ensure appropriate complementarity and therefore to enrich the disciplinary scope of each project.

In order to ensure that this top–down strategy meets the bottom–up requirements, technology transfer and science dissemination should be closely related to the overall growth of the CEI Member Countries: relevant indicators and proper guidance are expected to envisage in the meetings of the Advisory Committee, through the work of scientific Project Committee or in direct bilateral contacts with the Secretariat. This way the strong research capacity of the CEI S&T Network of Excellence in Trieste will combine with the development potential for the real benefit of the region.

The eventual purpose of actions which will be carried out in the Technology Transfer and Innovation project to be implemented by Area Science Park is to promote the applications of technologies (i.e. nanotechnology, biotechnology, environmental technologies, etc.) and innovative ideas to specific fields of economic development and productive uses to create jobs, ensure economic growth and bring benefits for human health and the environment (eg. health, agriculture, secure energy, clean industries, etc.) and the fields of biological sciences and chemistry, in which the regions show a higher scientific performance. As described in more detail below, the selected research fields are mainly related to biotechnologies, synchrotron radiation, lasers, renewable energy and food technologies, physics, environmental technologies and renewable energy.

As mentioned earlier, in covering the proposed areas it is also considered that the CEI Member Countries will improve their R&I capacity in addressing global challenges which is an important in view of the EU research programme Horizon 2020.

The following table (Table 1 at page 18) provides a scientific summary of the disciplinary topics/projects which correspond to relevant and internationally recognized strengths of the institutions belonging to the CEI Science and Technology Network on which are based the projects to be
implemented in the framework of the CEI-PRAISE Programme. A description of each research line/scientific project in the context of the current activities of the host institutions in the Trieste hub is outlined in Annex 2 of this paper from page 32.

The institutions of excellence belonging to the CEI Science and Technology Network will actively continue to implement their research programmes and projects, besides the CEI-PRAISE Programme. In fact, in the implementation of their other programmes all of them will also submit separate applications responding to Horizon 2020 calls. On the other hand, it is expected – and CEI intends to activate an appropriate promotion on this effect that each institution belonging to the CEI Science and Technology Network does associate one or more center(s)/research group(s) from the CEI-PRAISE Partnership to one or more of its H-20220 project(s).

<table>
<thead>
<tr>
<th>Table 1 – Institutions belonging to the CEI Science and Technology Network leading the projects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institutions belonging to the CEI S&amp;T Network</td>
</tr>
<tr>
<td>Elettra Sincrotrone Trieste</td>
</tr>
<tr>
<td>Elettra Sincrotrone Radiation Lab and Fermi Free Electron Laser</td>
</tr>
</tbody>
</table>

2) Molecular and structural biology tools including microscopic and 3-D analysis
<table>
<thead>
<tr>
<th>Institution</th>
<th>Description</th>
<th>Collaborations/Fields</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>IOM-CNR</strong> Institute for Materials Manufacturing</td>
<td>A laboratory belonging to the National Research Council of Italy, the largest scientific public institution in the country.</td>
<td>Strong cooperation/interaction with Elettra and Fermi Labs</td>
</tr>
<tr>
<td><strong>ICTP</strong> International Centre for Theoretical Physics Abus Salam</td>
<td>Autonomous Center managed by a joint venture by UNESCO and IAEA (International Atomic Energy Agency) with full international status.</td>
<td>3) Environment protection modelling and climate change</td>
</tr>
<tr>
<td><strong>ICGEB</strong> International Centre for Genetic Engineering and Biotechnology</td>
<td>Full-fledged international/ intergovernmental organization with its statute deposited at the United Nation: therefore, it is part of the broader UN family.</td>
<td>4) Condensed matter physics, advanced materials and photonics</td>
</tr>
<tr>
<td><strong>SISSA</strong> International School for Advanced Studies</td>
<td>An institution in the Italian national University system, with a special statute, covering research and only postgraduate courses (Masters and PhD), with English medium and a strong international vocation.</td>
<td>5) Biotechnologies for food and energy</td>
</tr>
<tr>
<td><strong>SISSA</strong> International School for Advanced Studies</td>
<td>An institution in the Italian national University system, with a special statute, covering research and only postgraduate courses (Masters and PhD), with English medium and a strong international vocation.</td>
<td>6) Regenerative medicine, with specific reference to cardiovascular and neurodegenerative disorders</td>
</tr>
<tr>
<td><strong>OGS</strong> National Institute of Oceanography and Applied Geophysics</td>
<td>An autonomous research institution within the Italian public system, with a strong tradition in collaboration with industry and in international cooperation.</td>
<td>7) Cognitive neuroscience</td>
</tr>
<tr>
<td><strong>UNITS</strong> University of Trieste</td>
<td>Established in the framework of the Italian public University system, with a consolidated vocation toward international cooperation.</td>
<td>8) Computational and theoretical biology</td>
</tr>
<tr>
<td><strong>UNIUD</strong> University of Udine</td>
<td>Established in the framework of the Italian public University system, with a vocation toward international cooperation.</td>
<td>9) Applied mathematics</td>
</tr>
<tr>
<td><strong>AREA</strong> Consortium Area Science Park</td>
<td>An autonomous institution in the Italian public research system, which is also national benchmark for transfer of technology and promotion of innovation, with a consolidated experience in international cooperation.</td>
<td>10) Secure energy</td>
</tr>
<tr>
<td><strong>IGEB</strong> International Centre for Genetic Engineering and Biotechnology</td>
<td>Full-fledged international/ intergovernmental organization with its statute deposited at the United Nation: therefore, it is part of the broader UN family.</td>
<td>11) Nanotechnology and nanomedicine</td>
</tr>
<tr>
<td><strong>ICGEB and UNIUD</strong></td>
<td>Advanced biofuels and sustainable technologies for integrated Biorefineries</td>
<td>12) Advanced biofuels and sustainable technologies for integrated Biorefineries</td>
</tr>
<tr>
<td><strong>UNIUD</strong> University of Udine</td>
<td>Established in the framework of the Italian public University system, with a vocation toward international cooperation.</td>
<td>13) Smart and sustainable land</td>
</tr>
<tr>
<td><strong>AREA</strong> Consortium Area Science Park</td>
<td>An autonomous institution in the Italian public research system, which is also national benchmark for transfer of technology and promotion of innovation, with a consolidated experience in international cooperation.</td>
<td>14) Innovation in personalized health care</td>
</tr>
<tr>
<td><strong>SISSA</strong> International School for Advanced Studies</td>
<td>An institution in the Italian national University system, with a special statute, covering research and only postgraduate courses (Masters and PhD), with English medium and a strong international vocation.</td>
<td>15) Promotion of technology transfer and innovation</td>
</tr>
</tbody>
</table>

*See details of projects in Annex 2 at page 32*
V. Preliminary Cost Estimate, Outputs and Measurable Indicators

Preliminary Cost Estimate

A preliminary inventory of envisaged outputs for the CEI-PRAISE Programme is summarized below with their corresponding cost estimates. The overall cost has been estimated as Euro 45 million over a period of seven years, coinciding with the EU financial programming period 2014-2020.

Furthermore, it may be further emphasized that tentative/preliminary figures are indicated herewith with the sole purpose to provide an order of magnitude about activities which could be carried out, provided that an appropriate level of resources can be secured through the variable geometry of funding described below. In any case all the measures/actions described herewith have to be considered with an intrinsic modular character and flexibility and only the mid-term evaluation of this Programme at the end of 2016, in coincidence with the conclusion of the CEI Action Plan, will provide the opportunity for a thorough revision, and if necessary redefinition of targets and consequent planning of a further implementation of actions, specifically in view of the resources which will have been secured by the time from different sources.

- **Fellowships in Trieste**
  170 fellows from CEI Member Countries will be hosted at the CEI S&T centres of excellence in Trieste for a period of 30 months (but only 10 months for fellows to be trained by AREA Science Park) each at an average monthly rate of Euro 2,000, including grants for scientific travel, consumables, etc.

- **Scholarships in CEI Member Countries**
  600 scholarships will be supported for a period of 30 months at monthly rate of Euro 500 each to be spent at the recognized CEI partner centres in CEI Member Countries: upon a proposal by the directors/team leaders in home laboratories to the Project Committee relevant for the disciplinary/research area of each applicant.

- **Grants for group leaders in home laboratories**
  100 group leaders will receive grants to perform their scientific research/studies for a period of 36 months at monthly rate of Euro 1,200 each to be spent at the CEI partner centres or groups of scientific excellence stemming the brain drain and encouraging the return of national researchers, including visiting and post-doc fellowships: proposals to these effect will be discussed and decided by the Project Committee relevant for the disciplinary/research area of each applicant.

- **Support to CEI partner centres in CEI Member Countries**
  Support for approved scientific travel, organization of scientific events, subscriptions to literature, consumables, software, etc. The aim is to strengthen the level of research and its quality through competitive grant funding for collaborative regional research, in key scientific domains and connecting local scientists with a number of emigrated scientists. The CEI partner centres will provide research training and promote joint intra-regional research. Expenditure in this area will be carefully monitored and rigorously audited in all participating CEI Member Countries to
ensure appropriateness to the project, according to the same procedure which will be followed in Trieste.

- **Support to CEI S&T Network for implementation of the research programmes in CEI Member Countries**

  Research projects of interest to the CEI Member Countries will be developed in partnership with the CEI S&T Network within the framework of their core programmes and research lines (relevant support will be provided in view of the multiplier effect for scientists involved).

- **Collaborative learning and web-based trainings**

  E-learning support and e-laboratory conferencing, tutoring, networking, scientific podcast production to connect centres of the CEI S&T Network and centres of excellence and other advanced research groups in CEI Member Countries. The latter will also host and manage research networks, providing local ownership of at least 60% of this outcome by the end of the project.

- **Contingencies**

  Contingencies for unexpected expenditures in the above budget lines, but also actions particularly worth being supported when a revision of the Work Plan may be appropriate.

- **Overall management and internal auditing**

  To be distributed among the several segments of the variable geometry: these costs appear to be appropriate as they do not exceed 7% while including all horizontal costs of coordination and governance managed by CEI.

**Total estimated cost**

Euro 45,000,000

The actual expenditure incurred in the implementation of the individual projects in the Framework of the CEI-PRAISE Programme will be rigorously checked by the Advisory Committee upon a report by the CEI Secretariat indicating the compliance with the regulations prescribed by each funding instrument in terms of eligibility as well as in terms of compliance with the prevailing standards of project management and reporting as established by the European Commission.

It must be noted also that the above mentioned budget appropriations will provide allocation expenditure over 85% for the benefit of the Scientific Communities of the CEI Members Countries.

**Outputs and Measurable indicators**

The following are the envisaged outputs and measurable indicators:

- Approximately 170 fellows will be hosted at the CEI S&T Network in Trieste and Udine for a period of 30 months each (but only 10 months for those to be trained by AREA Science Park);

- Up to 100 selected partner centres and/or other advanced research groups in CEI Member Countries will be supported for local scholarships and the above fellowships (over 500);

- Up to 100 selected partner centres and/or other advanced research groups in CEI Member
Countries will be assisted with relevant approved travel costs, consumables, subscription to literature, software, etc.

- Approximately 100 group leaders will receive grants to perform their research studies/scientific work in their country reversing the brain drain and therefore raising the overall scientific status of the country/region;

- at least 14 research projects of interest to the CEI Member Countries will be developed in partnership with the CEI S&T Network within the framework of their core research lines, ensuring a virtual critical mass for each research project

- for each of the above research projects Virtual Regional Clusters of laboratories will be established with a view of better organizing the collaboration amongst the centres of excellence and advanced research groups involved in a specific project, not only in order to strengthen its relevant critical mass but also as a mean to increase visibility;

- at least 30 events per year including high level conferences, e-learning trainings and e-lab conferencing will be organized involving industry as appropriate;

- a project on technology transfer and promotion of industrial innovation focused on the multidisciplinary scope of the 14 research projects above will be carried out by Area Science Park for 100 advanced trainees (for an average of 10 months each);

- a number of knowledge intense NewCos (new companies) are expected as direct spin off of the foreseen research and technology transfer projects of the Programme.

In a first phase the CEI Secretariat, in coordination with the institutions belonging to the CEI Science and Technology Network, has identified over 200 potential partners (centres of excellence or other groups of advanced research in CEI Member Countries) which are ready to be proactively associated with the implementation of the CEI-PRAISE Programme. This does not mean that the participation to CEI-PRAISE will be limited to the above partners: on the contrary, it may be extended to other highly qualified partners during the next few years.

**Chart 1 – Share of the CEI-PRAISE Programme outcomes in total estimated cost**

- Fellowships in Trieste
- Scholarships in CEI Member Countries
- Grants for group leaders in home laboratories
- Support to CEI associate/partner centres in CEI Member Countries
- Support to CEI S&T Network for implementation of the research programmes in CEI Member Countries
- Collaborative learning and web-based trainings
- Contingencies
- Overall management and internal auditing
VI. Funding from a Variable Geometry of Instruments, Pilot Activities and Governance

As mentioned elsewhere in this document, it seems worth emphasising here that the CEI–PRAISE Programme intends to offer a unique framework of opportunities aimed at promoting Research, Technological Transfer and Innovation in all Member Countries of the Central European Initiative. At present this Programme is based upon the internationally recognized strengths of the institutions of excellence belonging to the CEI Network for Science and Technology which elaborated the proposals for projects with a broad disciplinary spectrum, combined with a consistent interdisciplinary approach. Furthermore the foreseen instruments and actions to implement this comprehensive approach are based upon several decades of specific experience of these institutions in the field of international scientific cooperation, supported by an impressive state of the art research infrastructure that they have collectively at their disposal and are ready to share with the scientific communities of the CEI Member Countries: this readiness being the result of their respective institutional mission and/or of their vocation.

The global cost of this Programme has been initially estimated in Euro 45 million over a period of seven years, coinciding with the EU financial programming period 2014-2020. This is also due to the consideration that a large part of the resources needed to implement this Programme are expected to come from different EU policies and programmes. However at the same time it can be expected that other sources of funding, which would complement EC funding, might be found at the international level (multilateral or bilateral funds, technical assistance by cooperation/development agencies), ad hoc memoranda of understanding or contracts, from national Governments or regional bodies within CEI Member Countries, from foundations or other donors (for instance, industry). The CEI-PRAISE Programme is meant to be implemented progressively and by segments, according to the resources available over the years: through the fundraising efforts of the CEI Secretariat combined with appropriate initiatives of the CEI Member Countries whose scientific communities are the final beneficiaries.

Variable geometry of financial instruments

In this context it must also be emphasized that, particularly as far as EU funding is concerned, the eligibility to this various instruments/funds depends for each CEI Member Country on its respective institutional status vis-a-vis the European Union. This naturally implies that the CEI-PRAISE Programme can only be implemented through a variable geometry taking into account the above differentiation and related eligibility. Obviously the same consideration applies to other, different sources of possible funding which may be tied by definition.

