



ICSU Strategic Plan II, 2012-2017

(including a summary of progress made in implementing the Strategic Plan I, 2006-2011)



ICSU

International Council for Science

ICSU - International Council for Science

Founded in 1931, the International Council for Science (ICSU) is a non-governmental organization representing a global membership that includes both national scientific bodies (120 National Members representing 140 countries) and International Scientific Unions (30 Members). The ICSU 'family' also includes upwards of 20 Interdisciplinary Bodies - international scientific networks established to address specific areas of investigation. Through this international network, ICSU coordinates interdisciplinary research to address major issues of relevance to both science and society. In addition, the Council actively advocates for freedom in the conduct of science, promotes equitable access to scientific data and information, and facilitates science education and capacity building. [www.icsu.org]

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Foreword

This is the second ICSU Strategic Plan. From the creation of ICSU in 1931 until 2006 the organization functioned without a clearly articulated strategic vision. The need for ICSU to be more strategic was first raised in an external assessment completed in 1996. There have been many changes over the past two decades that prove the wisdom of this assessment; perhaps the most important of these is simply the pace and scale of scientific progress. International science has expanded to such an extent that ICSU is obliged to make clear choices – both of what to do and what not to do. This Strategic Plan, which has been developed in consultation with the ICSU Membership, is really a statement of those choices for the coming six years. It builds on the successes and lessons learned from the past, and tries to anticipate and address some of the major challenges for the future. It defines the operating space for ICSU during the next six-year period and at the same time leaves room for new ideas and areas to be nurtured and developed.

Of course, the proof of any plan is in its implementation. Having the ideas and defining the priorities is one thing; realizing the actions and having the desired impact is something else. Many of the actions laid out in this plan are not straightforward. The issues that ICSU, with its members, has chosen to address are important but also complex. Changing existing structures, implementing new interdisciplinary initiatives, promoting trans-disciplinary approaches, coordinating national infrastructures, defining scientific responsibilities, linking science to policy are all very major challenges. Moreover, ICSU does not have immediate access to the financial resources that could assist with these tasks. Rather, what ICSU does have, via its global network of members and partners, is access to the ‘intellectual’ resources to meet the challenges. ICSU is a convenor, facilitator and broker, providing a neutral platform on which scientists and other stakeholders can come together to agree on common approaches and actions, which they themselves then implement. The strength of ICSU is in both the individuals that it involves and the networks and organizations that it works with.




The Committee on Scientific Planning and Review (CSPR), under the chairmanship of the ICSU Vice-President Kari Raivio, is a good illustration of the convening power of ICSU. Made up of 15 leading scientists from different countries and disciplines, it is this committee that has managed the consultation and planning process resulting in this new Strategic Plan. The process has been overseen by the Executive Board, which also represents a diversity of science and cultures. We take this opportunity to thank all of those who served on these bodies and the many other scientists from around the World who have freely contributed to the development of this Plan.


The Plan includes a summary of achievements, including the completion and launching of a number of new global initiatives during the period 2006-2011 (see Annex 1). If we take this as evidence of the feasibility of what is proposed for the next six years, then we should be optimistic. ICSU has a critical mission to contribute to *strengthening international science for the benefit of society*. It has delivered on this mission in the past and, with the support of its Members and partners, it is now well positioned to do so in the future.

Catherine Bréchnignac
President, 2008-2011

Yuan T Lee
President, 2011-2014

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Executive Summary



The International Council for Science has the ambitious mission of strengthening international science for the benefit of society. In 2006, it launched its first-ever strategic plan, which laid out how it would build on the strengths of its global network of international disciplinary Unions, National Member organizations and strategic partners to address key issues for science and society. The second Strategic Plan presented here summarizes the major achievements over the past six years and analyses the key challenges ahead in order to identify priorities and actions for the next six years.

ICSU's activities can be organized into three major areas: coordinating and planning research, science for policy and the universality of science. In practice, many of ICSU's most successful activities cut across all of these areas. For example, over the past three decades, international research programmes sponsored by ICSU and its partners have provided the scientific basis for understanding global environmental change, as acknowledged by the Intergovernmental Panel for Climate Change. A more recent illustration of ICSU's potential is the International Polar Year (IPY), 2007-2008, which was planned by ICSU and implemented in partnership with the World Meteorological Organization. It brought together tens of thousands of scientists from more than 60 countries in a coordinated campaign of multi-disciplinary research and outreach. Following up on the legacy of the Polar Year, particularly in relation to data access and observation systems, will be a continuing priority for the next six years. Ensuring that the scientific results from IPY are translated into policy will be the focus of a major international conference in 2012. And the education and outreach activities of IPY provide a model for how ICSU can have an impact at the interface between science and society; this model needs to be replicated across all new interdisciplinary initiatives.

So what new initiatives are being planned to emulate or complement the global change programmes, IPY and other successful ICSU research activities? There are two major new interdisciplinary research initiatives proposed in the current plan. The first of these focuses on earth system research for global sustainability and aims to build on and expand the existing global environmental change programmes by integrating natural and social sciences and humanities to address five identified 'Grand Challenges'. These challenges provide also a framework for integrating ICSU's recently launched initiatives on disaster risk and ecosystem change and aligning them with the priorities of funding agencies, who are working in an alliance with ICSU and other partners to co-design the new sustainability initiative. This cross-cutting initiative will have a particular focus on science for adaptation and mitigation at the regional level and there will be a key role for the ICSU Regional Offices in ensuring the full involvement of less developed countries. The second new interdisciplinary initiative that is being proposed aims to promote a systems analysis approach to urban health and wellbeing. This builds on the interests of several of ICSU's Unions and aims to provide integrated scientific information that is useful for urban decision-makers. Again, the role of partners will be crucial and there will be an important regional element.

In the context of science for policy and ICSU's role in representing the global science community in international policy fora, the UN Conference on Sustainable Development, which will take place in Brazil in June 2012, represents a very important milestone. In 2011, ICSU is convening series of regional workshops to bring together scientists and other stakeholders to agree on input to the preparatory meetings for the Conference. At the Conference itself in Rio de Janeiro, ICSU and other partners will organize a Science, Technology and Innovation Forum and launch the new research initiative on earth system sustainability. At this stage the precise outcomes of Rio+20 are hard to predict, but there is likely to be a renewed global commitment to achieving the Millennium Development Goals in the broader context of sustainable development. Science must be a key part of this future global agenda and ICSU is committed to working with whatever structures are put in place following the Rio Conference to connect science and policy. Likewise, it has already been agreed that a new Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) will be established in 2012 and ICSU, working with its global environmental change programmes, has been formally invited to represent science in this structure.

Promoting the Universality of science – developing and strengthening the global science community on the basis on non-discrimination and equity – is a fundamental function of ICSU and underpins all its other activities. This embraces scientific freedoms and responsibilities, access to data, information and research materials, capacity building and science education. It requires the active commitment of ICSU Unions and National Members working together on local, regional and global scales. The Committee on Freedom and Responsibility in the conduct of Science is planning a series of workshops working with National Members to generate guidance in areas such as academia-industry interactions. A World Data System is being established to ensure long-term stewardship and open worldwide access to essential data-sets and data products – its success depends on the commitment of nationally funded data centres, with Unions also having a critical role in ensuring data quality. And whilst it is proposed that capacity building and science education will be a part of all new interdisciplinary initiatives, these are also areas in which the Unions can make a critical contribution at the disciplinary level. The grants programme will be re-focused to encourage Unions to work with the ICSU Regional Offices and reach out to scientists and students in less developed countries.

There are several issues relating structure and function that have become apparent over the past six years and which need to be addressed if ICSU is to achieve its strategic goals. An ongoing foresight exercise to explore the future of international science and ICSU's role therein has also highlighted a number of critical structure-function issues. These include issues of membership and disciplinary representation (social and health sciences and engineering); models for implementing and funding new interdisciplinary, international initiatives; establishing productive partnerships; and linking effectively with decision-makers. It also relates to the positioning and role of ICSU relative to other global and regional science bodies. Actions relating to some of these areas are laid out in this strategic plan. Most importantly, it is proposed that a comprehensive external review of ICSU be commissioned at some stage over the next six years to analyse some of these structure-function issues in more detail.

