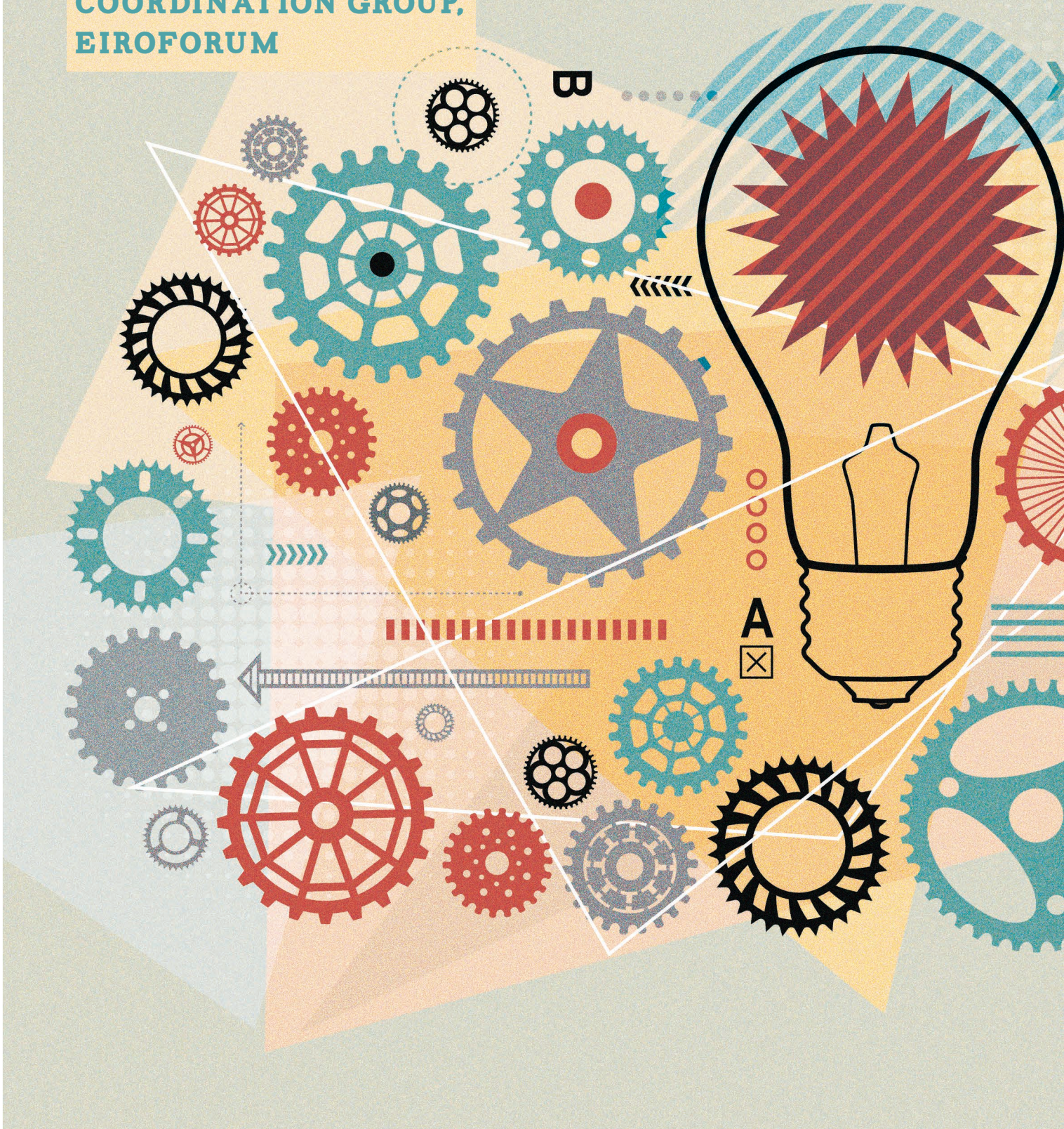
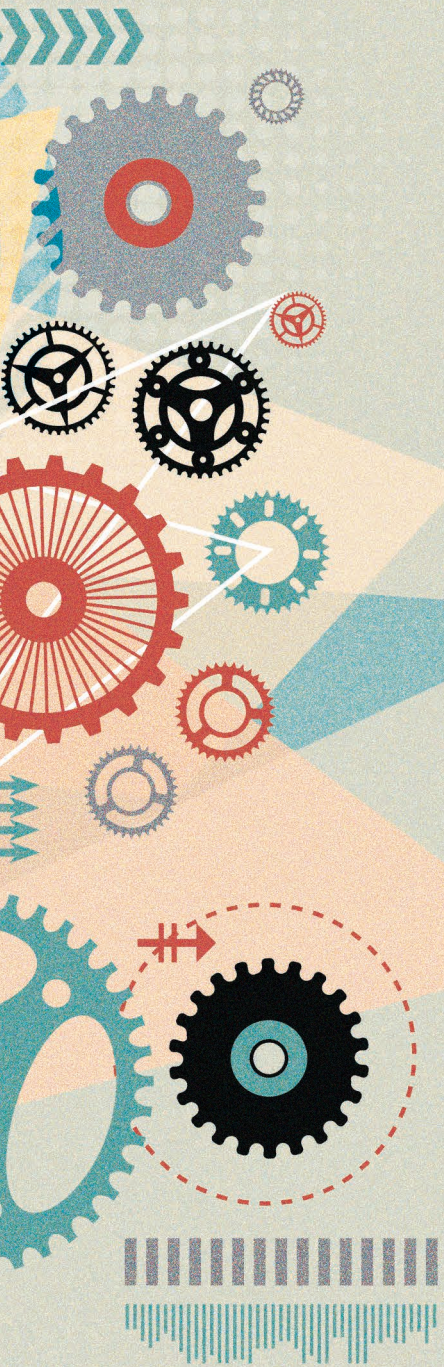