In view of a centralised management by CEI as the fundraiser and only implementing Agency is essential. This also greatly simplifies relevant expenditure and the appropriate (required) reporting, according to prevailing European Commission standards, especially in view of diversified monitoring and auditing requirements pertaining to different financial instruments. Obviously a privileged source of financial resources will be found in the framework of Horizon 2020, and as a matter of fact, CEI will submit one or more project proposals during the first semester of 2014, according to calls already published.

Examples of European Union instruments which are potentially relevant to the implementation of the CEI-PRAISE Programme

- The EU Cohesion Policy, which is financed by the Regional Fund, the Social Fund and Cohesion Fund, may significantly support the CEI Member Countries and regions in investing in research and innovation. To make sure that the funding of the regional cooperation in R&D activities is really efficient, CEI Member Countries already show keen attention to implement Smart
Specialisation Strategies for research and innovation. The EU Regional Policy is not totally new in supporting Science and Technology: widespread experience has been gained by regions in the field of innovation strategies. The Smart Specialisation Strategies are the key instrument to maximise these synergies with Horizon 2020. **Smart Specialisation** Strategies will guarantee that Cohesion Policy funds are invested more efficiently. In particular, they will avoid the duplication and fragmentation in regional support to research and innovation; synchronize different policies and funding programmes; provide a good mix of grants, financial instruments and other support measures, and leverage more private investment. Moreover it will give a more desirable (in coordinate policy terms) outcome from a more cost efficient approach.

- The CEI-PRAISE Programme is also fully in line with the requirements of the European Union **Instrument for Pre-accession Assistance** (IPA II) - and more specifically, its multi-beneficiary/regional dimension - for the eligible countries. The Programme will also facilitate the Regional R&D Strategy for Innovation and contribute significantly to the economic, social and cultural development of the region. This CEI-PRAISE Programme for promoting research and innovation through scientific excellence will take stock of and provide a multiplier effect to the outcomes of other similar programmes/projects.

- Similar considerations would obviously apply to the present situation and prospects in CEI Member Countries belonging to the Eastern Neighbourhood (Ukraine, Belarus and Moldova) through **European Neighbourhood Instrument** (ENI).

- Additionally, it should be noted that the CEI Secretariat has already established a line of communication with the **Regional Government of Friuli Venezia Giulia** to analyze the prospect of utilizing resources from EU Structural Funds available to the Region itself as a contribution to the implementation of CEI-PRAISE. In this context various possibilities concerning the proposed planning of the FVG Region considering the utilization of the EU Social Fund 2014/2020 are being considered. Similarly, opportunities of cross-border cooperation within the specific Programme between Italy, Austria, Croatia and Slovenia, have also been considered as they all include lines of action related to Research, Technological Transfer and Innovation.

It has already been emphasized that the complexity of the CEI-PRAISE Workplan combined with the necessity to proceed through a variable geometry of funding, implies the necessity of a single, centralised management for the Programme. In this context the existing inter-relationships between the scientific partner institutions belonging to the CEI Science and Technology Network, the previous positive experience for collaborating together within the implementation of the 7th Framework Programme and a strong managerial record related to 27 EC projects already successfully concluded and delivered or currently under implementation in several fields (See also Table 3 at page 26) confirm the **CEI Secretariat** as the ideal implementing Agency for the CEI-PRAISE Programme: furthermore, with CEI Secretariat as implementing Agency there is **no need to create a new and untested management structure for the implementation of the CEI-PRAISE Programme**.

**Pilot Activities**

It is to be noted that the CEI Secretariat is actively engaged in a fundraising effort aiming at providing the necessary resources to **support some pilot activities** for an early start of the CEI-PRAISE Programme. This fundraising role by the CEI Secretariat in fact is identified with the unique characteristics of the CEI-PRAISE with its intrinsic added value: no other subject could perform this role with same level of efficiency, in respect of European Commission and of the Governments of its Member Countries, in view of the solid reality represented by CEI Science and Technology Network as a whole. The **target** of this ongoing promotion should be **between two and four million Euro** for an initial phase of two/three years.
Without excluding other possibilities, two promising directions are being followed: on the one hand, the opportunities which will be offered through the implementation of the Operational Programme (POR) based on the allocation from the European Social Fund available to the Friuli Venezia Giulia Region; on the other hand the possible financial support according to the Instrument of Pre-Accession (Regional IPA 2). Additionally an exploration is being carried out focused of the European Neighbourhood Instrument (ENI) and the CEI Secretariat intends to submit a new proposal to support the mobility of researchers as soon as the relevant call of the Marie Skłodowska-Curie Programme is published during the current year, thus aiming at replicating the success of its previous CERES Project in the same context.

The resources which the CEI Secretariat will be able to raise will be utilized for some **pilot activities** which will be organized and managed on the basis of the CEI-PRAISE Programme with the same margins of **flexibility** and **step by step** criteria envisaged for the said Programme as a whole, and taking into account respective eligibilities as appropriate:

- **mapping** of centres of excellence and other groups of advanced research in CEI Member Countries matching with the disciplinary projects described in CEI-PRAISE and with the expertise of the CEI science and Technology Network;

- **integrating the CEI Network with the matching centers and groups** above, thus contributing to allow the scientific communities of the CEI Member Countries to establish their road maps and to facilitate their early participation to Horizon 2020 projects;

- **granting fellowships** to young scientists to be spent in the institutions of the CEI S&T Network (at least 15 candidates for 2 years) and **grants** to be spent in home institutions in CEI Countries to group leaders (at least 10 for 2 years) with the understanding that both categories of scientists will actively participate to the establishment of stronger ties between the institutions of the CEI S&T Network and the scientific communities in the respective CEI Member Countries;

- **promoting** the utilization of the scientific infrastructure available at the institutions of the CEI S&T Network by the fellows under advanced training in Trieste (and in Udine), so that they can disseminate the relevant opportunities in their home laboratories and, more in general, among the scientific communities of the respective Countries, also in view of the subsequent implementation phase of CEI-PRAISE Programme when more financial resources will be available for a full fledged operation;

- **creating a CEI-PRAISE portal** in support of all the activities described above and, more specifically, to make available instruments of e-learning pertaining to the projects included in the CEI-PRAISE Programme, in cooperation with the institutions of the CEI S&T Network (lectures, seminars, workshops, conferences, etc.) and available to the scientific countries of the CEI Member Countries;

- **organizing virtual laboratories** through the portal described above, progressively for each of the disciplinary projects included in the CEI-PRAISE Programme, in order to **extend the critical mass pertaining to each project**, also by directly involving the project leader(s) in digital laboratory meetings (through regular teleconferencing), thus creating **Regional Virtual Clusters**;

- **supporting high level scientific events** in CEI Member Countries and access to leading science literature.

All the pilot activities described above will contribute to facilitate an early participation in the Horizon 2020 programme of the **scientific communities** in CEI Member Countries.
- The **Project Committees** - coordinated by a Project Leader from a lead institution(s) of the CEI S&T Network – is a body composed of representatives, mostly participating scientists of centers/groups in CEI Member Countries. Its main task is to define, manage and coordinate the scientific activities of each project. It shall convene at least twice a year and remote conferencing will be utilised as often as possible.

- The **Advisory Committee** will support the overall implementation of CEI-PRAISE Programme: it shall meet once a year and be chaired by the CEI Secretary General or his/her Delegate:
  - CEI National Focal Points for Science and Technology;
  - representatives of CEI Science and Technology Network;
  - independent experts nominated by CEI upon proposals from the scientific community: they will also be asked to act separately from the Advisory Committee for scientific peer reviews which may be necessary.

- The **Executive Committee** - composed of maximum 7 members nominated for a two-year period by the Advisory Committee - shall ensure support to the actual management of activities.

- The **CEI Secretariat** is responsible for the overall management, fundraising and reporting of the Project.
### Table 2 – Participation of CEI Science and Technology Network to FP7

<table>
<thead>
<tr>
<th>INSTITUTION</th>
<th>SUBMITTED PROPOSALS</th>
<th>PROJECT FUNDED</th>
<th>SUCCESS RATE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Elettra Sincrotrone Trieste</td>
<td>109</td>
<td>20</td>
<td>18% (18.35%)</td>
</tr>
<tr>
<td>ICTP</td>
<td>66</td>
<td>15</td>
<td>23% (22.73%)</td>
</tr>
<tr>
<td>ICGEB</td>
<td>49</td>
<td>9</td>
<td>18% (18.37%)</td>
</tr>
<tr>
<td>SISSA</td>
<td>197</td>
<td>47</td>
<td>24% (23.86%)</td>
</tr>
<tr>
<td>OGS</td>
<td>80</td>
<td>29</td>
<td>36% (36.25%)</td>
</tr>
<tr>
<td>AREA SCIENCE PARK</td>
<td>33</td>
<td>7</td>
<td>21% (21.21%)</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>534</strong></td>
<td><strong>127</strong></td>
<td><strong>24% (23.78%)</strong></td>
</tr>
<tr>
<td>University of Trieste</td>
<td>356</td>
<td>36</td>
<td>10% (10.11%)</td>
</tr>
<tr>
<td>University of Udine</td>
<td>198</td>
<td>38</td>
<td>19% (19.19%)</td>
</tr>
<tr>
<td>IOM-CNR**</td>
<td>30</td>
<td>5 (+12)</td>
<td>17% (16.67%)</td>
</tr>
<tr>
<td><strong>GRAND TOTAL</strong></td>
<td><strong>1,118</strong></td>
<td><strong>206</strong></td>
<td><strong>18% (18.43%)</strong></td>
</tr>
</tbody>
</table>

* Total does not include Universities of Trieste and Udine which joined CEI S&T Network in 2014.
**IOM-CNR was established and incorporated by the National Research Council only in 2010 and these figures refers only to the subsequent years: in fact IOM is implementing 12 more projects which were “inherited” by the previous set up of TASK laboratory.

Source: EC DG Research and Innovation

### Table 3 - EU co-funded projects managed by the Central European Initiative in various fields*

<table>
<thead>
<tr>
<th></th>
<th>Realized projects</th>
<th>Ongoing projects</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of projects</td>
<td>14</td>
<td>13</td>
<td>27</td>
</tr>
<tr>
<td>CEI own investment</td>
<td>€ 280,000</td>
<td>€ 480,000</td>
<td>€ 760,000</td>
</tr>
<tr>
<td>Financial Resources managed by CEI</td>
<td>€ 3.8 million</td>
<td>€ 9.6 million</td>
<td>€ 13.4 million</td>
</tr>
<tr>
<td>Total Resources mobilized by projects</td>
<td>€ 16.3 million</td>
<td>€ 28.2 million</td>
<td>€ 44.5 million</td>
</tr>
<tr>
<td>Multiplier effect</td>
<td>58.2</td>
<td>58.8</td>
<td>58.6</td>
</tr>
</tbody>
</table>

27 projects proposed between 2011 and 2013, of which 12 already approved, success rate of 44.4%.

*Diversified areas of intervention: transport, energy, sustainable development, information society, SMEs, civil protection, cross-border cooperation, culture, higher education, science and technology.
Annex 1 - Profiles of the institutions belonging to the CEI Network for Science and Technology

The Central European Initiative is the oldest regional organization in Central, Eastern and South Eastern Europe and in the 25 years since its establishment, has shown a great capacity to adjust to the great changes which have taken place in this part of Europe. Thanks to its mission, namely **regional cooperation to facilitate European integration**, which is being carried out in several fields including **Science and Technology** (which represent one of the priorities of its Plan of Action), CEI contributes positively to bringing the candidates and potential candidates countries closer to their goal of shortening the path towards accession to the European Union whilst at the same time it is offering best terms of reinforcing relationships with Ukraine, Belarus and Moldova. In this context and according to mandate endorsed at the CEI Ministerial Meeting on Science and Technology of October 29th, 2013, CEI is promoting this programme that it intends to implement in cooperation with the Regional Cooperation Council (RCC) of Sarajevo as well as with the Governments of the interested countries and the European Commission (primarily, DG for Research and Innovation and DG for Joint Research Centre – JRC, but also other Directorates such as DG Enlargement, DG Regio and DG DG Dev.Co). All of these subjects together with representatives of the institutions belonging to the CEI Science and Technology Network as well as with the Members of CEI own group of national Focal Points for Science and Technology will be invited to participate to an **Advisory Committee**, which will provide expert guidance and monitoring to the CEI-PRAISE Programme on an ongoing basis.

In particular the institutions belonging to the CEI S&T Network in Trieste and the surrounding region will lead a **number of projects in disciplines in which their strength is recognized worldwide: they will provide the prime scientific responsibility for the implementation of the related projects according to their respective competences**. Each institution will be assisted by a Scientific Committee for each project with its (co) leadership. The scientific members of the Advisory Committee will also act separately and independently to provide appropriate scientific peer review to all activities. **The CEI Network includes:**

- **Elettra Sincrotrone Trieste** is multidisciplinary international laboratory of excellence, specialized in generating high quality synchrotron (Elettra) and free-electron laser (FERMI) light and applying it in materials science. The CEI Ministers for Science and Technology met in Trieste in 2011 and 2012 at the premises of Elettra and FERMI laboratories. They are committed to support the creation of a consortium according to the new EU legislation in this matter, called CERIC, which will enhance the participation of the CEI Member Countries to the activities carried out and liaise with laboratories to facilitate the access for its respective scientific communities. The main facilities of Elettra Sincrotrone Trieste are beamlines and experimental stations fed by two accelerator-based photon sources: a Free Electron Laser FEL (FERMI) and a third generation electron storage ring (Elettra). Several support laboratories are also available for sample preparation and development. The FEL is new (as it started its operation at the end of 2010) and it consists of two seeded FEL sources: the first one is presently under fine tuning, while the second one entered in the commissioning phase in 2012. The Elettra and FERMI beamlines cover a wide variety of experimental techniques and scientific fields, including photoemission and spectromicroscopy, crystallography, low-angle scattering, dichroic absorption spectroscopy, x-ray imaging etc. The present user communities range from materials science, surface science, solid-state chemistry, atomic and molecular physics, as well as biology and medicine.

- **IOM-CNR** – The Institute of Materials (IOM, Istituto Officina dei Materiali), recently established (February 2010) as an Institute of the National Research Council (CNR, Consiglio Nazionale delle Ricerche), stems from former groups and laboratories of INFM (Istituto Nazionale di Fisica della Materia, National Institute for Condensed Matter Physics) among which are the National
Laboratory TASC in Trieste, the Democritos Simulation Centre at Sissa in Trieste, the Operative Group in Grenoble (OGG). IOM pursues the objective of studying and developing innovative materials and devices at the micro- and nano-scale based on a complete set of tools and methodologies like theoretical modelling, atom-by-atom synthesis, fine analysis, materials and device functionalization. The research of the Institute focuses on fields such as hybrid materials (inorganic, organic, biologic), superconductivity, spintronics, energy conversion, sub-microscopic energy transportation and storage, DNA or proteins properties. Within the context of national and international initiatives, such as Open-Lab and NFFA (Nanoscience Foundries and Fine Analysis), IOM has given greater relevance and strength in promoting a closer involvement of the industrial sector in research and innovation at European level. The aforementioned initiatives aim at fostering shared use of premises and laboratories located in the vicinity of major research facilities and infrastructures by scientific research groups and industrial development actors. The IOM is in charge of managing most of the CNR activities operating in the context of Italian and European large scale research infrastructures in the field of matter characterization. The Institute operates six beamlines at the Elettra laboratory as well as two beamlines at the ILL neutron source, and an X-ray beamline at the ESRF synchrotron. The Institute relies also on electronic microscopy and scanning probe microscopy laboratories. Besides fine analysis of Matter, IOM activities include new materials synthesis based on atomic beam deposition, and the manufacturing of devices based on nano- and microfabrication. IOM also carries out atomic-level numerical modelling applied to materials, biologic systems and physics of highly correlated systems.