ICSU is a complex organization with a long history that has undergone very considerable change over the past decade. Preparing and presenting the six-year Strategic Plan for ICSU in such a way that it can be easily understood is not a trivial task. The highlights for the next six years have been touched upon in this Executive Summary and a comprehensive list of actions is provided in the table that follows.

Summary of proposed strategic activities, 2012-2017

The table below is a summary of the principal priority themes and actions that are proposed for the six-year period 2012-2017. More detail on these is given in the subsequent sections of this Strategic Plan. Many of themes are modified from those in the first Strategic Plan (ICSU, 2006) and, for reference, a summary of progress between 2006 and 2011 is provided in Annex 1.

The successful implementation of the actions that are listed depends on the support and involvement of National and Union Members and the establishment of effective strategic partnerships with other organizations.

Planning and coordinating research

Theme	Actions, 2012-2017
Earth system sustainability research and global environmental change	Implement new strategic framework for research on global sustainability; co-design and launch a major new 10-year initiative; re-structure current activities as necessary to implement the new initiative.
Global Earth Observing Systems	Work with the observing systems in the context of the new research initiative; establish a role for the ICSU World Data System in relation to the developing Global Earth Observation System of Systems; review role of ICSU in earth observation systems.
Polar research	Integrate polar research into overall framework for research on global sustainability; review future international coordination of polar research and ICSU's role, including IPY legacy issues.
Disaster risk	Implement IRDR programme within overall framework for research on global sustainability; integrate regional science plans into the global IRDR plans; review progress of IRDR in 2014.
Ecosystem change and society	Implement PECS programme within overall framework for research on global sustainability; integrate regional activities and interests into PECS; review progress of PECS in 2016.
Sustainable energy	Promote activities in the area of energy within the overall framework for research on global sustainability; implement and ensure coordination of regional science plans, taking into account the Global Energy Assessment.
Human health and wellbeing	Implement new 10-year initiative on urban health; work via Regional Offices to facilitate involvement of less developed countries in this initiative.
New horizons and future directions	Engage ICSU Membership in continuing foresight analysis; adapt ICSU's focus and structure, as necessary, in light of foresight; convene 'pilot' workshop on nanotechnology and nanoscience in 2012.

Science for policy activities

Theme	Actions, 2012-2017
Commission on Sustainable Development (CSD)	Continue to provide scientific input on specific topics, working with relevant ICSU Members, bodies and other UN Major Groups.
UN Conference on Sustainable Development	Represent science in Rio+20; organize regional science events and a science forum in Rio; take lead post-Rio in ensuring responsive actions from science community.
Biodiversity and ecosystem services (IPBES)	Ensure the place of science in the IPBES structure; provide scientific input to IPBES.
Climate change (IPCC)	Strengthen and expand contribution of ICSU community to IPCC assessments, via new initiatives, e.g. the Earth System Sustainability Initiative and IRDR.
UN organizations	Strengthen established links and develop new links with bodies such as UNEP and WHO; re-invigorate UNESCO partnership.
Other international policy fora	Participate on a 'case-by-case basis' in other key science-policy fora that fit with ICSU's overall goals.
Regional and national policy mechanisms	Identify and target key regional fora, via Regional Offices; work with National Members in policy priority areas, e.g. Rio+20; organize workshop(s) on "climate change assessment and policy-making at the national level".

Strengthening the Universality of Science

Theme	Actions, 2012-17
Principle of Universality (Freedom and Responsibility)	CFRS to continue working with Members to defend freedoms and promote responsibilities of science.
Data and Information	Consolidate and expand the new World Data System; Implement ad-hoc strategic committee (SCCID) recommendations; conduct a strategic review of the Committee on Data for Science and Technology; work via dedicated ICSU bodies and Regional Offices to expand access to less developed countries.
Reaching out to all countries/ Regional Offices	Strengthen ICSU presence and activities at national level; work with hosts to strengthen activities of Regional Offices; use grants programme to link Unions and Regional Offices, with focus on capacity building; establish fourth Regional Office in the Middle East and North Africa region; work with European Members' network and ICSU bodies to strengthen interactions with CIS and Western Balkan countries.
Science Education	Work with Members and Regional Offices to facilitate interaction between scientists and educators; promote education activities within the context of existing and new interdisciplinary initiatives; review progress in 2016-2017.
Science and Society	Promote science-society interactions across the breadth of ICSU activities, e.g. Rio+20; develop trans-disciplinary research approach in new initiatives; CFRS to organize workshops and provide advice on important science-society issues; organize sessions at AAAS and ESOF meetings.

Structure-Function issues

Theme	Actions, 2012-2017
Union Members	Facilitate Union involvement in new interdisciplinary initiatives and other activities; formally support, on a case-by-case basis, proposals from Unions for International Science Years; include relations with the Unions as part of proposed external review of ICSU.
National Members	Facilitate Members' involvement in new interdisciplinary initiatives and other activities; expand membership and involvement of less developed countries via Regional Offices.
Interdisciplinary Bodies (IBs)	Monitor new single-host model for new IBs and review each one after five years; conduct a series of IB reviews, starting with CODATA; strengthen IB-Regional Office links.
Grants Programme	Continue with focus on catalysing closer interactions between Unions, Interdisciplinary Bodies and Regional Offices.
Associates	Review the role of Associates; encourage important regional partners to become associates; strengthen representation of social, engineering and health sciences within ICSU.
The Secretariat	Strengthen human capacity via secondments from Members.
Governance	Replace PCDC with a new strategic coordination group.
Communication and outreach	Increase visibility and outreach, making maximum use of website and other social networking and multi-media tools.
Partners	Identify and work with active partners in developing and implementing new initiatives.
Resources	Ensure transition to new dues structure in 2012; establish a new Committee for Fund-raising; work with diversity of public and private donors to ensure funding for global and regional initiatives.
Evaluation and value for money	Commission an independent external assessment of ICSU to report to the GA in 2014 and/or 2017.



1. ICSU in a changing world

1.1 ICSU: past and present, form and function

ICSU, whose original name was the International Council of Scientific Unions, was created in 1931, although its roots can be traced back to 1899. Its establishment was recognition, even in those early days, that science was both international and interdisciplinary and that there was added value in combining these two aspects. This was reflected in the dual membership of international disciplinary unions and national interdisciplinary bodies (mainly academies). In 1998, the name was changed to better reflect its 'mixed' composition and it became the International Council for Science.

Over time, ICSU's role has changed significantly, although its primary focus on working with its Union and National Members to address key areas of international, interdisciplinary science remains the same. Starting with the International Geophysical Year in 1957, ICSU has established itself as the leading non-governmental organization for planning and coordinating global research in the area of the environment. This has led to it being the institution of choice for representing science in many international policy fora, in particular within the United Nations system. Promoting the freedom – and more recently the associated responsibilities of scientists – is an integral aspect of the Principle of Universality of Science which has underpinned ICSU activities from the very outset. In order to contribute effectively in these three key domains (Fig. 1) ICSU has, over time, established interdisciplinary bodies, some of which are co-sponsored with other organizations. There are currently 17 of these bodies, which are listed in Box 1 (overleaf).



Fig. 1 Key domains of ICSU activity

The ICSU vision (see below) and mission – *strengthening international science for the benefit of society* – were first articulated in conjunction with the development of the Strategic Plan 2006-2011. Most importantly, they make explicit what had already been understood for some time: that ICSU's role is not just to promote excellence in international interdisciplinary science but to link this to societal benefit.