THE SUM OF ITS PARTS

COORDINATION GROUP,
EIROFORUM





Through its Coordination Group, EIROforum speaks to *International Innovation* about the consortium's scope and discusses the successful partnerships formed with institutions within Europe and beyond

What is EIROforum and why was it established?

EIROforum brings together eight European intergovernmental Research Infrastructures (RIs). The organisations – Conseil Européen pour la Recherche Nucléaire (CERN), European Molecular Biology Laboratory (EMBL), European Space Agency (ESA), European Southern Observatory (ESO), European Synchrotron Radiation Facility (ESRF), EUROfusion, European XFEL and Institut Laue-Langevin (ILL) – have been established to provide the infrastructure required to perform state-of-the-art research in their respective fields. Their success in enabling scientific breakthroughs, as well as supporting scientific excellence of users, has been closely related to the fact that the EIROforum organisations (EIROs), some of which have existed for 60 years, have extensive expertise in basic research and the management of large, international infrastructures, facilities and research programmes.

The EIROforum partnership should be placed in the context of the launch of the European Research Area (ERA) and the need to broaden the concept of European cooperation in science (interdisciplinary and, crucially, cross-border cooperation). EIROforum was established in 2002 with the aim of enhancing synergies between its members, and with a vision to create a climate in Europe in which relevant and competitive scientific research could be undertaken in an efficient, cost-effective and successful way.

How does EIROforum strive to support and develop world-class science across Europe?

EIROforum and its organisations support and develop world-class science in Europe and beyond, first and foremost by striving for excellence in their respective fields. This is possible as each of the EIROs is deeply embedded in its respective field of science and hence has a strong link to its community. Excellence in research requires state-of-the-art instrumentation and infrastructures, and EIROs therefore work towards efficient operations, continuous maintenance and timely upgrades of instrumentation and/or operational modes in order to ensure that the facilities correspond to the present and future requirements of their communities.

Can you provide any examples?

There are three ongoing cases. First, the ESRF upgrade programme. For more than two decades ESRF has been one of the world's leading synchrotron light sources when measured in numbers, for example, of users and in scientific output. Worldwide, the demand for high-brilliance X-ray beams has been growing and, consequently, four synchrotrons were inaugurated in Europe alone between 2006 and 2010. At the ESRF, the user communities have been specifically demanding smaller, nanosized beams with higher brilliance, improved facilities and instrumentation on the beamlines and, not least, more beam time, or a higher throughput of experiments. The ESRF Upgrade Programme (2009-22) is serving this demand, with the additional objective of maintaining the ESRF's role as the leading European provider of hard synchrotron radiation X-ray light in the forthcoming two decades.