- **ICTP**, the Abdus Salam International Centre for Theoretical Physics, has been a driving force behind global efforts to advance scientific expertise in the developing world for almost 50 years. The Centre (a joint UNESCO-IAEA initiative) seeks to accomplish its mandate by providing scientists from developing countries with the continuing education and skills that they need to enjoy long and productive careers and recognizing excellence in physics and mathematics. ICTP has been a major force in limiting the scientific brain drain from the developing world and from Eastern Europe generally. This latter is a key issue in retention of skills required to develop S&T and thereby the wider economy in any area. Theoretical and computational research at ICTP takes advantage of a network of computational infrastructures which includes a 2,000-core, 30-teraflop local cluster, access to national and international HPC centers, and collaboration with SISSA on the installation of a 130-teraflop cluster. ICTP develops, maintains, and offers training on advanced software particularly in the areas of atomistic materials modelling and climate modelling. ICTP visitors are offered intensive hands-on training on the use of state-of-the-art computational models and are given access to the above facilities for training and research purposes. In addition, ICTP's programme of Conferences, Workshops and Schools attracts several thousand of scientists every year and offers a unique venue for the exchange of ideas and for the dissemination of scientific results to a qualified international audience.

- **ICGEB**, the International Centre for Genetic Engineering and Biotechnology, is an international, intergovernmental Organization conceived as a Centre of Excellence for research and training with special regard to the needs of the developing world. The Centre conducts innovative research in life sciences and strengthens the research capability of its 60 plus nation membership through training, funding programmes and advisory services. The ICGEB laboratories in Trieste: provide a scientific and educational environment of the highest international standards. Currently, 16 Research Groups, including over 200 people, of more than 25 different nationalities, are active in Trieste; the research programs include basic science projects, virology, environmental protection and remediation, biopharmaceuticals,
molecular genetics and regenerative medicine. Other Groups focus on projects in the fields of bacteriology and yeast genetics, protein structure and bioinformatics. Over 70 formal agreements and collaborations with industrial partners for training, transfer of technologies and patented licensing have been concluded in the past seven years. ICGEB with particular reference to its facility for automated High-Throughput Screening (HTS) for the identification of small drugs, siRNA and microRNA and its platform for advanced optical and fluorescent microscopy will provide a unique instrumentation open to utilisation by outside researchers. Similarly, the SISSA, ICTP and OGS have a consolidated expertise in handling extensive computing capacities and processing great quantities of data, with readiness to make the relevant results and their specialized libraries available also to external scientific partners.

- **SISSA**, the International School for Advanced Scientific Studies, was the first institution in Italy to promote post-graduate courses to achieve an internationally recognized Ph.D. degree. It is a Centre of Excellence in the Italian and European university context, with a strong international vocation. It encompasses around 65 professors, 100 post-docs and 245 Ph.D. students. Established as a high-level training school and as a centre for theoretical research in mathematics and physics, in the 1990s SISSA has broadened its interests to include new cutting-edge disciplines, such as cognitive neuroscience and neurobiology. Today its Ph.D. courses (in English language) provide new and innovative post-graduate curricula, and SISSA is considered as a reference model in the international scientific world, comparable few other research and teaching institutes worldwide in the field of mathematics, physics and neuroscience research.

- **OGS**, the Italian National Institute of Oceanography and Applied Geophysics, is an internationally oriented public research institution, developing its own mission in the European Research Area (ERA) and internationally, prioritizing basic and applied research fields of oceanography, geophysics, marine geology and experimental as well as explorative geophysics to prevent geological, environmental and climatic risks, as part of the overall framework of National Research Program and the strategic goals set forth by the European Union, with particular reference to Horizon 2020. Moreover, the OGS mission involves research and technological development and to contribute to an optimization in the energy resource utilisation. Infrastructure available at OGS include: the research vessel OGS Explora for research campaigns and service for companies operating offshore; an aircraft designed to research and service that enables to carry out missions aimed at acquisition of remotely sensed data (scanning laser, thermal, photo, hyperspectral) and direct samples of the atmospheric column for the determination of air quality (concentration CO2, particulate matter); an instrumented site for the experimental study of borehole and surface geophysics and of drilling with innovative tools; the National Oceanographic Data Centre for the storage, quality control and dissemination of marine data; the Antarctic Seismic Data Library System (SDLS), a dynamic library in which are kept and maintained the digital multichannel seismic reflection data acquired in Antarctica by all nations; the Seismic and bathy-morphological data processing and database where is stored and processed a large amount of geophysical data collected both through acquisition OGS campaigns, and through his collaborations or initiatives for sharing data, and also through the recovery, digitization and conformation of historical data and paper documents; the Seismic and Geodetic monitoring networks through which earthquakes and their possible consequences on the territory are being analyzed; the Multidisciplinary laboratories of physical oceanography, biochemistry, biology, for terrestrial and marine geology; the Oceanography and Seismometric centres for equipment which guarantees the highest quality of measurements according to international excellence standards; the collection of marine microorganisms both planktonic and benthic, unique in the national scene, used for eco-
physiological and biomolecular surveys for the determination of the vital cycle and the genetic characterization.

- The University of Trieste, founded in 1924, is a medium-sized university with a student population of approximately 20,000. It offers a wide range of degree programmes at bachelor, master and doctoral level as well as short vocational masters, advanced masters and specialisation programmes, most of which are in the medical area. Some degree programmes are taught in English. The University currently has ten departments: Economic, Business, Mathematical and Statistical Sciences; Engineering and Architecture; Humanities; Legal, Language, Interpreting and Translation Studies; Mathematics and Geosciences; Medicine, Surgery and Health Sciences; Life Sciences; Pharmaceutical and Chemical Sciences; Physics; Political and Social Sciences. The University is involved in a variety of student and staff exchange programmes with other universities in the EU and collaborates with several universities from Eastern Europe and other non-EU countries. It also participates in many research projects at national, European and international level. University of Trieste, relies on dedicated facilities of its departments, which embraces, synergistically, biotechnology, chemistry and engineering. In house micro pilot facilities are available for biomass conversion and biofuels production. For instance, research laboratories have consolidated experience in bio-catalytic processes and biodiesel synthesis. Spectroscopic instruments (NMR 500, 400, and 270 MHz, Mass-spec, Diffractometer, CD, IR, Raman, UV-Vis) as well as reactors and micro-pilot plants, together with comprehensive analytical facilities, allow full process design and analysis, including monitoring, optimization and full characterization of bio-fuels. In addition, anaerobic digestion is investigated on laboratory batch plants as well as on continuous a pilot scale reactor. Laboratories of the University of Trieste are equipped with instrumentation for the bottom-up synthesis of nanomaterials and their characterization. Beside the already described instruments, TGA, AFM, STM, DSC, Flow-Field Flow Fractionation, UV-VIS-NIR Spectrophotometer, RAMAN, Fluorescent spectroscopy instruments, GC instruments, TEM, SEM, Nanosight, ICP-Atomic Absorption, confocal microscopy are available. Moreover, MOSE lab are equipped with state-of-the-art computational facilities.

- The University of Udine is also an Italian Public University founded in 1978 with a student population of more than 16,000. The University vaunts one of the highest Italian percentages of students participating to the Erasmus programme. Research activity is performed within 14 Departments and 8 interdepartmental centres focused on a considerable number of fields, such as: ICT, mathematics, energy and environmental technologies, electronics, telecommunication systems, civil and management engineering, food technologies, agronomy, biomedical and clinical studies, genomics, chemistry, physics. It is actively engaged in a wide range of research activities in co-operation with other universities and research institutes at both national and international level and is leader of research projects developed by the Central Eastern European University Network (Ceeun). UNIUD hosts Flow Cytometry, Cell sorter, Cellular Imaging and confocal microscopic analysis core facilities in use by groups involved in cancer and chronic diseases research; a proteomic facility with mass spectrometry, circular dichroism, analytical and micro-analytical high performance liquid chromatography (HPLC) as well as NMR for protein structure analysis and service for peptides synthesis. In addition UNIUD hosts and will offer a complete lab for analysis and measurement of the metabolic metabolism during human exercises. Furthermore, referring to carbon dynamics and functional genomics studies, the following instrumentation is available: DNA Sequencers, Realtime and classical PCR machines; DNA/RNA and protein electrophoresis systems; Radiochemical laboratory with liquid-scintillation counter; HPLC, HPLC-MS; ICP-OES spectrophotometer; C,H,N elemental Analyzer; Phytotrons and greenhouses to grow plants under controlled conditions.

- AREA Science Park, a national benchmark for transfer of technology and the promotion of
innovation is a prestigious multi-sectoral Science and Technology Park where research, development and innovation have provided significant steps forward. AREA provides support services for the development of activities based upon knowledge management and technology transfer. It also plays an intermediary role within the engagement in commercialization efforts and partnerships. AREA has a long-standing experience of fruitful collaboration with partners from Eastern Europe in the framework of EU-funded projects involving innovation stakeholders and economic operators, aiming at supporting the development of regional innovation systems, increasing business competitiveness by means of technology and know-how transfer and exchanging innovation management tools and techniques.

As already mentioned above, the main objective of the CEI Science and Technology Network in the CEI-PRAISE Programme will be to enhance centres of excellence and other advanced research groups in CEI Member Countries which are the real beneficiaries of CEI-PRAISE Programme. They will be identified and linked to the respective centres/programmes of the CEI S&T Network in Trieste, through a selection based upon previous experience and in cooperation with the relevant Governments, through CEI National Coordinators and CEI National Focal Points for Science and Technology.

Appropriate opportunities, joint activities and funding available in the framework of CEI-PRAISE Programme to selected centres of excellence and other advanced research groups in CEI Member Countries will support the diffusion of scientific knowledge and transfer of science and technology in order to stimulate the setting up of R&D innovation initiatives. Transfer of knowledge will involve a training-of-trainers, curriculum development and awareness-raising (list is not exhaustive), activities as well as institutional development at country level. A massive utilization of instruments such as digital portal, video conferencing, and other information/communication technology (ICT) tools in the Framework of CEI-PRAISE Programme will provide an enhanced impact through consistent multiplier effect.

Through this programme, CEI will support scientific and technological development in its Member Countries and will forge collaboration and exchange of knowledge by organizing a number of S&T activities such as fellowships, scholarships, short-term exchange of experts, on-the-job training and conferences. In the framework of each scientific project the CEI-PRAISE Programme will also contribute to national development by promoting Science and Technology through active participation of scientists and researchers who have demonstrated professional excellence in their respective fields. The Programme will enhance the reserve/resource of skilled and experienced researchers, innovators and others in the countries. The CEI-PRAISE Programme combines two-way exchange of excellence in Science and Technology between the CEI Network of Centres in Trieste and a selected number of centres of excellence in CEI Member Countries. The project will strongly support the trans-national mobility of scientists and researchers to carry out their research tasks in one of the CEI S&T Network’s Institutions in the region of Trieste as well as training opportunities for representatives of research and intermediary organisations in charge of technology transfer, research exploitation activities and support to start-ups and spin-offs. Furthermore, grants will be provided to group leaders to be spent at their home centres of excellence in CEI Member Countries. This approach will certainly support the decision of young scientists to remain in their centres/home countries. It will further improve the impact of S&T on institutional capacity development, economic growth and job creation in the region. It will also strengthen international collaboration with the scientific institutions, universities, laboratories, regional centers of excellence in selected fields, technology transfer facilities, etc., and ensure enhanced integration into the global scientific community.

Annex 2 - Description of each research line/scientific project to be implemented in the framework of the CEI-PRAISE Programme in connection with the current activities of the institutions of CEI S&T Network which will lead each project
1) Synchrotron radiation and free electron lasers to develop innovative materials, including new technologies on the conservation of cultural heritage at Elettra/FERMI in collaboration with IOM-CNR

Background

The international research centre Elettra Sincrotrone Trieste provides the research community with unique tools to conduct state-of-the-art experiments ranging over a broad spectrum of scientific disciplines. Elettra is a third-generation synchrotron facility that produces electromagnetic radiation ten billions times brighter than the one generated by conventional sources. It gives access to advanced spectroscopic and imaging techniques to users both from academic institutions and industries. FERMI, the next generation light source based on a free electron laser accelerator, is ready to open unprecedented opportunities in science, providing the brightest probe to look at ultrafast processes in the matter.

Both accelerators can provide state-of-the-art instrumentation and methods for the development and characterization of innovative materials.

IOM runs six of the Elettra beamlines specialized in fine analysis of magnetic, hybrid, superconducting and other novel materials. Moreover it can offer access to advanced microscopy laboratories like TEM (reaching record spatial resolution), LT-STM VT-STM and nano- and micro-fabrication facilities. Also available are various systems for the growth of semiconductors and complex oxides with Molecular Beam techniques and carbon nano-materials by Chemical Vapor Deposition.

Current activities

Elettra and IOM have one of the most extensive programs in X-ray electron spectroscopy (XPS), X-ray microscopy and X-ray imaging in Europe, electron and scanning probe microscopies. The expertise and achievements in X-ray spectroscopy and microscopy have been worldwide recognized. Synchrotron radiation methods give insights in the study of the structural, electronic, chemical, and magnetic properties of materials, nanostructures, surfaces and interfaces, finding application in diverse fields such as catalysis and magnetism, thin-film growth and many domains of materials science. Thanks to the broad electromagnetic spectrum provided by the storage ring FTIR spectro-microscopy is also available for biological and material science applications in extreme conditions as well. One of the priority topics at several Elettra beamlines concerns the investigation and characterization of innovative materials for fuel cell, catalysis and superconductor applications. The know-how acquired at Elettra on new technologies can also be transferred to the study of ancient objects, such as glasses from Gothic Cathedrals, ancient musical instruments, human finds, inks. The new FERMI accelerator that has already been open to external users could provide insightful information on ultrafast processes happening in the matter, providing information not yet available with other techniques.

Specific activities foreseen in the context of CEI-PRAISE

This Project will be able to connect and favor activities among participating laboratories located in CEI Member Countries specifically in fields related to innovative materials with the extension to new technologies for the conservation of cultural heritage. For these studies, Elettra/FERMI and IOM will provide and further develop advanced methods and instrumentations to perform state-of-the-art and innovative experiments in the field of innovative materials for applications in spintronics, energy harvesting, biomedicine.

2) Molecular and structural biology tools including microscopic and 3-D analysis at Elettra/FERMI

Background
Structural biology is an interdisciplinary research area, requiring expertise from both the life sciences and the physical sciences. Macromolecular bio-crystallography is used to determine the atomic structure of proteins, as well as biochemical and biophysical approaches to understand how they work. Crystallographic studies are complemented by the concomitant use of electron microscopy to visualize the architecture of large complexes and/or small-angle X-ray scattering (SAXS) to obtain additional structural information. The variety of complementary techniques presently available for structural biology at a synchrotron radiation source offers a working-pipeline that allows to dissect biological complexity going from the overall shape to the atomic details of the cell.