The ICSU Vision

The long-term ICSU vision is for a world where excellence in science is effectively translated into policy making and socio-economic development. In such a world, universal and equitable access to scientific data and information is a reality and all countries have the scientific capacity to use these and to contribute to generating the new knowledge that is necessary to establish their own development pathways in a sustainable manner.

Box 1. ICSU Interdisciplinary Bodies

The Interdisciplinary Bodies bring together different scientific disciplines to address scientific issues of international relevance that are of interest to ICSU Members. Some of these bodies are co-sponsored with other organizations and are referred to as joint initiatives.

THEMATIC BODIES

Committee on Space Research (COSPAR)
Integrated Research on Disaster Risk (IRDR, with ISSC and UN-ISDR)
Programme on Ecosystem Change and Society (PECS, with UNESCO)
Scientific Committee on Antarctic Research (SCAR)
Scientific Committee on Oceanic Research (SCOR)
Scientific Committee on Solar-Terrestrial Physics (SCOSTEP)

GLOBAL ENVIRONMENTAL CHANGE PROGRAMMES

DIVERSITAS: an International Programme of Biodiversity Science (with UNESCO, IUBS, IUMS and SCOPE)
International Geosphere-Biosphere Programme (IGBP)
International Human Dimensions Programme on Global Environmental Change (IHDP, with ISSC)
World Climate Research Programme (WCRP, with IOC of UNESCO and WMO)

MONITORING/OBSERVATION BODIES

Global Climate Observing System (GCOS, with WMO, IOC, FAO and UNEP)
Global Ocean Observing System (GOOS, with WMO, UNEP and IOC)
Global Terrestrial Observing System (GTOS, with FAO, UNEP, UNESCO and WMO)

DATA AND INFORMATION BODIES

Committee on Data for Science and Technology (CODATA)
International Network for the Availability of Scientific Publications (INASP)
Scientific Committee on Frequency Allocations for Radio Astronomy and Space Science (IUCAF)
World Data System (WDS)

Within the framework of its mission and vision, ICSU has three overarching and inter-related goals

1. *Research coordination and planning* – to organize excellent international interdisciplinary research in selected priority areas of importance to society
2. *Science and policy* - to ensure that science is integrated into policy development at the international and national level and that relevant policies take into account both scientific knowledge and the needs of science.
3. *Universality of science* – to promote the freedom and responsibilities of scientists and access to data and information as a critical contribution to strengthening the global science community.

ICSU is committed to working with its Members, associates and strategic partners in order to deliver these goals. To this end, the criteria for selection of specific ICSU activities are shown in Box 2.

Box 2. Criteria for selection of ICSU activities

ICSU activities are proposed by the Committee on Scientific Planning and Review and/or Executive Board in consultation with Union and National Members. The six-year Strategic Plan and any major new initiatives are subject to formal approval by the General Assembly. The general selection criteria for all activities are as follows:

1. Does the activity fit with ICSU's mission – *to strengthen international science for the benefit of society* – and longer term vision?
2. Does it build on the strengths of ICSU Membership, i.e. is it interdisciplinary and international?
3. Does the activity address global and/or regional interests and priorities?
4. Is there a unique niche that ICSU can fulfill, distinct from that of other international organizations and potential partners?
5. Does ICSU have a track record in the area or obvious potential to contribute?
6. Is the activity of interest to a significant proportion of the ICSU Membership?

1.2 The evolving context for international science

In 2010 UNESCO published the *UNESCO Science Report 2010: The Current status of Science around the World*, and in 2011 the Royal Society published *Knowledge, Networks and Nations, Global Scientific collaboration in the 21st Century*. These two analyses give a comprehensive overview of the present international landscape for science and technology. The main conclusions have been drawn together as part of an ICSU foresight exercise to explore the future of international science over the next two decades (ICSU, 2011a). These conclusions are repeated here and help to provide the context in which ICSU's strategy and priorities for the next six years need to be considered.

Science is increasingly global: This is reflected in the rise of China and rapid developments in India and Brazil. New centres of scientific excellence are emerging in the Middle East and South East Asia, and the smaller European nations are strengthening their role. At the same time, the USA, Western Europe and Japan have, on the whole, retained their historical strengths and many less developed countries are struggling not to be marginalized.

A multi-polar science world is developing: The continued strength of the traditional centres and the emergence of new players such as the BRIC countries (Brazil, Russia, India and China) points toward an increasingly multi-polar scientific world.

The scientific world is becoming increasingly connected: New digital technologies have accelerated the organization of science, making it easier than ever before for researchers to work together. This has been further supported by more extensive and cheaper air travel.

Skilled migration is occurring: Recent decades have seen significant increase in the global competition for talent. Understanding whether this is brain gain, drain or circulation is difficult as there is little data on the factors that influence individuals' choice of location, how long they intend to stay and how they connect back to their home countries. However, brain drain remains a major challenge for less developed countries.

The primary driver of most collaboration is still the scientists themselves: However, little is understood about the dynamics of networking and mobility of scientists, how these affect global science and how best to harness these networks to catalyse international collaboration.

Many global assessment and research programmes are managed separately: This despite the reality that many global challenges are interdependent. This often reflects a lack of co-ordination in the science policy sphere.

The role of business in science is growing and transnational: Spending on research and development by industry in the OECD countries increased from 52% in 1981 to 65% in 2008 and only 2% of patent applications are from outside of North America, Asia and Europe. From 1993 to 2002 R&D spending by foreign investors in countries grew from an estimated US\$30 to US\$67 billion. This pattern is driven by global competition for talent, the result of companies looking outward for new knowledge, and the influence of policies by countries to attract foreign investment. Increasingly multinational companies are decentralizing their research activities, with very significant investment in the BRIC countries.

Science is an important part of international diplomacy: Science increasingly contributes to international diplomacy as many issues that nations face are seen as global. Science is recognized as having an important role in informing international policy discussions on many topics. It is an important part of the diplomatic activity of many nations.

There are concerns about science education and literacy: In many countries, across all scales of development, there are serious concerns about science education, in relation both to the training of scientists and scientific literacy more broadly. Paradoxically, there is an inverse relationship between the quality of a country's overall education system and interest in science (see, for example, the Report of the ICSU Ad-hoc Review Panel on Science Education, ICSU, 2011b).

1.3 The first Strategic Plan and lessons for the future

Progress in implementing the specific actions that were included in the first ICSU Strategic Plan 2006-2011, is summarized in the relevant chapters of the current document and in Annex 1. The majority of the agreed actions have been successfully carried out and in some cases, such as the implementation of the International Polar Year, the impact has unquestionably been significant. In other areas, such as sustainable energies or exploring new horizons, progress has been less consistent. It is important that ICSU learns both from its successes and relative failures in planning its future activities. These lessons need to be considered alongside the rapidly evolving context for science in deciding on future priorities for ICSU and on the most appropriate mechanisms to address these priorities.

Three major cross-cutting challenges have emerged or become more evident since 2006 and during the implementation of the first ICSU Strategic Plan.

- **Integrating regional and global activities and bridging the gap to the less developed countries:** since 2005, ICSU has established three Regional Offices for Africa, Asia and the Pacific, and Latin America and the Caribbean. They have a key role to play in linking ICSU to the less developed countries in these regions. These Offices have developed their own science plans, building on expertise in the regions, and are at the early implementation stage of these plans. In most, but not all, cases, they are complementary to ICSU's global initiatives and ensuring the synergy and coordinated support for the regional and global plans will require concerted efforts.
- **Integrating disciplinary perspectives** (including the Unions) into interdisciplinary initiatives: ICSU concentrates its activities on the interface between scientific disciplines, leaving the main responsibility for organizing and promoting the disciplines themselves to its Union Members. The Unions and ICSU have different and complementary roles and the mechanisms for more fully exploiting the disciplinary expertise of the Unions in ICSU activities need to be improved.