The second example is the building of the European XFEL, which is in response to the scientific need for an extra peak power light source. The European XFEL will generate ultrashort X-ray flashes – 27,000 times per second – with a unique peak brilliance that is up to 1 billion times higher than that of the best X-ray synchrotron radiation sources. The ultrashort and extremely brilliant X-ray flashes will enable researchers to observe, among other things, dynamic processes such as changes to the atomic structure of molecules during a chemical or biological reaction. These features will open up completely new research possibilities and complement the scientific offering of actual and future state-of-the-art synchrotron radiation light sources. European XFEL will be ready to serve its users in 2017.

The third example is the construction of the European Extremely Large Telescope (E-ELT) in Chile. This telescope, the largest optical/near-infrared telescope in the world, was approved for construction in 2012 for an expected operation date in 2024 and has been designed to take images up to 16 times sharper than those from the Hubble Space Telescope. E-ELT will guide astronomers in answering the big questions of modern astronomy by aiding with the identification and characterisation of new planets and proto-planetary systems, as well as allowing scientists to observe the farthest objects in the Universe, potentially shedding light on dark energy.

To some degree, the EIROforum organisations act as grassroots movements, seeking solutions to the needs of European scientists; yet the partnership is also set within an intergovernmental framework. Is this a unique quality of EIROforum that brings certain advantages?

While much science is carried out on the basis of individual grassroots projects, in every research infrastructure, and also in EIROforum organisations, it is important to emphasise that the organisational, governance and legal frameworks of the research infrastructures are crucial to ensuring the coherence and sustainability of the research effort and enabling full use of the results over long timescales.

Excellent science is, by nature, an international endeavour, and breakthroughs can only be achieved through research collaborations

EIROforum plays an active and constructive role in promoting the quality and impact of European research, in particular by:

- Encouraging and facilitating discussions among its members on issues of common interest, which are relevant to R&D
- Maximising the scientific return and optimising the use of resources and facilities by sharing relevant developments and results, whenever feasible
- Coordinating activities of the organisations, including technology transfer and public outreach
- Taking an active part, in collaboration with other European scientific organisations, in a forward look at promising and/or developing research directions and priorities, particularly in relation to new, large-scale research infrastructures
- Simplifying high-level interactions with the EC and other institutions of the EU, and offering expert advice in the areas covered by the member organisations
- Providing coordinated representation to the outside world

The founding treaties of the EIROforum organisations offer a regulatory framework that is both flexible and reliable. All of the organisations are based on arrangements among member states, such as intergovernmental conventions or treaties, although they have opted for different legal models with regards to their implementation. These vary from an international organisation, a non-profit company model established under national law or a joint undertaking and a multi-party agreement.

These legal models ensure that the administrative workload within a particular RI is minimised. In the constantly evolving and always competitive global research environment, the organisational framework of RIs needs to support streamlined decision-making processes throughout the planning and operations period. In particular, a decision-making process able to identify the needs and ambitions of all member states/funders, and to respond rapidly with adequate programmes and/or projects, is a prerequisite to their continued relevance. The governance and legal frameworks must ensure that the implementation of the programmes, specifically the organisation of the industrial and scientific consortia that will support the development of the RI, are adequate to the member states' capacities and ambitions, while also complying with national regulations.

It is crucial to emphasise that the force of the eight EIROs is their close ties to their respective research communities – the grassroots. What is unique about the EIROs is that each group combines an international, top-down approach to needs defined from the bottom-up.

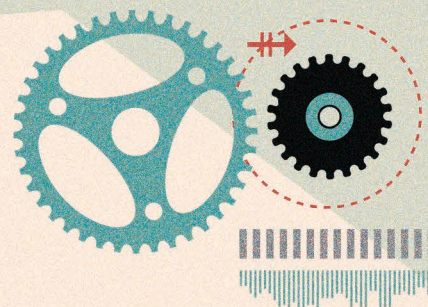
What role does the partnership play within ERA?