Current activities

At Elettra, molecular and structural biology tools are applied to study the basic genetic processes within the cell by characterizing the fine molecular and atomic details of proteins and of bio-macromolecular complexes. A new structural biology laboratory has been established at Elettra to provide state-of-the-art facilities to the structural biology community, and to all those scientists that study structural aspects of biomolecules to develop innovative solutions to research. The laboratory is set up for high-throughput cloning, large-scale purification and crystallization of recombinant proteins, as well as their biophysical and biochemical characterisation. The laboratory works in synergy with the X-ray diffraction beam lines given that the final goal of most of the projects is the determination of their atomic structures using macromolecular crystallography. Moreover, the samples are also applied to other structural and biophysical studies that profit of the many experimental techniques available at Elettra, such as small angle scattering (SAXS), atomic force microscopy (AFM), infrared micro-spectroscopy (IRSM) and X-ray microscopy.

Specific activities foreseen in the context of CEI-PRAISE

This Project will coordinate activities, carried out in the participating laboratories located in CEI Member Countries that are specifically related to biological and biomedical issues that will require structural biology tools to find a solution. More precisely, Elettra will provide expertise, technologies and sophisticated instrumentations to support structural biology projects, going from structural based drug design to 3-D analysis of macromolecular machines. The research activities will be tailored accordingly to the biological questions that will be posed. A great number of different solutions will be offered ranking from preparation of suitable samples for the desired experimental set up, to the investigation of macromolecular systems in single cell unit by means micro-spectroscopy, microscopy as well as molecular imaging.

The fine comprehension of the molecular structure mechanisms in the cells will give to the CEI-PRAISE project the opportunity to develop new tools to improve healthiness and general wellbeing.

3) Environment protection modelling and climate change at ICTP in collaboration with OGS

Background

European decision-makers as well as the general public need detailed information on future climate to
quantify the risks of a changing climate due to the anthropogenic emission of greenhouse gases. This is absolutely essential to formulate and implement realistic adaptation and mitigation strategies.

Atmosphere-ocean coupled General Circulation Models (AOGCMs) are the widely used tools in simulating present climate and conduct sensitivity experiments. In particular, it is the primary tools used for climate change projections. However, due to limited computer capabilities, the resolution of present day AOGCMs is usually not high enough to represent the details of coastline, small scale topography, surface characteristics and other local forcing. This is a major drawback for the community impact modelers that are typically asking for much higher resolution climate model output to be feed inside the impact models.

Current activities

ICTP is one of the leading European institutes in the research field of regional climate modelling. The institute is involved and has been involved in many FP6 and FP7 EU projects (PRUDENCE, ENSEMBLE, CECILIA, WATCH, ACQWA, MEDCLIVAR) focused on climate change with the aim of quantifying the impact of climate change at regional scale. The ICTP Regional climate model RegCM is effectively employed by scientists in several countries of Central and Eastern Europe to carry out regional climate-change studies.

OGS has a strong and consolidate expertise in the field of Modelling of Marine Ecosystems, with particular reference to the Mediterranean Basin and the Mediterranean regional seas. This includes experience on assessing and predicting effects of climate change on physic, biogeochemistry and ecosystem dynamics, both at the regional and local scale. It also includes research to assess the impacts of a variety of anthropogenic activities on marine ecosystems, and the identification of possible mitigation policies.

Specific activities foreseen in the context of CEI-PRAISE

At the beginning of 90's countries of the former Eastern Bloc started to have access to data and information related to climate change. Through cooperation promoted by the US Country Study Program many countries from the former Eastern Bloc obtained access to global climate-change scenarios and longer series of global climatological data. However a prerequisite for the identification of effective mitigation policies is the capability to understand, assess and predict the cumulative impacts of climate change and anthropogenic pressures on ecosystems at the regional and local scale. This Project will focus on the coordination of activities in the area of climate-change prediction at the regional level, with the ultimate goal of assessing the impact of climate change on agriculture, forestry, water management and health.

4) Condensed matter physics, advanced materials and photonics at ICTP in collaboration with SISSA

Background
A deep understanding of the complexities underlying the behaviour of matter, of light, and of their interaction, is at the heart of many recent technological developments. Fundamental concepts in condensed matter physics, such as superconductivity, electronic structure, mechanical and optical properties, are instrumental in order to harness the potential offered by new materials for practical applications, such as graphene. New functional materials are at the core of many exciting developments in recent years: ranging from the production of renewable energy to better computer displays or data storage, so-called functional materials offer the promise to drastically improve many aspects of life with evident economic benefits.

Basic condensed matter physics, nanotechnology and computer simulations are playing hand-in-hand in the design, understanding and improvement of such materials. Similarly, the ability to manipulate light at wave length scales, or photonics, is an enabling technology that drives the pace of technological development that impacts every corner of the world from communications and optical sensing to medical diagnostics, security, solar, and less-polluting technologies. Photonic devices have an excellent potential to provide the basics for wealth creation and reducing the gap between the world regions at different stages of development.

Current activities

The ICTP and SISSA Condensed Matter sections carry out research in disordered and strongly correlated systems, high-temperature superconductivity, theoretical nanophysics, localization, quantum systems out of equilibrium, low-dimensional systems, cold bosonic and fermionic atoms. In addition, the sections have a strong focus also on computational approaches to electronic structure and atomistic simulations, with applications to high pressures, new materials, ab-initio calculations of properties of nano- and bio-systems, catalysis and surface physics, simulations of fast processes of energy transfer, energy conversion and storage research, and physics of friction and lubrication. ICTP also runs an Optics and Laser Physics lab. The laboratory is located within the Synchrotron Light Facility Elettra, in Trieste. Its main research lines are the applications of femtosecond lasers to free electron laser development, the physics and applications of short pulse lasers, and the diagnostics of VUV and soft X-ray light pulses.

Specific activities foreseen in the context of CEI-PRAISE

This Project will coordinate activities at ICTP, SISSA, and at partner institutes in CEI member countries in the area of condensed matter physics, advanced materials and photonics. Activities will include scientific visits of scientists from CEI countries to ICTP and SISSA, participation in ICTP workshops and training events, as well as research collaboration between the ICTP and SISSA research groups and selected teams based in CEI countries.

5) Biotechnologies for food and energy at ICGEB

Background

Meeting the food and energy needs of a growing population and overcoming nutritional deficiencies are prime considerations in the immediate future. Agrobiotechnology can provide solutions to the growing
demands of food as for example the generation of resistant plants that improve yields and use less synthetic pesticides, plants that are tolerant to cold, drought or salt, and staples with improved nutritional profiles. However a significant part of the food crop is still destroyed yearly due to attack by insects, fungi, bacteria, and nematodes. The climate changes which are constantly and now commonly occurring are responsible for laying the conditions for novel epidemics which require novel ways to control and/or prevent. Currently the major strategies to fight/control plant pathogens are chemical pesticides or resistant plant cultivars. However, these strategies present limitations as do not prevent/control all diseases, and toxic residues can accumulate in the soil and food chain and resistance of genetically resistant cultivars is often overcome by the pathogen within a few years. Biopesticides and bioinoculants derived from natural materials such as bacteria is still considered a niche sector in the overall global pesticide and agro-fertilizer market. It is expected however that the share of the market bioinoculants will increase at an annual average growth rate of approximately 10% over the next three years. Another aspect that also requires considerable research efforts is the proper utilization of agriculture waste biomass. The conversion into easily utilizable carbon sources for fermentation processes resulting in the production of biofuels is a potential way.

Current activities

Over the last several years, the ICGEB has developed advanced investigations in the fields of agrobiotechnology studying several emerging bacterial diseases as well as studying the communication and dynamics within a bacterial plant associated community. In addition expertise has been recently developed in the isolation and characterization of novel bacterial isolates associated with plants which either (i) have biocontrol and biofertilizer properties and (ii) which have enzyme activities which can be applied to conversion of waste biomass into carbon sources utilizable for fermentation processes. ICGEB has also in place the technologies for the investigation of large scale production of bacteria via fermentation.

Specific activities foreseen in the context of CEI-PRAISE

This Project will allow the expansion and the commencement of new activities as well as participating laboratories located in CEI Member Countries that are specifically related to isolation and development of bacteria as bioinoculants and for the transformation of waste biomass into utilizable carbon and nitrogen sources for fermentation processes. Efforts will focus in the identification and characterization of bacteria and/or enzyme activities applicable to the use in agriculture as biostimulants and biocontrol agents as well as sources for the transformation of waste agricultural biomass. The major goal of CEI-PRAISE will be the development of innovative strategies for the identification and use of bacteria as plant growth promoters and for the conversion of non-utilizable waste-based biomass into valuable by-products.

6) Regenerative medicine, with specific reference to cardiovascular and neurodegenerative disorders at ICGEB in collaboration with SISSA

Background
A foremost health problem stems from the burden of degenerative diseases, including heart failure and neurodegeneration. Currently, in Europe, there are 6.5 million people with heart failure. The prognosis of this condition remains very poor, with mortality estimated at 40% of patients at 4 years from diagnosis; no new classes of drugs against heart failure have been introduced since the mid 90s. Similar considerations also apply to several neurodegenerative conditions. In particular, with the lengthening of lifespan, the incidence of central nervous system diseases has significantly increased, in particular those characterized by a gradual decline in neurological function and progressive neuronal death. In Europe, about 40% of people over 80 years of age develop Alzheimer's disease, and 1-3% of those over 65 years of age develop Parkinson's disease. Another devastating neurodegenerative disorder is amyotrophic lateral sclerosis, which leads to progressive motor neurodegeneration in mid-life patients, with a life expectancy shorter than 3 years from the time of disease onset. Also for these conditions successful treatment strategies are still limited.

Current activities

Over the last several years, the ICGEB has developed advanced investigations in the fields of cardiovascular and neurodegenerative conditions, with particular reference to the development of novel therapeutic strategies. The ICGEB has developed high throughput screening techniques for the identification of novel compounds (small molecules, siRNAs, microRNAs, cDNAs, chemical compounds from natural sources) that might be developed towards human therapeutic applications. The ICGEB has also developed international expertise in the application of advanced technologies for gene transfer in small animal models of human disease. Particular attention is paid to the development of innovative technologies to promote cardiac and neuronal regeneration, either through stem cell-based applications or by promoting tissue repair by already differentiated, adult cells.

Specific activities foreseen in the context of CEI-PRAISE

This Project will coordinate activities, carried out in the participating laboratories located in CEI Member Countries that are specifically related to biological and therapeutic issues in the cardiovascular and neurodegeneration fields. In particular, the Project will bridge collaborative efforts in understanding the molecular correlates of heart failure after myocardial infarction and of neuronal loss in animal models of Alzheimer's disease and other dementias. For these studies, ICGEB and SISSA will render available advanced technologies and instrumentation to perform laboratory and animal research, including instrumentation for cardiovascular surgery and monitoring of cardiac function and for the study of the neurological function in animal models and humans.

Based on the understanding of the molecular causes of cardiac and neurological degeneration, a major goal of CEI-PRAISE will be the development of innovative therapies based on biotechnological drugs, including genes, regulatory RNAs, recombinant factors and stem cells.

7) Cognitive neuroscience at SISSA

Background

The group of Cognitive Neuroscience in SISSA has a long-term experience in pursuing and coordinating
state-of-the-art research and didactical interdisciplinary activities at the interface of psychology, physiology and neurology. The active expertise of the members of this group covers topics that range from fundamental research to applicative ramifications and include the study of the relationship between the cognitive system and the brain of humans and rodents. To date particular interest has been devoted to the understanding of the neural mechanisms underlying memory, language, perception, decision making and motor control. In addition to these traditional domains, two new research programs have recently been launched. The first focuses on how the human brain perceives and categorizes foods; the second is concerned with characterizing the neural mechanisms that are involved in human interactions.

Current activities

The group coordinates a Ph.D. program in "Cognitive Neuroscience" which trains young researchers in the most advanced theoretical and experimental methods in cognitive neuroscience, including neural networks (i.e., mathematically-based models of brain systems), neurophysiology (i.e. single cell recording), neuroimaging (i.e., functional Magnetic Resonance Imaging, Transcranial Magnetic Stimulation and Electroencephalography) and neuropsychology (i.e., the study of brain damaged patients). The Ph.D. program has a very high degree of internationalization, with more than one third of the foreign students being enrolled. Indeed, the broad international appeal of the PhD program is underscored by the fact that each year it gathers about 50 applications from foreign students. Most of them are from outside the Western EU countries and a good number of them are from the countries addressed by this initiative (including Turkey, Croatia, Hungary and Serbia). In addition, we are run an international summer school in social cognitive neuroscience that takes place in the summer and lasts two weeks, and it is open to Ph.D. students and postdoctoral fellows from around the world. During this period, well-established experts of this field give theoretical lectures in the mornings, while junior scientists deliver practical seminars in the afternoons on cutting-edge methods in social cognitive neuroscience.

Specific activities foreseen in the context of CEI-PRAISE

This Project the "Cognitive Neuroscience" group aims at developing more the existing collaborations with research groups located in CEI Member Countries. In particular, we are willing to promote and foster the training and exchange of young researchers from CEI Member Countries in the areas of research mentioned above.

8) Computational and theoretical biology at SISSA

Background

Theoretical approaches in molecular biology, biochemistry, and life sciences in general, are becoming
more and more useful also in practical applications and in several cases their predictive power has become comparable to the one of experiments. For example, docking and virtual screening algorithms allow checking the activity of hundreds of thousands of compounds in a relatively short time and with an enormous reduction of costs with respect to in vitro screening. Atomistic molecular dynamics and coarse-grained models have been fine-tuned during three decades of work by thousands of researchers and are now capable of reproducing with amazing detail the behavior of proteins, nucleic acids, and basically any possible biomolecule.

However, enormous problems still remain to be addressed. For example, atomistic molecular dynamics can nowadays access at most the microsecond time scale, while several interesting phenomena (e.g. the folding of proteins and nucleic acids and the formation of a drug-protein complexes) usually take a much longer time to happen. This poses a severe but extremely rewarding challenge to theoreticians, that are nowadays fighting to push the frontier of theoretical biophysics and biochemistry further and further, with the final goal of providing a predictive and quantitative "theory of life".

Current activities

The Molecular and Statistical Biophysics group in SISSA has a long term experience in pursuing and coordinating state-of-the-art research and didactical interdisciplinary activities at the interface of Physics, Chemistry and Biology. The active expertise of the members of the group covers topics that range from fundamental research to applicative ramifications and include the study of the kinetics, thermodynamics and mechanics of proteins, nucleic acids and macromolecular assemblies relevant in systems biology. The distinctive trait of the group activity is to be at the forefront of the development of advanced algorithmic and computational techniques for the quantitative characterization of the above-mentioned biomolecular systems.