A relatively new but increasingly important challenge for ICSU is incorporating disciplinary perspectives that are not represented by the current Union membership into its activities. Extensive efforts have been made to include social sciences in the new ICSU initiatives that have been developed over the past six years and this needs to continue and be expanded to incorporate the health and engineering sciences, including by building on the existing expertise within several Unions.

- **Structure–function issues:** in several areas, there is some discordance between ICSU’s mission and goals and the structures that are expected to deliver these. At one level this relates to the composition and roles of ICSU Members and Associates. It also relates to the models for implementing ICSU initiatives and the links with funding agencies and policy-makers. (see Section 5)



2. International Research Collaboration

Goals

¹*Science for Global Sustainability* - to realize the full potential of science, integrating knowledge across a broad range of disciplines, to assist societies in making the transition to sustainable development.

Human Health – to ensure that health considerations are duly taken into account in the planning and execution of future activities by building on the relevant strengths of Scientific Unions and Interdisciplinary Bodies.

New Scientific Horizons – to monitor emerging international research issues of importance to science and society and to develop mechanisms to ensure that these can be addressed in a timely manner by the relevant members of the ICSU family.

Progress and achievements, 2006-2011

Beginning with the International Geophysical Year in 1957-1958, ICSU has a long tradition in planning and coordinating international research endeavors, particularly in the area of environmental research. In order to understand the complexities of the earth system, these initiatives have become progressively more interdisciplinary and in the Strategic Plan 2006-2011 this trend was continued with commitments to review existing structures and develop and launch several new programmes and assessments.

Progress in meeting these commitments is summarized in Annex 1 and more details on specific areas are given in Section 2.1. However, looking to the future, it is useful here to illustrate the scale and potential impact of ICSU's research activities with just a few key highlights from the past six years:

- The ICSU-sponsored and co-sponsored, Global Environmental Change programmes have played an essential role in providing the science that underlies the assessments of the Intergovernmental Panel on Climate Change (IPCC) ;
- The International Polar Year, 2007-2008 mobilized thousands of scientists and educators from over 60 countries and revealed the extent to which dramatic changes are occurring in the polar regions and impacting on the planet as a whole ;
- Two major international programmes, on Disaster Risk (IRDR) and Ecosystem Change (PECS), were launched in 2008 and programme offices have been established with substantial support from host countries.

¹ All strategic goals marked with an asterisk are new for 2012-2017. Those that are not marked are continuing goals that were originally identified for the Strategic Plan 2006-2011.

- The newly established ICSU Regional Offices brought together leading scientists – many of them from countries that have previously been peripheral to ICSU activities – to develop regional science plans that are ready to be implemented with support from international donors.
- The key research questions for earth system sustainability for the next decade were identified in a world-wide consultation. These ‘Grand Challenges’ have been rapidly adopted by funding agencies and provide the basis for co-designing a major new international initiative.

Challenges over the next decade

There are a number of challenges that ICSU is faced with over the coming years with regard to its changing portfolio of research programmes and initiatives.

An appropriate balance needs to be struck between nurturing new programmes and initiatives and terminating matured activities. There needs to be a division of efforts between reviewing and, where necessary, re-aligning existing activities and developing new initiatives.

Maximizing the synergies and cross-fertilization between disciplinary and interdisciplinary research is an ongoing challenge. As the emphasis within ICSU’s programmes is increasingly on meeting societal needs, then inevitably the need to include perspectives from social sciences is heightened. Likewise stronger links with agricultural, engineering and health sciences need to be fostered, including by building on the existing strengths of several Unions. At the same time, both traditional and newly emerging scientific disciplines need to be supported and strengthened.

Attracting young researchers into ICSU’s programmes is critical for ensuring their future viability and influence. A new generation of globally representative male and female scientific leaders needs to be nurtured. This is one focus of the international science years organized by many Unions. Initiatives such as the International Polar Year can complement these with the development of dynamic new interdisciplinary networks.

Financial support for both existing and new global research planning and coordination activities is necessary. Developing effective strategic and operational partnerships is critical. New co-design mechanisms, working with research funding agencies and other stakeholders are being developed. Closer links with development agencies and other funders are also being established and need to be strengthened.

2.1 Earth system science for global sustainability: a framework

Following reviews of the Global Environmental Change (GEC) programmes (see ahead, Section 2.1.2), a visioning exercise was launched in 2009 to identify the key scientific questions for earth system research over the next decade. The resultant document, *Earth Systems Science for Global Sustainability: the Grand Challenges* (ICSU-ISSC, 2010), represents a very significant milestone in the development of ICSU’s research portfolio. It provides a framework for the evolution of global environmental change research and the necessary integration of natural and social sciences. It is notable that this has been developed in partnership with the International Social Science Council (ISSC) and this partnership is likely to be increasingly important over the next decade.

The five Grand Challenges, which are laid out in the ICSU-ISSC document and have been identified after extensive worldwide consultation with the scientific community, are:

1. Forecasting: improve the usefulness of forecasts of future environmental conditions and their consequences for people.

2. Observing: develop, enhance and integrate the observation systems needed to manage global and regional environmental change.
3. Confining: determine how to anticipate, recognize, avoid and adapt to abrupt global environmental change.
4. Responding: determine what institutional, economic and behavioural changes can enable effective steps towards global sustainability.
5. Innovating: encourage innovation (coupled with sound mechanisms for evaluation) in developing technological, policy and social responses to achieve global sustainability.

These Grand Challenges have been broadly accepted by a group of major environmental research funding agencies – the Belmont Group - who had been conducting a parallel process of setting research priorities (ICSU, 2010). These challenges and priorities are now being integrated together into the plans for a new joint initiative (see ahead, Section 2.1.2). Discussions are ongoing with representatives from the existing Global Environmental Change programmes and their co-sponsors to look at what contribution they can make to this ambitious agenda. New ICSU initiatives on hazard risk (IRDR) and ecosystem change (PECS) have an important part to play, as do the co-sponsored Global Observing Systems. Polar research and regional activities on sustainable energy can also be taken forward within the framework of the Grand Challenges. Details of how these various activities will be further developed are given in the following sections.

2.1.1 Earth System Sustainability Initiative (ESSI)

In order to address the Grand Challenges, a major new decadal initiative will be launched. This will build on the existing global change programmes and other relevant activities and will have a particular focus at the regional level. The aim is to deliver the knowledge that is necessary to implement policy and/or technology solutions that can lead to a sustainable future at multiple scales – local to global. The Initiative will address critical issues such as food, water and energy security and their links to environmental change and human development in an integrated system approach.

In June 2011, a Transition Team was established by an alliance of ICSU, ISSC and the Belmont Group of funding agencies. Several UN agencies have agreed to formally join this alliance and/or be represented on the Transition Team. The Team is tasked with developing a strategic framework – based on the Grand Challenges and related Belmont Report – and an implementation process for the new Initiative. This will include proposals for changes to the existing structures and mechanisms for support.

The aim is to present the advanced plans for a new initiative at the Planet Under Pressure meeting being organized by the GEC programmes in March 2012, and then to formally launch it at the Rio+20 Earth Summit in June 2012 (see ahead, Section 3.1.2).

2.1.2 Global environmental change programmes

ICSU is a co-sponsor of four GEC programmes that are focused on climate, geosphere-biosphere, biodiversity and human dimensions (see Table 1 for full titles, acronyms and co-sponsors). For the past 2-3 decades, these four programmes have served global science (and society) by developing strategies and promoting and coordinating research in their respective areas of interest. They have also increasingly been involved in communicating the outcomes of this research. As mentioned above, they have made a major contribution to the assessment work of the Intergovernmental Panel on Climate Change (IPCC). In 2001, the four programmes joined together to form the Earth Systems Science Partnership (ESSP), which has been responsible for cross-cutting projects in areas such as carbon, water, food systems and health.