EIROforum and the EC signed their first Statement of Intent in 2003, explicitly outlining their agreement to collaborate with the aim of furthering the development of ERA. The partnership was renewed in 2010, where cooperation is foreseen in the following areas pertaining to ERA: research programming; training and mobility of researchers;

research infrastructures; intellectual property rights; and international cooperation in research. The cooperation is implemented via biannual Work Plans, which put forward synergies between the mid-term plans of the EC and EIROforum.

In some ways, ERA takes a top-down approach. The strong link with the scientific community and the fact that each of the eight organisations are international by nature allows a natural implementation of ERA bottom-up. The ERA process, which among other things led to the establishment of the European Strategy Forum on Research Infrastructures (ESFRI), has also enabled the identification of a whole range of important research facilities for the future. A key obstacle to realising the ambitions embedded in the ESFRI list is the ability to harness the necessary, yet specialised expertise. While this is indeed present within the EIROforum organisations, it is scarce. For this reason EIROforum has proposed a secondment scheme to alleviate or remove this bottleneck. EIROs have put programmes in place to ease the mobility of scientists. EIROforum fosters collaboration and competition and already ensures open access to their facilities. The partnership hence profits from the strength of its components.

The partnership has brought about regular meetings between EIROs' Director Generals and the EC Director General for Research and Innovation. These meetings facilitate the exchange of views and advice on topical research policy discussions, as well as considerations about the future of European research policy. EIROforum senior experts are also often asked for their views on very specific topics, such as long-term sustainability of RIs, cloud computing and access to research infrastructures. Both EIROforum and the EC find this collaboration valuable, and we believe that the partnership will continue to grow



stronger as research and science gain importance in understanding their key role in Europe's growth and long-term progress.

The EIROforum organisations have built strong relationships with institutions outside of Europe. How does this international collaboration benefit European scientists?

Excellent science is, by nature, an international endeavour, and breakthroughs can only be achieved through research collaborations. International cooperation offers an opportunity to improve the quality of research through competitively striving for excellence, assembling critical mass, facilitating the flow of perspectives, and enabling complementarity and synergy. Ultimately, international cooperation unlocks access to new sources of knowledge. It also optimises the use of available research infrastructure and promotes the circulation of young talent and innovative ideas, thus bringing added value to both European and global science community.

To enable sustainable interactions between the European research communities and their international peers, many of the EIROforum organisations have arrangements for dedicated interaction with countries outside of Europe. As an example, ESA cooperates with many of the world's space agencies, including NASA and Roscosmos.

What would you say have been some of the most influential policy activities EIROforum has been involved with?

We have advised on many research policy topics of European interest and our views are taken into consideration when drafting European policy papers. One particular area, which is driven by EIROforum alone and is a unique initiative in Europe, is science education. Since 2006, EIROforum has published its journal *Science in School* (www.scienceinsociety.org), targeted at secondary and high school teachers. With a mix of teaching activities, science topics and scientist profiles, the journal informs, motivates and inspires science teachers and, indirectly, their students. This enables it to provide an effective outreach channel for EIROforum and the individual EIROs, and to fulfil EIROforum's mission to promote inspiring science teaching. Today, the journal reaches 170,000 readers online and in print per quarter (2014 average). The print journal is in English, and online articles are available in 31 European languages.

THE ORGANISATIONS AND THEIR FIELDS

CERN (<http://home.web.cern.ch>) – high-energy physics

ESA (www.esa.int) – space exploration

ESO (www.eso.org) – astronomy/astrophysics

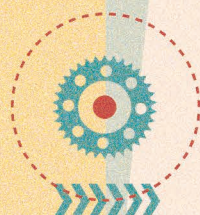
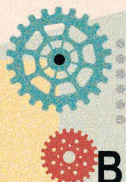
EMBL (www.embl.org/index.php) – molecular biology

ESRF (www.esrf.eu) – photon science based on synchrotron sources

EUROfusion (www.euro-fusion.org) – realisation of plasma fusion for energy

European XFEL (www.xfel.eu) – photon science based on free electron lasers

ILL (www.ill.eu) – neutron science



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