The group also coordinates the Ph.D. programme in "Physics and Chemistry of Biological Systems" which trains young researchers that are well versed in the most advanced theoretical and numerical strategies available for characterizing biomolecular systems. The latter include: advanced sampling and thermodynamic reweighting techniques, multi-scale modelling, bioinformatics.

Specific activities foreseen in the context of CEI-PRAISE

Within this Project SISSA plans to start collaborations with research groups located in CEI Member Countries specifically working on molecular and statistical biophysics by computer simulations or other theoretical approaches. In particular, SISSA plans to (i) start a project aimed at developing a computational protocol for predicting the binding pathway of metabolites to membrane proteins (ii) characterizing the formation of entanglement such as knots and links in dense biomolecular systems and addressing the implications for biological functionality (iii) describing the folding and kinetic properties of nucleic acids inside the nuclei of eukaryotic cells, with a special focus on their relationship to genomes behavior (iv) apply molecular dynamics and enhanced sampling techniques to the folding of small RNA and DNA molecules.

9) Applied mathematics at SISSA

Background

In recent years, Mathematics has been increasingly recognized as a strategic tool for innovation both in
basic sciences ("Mathematics is Biology's next microscope; Biology is Mathematics' next Physics", J.E. Cohen, PLOS Biology, 2004) and in industry. With the aim of contributing to this trend, SISSA has recently established MathLab, a new research center on mathematical modeling and scientific computing dedicated to the interaction of mathematics with its applications. Besides promoting cutting edge cross-disciplinary research on the modeling of advanced materials, of biological processes and cellular systems, on algorithms for complexity reduction and uncertainty quantification, SISSA MathLab is involved in applied research commissioned by industry and acts as a partner for companies wishing to exploit mathematics as a driver for innovation.

Current activities

Among the research projects that are currently being pursued, the following may be cited: (i) multiscale modeling of the motility of unicellular swimmers and crawling cells, resolving the motion and shape changes occurring at the global scale of the entire cell in terms of the microscopic mechanisms and motors; (ii) reduced basis methods for the numerical solution of parametrized partial differential equations allowing for parametric analysis, shape optimization, quantification of uncertainty, and real time solution of problems arising in engineering and life sciences; (iii) modeling of soft active materials for innovative biomedical applications. These activities are being pursued also in collaboration with other partners of the PRAISE project, such as OGS.

Among the topics that are being currently pursued with industrial partners, the following may be cited: (i) process and product innovation in naval architecture: quantitative comparison and design optimization of alternative designs through the application of reduced basis methods to computational fluid dynamics simulations; (iii) process innovation in mechanical engineering and naval architecture: cost and price estimation in the pre-design and offering stages based on statistical analysis of the database of previous designs. These activities are being pursued also in collaboration with other partners of the PRAISE project, such as the Universities of Trieste and Udine.

Specific activities foreseen in the context of CEI-PRAISE

Within this Project SISSA plans to start collaborations with research groups located in CEI Member Countries, based on the identification of some concrete and focused themes for collaborative research, and to offer them access to a broad network of international collaborators, including Politecnico di Milano and EPFL. In particular, SISSA plans to (i) start a new project on multiscale modeling of crawling cell motility, bridging the molecular scale of adhesion receptors and of the contractile acto-myosin cytoskeleton to motion and shape changes occurring at the global scale of the entire cell (ii) develop an open source platform for numerical simulation and visualization in Computational Fluid Dynamics oriented towards use in the industrial context of Ship Hydrodynamics and Naval Architecture.

10) Secure energy at OGS

Background

In line with Horizon 2020, one of the major challenges of European society is represented by an efficient, safe and sustainable Energy. In particular, priority themes are the "Supply of electricity at low cost and
low emission," which includes the "development of new competitive and environmentally safe technologies for the capture, transport and storage of CO2" and the "development of hydropower, geothermal, marine and other options in renewable energy."

The research and development on energy resources has a great socio-economic impact as they fit well within the community strategies to respond to the great challenges of climate and energy that Europe intends to pursue in the future, particularly for the achievement of a Low-Carbon Economy in the year 2050.

Research in the field of secure and sustainable Energy further represents an opportunity to promote and exchange the knowledge on the physics of underground fluids in the development of policies and legislative frameworks regarding emerging energy applications, sometimes controversial, in areas outside Europe (shale gas, methane hydrates, gas storage).

Current activities

OGS is a member of two EERA (European Energy Research Alliance) Joint Programms: "Carbon Capturing and Storage" and "Geothermal". Furthermore, OGS was recently funded by the Italian Ministry of Education the multi-centre pan-European infrastructure European Carbon dioxide Capture and Storage Laboratory Infrastructure (ECCSEL), which connects the best laboratories in Europe engaged in research on the geological storage of carbon dioxide (included in the ESFRI roadmap). OGS has a prominent role in CO2GeoNet (The European Network of Excellence on the CO2 Geological Storage), European Network of Excellence that brings together foreign institutions engaged in the study of geological sequestration of CO2.

Furthermore, OGS undertakes technological research at national and international levels aiming at the selection and characterization of potential storage sites, the construction of 3D models for assessing the behavior of the injected CO2, the monitoring of activities of injection and corrective measures, and the monitoring of natural sites of storage of natural gas.

With its activities OGS fits well within the community strategies to respond to the great challenges of climate and energy that Europe intends to pursue in the future, particularly for the achievement of a Low-Carbon Economy in the year 2050.

Specific activities foreseen in the context of CEI-PRAISE

OGS research will contribute to strengthen innovation capabilities and to establish strong networking links among Research Centers in the targeted countries, accompanied by the aim of developing technological transfer actions. The objective is to promote the role of public institutions as reference scientific parties at national and international level in secure and sustainable Energy issues. This matter is often highly debated and implies the engagement of the citizen through the public perception. Specific research will be performed addressing temporary gas storage in geological formations, CO2 geological storage, full exploitation of high and low enthalpy geothermal fields, evaluation of the related potential environmental impacts, non-conventional hydrocarbons, energy efficiency of buildings.

11) Nanotechnology and nanomedicine at University of Trieste

Background

Nanotechnology has a long tradition at the University of Trieste with the National Center of Excellence for Nanostructured Materials and Surfaces (CENMAT) and the presence of excellent research groups. Activities are strongly connected with the PhD school of Nanotechnology, active since 2006. Three
research areas have been selected, strategic for networking within the Horizon 2020, in which the expertise of the research teams may be exploited and synergistically grow in collaborations with other partners of the CEI-PRAISE: i) Nanotechnology for sustainability; ii) Theory, Modeling, and Simulation; iii) Nanobiosystems, Medicine and Health.

Current activities

**Nanotechnology for sustainability:** Current activities are focused on: i) development of nanostructured catalysts for hydrogen production and purification. In particular, stable and active embedded catalysts using Rh, Au, Pd have been prepared for: partial oxidation and steam reforming of methane, ethanol and methanol steam reforming, and preferential oxidation and water gas shift reaction; ii) design and synthesis of carbon nanomaterials as support for molecular and nanostructured catalysts; in particular the research is focused on photocatalysis and electrocatalysis.

**Theory, Modeling, and Simulation.** Research activities are focused on: i) molecular modeling in the field of life science including: techniques and methods for drug design, for virus inhibition and development of new molecular assembly for the bioscience, the development of new drugs, the understanding of physical chemistry and thermodynamics in physiological processes; ii) multiscale molecular modeling in the field of material science, spanning from quantum mechanics to micro finite elements.

**Nanobiosystems, Medicine and Health.** The research activities of several research groups are concentrated on: imaging tools, theranostics, targeted therapy and drug delivery systems as well the use of nano-enabled material surfaces for tissue engineering.

Specific activities foreseen in the context of CEI-PRAISE

**Nanotechnology for sustainability.** Energy production and catalysis by nanostructured materials. Innovative solutions will be developed for: i) new nanostructured economical catalyst materials for implementation of photo- and photoelectrocatalysis for sustainable energy production; ii) nanostructuring materials for fuel cells and improved membrane materials and configuration, nature and structure of the catalyst; iii) nanostructured materials for improved lighting efficiency.

**Theory, Modeling, and Simulation.** Effort will be devoted to predictive simulation which has the potential to greatly accelerate research and development in fields such as catalysis design and drug discovery and to the design of nanomaterials. To this aim support teams are needed that couple application developers with computational experts and couple industry with academia.

**Nanobiosystems, Medicine and Health.** Collaborative efforts between different groups will be focused on development of new nanotechnological approaches for: i) innovative devices and therapeutic protocols based on the nanomechanical response of biomolecular nanostructures; ii) neural tissue engineering; iii) nanoengineered biomaterials for tissue engineering. Our approach comprises the design of new drug delivery systems that will target and protect drugs during their delivery, and nanosystems to monitoring the disease and the effectiveness of the administered drugs. A special aspect that will be considered is the cost of the nanomaterials and nanotechnological approach. Collaboration with CEI partners may enable to face an imperative issue that is the reliable production of high-quality nanomaterials and their characterization. A main activity to the development of nanotechnology in CE will be education and training of new generation of scientists and engineers skilled in multidisciplinary science is a priority. The inter- and multidisciplinary environment will constitute an unprecedented opportunity for researchers.

**12) Advanced biofuels and integrated Biorefineries at University of Trieste**

**Background**

Biorefineries are integrated processing facilities that extract carbohydrates, oils, lignin, and other materials from biomass. Integrating the production of higher-value chemical/material co-products into the biorefinery’s fuel and power output improves the overall profitability. Moreover, the coupling of
biotransformations and chemical reactions represents a route for producing chemicals and biofuels at lower cost. Enhancing the range of types of biomass for use in second generation biorefineries, are expected to avoid food/fuel conflicts and support sustainable economic development. The implementation of bio-based methods for the production of aromatics chemicals and building blocks from renewable lignocellulosic feedstock is expected to constitute a relevant step forward the development of a sustainable chemistry. All current commercial uses of lignin represent relatively low value applications. Opportunities that arise from utilizing lignin fit into three categories, (i) power, fuel and syngas (near-term), (ii) macromolecules (medium-term) and (iii) aromatics and miscellaneous monomers (long-term). Some fungi and bacteria produce enzymes which can biodegrade lignin, thus opening new perspectives towards the valorization of lignin obtained as by-products in bio-refineries.

Current activities

Exploiting biomass in a profitable way requires a multidisciplinary approach. At the University of Trieste, advanced biotechnological, chemical and engineering expertise covers the whole chain for the production of biofuels. Enzyme technologies have been developed for transformation of lignin as well non-edible oils. Molecular basis of enzyme (laccase and lipase) stabilization have been disclosed, thus enabling effective bio-transformation of renewable raw-materials into polymers, chemicals and biofuels. Bio-conversions are attractive because they allow for i) lower waste production, ii) lower energy consumption and iii) the possibility of avoiding pre-treatments of feed-stock. The technological platform includes also chemical (pyrolysis) and microbial (anaerobic digestion) methodologies for the valorization of byproducts of the bio-fuel chain (glycerol, biomass, etc.). ICGEB has developed expertise in the isolation, purification, characterization of novel bacterial isolates associated with plants, endowed with enzyme activities of interest (laccase for lignin transformation, lipases for oil transesterification etc.). Technologies for heterologous expression and large scale fermentation are also available. The University of Udine has developed Life Cycle Analysis competences and expertise in the optimization of crops for maximizing production of biomass and oil to be converted in fuels, chemicals, biogas via biotechnological routes, protein supplements for animals.

Specific activities foreseen in the context of CEI-PRAISE

The major goal of this Project will be the development of innovative processes for the sustainable conversion of co-products of biorefineries (lignin) as well as renewable non-food raw-materials into chemical, fuels and building blocks for polymers. The Project will bridge collaborative efforts among the three institutions above and with the selected partners in CEI Member Countries: (i) ICGEB will identify bacteria and enzyme activities applicable to the transformation of non-edible oils into biodiesels and will provide expertise for fermentation, cloning and heterologous expression, (ii) researchers from the University of Udine will optimize the selection and production of plant species to be introduced profitably within different bio-refinery value-chains. They will also provide support to all activities with Life Cycle Analysis and sustainability assessment and (iii) the University of Trieste will be involved in the enzymatic, microbial and chemical transformation of biomass and co-products. Laccase enzymes will be formulated and applied to lignin bio-transformation. Enzymatic technologies will also enable conversion of non-edible oils into bio-fuels and building blocks for polymers. Chemical routes will be coupled for the full valorization of glycerol and residual biomass.

13) Smart and sustainable land at University of Udine

Background

A Smart Land is a territory in which widespread experience and shared policies aim at increasing the competitiveness and attractiveness of the area. Specific focus can be put on social cohesion,
dissemination of knowledge, creative growth, accessibility and free movement, environment usability and sustainability (natural, historical, architectural, urban and widespread), quality of the landscape and of the life of citizens.

ICT tools are essential to reach the “smartness” while competences in different fields, (bioeconomy, environment and energy, regional planning, etc.) are essential to reach the “sustainability”.

Current activities

The University of Udine is working at an original innovative approach, concerning an interdepartmental project on Smart Land and Communities, which involves several Departments working in synergy and providing competences ranging from ICT to the juridical, regional planning, economic and management, agriculture and food, environment and energy and healthcare sectors. The approach stems from the strongly believed and recognized idea the any ‘smart’ initiative needs to involve all the dimensions of the concept of Smart Land & Communities (from healthcare to education, from environment to energy, from governance/governmental to citizenship) and that a strong ICT set of tools and infrastructure must sustain, connect, support and empower the initiative.

Specific activities foreseen in the context of CEI-PRAISE

Within this specific Project several initiatives may be supported, with the overall aim of building step by step, in an integrated way, a smart and sustainable land. The proposed areas of research are

1. bioeconomy, sustainability of agricultural activities, performance of agri-food systems, sustainable use of territorial resources, evaluation of agricultural farms and agro-energy plants;
2. environment pollution and waste management;
3. natural hazard assessment for prevention and emergency management purposes;
4. "smart transports", including logistics, security and optimization of transport systems; sustainable mobility and "smart" management of traffic;
5. in the field of healthcare & medicine activities may be envisaged specifically for Medical Training & Life-Long Learning and Care Continuity & Personalization.

14) Innovation in personalized health care at University of Udine

Background

Despite the fact that people are living longer than we had in recent history, our overall health is declining rapidly. There are big increases in chronic diseases such as type 2 diabetes, obesity, Alzheimer’s disease, cancer, heart disease and allergies. A few common factors can be found with all these problems; first
and foremost they are all are related to chronic inflammation. One of the tools to facilitate prevention (and consequently prognosis and therapies) of such chronic diseases is personalized health care. Personalized health care includes genomic/transcriptomic analysis, pharmacogenetics, and pharmacogenomics together with use of other specific biological markers that (will) provide information on the risk for developing a specific disease or response of patients to specific treatments. An example of personalized health care is use of genetic and biochemical tumor markers that might anticipate occurrence of disease or inclusion of biomarkers such as prothrombotic or proatherogenic molecules in evaluation panels of patients in whom we wish to improve prediction of the risk of ischemic heart disease or stroke.