Reviews of the majority of programmes and the Partnership between 2005 and 2008 raised issues

about prioritization, integration, coordination and overlap. It was recognized that ESSP was not currently equipped to adequately respond to these concerns and the possibility of restructuring was raised. The need for an over-arching strategic framework for all GEC activities was strongly emphasized. It was as a direct result of these reviews that the earth system science visioning process was launched, resulting in the Grand Challenges document.

Several meetings have been organized in 2009-2011 with lead scientists, sponsors and funders of the GEC programmes to discuss the Grand Challenges and the implications for existing and new institutional structures. It is recognized that some of the existing interests and activities of the programmes will need to continue into the future but these will need to be supplemented by a new focus on integrated science.

²**Key partners:** International Social Science Council; intergovernmental sponsors of the GEC programmes (WMO, UNESCO, IOC, UNEP, UNU); funding agencies – Belmont Group and International Group of Funding Agencies (IGFA); individual national funders and development agencies; private foundations and donors.

Overall strategy

To work with existing structures, their co-sponsors and other potential partners, whilst reaching out to the scientific community more broadly, to promote the integrated research that is required to address the five Grand Challenges in Earth System Science for Global Sustainability.

Area/activity	Actions, 2012-2017
Earth System Sustainability Initiative	<ol style="list-style-type: none"> 1. Implement new strategic framework for global sustainability, based on the Grand Challenges document. 2. Co-design and launch a major new 10-year initiative.
Global Environmental Change (GEC) programmes and partnership (ESSP)	<ol style="list-style-type: none"> 3. Merge ESSP into a new structure to implement the new initiative. 4. Integrate programme activities as necessary to implement the new initiative.

2.2 Global Earth Observing Systems

ICSU is a co-sponsor, together with various UN agencies, of the established global observing systems for the oceans and the terrestrial domain and the cross-cutting system for the climate. In 2003, an inter-governmental Group on Earth Observations (GEO) came together and agreed to develop Global Earth Observation System of Systems (GEOSS). The intention was to build and expand on the existing structures to implement a more comprehensive and integrated global network.

ICSU has been a participating organization in GEO from the outset and is variously represented on several of its key committees³, including a period as co-chair of the S&T Committee. The ICSU World Data System (see ahead, Section 4.2) has a potentially key role to play in long-term stewardship of GEOSS data and it is actively involved in the data architecture committee of GEO.

² Key partners are identified in association with the various priority themes throughout this document. These include both formally committed partners and potential partners, some of whom have not been formally approached. Establishing active strategic partnerships will be an important aspect of addressing each theme.

³ Over the past six years, several Interdisciplinary Bodies have played critical roles in taking forward the various GEO work packages: the ICSU Committee on Data for Science and Technology (CODATA) has played a leadership role in developing the GEOSS data-sharing principles; DIVERSITAS has taken the lead in developing the framework for a biodiversity and ecosystems services observation network (GEO-bon); the ICSU Committee on Space Research (COSPAR) has taken over ICSU's role as co-chair of the GEOSS S&T Committee.

The eventual success of GEOSS depends on continued governmental commitment and close interaction between the operational and research aspects of earth observations. One of the five Grand Challenges for global sustainability research is to develop, enhance and integrate socio-environmental observation systems. ICSU has a continuing role to play in GEOSS over the next six years, in advancing this agenda and representing the interests of the global science community.

At the same time, it is timely to re-assess the ongoing sponsorship role of ICSU in relation to the existing global observing systems. A forward-looking assessment of ICSU's environment programmes (ICSU, 2003) concluded that the links between these programmes and some of the observing systems were relatively weak. The various UN co-sponsors of the systems have also variously questioned how these links might be strengthened. Given the importance of observations for responding to the Grand Challenges and the potential for GEOSS to improve the coordination and integration of the existing systems, a strategic review of ICSU's future role in relation to observing systems is proposed.

Key partners: GEO, WMO, IOC, FAO, UNEP.

Overall strategy and specific actions

- To work with the global observing systems and GEOSS in relation to the new earth system sustainability initiative, in particular Grand Challenges 1 and 2 – Forecasting and Observing;
- To establish a role for the ICSU World Data System in relation to GEOSS (see ahead, Section 4.2);
- To conduct a review of the role of ICSU in earth observation systems.

2.3 Polar research

The poles provide unique historical insights, serve as a barometer of the current state of the planet and can act as an indicator of future. Hence, polar science is a critical aspect of global sustainability research.

The International Polar Year 2007-2008 was planned by ICSU (ICSU, 2004c) and co-sponsored with the World Meteorological Organization. It brought together tens of thousands of scientists and educators from more than 60 countries in a two-year internationally coordinated campaign of multidisciplinary research and outreach. It culminated in the largest-ever polar science meeting, convened in Oslo in June 2009. Many of the studies initiated during IPY are still ongoing and much of the collected observations and data have yet to be fully analysed. Another major conference is being planned for Montreal in 2012, when the policy implications of IPY science will be considered.

IPY revealed the strengths and weaknesses of the long-standing mechanisms for coordinating polar research. There is now renewed enthusiasm and a pressing need to address the legacy issues arising from IPY: to strengthen long-term polar observation systems; to ensure easy access to quality controlled data; to continue public education and outreach. Building on the solidarity between scientists from different nations that characterized IPY requires continuous and active global leadership. ICSU has a critical role to play as many of the structures involved in global coordination are either interdisciplinary bodies or associates of ICSU itself and/or affiliated with ICSU Unions.

It is proposed that a strategic review of future polar research needs and structures be carried out within the framework of the Grand Challenges for sustainability research. This would include consideration of the roles of: the Scientific Committee for Antarctic Research, the International Arctic Science Council, the International Permafrost Association, the IUGG Cryosphere Commission and the links between these and the GEC programmes and ICSU's data bodies.

Key partners: WMO and international polar research bodies

Overall strategy and specific actions

- To work with polar science bodies and funding agencies to integrate polar science into the mainstream earth system research agenda and the Grand Challenges framework;
- To review the needs and mechanisms for the future international coordination of polar research and the role of ICSU, including IPY legacy issues;
- To co-sponsor the IPY 2012 “From Knowledge to Action” conference in Montreal.

2.4 Disaster risk

A new 10-year initiative on Integrated Research on Disaster Risk (IRDR) was approved at the ICSU General Assembly in 2008 and an International Programme Office (IPO) was established in Beijing in 2010. IRDR is an initiative that integrates research across hazards, disciplines and geographical regions (ICSU, 2008a). Acute disasters are a major obstacle to sustainable development and the IRDR initiative has a potentially important role to play in addressing various aspects of the five Grand Challenges.

Natural hazards is also a priority for all three ICSU Regional Offices, which have developed their own scientific plans (ROA, 2007a; ROAP, 2008a; ROLAC, 2009a) that focus on specific hazards that are predominant in the regions. This additional regional focus should help to promote the involvement of scientists from less developed countries that are often the most vulnerable to natural hazards. Ensuring the smooth integration of the regional and global strategies and plans will be a priority for the International Programme Office of IRDR, working closely with the Regional Offices. This should include coordination and integration of regional and global data and information sources, systems and policies, working in conjunction with ICSU data bodies and other stakeholders.

Key partners: ISSC, UN-ISDR.

Overall strategy and specific actions

- To implement the IRDR programme within the overall framework of the Grand Challenges ;
- To integrate the regional science plans for natural hazards into the overall global IRDR plan and take them forward concurrently;
- To review the progress of IRDR after five years, i.e. in 2015.

2.5 Ecosystem change

The Programme on Ecosystem Change and Society is a 10-year initiative that was approved at the General Assembly in 2008. An International Programme Office jointly hosted in Stockholm and Penang was established in 2011. This new initiative originated out of the follow-up to the Millennium Ecosystem Assessment and focuses on the relationship between governance, ecosystem services and human wellbeing at global and local scales (ICSU-UNESCO-UNU, 2008). The integration of social and natural sciences is at the core of this work. The results of this initiative should help provide the scientific knowledge base for the newly established Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES, see Section 3.1.3)

This initiative cuts across the longer-established GEC programmes and directly addresses several aspects of the Grand Challenges in an integrated way. Biodiversity and Ecosystem Services is a priority for the Regional Offices for Latin America and the Caribbean and for Asia and the Pacific. The former has developed its own regional analysis (ROLAC, 2010) and the latter is working with the global scientific committee to define how it can best promote and implement the initiative at the regional level.

Key partner: UNESCO.

Overall strategy and specific actions

- To implement the PECS initiative within the overall framework of the Grand Challenges;
- To integrate regional activities and interests into the overall PECS initiative;
- To review the progress of PECS after five years, i.e. in 2016.

2.6 Sustainable energy

Addressing sustainable energy needs is a crucial aspect of any agenda for global sustainability research and a key element of transformation towards sustainable futures. The International Science Panel on Renewable Energies (ISPRES) was created in 2007 as a joint initiative between ICSU, the International Council of Academies of Engineering and Technological Sciences (CAETS) and the Renewable Energy Network for the 21st century (REN21). The Panel produced two reports assessing the current global status and future priorities for research in the areas of biomass, and photovoltaic and wind energy (ISPRES, 2009a, b). However, the international policy landscape for renewable energy has evolved rapidly over the past five years, most notably with the establishment of the new International Renewable Energy Agency. In addition, the outcomes of a major Global Energy Assessment, in which ICSU is participating, will be available in 2011. In the light of these developments, it was decided to disband ISPRES in 2009 and to reassess ICSU's potential contribution to this area.

At the regional level, sustainable energy is a priority for all the three Regional Offices, each of which has developed its own science plan (ROA, 2007b; ROAP, 2009; ROLAC, 2009a). These have different foci, specific to the regions, e.g. biomass in Latin America versus models and energy scenarios in Africa, and also common elements. The main priority for Asia, which is shared by the other regions, is identification of existing research capacity and future needs. There is considerable, and currently unexploited, potential for combining expertise across institutes, countries and regions to address specific priority topics. ICSU can play a leading role in facilitating the development of the necessary interdisciplinary networks and projects at various scales.

In addition to the regional plans, there are a number of energy related interdisciplinary projects being conducted under the aegis of the existing global environmental change programmes, and several of the unions are also interested from their particular disciplinary perspectives. The implementation of the Global Challenges framework and associated structural changes provides an opportunity to build on these various activities and potentially develop a more integrated global initiative on sustainable energy.

Key partners: IIASA, CAETS, REN21.

Overall strategy and specific actions

- To promote activities in the area of energy within the overall framework of the Grand Challenges;
- To implement and ensure coordination of the regional science plans for energy, taking into account the outcomes of the Global Energy Assessment.

2.7 Urban health and wellbeing

Over half of the world's population lives in urban areas and this proportion is increasing rapidly, generating new challenges for maintaining and improving human health and wellbeing.

A major stimulus for greater attention from ICSU to health research is the potential to build on the many and varied interests of the scientific unions, which started to develop their own loosely coordinated initiative on science for health and wellbeing (SHWB) in 2002. In 2006, a Scoping Exercise was initiated to identify how ICSU might contribute and potentially add value to these union activities (ICSU, 2007). This exercise eventually identified “a systems analysis approach to health and wellbeing in the changing urban environment” as an area where ICSU was perhaps uniquely qualified to make a significant contribution. An interdisciplinary planning group was established in 2008 to take this idea forward and develop a science plan for a new ICSU initiative.

The science plan – *Health and wellbeing in the changing urban environment: a systems analysis approach* (ICSU, 2011c) – lays out a new conceptual framework for considering the multi-factorial nature of both the determinants and manifestations of health and wellbeing in urban populations. A 10-year initiative is proposed to promote trans-disciplinary projects that adopt this framework and aim to generate understanding and products that are useful to policy-makers. The International Institute for Applied Systems Analysis (IIASA, Austria) has been an important partner in the development of this plan and will continue to play a key role in its implementation.

The Regional Offices for Asia and the Pacific and for Africa have also selected human health and wellbeing as one of their initial priority areas. In Africa, this has led to a very broad scoping exercise that describes the health research needs and priorities for the continent – urban health is one of the highlighted areas (ROA, 2007c). In Asia and Pacific, a different approach has been taken, with a regional science planning group being established in 2010 to consider how the global plan for urban health can be implemented in the region (ROAP, 2011). The Offices have a key role to play in ensuring that scientists (and policy makers) from the less developed countries, where the challenges of urbanization are often most pressing, are included in the new ICSU initiative.

Key partners: IIASA, WHO.

Overall strategy and specific actions

- To work with the ICSU Unions and key partners to implement a new 10-year initiative on Urban health;
- To work via the Regional Offices to facilitate the involvement of less developed countries in the implementation of the Urban Health plan

2.8 Exploring new horizons and future directions

2.8.1 Foresight

In line with its overall mission, ICSU has an important role in exploring future directions for international science. Foresight approaches can be used both to help ICSU position itself strategically and to provide information that can be used by Unions and National Members to explore their future international positions.

In preparation for the first ICSU Strategic Plan 2006-2011, a ‘traditional’ foresight exercise was carried out in consultation with Members to identify priority areas for international interdisciplinary research (ICSU, 2002b, 2004a). This reinforced the continued importance of ICSU’s historical areas of interest, mainly focused around the environment, and helped in identifying new programme topics, such as disaster risk and urban health. It also highlighted a number of areas, such as cognitive neuroscience and nanoscience, in which the role of ICSU was less obvious but where ICSU Members, and in particular the Unions, could make a significant contribution (see ahead, Section 2.8.2).

In parallel with the development of this second Strategic Plan, ICSU is conducting a second Foresight exercise (ICSU, 2011). This is very different from the earlier exercise in that it uses a scenarios

approach to consider potential pathways for international science over the next two decades and beyond. These are then used to develop a 'success scenario' in which ICSU is envisaged as having taken the necessary steps to optimize its role in strengthening international science for the benefit of society. It is hoped that this exercise – to be completed in 2012 – will be useful not only in helping ICSU, but also its members, in assessing longer term choices and options.

2.8.2 New Scientific horizons

Building on the expertise of its members, ICSU is well positioned to contribute to international awareness and collaboration in frontier research at the interface between disciplines (see selection criteria in Box 2).

In order to take forward some of the 'new horizon' priorities identified in the first ICSU foresight exercise, two specific mechanisms were proposed – the ICSU Grants Programme and joint workshops with the European Science Foundation. The effectiveness of the former mechanism was severely limited because of cuts in the funding for the Grants Programme (which was then re-focused on the Regional Offices). Two workshops were jointly held with ESF on molecular medicine and infections, in 2009, and on social-ecosystem change, in 2010. These had a particular focus on building links between researchers in Africa and Europe. However, these were isolated activities and overall ICSU's contribution to various 'new horizon' priorities outside of its established strategic interests was very limited over the past six years.

There is considerable interest, particularly from the Scientific Unions, in new scientific horizons from a disciplinary perspective and a potential role for ICSU is to unite some of this interest around common topics. One such topic that cuts across many disciplines and is of considerable economic and societal interest is nanoscience and nanotechnology. It is proposed that this be taken as a pilot area to explore how ICSU can work with interested members and link to other international activities. The International Standards Organization and the OECD Working Group on Nanotechnology are working on defining global ontologies and standards for nanotechnology and making these openly accessible via structured databases. They are keen that this activity be more closely linked with the academic research community. ICSU, working with its Committee on Data for Science and Technology (CODATA), can play a role in brokering this relationship.

Depending on the nanotechnology pilot, other scientific horizons may also benefit from an inter-Union approach, with the development of standards and databases being one obvious focus of interest. Other foci, such as environmental impacts and societal acceptance/response, can be imagined for other topics.

Key partners: OECD, ISO, relevant industrial organizations.