Current activities

This personalized heath care approach might have impact in different areas of medical diagnostics and therapeutics, but also in epidemiology. For such a reason, over the last several years, medicine departments at UNIUD, have developed advanced investigations using different approaches to clarify the molecular mechanisms of different human diseases. The idea is to approaching the problem from clinical up to molecular levels. This environment has led to discoveries in:

- Health technologies: which has directed to the application of skills in the form of devices, medicines, vaccines, procedures and systems developed to solve a health problem;
- Innovation technologies in chronic disease, cancer, and hematologic malignancies, which has focused the attention on the development of better treatment for chronic disease. Despite most new treatments having relatively high costs and low health benefits, we try through multidisciplinary approaches to find novel treatment with better outcome at low prices;
- Public Health, which through epidemiological studies and large cohorts for patients suffering of chronic diseases has deepened the relationship between environment and genetic markers.

Specific activities foreseen in the context of CEI-PRAISE

This Project will coordinate activities, carried out in the participating laboratories located in CEI Member Countries that are related to molecular, biological and clinical/therapeutic issues in chronic diseases. In particular it will take advantage of the multidisciplinary clinical and technological competences that have already led to the discovery of correlations between environmental factors and genetic markers, which will be further investigated to find molecular mechanisms that lead to the development of chronic diseases. The strict cross talk between basic and clinical sciences will guarantee developing bench-to-bedside programs in prevention, management, and improvement of innovative treatments for chronic diseases including; ICT solutions for health, ICT technologies for people with disabilities; health system management. UNIUD departments will make available for research activities bioinformatics competences, Flow Cytometry, Cell sorter, Cellular Imaging and confocal microscopic analysis core facilities; ultrastructural analysis with electron microscopy; a proteomic facility with mass spectrometry, circular dichroism, analytical and micro-analytical high performance liquid chromatography (HPLC) as well as NMR for protein structure analysis and service for peptides synthesis. In addition UNIUD will offer a complete lab for analysis and measurement of the metabolic metabolism during human exercises.

15) Promotion of technology transfer and innovation at AREA Science Park

Background

Several attempts have been made to revamp the Danube Region, Western Balkans, and Eastern Neighbourhood research & innovation potential. Despite some substantial results, most of the outcomes
achieved so far have been essentially, small scale, short lived and fragmented. Indeed, the impacts of R&I past programmes are still limited in the above mentioned areas, mainly due to lack of operative links between public research institutions and private businesses. This gap is also burdened by a still insufficient presence of a critical mass of R/D centres well networked with the most developed ones present in the rest of Europe. Moreover, according to a recent survey by the World Bank involving local companies in the Western Balkans areas, there is still an unsatisfactory diffusion of competences in technology transfer and innovation management that can be tackled supporting capacity building programmes on technology transfer schemes.

Current activities

In Friuli Venezia Giulia Region, one among the most innovative and advanced Italian Regions, operates AREA Science Park, a multi sectorial innovation hub of European interest, where researchers and enterprises work together for the development of new hi-tech product and services. The Consortium AREA Science Park (AREA), a National Research body which, over the years, has supported the growth of the science and technology through the gradual installation of many laboratories, including several significant national and international research institutes (by 31/12/2013: 94 tenants out of which 10 research centres and 84 companies that employed over 2,400 people, with a total aggregate turnover of around €180 million). During the past few years AREA has expanded and diversified its scope by developing advanced technology transfer activities to drive development and competitiveness and bridging the gap between academia and industry. Today the mission of AREA is to provide a reference point for capacity building and technology transfer in order to exploit research results.

Specific activities foreseen in the context of CEI-PRAISE

AREA will deliver a tailored training and mentoring in compliance with the CEI-PRAISE Programme targeted research lines/projects and to the participants’ existing level of expertise, in collaboration with the other CEI S&T Network Institutions where the fellows will spend part of their time in Trieste in order to become acquainted with their specific skills and knowledge. AREA will offer its fellows the tools and knowledge necessary to start or develop activities of technology and knowledge transfer, research results exploitation and innovation promotion up to the spin-off of new entrepreneurial initiatives in all the above programmes to be managed by the CEI S&T Network. A few suggested topics for the above mentioned training project could be the following:

- Knowing the context: systems for innovation;
- Knowing the companies;
- Management tools and valorisation of Intellectual Property;
- Technology transfer and innovation projects management;
- Relations and customer/client management;
- Technology transfer support tools.

As it is important to retain fellows to their home institutions, coaching and mentoring on-distance, including their assistance for the spin-off of innovative business start-ups, will be delivered. Fellows will spend part of their fellowships at AREA Science Park, and other centres of S&T Network, and then return to their home-countries to field test the knowledge acquired. Finally they will be back to Trieste for final presentation of their fellowship reports.

### Table 4 - CEI-PRAISE Focal Points and relevant project leaders

<table>
<thead>
<tr>
<th>Institution of CEI S&amp;T Network</th>
<th>CEI-PRAISE Focal Point</th>
<th>Relevant CEI-PRAISE project leader</th>
<th>Relevant CEI-PRAISE co-project leader</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Synchrotron Elettra / Free Electron Laser Laboratory Fermi</td>
<td>Rodolfo Laghi</td>
<td>1) Alessandra Gianoncelli</td>
<td>IOM-CNR Roberto Gotter</td>
</tr>
<tr>
<td>----------------------------------------------------------</td>
<td>---------------</td>
<td>--------------------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Institute for Materials Manufacturing (IOM-CNR)</td>
<td>Roberto Gotter</td>
<td>2) Paola Storici</td>
<td></td>
</tr>
<tr>
<td>International Centre for Theoretical Physics Abdus Salam (ICTP)</td>
<td>Sandro Scandolo</td>
<td>3) Ralph Gebauer</td>
<td>OGS Paola Del Negro</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4) Erika Coppola</td>
<td>SISSA Raffaella Rumiati</td>
</tr>
<tr>
<td>International Centre for Genetic Engineering and Biotechnology (ICGEB)</td>
<td>Vittorio Venturi</td>
<td>5) Vittorio Venturi</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>6) Vittorio Venturi</td>
<td>SISSA Raffaella Rumiati</td>
</tr>
<tr>
<td>International School for Advanced Studies (SISSA)</td>
<td>Raffaella Rumiati</td>
<td>7) Raffaella Rumiati</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>8) Raffaella Rumiati</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>9) Raffaella Rumiati</td>
<td></td>
</tr>
<tr>
<td>National Institute of Oceanography and Experimental Geophysics (OGS)</td>
<td>Mounir Ghribi</td>
<td>10) Angelo Camerlenghi</td>
<td></td>
</tr>
<tr>
<td>University of Trieste</td>
<td>Lucia Gardossi</td>
<td>11) Lucia Pasquato</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>12) Lucia Pasquato</td>
<td>UNIUD Mario Baldini ICGEB Vittorio Venturi</td>
</tr>
<tr>
<td>University of Udine</td>
<td>Roberto Pinton</td>
<td>13) Francesco Marangon</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>14) Leonardo Alberto Sechi</td>
<td></td>
</tr>
<tr>
<td>Consortium Area Science Park (AREA)</td>
<td>Marcello Guaiana</td>
<td>15) Marcello Guaiana</td>
<td></td>
</tr>
</tbody>
</table>

Annex 3 – Preliminary estimate of critical mass to be immobilized by research project to be implemented by CEI-PRAISE Framework Programme
<table>
<thead>
<tr>
<th>Topics/Projects</th>
<th>Institutions of CEI Network</th>
<th>1*</th>
<th>2**</th>
<th>3**</th>
<th>4***</th>
<th>5***</th>
</tr>
</thead>
<tbody>
<tr>
<td>Synchrotron radiation and free electron lasers to develop innovative materials, including new technologies on the conservation of cultural heritage</td>
<td>Elettra/FERMI in collaboration with IOM-CNR</td>
<td>13</td>
<td>60</td>
<td>130</td>
<td>195</td>
<td></td>
</tr>
<tr>
<td>Molecular and structural biology tools including microscopic and 3-D analysis</td>
<td>Elettra/FERMI</td>
<td>10</td>
<td>60</td>
<td>130</td>
<td>195</td>
<td></td>
</tr>
<tr>
<td>Environment protection modelling and climate change</td>
<td>ICTP in collaboration with OGS</td>
<td>12</td>
<td>45</td>
<td>100</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Condensed matter physics, advanced materials and photonics</td>
<td>ICTP in collaboration with SISSA</td>
<td>10</td>
<td>45</td>
<td>100</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Biotechnologies for food and energy</td>
<td>ICGEB</td>
<td>12</td>
<td>45</td>
<td>100</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Regenerative medicine with specific reference to cardiovascular and neurodegenerative disorders</td>
<td>ICGEB in collaboration with SISSA</td>
<td>15</td>
<td>45</td>
<td>100</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Cognitive neuroscience</td>
<td>SISSA</td>
<td>7</td>
<td>35</td>
<td>80</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Computational and theoretical biology</td>
<td>SISSA</td>
<td>7</td>
<td>35</td>
<td>80</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Applied mathematics</td>
<td>SISSA</td>
<td>7</td>
<td>35</td>
<td>80</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Secure energy</td>
<td>OGS</td>
<td>7</td>
<td>45</td>
<td>100</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Nanotechnology and nanomedicine</td>
<td>UNITES</td>
<td>10</td>
<td>45</td>
<td>100</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Advanced biofuels and sustainable technologies for integrated Biorefineries</td>
<td>UNITES in collaboration with ICGEB and UNIUD</td>
<td>10</td>
<td>45</td>
<td>100</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Smart and sustainable land</td>
<td>UNIUD</td>
<td>10</td>
<td>45</td>
<td>100</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Innovation in personalized health care</td>
<td>UNIUD</td>
<td>10</td>
<td>45</td>
<td>100</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>Promotion of technology transfer and innovation</td>
<td>AREA Science Park</td>
<td>30</td>
<td>70</td>
<td>100</td>
<td>200</td>
<td></td>
</tr>
<tr>
<td>TOTAL:</td>
<td></td>
<td>±330</td>
<td>170</td>
<td>700</td>
<td>1,500</td>
<td>2,300</td>
</tr>
</tbody>
</table>

* Strengths as of February 2014.
** Preliminary estimated figures according to the CEI-PRAISE Work Plan for its whole duration (7 years).
*** Preliminary and conservative estimates based on 100 centers of excellence and/or advanced research groups in the CEI Member Countries to be involved in all disciplines/projects: ±6 in average per country, assuming a strength of 15 researchers respectively involved in CEI-PRAISE Programme.

Annex 4 - List of confirmed CEI-PRAISE partners: research institutions and/or advanced research groups which have formally submitted their Candidature Form to participate to one or more scientific project(s) in the framework of CEI-PRAISE Programme
ALBANIA - 2
  - Albanian Geological Survey, Tirana
  - Institute of Geosciences, Energy, Water and Environment

AUSTRIA - 2
  - University of Vienna, Faculty of Psychology
  - University of Vienna, Faculty of Physics

BELARUS - 3
  - National Academy of Sciences of Belarus, B.I. Stepanov Institute of Physics, Scientific Centre of Central European Initiative Secondary Network
  - National Academy of Sciences of Belarus, Institute of Biophysics and Cell Engineering
  - Laboratory of lakes research, Belarusian State University

BOSNIA AND HERZOGOVINA - 2
  - COMP-2000
  - International University Sarajevo, Faculty of Engineering and Natural Sciences

BULGARIA - 9
  - Agrobioinstitute
  - Bulgarian Academy of Sciences, "Acad. Evgeni Budevski" Institute of Electrochemistry and Energy Systems
  - Bulgarian Academy of Sciences, Academician Emil Djakov Institute of Electronics, Microwave Magnetic Laboratory(*)
  - Bulgarian Academy of Sciences, Institute of General and Inorganic Chemistry
  - Bulgarian Academy of Sciences, Institute of Physical Chemistry(*)
  - Department of Computer Science and UNESCO Chair on ICT in Education, Library Studies and Cultural Heritage
  - University of Chemical Technology and Metallurgy

($) The Institute has submitted two different Candidature Forms.

CROATIA - 3
  - Ruđer Bošković Institute
  - University of Rijeka, Department of Biotechnology
  - University of Zagreb, Faculty of Agriculture

CZECH REPUBLIC - 7
  - Academy of Sciences of the Czech Republic, Institute of Organic Chemistry and Biochemistry
  - Academy of Sciences of the Czech Republic, Institute of Physiology, Department of Membrane Transport
  - Charles University in Prague, Faculty of Mathematics and Physics, Department of Surface and Plasma Science
  - Global Change Research Centre AS CR, v. v. i.
  - Institute of Experimental Medicine
  - Institute of Mathematics of the Academy of Science of the Czech Republic
  - Masaryk University, Central European Institute of Technology
HUNGARY - 4
- University of Debrecen, Department of Theoretical Physics(*)
- University of Pannonia, Research Institute on Bioengineering, Membrane Technology and Energetics
- Budapest University of Technology and Economics, Institute of Physics

(*) The Department has submitted two different Candidature Forms.

MACEDONIA - 0
- /

MOLDOVA - 7
- Academy of Sciences of Moldova
- Alecu Russo Balti State University
- Ghitu Institute of Electronic Engineering and Nanotechnologies
- Institute of Ecology and Geography
- Institute of Geology and Seismology of the Academy of Sciences of Moldova
- Institute of Mathematics and Computer Science, ASM
- State University of Moldova

MONTENEGRO - 3
- Ministry of Economy, Directorate for development of small and medium sized enterprises
- University of Montenegro, Biotechnical Faculty
- University of Montenegro, Faculty of Economics

POLAND - 4
- Institute of Oceanology Polish Academy of Sciences
- International Laboratory of High Magnetic Fields and Low Temperatures
- Jagiellonian University, Faculty of Biochemistry, Biophysics and Biotechnology
- Jerzy Haber Institute of Catalysis and Surface Chemistry of the Polish Academy of Sciences

ROMANIA - 2
- Institute of Cellular Biology and Pathology "Nicolae Simionescu, Centre of Excellence of the European Community
- "Petru Poni" Institute of Macromolecular Chemistry

SERBIA - 8
- Institut Mhailo Pupin
- University of Belgrade
- University of Belgrade, Center for Technology Transfer
- University of Belgrade, Institute for Biological Research "Siniša Stanković"
- Mathematical Institute of the SASA
- Institute of Soil Science
- Institute for the Application of Nuclear Energy
- Association of Geophysicists and Environmentalists of Serbia
SLOVAKIA - 5
   – Comenius University in Bratislava, Faculty of Mathematics, Physics and Informatics, Department of Experimental Physics(*)
   – International Centre for Applied Research and Sustainable Technology
   – University of SS. Cyril and Methodius in Trnava

(*) The Department has submitted three different Candidature Forms.