Overall strategy and specific actions

- To engage the ICSU membership in analysing the future of international science via the foresight scenarios exercise. [If successful, it is envisaged that this exercise will be up-dated, and the changing international landscape assessed, at six-year intervals.];
- To consider the implications of the foresight exercise for ICSU's long-term future and, after consultation with the Membership, make adaptations to the organization's focus and structure as necessary
- With regard to 'new scientific horizons', to take nanoscience and nanotechnology as a pilot area and convene an exploratory workshop in 2012 to consider how ICSU, CODATA and the Unions can collectively contribute to the global development of this field.



3. Science for Policy

Goal

Science and policy - to ensure that science is integrated into policy development and governance at the international and national level and that relevant policies take into account both scientific knowledge and the needs of science.

Progress and achievements, 2006-2011

The World Summit for Sustainable Development in Johannesburg in 2002, and to a lesser extent the World Summit on the Information Society in 2003 and 2005, provided the global policy context in which the first ICSU Strategic Plan was developed. ICSU played a lead role in ensuring input from the global scientific community to these Summits. For WSSD in particular, science featured strongly in the formal political documents and multi-stakeholder commitments that came out of the Summit. The Commission on Sustainable Development (CSD) was strengthened as a result of the Johannesburg Summit and has become an important venue for integrating science into policy-thinking at the global level. ICSU had continued to lead the input from the global science community to CSD over the past six years and has been invited by the UN to maintain this science leadership role for the UN Conference on Sustainable Development (Rio+20) in 2012.

Another policy area in which ICSU has had a major impact has been the development of an Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES). This is expected to have a similar impact to IPCC in terms of ensuring that the outcomes of rigorous scientific assessments are communicated to, and discussed with, policy makers (see ahead, Section 3.1.3). As with the IPCC, it is expected that much of the science that feeds into IPBES will be conducted in the framework of ICSU programmes and initiatives.

Challenges over the next decade

ICSU has traditionally focused its science for policy activities on interaction at the global level with the UN system. In this regard, ICSU has had a privileged status and been recognized by the UN system as the legitimate representative of the global scientific community. However, international governance and policy-making mechanisms are evolving rapidly. At the intergovernmental level, a plethora of new multi-lateral and regional fora have developed as important venues for policy debate. And new multi-stakeholder networks are also having an effect on policy making in certain areas. Moreover, ICSU itself is no longer the only body that can justifiably claim to represent the global science community. There are a number of important challenges for ICSU as it positions itself in the science for policy arena over the next decade

As a global organization with very limited resources, ICSU has tended to focus on global policy fora. However, much of policy development and most of its implementation is actually at the regional, national and local scales. There is potential for the Regional Offices – which have a remit that includes making links with policy – to extend ICSU’s reach, and better mechanisms could be envisaged for supporting National Members in their policy work (and vice versa). Moves towards a trans-disciplinary research approach, e.g. in earth system research or urban health, should strengthen the science-policy interface at the local level.

Governments remain the critical decision-makers in most policy areas but they are strongly influenced by the business sector and civil society more broadly. Multi-stakeholder alliances are often the most effective mechanism for influencing both policies and their implementation. ICSU has some experience of working with such alliances at the global level, e.g. within the Major Groups of CSD and UNEP, but they require considerable resources, can be complicated to manage and difficult to evaluate in term of input versus output. Ultimately, most policy-making takes place at the national level, where multiple stakeholders are also increasingly involved. ICSU National Members play a critical role at the science–policy interface in many countries. Working with National Members to identify efficient and effective ways to interact with multiple stakeholders and effectively communicate science for policy is an important area for the future.

ICSU is only one of several bodies that represent global science. Other formal bodies include the InterAcademy Panel (IAP) and InterAcademy Council (IAC), both of which have links with the UN system. The Academy of Sciences for the Developing World (TWAS) also has strong links with the UN and intergovernmental systems. And more informal groupings, such as the G8 Group of Academies, are also acting as the ‘voice of science’ in specific fora. Whilst there are similarities and overlaps with ICSU, each of these organizations or networks has its own specificities. (ICSU is unique in being able to link the scientific knowledge from the scientific Unions and its own global programmes to policy). This global pattern is mirrored at the regional level, where a multiplicity of regional science bodies co-exists with ICSU’s own Regional Offices. The challenge at both global and regional scales is to overcome institutional rivalries and develop effective strategic partnerships with these various organizations.

3.1 Inter-governmental science for policy mechanisms

As described above, there are many intergovernmental structures and networks involved in policy-making that would potentially benefit from better scientific input. In the longer-term, ICSU will need to consider whether and how it might usefully interact with some of these. However, choices have to be made now on the basis of limited resources and likely impact, and these dictate that for the next six years ICSU should continue to have its main focus on key UN fora, where it has a clearly recognized role.

3.1.1 Commission on Sustainable Development

The UN Commission on Sustainable Development was established by the UN after the ‘Earth Summit’ in Rio de Janeiro in 1992. It was given renewed impetus by the World Summit on Sustainable Development in 2002 and is now an important venue for environment ministers to interact with other key stakeholders. Civil society is organized under nine major CSD groups, one of which is Science and Technology. This group is led by ICSU, in partnership with the World Federation of Engineering Organizations (WFEO).

Topics discussed at CSD over the past six years have included: energy, air pollution, climate change and industrial development (2006-2007); agriculture, rural development, land, drought, desertification and Africa (2008-2009); and transport, waste management, chemicals and mining (2010-2011). ICSU and WFEO prepare and submit discussion papers for these meetings and organize delegations of scientists to participate in the official ministerial meetings and various side events. There are

opportunities for ICSU Members to contribute to these activities, e.g. IUPAC made input to the debate on chemicals in 2010.

CSD provides a unique multi-stakeholder setting in which to introduce scientific perspectives on sustainable development. It is not a policy-making body per se, but it provides an opportunity to inform and influence policy-makers, industry leaders and civil society groups. It is also closely linked to the Preparatory Committee for the Rio+20 Conference and is likely to play a key role in ensuring the follow-up to that Conference. It is an important forum in which ICSU can communicate with multiple stakeholders, for example regarding the Earth System Sustainability Initiative (Section 2.1)

Key partners: UN, WFEO and CAETS, ISSC, IIASA.

3.1.2 UN Conference on Sustainable Development (Rio+20)

In preparation for the UN Conference on Environment and Development in 1992, ICSU organized its own international meeting to develop an “Agenda for Science and Development into the 21st Century”. As a result of this, ICSU was invited by the UN to participate in the follow-up, via CSD (see above). Subsequently, when the World Summit on Sustainable Development (WSSD) was organized in Johannesburg in 2002, ICSU was again invited to represent the scientific community. Whilst the direct impact of these conferences is difficult to assess (despite the production of several lengthy UN evaluation reports) they have certainly contributed to raise general awareness of the state of the planet and the challenges for sustainable development. They have been both a strategic driver and a policy target for ICSU and many of its Interdisciplinary Bodies.

In December 2009 the UN General Assembly decided to organize a further UN Conference on Sustainable Development in Rio de Janeiro in 2012 (Rio+20). The focus of this conference, which aims to bring together Heads of State, will include: green economy, poverty eradication, and the institutional framework for sustainable development. These are broad topics that will be further defined in the conference preparatory process. However, they can clearly be aligned with the five Grand Challenges that have arisen out of the ICSU visioning process, and the Conference represents a unique opportunity to get broad buy-in and support for the global sustainability research agenda.

For the WSSD in 2002, ICSU was actively involved in the preparatory committee and organized a science forum in Johannesburg. In addition, considerable effort was devoted to producing a ‘Rainbow Series’ of reports on specific topics related to science for sustainable development (ICSU, 2002c). The science forum was organized at the invitation of the UN and was widely acclaimed, and the aim for 2012 is to organize a similar event in Rio. As part of the preparatory process for Rio+20 there will be a series of regional consultations and this regional emphasis is likely to be more significant than for previous summits. It is important that the voice of science is heard strongly at this level and ICSU will work via its Regional Offices and in partnership with UNESCO to achieve this. One of the keys to success for Rio+20 will be linking the messages from the various ICSU regional and global activities with those of the national delegations and vice-versa. The ICSU National Members have an important role to play here.