SLOVENIA - 6
   – National Institute of Biology
   – National Institute of Chemistry
   – University of Ljubljana, Faculty of Health Sciences
   – University of Ljubljana, Faculty of Medicine, Institute of Microbiology and Immunology, Laboratory for diagnostics of zoonoses, Institute of Microbiology and Immunology
   – University of Nova Gorica, Center for Biomedical Sciences and Engineering
   – University of Nova Gorica, Laboratory for Environmental research

UKRAINE - 2
   – Institute of Molecular Biology and Genetics of NAS of Ukraine
   – National Scientific Center «Institute for Soil Science and Agrochemistry Research named after O.N. Sokolovsky»

GREECE - 4
   – National Technical University of Athens
   – Technical University of Crete
   – Technological-Educational Institute of Western Greece
   – University of Patras, Department of Chemistry, Food Biotechnology Group

TURKEY – 0
   – /

Annex 5 - List of CEI-PRAISE contacts according to suggestions received from different sources: potential CEI-PRAISE partners (research institutions or advanced research groups) which have been contacted
ALBANIA - 5

– Institute of Transport
– National Center of Environmental Movement, Tirana
– Polytechnic University of Tirana, Department of Energy Resources
– The Academy of Sciences of Albania
– The Institute of Informatics and Applied Mathematics, The Academy of Sciences of Albania

AUSTRIA - 23

– AIT Austrian Institute of Technology GmbH, Bioresources Unit
– Austrian Academy of Sciences
– Avl List GmbH, Österreich
– Bundesforschungs-und Ausbildungszentrum für Wald, Naturgefahren und Landschaft – Wien
– Bundesministerium für Wissenschaft und Forschung BMWF
– Centre for Social Innovation - WBC INCO.net
– Gregor Mendel Institute of Molecular Plant Biology GmbH
– Institut für Molekulare Biowissenschaften Karl Franzens Universität Graz
– Institut für Theoretische Physik, Technische Universität Graz
– Institute for Electron Microscopy and Nanoanalysis, Graz University of Technology
– Institute of Materials Chemistry, Vienna University of Technology
– Institute of Molecular Biotechnology of the Austrian Academy of Sciences
– International Institute for Applied Systems Analysis
– Johann Radon Institute for Computational and Applied Mathematics
– Leoben University, Austria
– Max F. Perutz Laboratories, Vienna
– Medical University of Vienna
– Profactor GMBH
– Technische Universität Graz, Graz
– Universitaet Linz
– University of Innsbruck, Institute of Ecology
– Vienna University of Technology
– Waldland Vermarktungs ges.m.b.h., Österreich

BELARUS - 14

– Belarusian State Technological University
– Central Research Institute for Complex Use of Water Resources
– Institute of Bioorganic Chemistry, NASB
– Institute of Genetics and Cytology, NASB
– Institute of Mathematics, NASB
– Joint Institute of Power and Nuclear Research - "SOSNY", NASB
– Laboratory for Physical Studies, State Technical University of Gomel
– N.N. Alexandrov National Cancer Centre of Belarus
– National Academy of Sciences of Belarus, NASB
– Republican Unitary Enterprise, Belarussian Research Geological Exploration Institute
– Research Unitary Enterprise Belarusian Research Centre 'Ecology'
State Scientific Institution “A.V.Luikov Heat and Mass Transfer Institute of the National Academy of Sciences of Belarus”
- The Republican Centre for Technology Transfer (RCTT)
- Yanka Kupala State University of Grodno

BOSNIA AND HERZOGOVINA - 3
- Academy of Sciences and Arts of Bosnia and Herzegovina
- Faculty of Mining Geology and Civil Engineering, University of Tuzla
- Institute for Genetic Engineering and Biotechnology

BULGARIA - 17
- Central Laboratory of Applied Physics Plovdiv, Bulgarian Academy of Sciences
- Central Laboratory of Physico-Chemical Mechanics at Bulgarian Academy of Sciences
- Central Laboratory of Solar Energy and New Energy Sources
- Faculty of Geology and Geography, University of Sofia
- Institute for Nuclear Research and Nuclear Energy-Bulgarian Academy of Sciences
- Institute of Catalysis, Bulgarian Academy of Sciences
- Institute of Chemical Engineering-BAS
- Institute of Mathematics and Informatics, Bulgarian Academy of Sciences
- Institute of Molecular Biology, Bulgarian Academy of Sciences
- Institute of Polymers, Bulgarian Academy of Sciences
- Ministry of Education, Youth and Science
- Orgachim ad
- Professor Fridtjof Nansen Institute for Oceanology, Bulgarian Academy of Sciences
- Regional Energy Agency of Pazardjik
- Stephan Angeloff Institute of Microbiology, Bulgarian Academy of Sciences
- University of Chemical Technology and Metallurgy
- University of Chemical Technology and Metallurgy, Laboratory for Advanced Materials Research

CROATIA - 18
- Azzri – Agency for rural development of Istria Ltd Pazin
- Center for Micro and Nano Sciences and Technologies, University of Rijeka
- Center for Translational and Clinical Research - School of Medicine, University of Zagreb
- Croatian Academy of Sciences and Arts
- Croatian Forestry Research Institute
- Croatian Institute for Brain Research, School of Medicine, University of Zagreb
- Croatian Meteorological and Hydrological Service (DHMZ)
- Department of Clinical and Transplantation Immunology and Molecular Medicine in Rijeka, Croatian Academy of Sciences and Arts
- Development Agency Zagreb – TPZ Ltd. (RAZA)
- Division of Biology, Faculty of Science, University of Zagreb
- Energy Institute Hrvoje Požar
- Institute of Physics
- Int. Centre for Sustainable Development of Energy, Water and Environment Systems
- University of Zagreb
– University of Zagreb, Faculty of Chemical Engineering and Technology
– University of Zagreb, Faculty of Food Technology and Biotechnology
– University of Zagreb, Faculty of Mechanical Engineering and Naval Architecture
– University of Zagreb, Faculty of Mining, Geology and Petroleum Engineering

CZECH REPUBLIC - 25
– Acad Sci Czech Republic, Inst Phys
– Charles University
– Czech Geological Survey
– Czech Hydrometeorological institute (CHMI)
– Czech Science Foundation
– Czech University of Life Sciences Prague
– Energy Research Center – VŠB Technical University of Ostrava
– Faculty of Mechanical Engineering, Brno University of Technology and Central European Institute of Technology
– Inotex spol. S R.o.
– Institute of Atmospheric Physics (IAP)
– Institute of Biophysics, Czech Academy of Sciences
– Institute of Chemical Process Fundamentals of the Czech Academy of Sciences
– Institute of Hematology and Blood Transfusion
– Institute of Microbiology of the ASCR, v. v. i.
– Institute of Photonics and Electronics of the ASCR, v. v. i.
– Institute of Physics of the ASCR, v. v. i.
– J. Heyrovsky Institute of Physical Chemistry of the ASCR, v. v. i.
– Mikrobiologický Ústav Av ČR
– Research Institute of Agricultural Engineering, p.r.i.
– South Moravian Innovation Centre
– Technologicke Centrum Akademie ved Ceske Republiky
– Third Faculty of Medicine, Charles University in Prague
– UniCRE - Unipetrol Centre of Research and Education
– Univerzita Karlova v Praze, Department of Macromolecular Physics
– Vyzkumný ústav anorganicke chemie, a.s.

HUNGARY - 21
– Bay Zoltán Nonprofit Ltd. for Applied Research
– Budapest University of Technology and Economics
– Budapesti Műszaki és Gazdaságtudományi Egyetem, Department of Polymer Engineering
– Central European University, Center for Policy Studies
– Central European University, Department of Cognitive Science
– Centre for Ecological Research, Hungarian Academy of Science
– Centre for Energy Research, Hungarian Academy of Sciences
– Department of Biotechnology, University of Szeged
– Eötvös Lorand University, Department of Meteorology
– Faculty of Information Technology, Pázmány Péter Catholic University
– Geological and Geophysical Institute of Hungary (MFGI)
– Hungarian Academy of Sciences
− Institute for Applied Mathematics, Hungarian Academy of Sciences
− Institute for Nuclear Research, Hungarian Academy of Sciences
− Institute of Experimental Medicine, Hungarian Academy of Sciences
− National Innovation Office (NIH)
− Res Inst Solid State Phys & Opt
− Research Centre for Natural Sciences, Hungarian Academy of Sciences, Department of Surface modification and Nanostructures
− Szent Istvan University, Godollo
− Wigner Research Centre for Physics, Hungarian Academy of Sciences
− Wigner Research Centre for Physics-Budapest Neutron Centre

MACEDONIA - 13
− Engineering Institution of Macedonia
− Faculty of Civil Engineering, Skopje
− Faculty of Natural Sciences and Mathematics Physics Department
− Faculty of Pharmacy, University "St. Cyril and Methodius"
− Geofluid, Skopje
− Goce Delcev University, Faculty of Natural and Technical Sciences
− Institute of Earthquake Engineering and Engineering Seismology
− Macedonian Academy of Sciences and Arts
− Macedonian Geothermal Association
− Medical Faculty, Ss. Cyril and Methodius University
− Research Center for Energy, Informatics and Materials, Macedonian Academy of Sciences and Arts
− Research Center for Genetic Engineering and Biotechnology, Macedonian Academy of Sciences and Arts
− University "Ss. Cyril and Methodius", Skopje

MOLDOVA - 4
− Fruit Growing Research Institute
− Institute of Genetics, Physiology and Plant Protection
− Institute of Applied Physics, ASM
− Institute of Microbiology and Biotechnology, ASM

MONTENEGRO - 4
− Faculty of Medicine, University of Montenegro
− Geological Survey of Montenegro
− Institute of Biomedical Research
− Institute of Marine Biology, University of Montenegro

POLAND - 33
− Adam Mickiewicz University
− Adam Mickiewicz University in Poznań, NanoBioMedical Centre
− Akademii Górniczo-Hutniczej
− Akademii Górniczo-Hutniczej, Faculty of Metals Engineering and Industrial Computer Science
− Automotive Industry Institute
- Center for Social and Economic Research
- Center for Theoretical Physics PAS
- Centre for Biostructure Research, Medical University of Warsaw
- Centre of Molecular and Macromolecular Studies, Polish Academy of Sciences
- Faculty of Biotechnology and Food Sciences, Lodz University of Technology
- Gmina Lublin
- Institute of Mathematics, Polish Academy of Sciences
- Institute of Medical Biology of PAS
- Institute of Molecular Physics, Polish Academy of Sciences
- Instytut Ciezkkiej Syntezy Organicznej
- Instytut Energetyki
- Instytut Ogrodnictwa, Skierniewice, Research institute of horticulture
- International Institute of Molecular and Cellular Biology in Warsaw
- Jagiellonian University - Uniwersytet Jagiellonski - SOLARIS
- Miedzynarodowy Instytut Polskiej Akademii Nauk - Europejskie Regionalne Centrum Ekohydrologii
- Nencki Institute of Experimental Biology, Polish Academy of Sciences
- Osrodek Badawczo Rozwojowy Przemyslu Rafineryjnego
- Pielaszek Research
- Polish Academy of Sciences
- Politechnika Warszawska
- POMInno Sp. z o.o.
- Poznan University of life sciences
- ProChimia Surfaces, Sp.z o.o.
- ŚCITT Sp. z o.o. Świętokrzyskie Centrum Innowacji i Transferu Technologii
- Transition Technologies S.A.
- Uniwersytet Warmińsko-Mazurski w Olsztynie
- Wroclaw University of Technology
- Wytwórnia Sprzętu Komunikacyjnego „PZL-Rzeszów” S.A.

ROMANIA - 25
- Agenţia Locală a Energiei Alba
- Faculty of Physics – West University of Timisoara
- Faculty of Physics, Chemistry, Electronics and Petroleum Technology, Ovidiu University of Constanta
- Faculty of Physics, University of Bucharest
- Institute of Biology of the Romanian Academy
- Institute of Chemistry Timisoara of Romanian Academy
- Institute of Physical Chemistry
- Institutul de Chimie Macromoleculară Petru Poni
- Institutul National de Cercetări-Dezvoltare pentru Textile și Pielarie
- Institutul National de Hidrologie și Gospodărire a Apelor
- National Institute for Marine Geology and Geooecology – GeoEcoMar
- National Institute for Research and Development in Environmental Protection
- National Institute of Materials Physics, Magurele
- National institute of Research and Development for Biological Sciences
- National Institute of Research and Development in Chemistry and Petrochemistry
Politehnica University of Bucharest
Research-Development Center for Field Crops on Sandys Soils Dabuleni
Romanian Academy
Ropot Development SRL
SC Institutul de Cercetare Dezvoltare pentru Apicultura SA
Societate comerciala pentru cercetare, proiectare si productie de echipamente si instalatii de automatizare
The Forest Research and Management Institute
UNESCO Chair at Horia Hulubei Foundation in partnership with the International Centre of Theoretical Physics (ICTP)
Universitatea Politehnica din Timisoara
University of Bucharest

SERBIA – 22

Electrical Engineering Institute “Nikola Tesla”
Faculty of Ecological and Environmental Sciences-Nikola Tesla Union University, Belgrade
Faculty of Pharmacy, University of Belgrade
Faculty of Physics, University of Belgrade
Faculty of Science and Mathematics, University of Nis (FSM NIS)
Faculty of Technology and Metallurgy, University of Belgrade
Geographical Institute ”Jovan Cvijic” of the Serbian Academy of Sciences and Arts, Belgrade, Serbia
Institut for cardiovascular disease Dedinje, Vascular Surgery Clinic
Institute for Plant Protection and Environment
Institute of Food Technology and Biochemistry, Faculty of Agriculture, University of Belgrade
Institute of Molecular Genetics and Genetic Engineering, University of Belgrade
Institute of Nuclear Sciences Vinca
Institute of Nuclear Sciences Vinca, Laboratory for thermal engineering and energy)
Institute of Physics Belgrade
Institute of Technical Sciences of SASA
Physical Society Nis (PSN)
Scientific Computing Laboratory, Institute of Physics
Serbian Academy of Sciences and Arts
University of Belgrade, Institute of Physics, Comp Sci Lab
University of Novi Sad
University of Novi Sad, Faculty of Technical Sciences

SLOVAKIA - 12

Comenius University, Bratislava, Slovakia
Geological Institute of Dionyz Stur Bratislava
Institute of Experimental Physics, SAS
Institute of Molecular Biology, SAS
Institute of Neuroimmunology, Slovak Academy of Sciences
Institute of Physics, SAS
Institute of Plant Genetics and Biotechnology, SAS
- Mathematical Institute, SAS
- Meroco, a.s.
- Narodne Lesnicke Centrum
- Slovak Academy of Sciences - SAS
- Statne Lesy Tatranskeho Narodneho Parku - Vysoké Tatry

**SLOVENIA - 20**
- Agriculture Forestry Institute Nova Gorica
- Arctur d.o.o.
- Center for biomedical sciences and engineering, University of Nova Gorica
- Centre for Excellence for Biosensors, Instrumentation and Process Control, Bio-Instrumentacijski laboratorij
- Department of Food Science and Technology, Biotechnical Faculty, University of Ljubljana
- Faculty of Mathematics and Physics, University of Ljubljana
- Geoinzeniring d.o.o
- Goriska Local Energy Agency
- Institute of Biochemistry, Faculty of Medicine University of Ljubljana
- Javna agencija za raziskovalno dejavnost Republike Slovenije
- Josef Stefan Institute
- Medical Center for Molecular Biology, University of Ljubljana
- OR-EL.doo Primorski Tehnoloski Park
- Scientific Research Centre Bistra
- Slovenian Academy of Sciences and Arts
- Slovenian NMR centre, Ljubljana
- University of Ljubljana
- University of Ljubljana, Faculty of Chemistry and Chemical Technology
- University of Primorska

**UKRAINE - 13**
- BioMedTalk
- Bogolyubov Institute for Theoretical Physics (BITP)
- Dnipropetrovsk Regional Environmental Association "Zeleniy Svit / Friends of the Earth Ukraine"
- Donetsk Institute for Physics and Engineering of the National Academy of Sciences of Ukraine
- Institute for Condensed Matter Physics, NAS
- Institute for Market Problems and Economic-and-Ecological Research, NAS
- Institute of Biochemistry
- Institute of Food Biotechnology and Genomics, NAS
- Institute of Physics of National Academy of Sciences of Ukraine
- Kiev Institute for Nuclear Research, NAS
- National Academy of Sciences of Ukraine
- Scientific Engineering Centre "Biomass" Ltd
- Sumy State University, Faculty of Electronics and Informational Technologies

**GREECE - 19**
Aristotelio panepistimio thessalonikis
Aristotle University of Thessaloniki, School of Biology
AVMap Digital Applications S.A.
Centre for renewable energy sources and saving
Chimar Hellas ae
Ethniko kentro erevnas kai technologikis anaptyxis
Foundation for Research and Technology - Hellas
Geniki grammatia erevnas kai technologias, ypourgio paidias, dia viou mathisis & thrisevmaton
Hellenic agricultural organization
Institute of Applied & Computational Mathematics, Foundation for Research & Technology Hellas
Institute of Electronic Structure and Laser, Foundation for Research and Technology - Hellas
Institute of Molecular Biology and Biotechnology, Foundation for Research and Technology - Hellas
Instituto geologikon kai metalleytikon ereynon
Mediterranean agronomic institute of chania
National and Kapodistrian University of Athens
National Technical University of Athens
Research Center of Pure and Applied Mathematics, Academy of Athens
The Institute of Environmental Research of National Observatory of Athens
University of Patras

TURKEY - 23
ARI Teknokent
Department of agriculture in Adana University
Energy Institute, TUBITAK Marmara Research Center
Faculty of Science, University of Istanbul
Fatih University
Genetic Engineering and Biotechnology Institute, TUBITAK Marmara Research Center
Istanbul Technical University
Izmir Institute of Technology
Mersin Teknopark
Metu Technopolis
Middle East Technical University di Ankara
Ministry of Food Agriculture and Livestock
National Magnetic Resonance Research Center, Ankara
Petroleum Research Center - Middle East Technical University, Ankara
Sabanci University
Technology Development Foundation of Turkey
The Scientific and Technological Research Council of Turkey
Turkish Academy of Sciences
Turkiye Bilimsel ve Teknolojik Arastirma Kurumu
Turkiye Elektrik Iletim Anonim Sirketi
Turkiye Teknoloji Gelistirme Vakfi
University of Cukurova
– Uskudar University, Neuropsychiatry Hospital, Depts of Neurology, Psychiatry and Neuropsychology

Annex 6 - List of institutions and/or advanced research groups suggested by the confirmed partners
ALBANIA - 0
   - /

AUSTRIA - 3
   - Center for Computational Materials Science, Vienna University of Technology
   - Clinical Institute of Pathology, Medical University of Vienna
   - Institute of chemical technologies and Analytics, Faculty of technical Chemistry, Vienna University of Technology

BELARUS - 1
   - Belarussian State Medical University

BOSNIA AND HERZOGOVINA - 8
   - Clinical Center of University in Sarajevo, Molecular Diagnostics
   - Clinical Center University of Tuzla, Cytogenetics
   - Faculty of Veterinary Medicine, Sarajevo, Immunology and Microbiology
   - Faculty of Agriculture and Food Sciences, Chemical Engineering and Nanotechnology
   - Faculty of Electrical Engineering, University of Sarajevo
   - Faculty of Pharmacy, Medical Biochemistry
   - Innovation Centers in Banja Luka
   - School of Economics and Business in Sarajevo

BULGARIA - 35
   - Association of the Business Clusters (ABC)
   - Automotive Cluster
   - Bilateral Chamber of Commerce Bulgaria
   - Bulgarian Association of Software Companies
   - Bulgarian Branch Association of Electronic Industry and Informatics
   - Centre for Information and Technology Transfer-Global
   - Centre Women in Technology
   - Cluster Innovation and CultureSofia TECH Park JSC
   - eHealth Foundation
   - EURAXESS Network
   - European Software Institute-Central and Eastern Europe
   - GIS Transfer Center
   - HIRON Management Consulting Ltd.
   - Hybrid Integrated Circuits
   - ICT Cluster
   - Information Services
   - Institute of Balkan Studies and Centre of Thracology
   - Institute of Biophysics and Biomedical Engineering
   - Institute of General and Inorganic Chemistry- Bulgarian Academy of Sciences
   - Institute of Geophysics, Geodesy and Geography, Bulgarian Academy of Sciences
   - Institute of Mathematics and Informatics of the Bulgarian Academy of Sciences
   - Institute of Nuclear Research and Nuclear Energy(INRNE) at Bulgarian Academy of Sciences
   - Institute of Physical Chemistry - Bulgarian Academy of Sciences
- Institute of Technology and Development Foundation
- Laboratory of "Geologic Microbiology" at the "General and Industrial Microbiology" department, Sofia University
- Laboratory of Neutron and X-ray Studies, Institute for Nuclear Research and Nuclear Energy, Bulgarian Academy of Sciences
- NET Com EL (NCE)
- New Idea Foundation
- Photothermal Conversion of Solar Energy Department, Central Laboratory of Solar Energy and New Energy Sources at the Bulgarian Academy of Sciences
- Sofia Development Association - SDA
- Sofia University "St. Kliment Ohridski"
- Sofia University "St. Kliment Ohridski", Faculty of Physics - "Department of Physics of Condensed Matter with associated Dept. Physics of Semiconductors"
- Technical University of Gabrovo
- University of National and World Economy
- VIRTECH Ltd.

CROATIA - 9
- Animal breeding unit, The Institute for Medical Research and Occupational Health
- Center for advanced modelling and computing, University of Rijeka
- Center for Technology Transfer, University of Split
- Centre for Micro and Nano Sciences and Technology, University of Rijeka
- Department of Applied Sciences, Institute for Adriatic Crops and Karst Reclamation
- Faculty of chemical engineering and technology, University of Zagreb
- Institute for Cartography and Photogrammetry, Faculty of Geodesy, University of Zagreb
- Mutagenesis Unit, The Institute for Medical Research and Occupational Health
- Teaching Institute of Public Health of Primorsko-Goranska County

CZECH REPUBLIC - 4
- CERIT-SC (CERIT Scientific Cloud)
- University of J. E. Purkyně in Ústí nad Labem
- Palacký University, Olomouc
- Central European Institute of Technology, Brno University of Technology

HUNGARY - 3
- Institute of Physics, Technical University of Budapest
- University of West Hungary
- Institute for Solid State Physics and Optics, Wigner Research Center

MACEDONIA - 1
- Faculty of Technology and Metallurgy, University "Sts Cyril & Methodius"

MOLDOVA - 2
- Technical University of Moldova
- ELIRI
MONTENEGRO - 0

POLAND - 7
- West Pomeranian University of Technology
- Institute of Physics at the University of Szczecin
- Faculty of Physics, Adam Mickiewicz University
- Institute of Evolution and Systematic of Animals Krakow
- Department of General Biophysics, University of Lodz
- Maritime Institute, Gdańsk
- Sea Fisheries Institute, Gdynia

ROMANIA - 14
- West University of Timișoara
- Black Sea Universities Network, Romanian National Secretariat
- Technical University Gheorghe Asachi from Iasi
- Physics Department, University of Oradea
- Cardiology Clinic from Elias University Hospital, Bucharest
- The National Institute of Diabetes, Nutrition and Metabolic Diseases "Nicolae Paulescu"
- Faculty of Economics
- National Institute for Research and Development in Microtechnologies
- National Institute for Laser, Plasma & Radiation Physics
- University "Alexandru Ioan Cuza" Iassy
- University "Lower Danube" Galati
- National Institute of Earth Physics
- University “Babes-Bolyai” Cluj-Napoca
- GEOECOMAR

SERBIA - 7
- Institute of interdisciplinary research, University of Belgrade
- Center for Technology Transfer, University of Nis
- Center for Technology Transfer, University of Kragujevac
- Department of Applied and Engineering Chemistry, Faculty of Technology, University of Novi Sad
- Plant Pathology Department, Faculty of Agriculture, University of Belgrade
- Faculty of Electrical Engineering, University of Niš
- Faculty of technical sciences, University of Novi Sad

SLOVAKIA - 6
- Slovak University of Technology in Bratislava
- Slovak Academy of Sciences, Unit of Scientific Seceretary
- University of Pavol Jozef Šafárik
- Slovak University of Agriculture in Nitra
- Agricultural Expert Institute of SUA
- University of Veterinary Medicine and Pharmacy in Košice

SLOVENIA - 11
– Development Centre for Hydrogen Technologies
– Wine research centre, University of Nova Gorica
– Materials research laboratory, University of Nova Gorica
– Medical Faculty, University of Ljubljana
– Biotechnical Faculty, University of Ljubljana
– Slovenian national building and civil engineering institute
– University of Maribor
– Faculty of Mechanical Engineering, University of Ljubljana
– Centre of Excellence for Biosensors, Instrumentation and Process Control
– University of Ljubljana – Faculty of Biotechnology
– Agricultural Institute

UKRAINE - 7
– N.M. Amosov National Institute of Cardiovascular Surgery
– Institute of Cell Therapy
– State Institute of Genetic and Regenerative Medicine of National Academy of Medical Sciences of Ukraine
– National University Lviv Polytechnic
– Scientific center of Ecology of Black see, Odessa
– National Museum of Nature
– V.N. Karasin Kharkiv National University

GREECE - 6
– ATLANTIS Consulting S.A. Research Organisation
– Balcan Environmental Association
– Centre for Research & Technology Hellas
– Department of Petroleum & Natural Gas Technology of the Eastern Macedonia and Thrace Institute of Technology
– Institute for the management of Information Systems
– Institute of Geology and Mineral Exploration of Greece

TURKEY - 3
– Gebze Institute of Technology
– EGE University, Solar Energy Institute
– Faculty of Science Molecular Biology and Genetics

Annex 7 - Candidature Form for CEI-PRAISE Programme (Questionnaire for potential partners)
CEI PRAISE Programme to Promote Research and Innovation through Centres and Groups of Scientific Excellence in CEI Member Countries

*(Please mail back to PRAISE@cei.int)*

## Partner's Full Details:

<table>
<thead>
<tr>
<th>Legal name (full title):</th>
</tr>
</thead>
<tbody>
<tr>
<td>Institution short name (if any):</td>
</tr>
<tr>
<td>Mandate (mission statement):</td>
</tr>
<tr>
<td>Key words:</td>
</tr>
<tr>
<td>Ownership: Public □ Private □</td>
</tr>
<tr>
<td>Main stakeholders:</td>
</tr>
<tr>
<td>Full address:</td>
</tr>
<tr>
<td>Zip code:</td>
</tr>
<tr>
<td>City:</td>
</tr>
<tr>
<td>Country:</td>
</tr>
<tr>
<td>Telephone:</td>
</tr>
<tr>
<td>Cell phone:</td>
</tr>
<tr>
<td>Fax:</td>
</tr>
<tr>
<td>E-mail:</td>
</tr>
<tr>
<td>Web site:</td>
</tr>
<tr>
<td>Yearly research budget (in Euro):</td>
</tr>
<tr>
<td>Total number of staff:</td>
</tr>
<tr>
<td>administrative and support staff as % of total staff:</td>
</tr>
<tr>
<td>researchers and scientists as % of total staff:</td>
</tr>
<tr>
<td>% of males:</td>
</tr>
<tr>
<td>% of females:</td>
</tr>
</tbody>
</table>

Project line(s) of CEI-PRAISE Programme in which the partner intends to cooperate.*

| Number of researchers who will be involved directly and/or indirectly in such project line(s). |

*See Table 1 of CEI-PRAISE document at page 18.*
Main research activities of the whole institute (and of the specific group):

**Brief description**

Proposal for potential cooperation project

*Summarized proposal (at least 200 words) on foreseen joint cooperation within CEI-PRAISE Programme: expected contribution to selected project(s)*

Equipment and facilities (In-house laboratories)

*Brief description (emphasis should be given to laboratory equipment that can be of major interest to relevant research activities)*

Internet connection quality

*Brief description of internet connection speed (in Mbps)*

Links to other partners

*List of recommended partners to join the project in the same country or in nearby countries*

Lab partnership

*List of other laboratories with which there is an established cooperation in related fields*

Reference persons:

Head of the Institution:

Head of the Office/Department/Faculty/Institute/Laboratory:

CEI-PRAISE Focal Point and position and, if appropriate different Head of the Advanced Research Group:

Name and title/function:

Office/Department/Faculty/Institute/Laboratory:

Telephone:

Cell phone:

Fax:

E-mail:

Name of higher reference to whom the reference person reports or by whom is authorized:
Annex 8 - Friends of CEI-PRAISE: international experts who reviewed previous version of this document in an independent capacity

- **Prof. Carlo Rizzuto**
  Executive Director of European Consortium CERIC-ERIC
  Former Chairman of European Strategy Forum on Research Infrastructures ESFRI and of Elettra National CEI Focal Point for S&T for Italy
  E: carlo.rizzuto@elettra.eu; carlo.rizzuto@trieste.it

- **Prof. Giorgio Rossi**
  Università degli Studi di Milano, Department of Physics
  Vice President of ESFRI - European Strategy Forum on Research Infrastructures
  E: giorgetto.rossi2@unimi.it

- **Professor em. Dr. Helga Nowotny, Ph.D.**
  Chair of ERA - Council Forum Austria; Former President of the ERC
  Senior Adviser to the Austrian Federal Minister of Science, Research and Economy
  E: helga.nowotny@wwtf.at

- **Dr. Jan HRUŠÁK, CSc.**
  Academy of Science of the Czech Republic
  Adviser to the President on European and International Affairs
  E: hrušak@kav.cas.cz

- **Prof. Melvyn F. Askew**
  Fellow of Royal Agricultural Societies, Founder of Census-Bio
  Formerly Visiting Professor INF, Poznan
  E: melvyn.askew@btinternet.com

- **Sergiu Porcescu**
  Moldovan Office for Science and Technology, NCP Coordinator (Brussels), JRC NCP
  E: sergiu.porcescu@yahoo.com

- **Prof. Stanislav Miertus**
  Director of the International Centre for Applied Research and Sustainable Technologies ICAR, Bratislava
  Formerly Senior Scientist at the International Centre for Science and High Technology UNIDO-ICS
  E: stanislav.miertus@icarst.org

- **Prof. Viktor Nedović**
  Assistant Minister for EU Integration, International Programmes and Projects
  Ministry of Education, Science and Technology Transfer of Serbia
  E: viktor.nedovic@mpn.gov.rs