Key partners: WFEO and CAETS, ISSC, UNESCO.

3.1.3 Biodiversity and ecosystem services: IPBES

ICSU was an institutional partner in the Millennium Ecosystem Assessment (MA) that was completed in 2005. Under the leadership of the United Nations Environment Programme, ICSU and other organizations have continued to promote the MA findings and explore mechanisms to ensure its follow-up. The new Programme on Ecosystem Change and Society (see Section 2.5) is one product of this follow-up process. Another important development has been the agreement to establish a new Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services (IPBES).

ICSU and its global biodiversity programme (DIVERSITAS) and Human Dimensions Programme (IHDP) have played a lead role in the multi-stakeholder discussions that led to the decision of the UN General Assembly in 2010 to establish IPBES. In particular, ICSU has advocated for a strong and independent mechanism for scientific input to IPBES. Whilst the exact role(s) and structure of the Platform have yet to be finalized, it is analogous to the Intergovernmental Panel on Climate Change (IPCC) and can be expected to be similarly influential in focusing society's attention on biodiversity and ecosystems. It will provide a focus for science-policy interactions and feed into several already existing international conventions in this domain. As with IPCC, it is likely to have a significant influence on future research strategies, structures and support.

Both DIVERSITAS and the new Ecosystem Change (PECS) initiative are promoting research that is directly relevant to IPBES. Socio-ecological research is also highlighted under the Grand Challenges and will be incorporated in the proposed new initiative on Earth System Sustainability (see Section 2.1.3). IPBES will provide a critical forum for considering the scientific knowledge generated by these activities and its implications for policy. ICSU and its programmes clearly have a very important role to play in ensuring the effectiveness of IPBES and vice-versa.

Key partners: UNEP, UNESCO, IUCN.

Overall strategy

- To focus on UN fora, where ICSU has a clearly defined role and real potential to influence policy, whilst at the same time being receptive to new opportunities;
- Work with partners (governmental and non-governmental) whose goals can be aligned with those of ICSU and who can make a substantive contribution to achieving these goals.

Specific actions

Area/Activity	Actions, 2012-2017
Commission on Sustainable Development (CSD)	1. Continue to provide scientific input on specific topics, working with relevant ICSU Members and bodies and the other UN Major Groups.
UN Conference on Sustainable Development (Rio+20)	2. Represent science in Rio+20. 3. Organize regional science events prior to the Conference and a science forum in Rio. 4. Depending on the outcomes of Rio+20, take the lead in ensuring the global scientific community responds to identified needs.
IPBES	5. Ensure the uniquely important place of science in the IPBES structure. 6. Provide scientific input to IPBES.
Climate change (IPCC)	7. Strengthen and expand contribution of ICSU community to IPCC assessments, via new initiatives, including the Earth System Sustainability Initiative and IRDR.
UN organizations	8. Strengthen established links and develop new links with bodies such as UNEP and WHO. 9. Reinvigorate UNESCO partnership.
Other international policy fora	10. Depending on resources and likely impact, participate on a 'case-by-case basis' in other key science-policy fora that fit with ICSU's overall goals

3.2 Regional and national policy mechanisms

At the regional level, there is a clear role for the ICSU Regional Offices to establish links with relevant inter-governmental policy mechanisms. The recent Office reviews identified this as an area in which some progress had been made – notably in Africa and Latin America and the Caribbean – and a greater impact could be made in the future. In order to achieve this, the visibility of the Offices has to be raised and their reputation established in the policy arena. The planned regional science events and preparatory meetings for Rio+20 provide a good opportunity to achieve this.

At the national level, a number of ICSU's Members are active at the science-policy interface. Political structures and mechanisms for decision-making vary considerably from one country to another, but in many countries there is either a defined role or clear opportunities for Academies or other national ICSU Members to promote evidence-based policy. ICSU can assist its National Members by providing information and materials from relevant international policy processes that are also being pursued nationally. Likewise National Members may be able to promote their science for policy agendas internationally by working more closely with ICSU. A good example of these types of mutually enforcing national and international policy activities is Rio+20, where ICSU will be preparing documents to input to the regional and global processes that may also be useful nationally.

Science for policy is an area where ICSU can also act as a convenor, bringing together its interested Members and other organizations to compare practices in specific areas of policy-making. For example a number of ICSU's National Members are active in presenting scientific knowledge related to climate change to policymakers; ICSU itself has a significant interest in this topic at the global level. Preliminary discussions indicate that there would be considerable support for a series of regional meetings on 'climate change assessment and national policies' that focus on exchange of experiences and practices. Other issues related to capacity building at the science-policy interface, such as mechanisms for mentoring/training parliamentarians, could also be considered jointly with interested National Members.

Key partners: UN agencies regionally.

Overall strategy and specific actions

- To work via the regional offices to strengthen links with regional economic commissions and policy networks, such as the African Union and the Organization of American States;
- To work with National Members on science for policy activities that relate to ICSU's priority themes, e.g. sustainability research in the context of Rio+20;
- To ensure that National Members are aware of relevant policy issues being considered at the global and/or regional level;
- To work with interested National Members and partners to organize a workshop on 'climate change assessment and policy-making at the national level'.



4. The Universality of Science

Goals

**Universality Principle* - to raise awareness and promote responsibility for the principle of Universality of Science – both freedoms and responsibilities – within and beyond the ICSU family.

Data and Information – to facilitate a coordinated global approach to scientific data and information that ensures equitable access to quality data and information for research, education and informed decision-making.

Reaching out to all countries – to ensure the full participation of scientists from less developed countries in international science.

On scientific capacity – to ensure that capacity building, which is integral to all aspects of ICSU's mission, is given the necessary attention in all the activities of the ICSU family and in relevant policy fora.

Science and society – to improve mutual understanding between science and other sectors of society, with a particular focus on ICSU's scientific priorities; to promote trust in science.

**Science education* – to improve science education and science literacy worldwide.

Progress and achievements, 2006-2011

A number of changes in direction and new activities were proposed in the first Strategic Plan in order to promote the universality of science. (Implementation of these proposals is detailed in Annex 1)

Significant advances have been made in three main areas that are highlighted here (see ahead, Sections 4.1-4.5, for fuller details):

- Scientific freedom and responsibility – the new ICSU committee in this area has initiated an ambitious work-plan that addresses key aspects of global scientific responsibilities.
- Regional Offices – three Regional Offices completed their first five years of work and were favorably reviewed by international expert panels in 2009-2010.
- The development of a new ICSU World Data System that can serve the interdisciplinary research needs of the future was boosted with the identification of a dedicated and well-resourced International Programme Office.

Challenges over the next decade

The universality of science in its broadest sense is about developing a truly global scientific community on the basis of equity and non-discrimination. It is also about ensuring that science is trusted and valued by societies across the world. As such, it incorporates issues related to the conduct of science; capacity building; science education and literacy; access to data and information and the relationship between science and society. There are a number of ICSU activities and Bodies addressing these issues, and looking into the future three areas are of particular importance and relevance to ICSU.

Responsibility and research integrity: over the past six years a number of high-profile cases of scientific misconduct have served to highlight the necessity of integrity in science. The internal pressures and public profile of science are such that ensuring good research practice and an honest and self-critical scientific endeavour requires proactive engagement from scientists and scientific institutions – including ICSU.

Data and information access: science is increasingly dependent on access to, and integration of, large data-sets from multiple sources. Both the access to, and the interoperability of, these data sets present major challenges. Maintaining and expanding a quality-assessed science data commons is a multi-faceted challenge that must be addressed if we are to make scientific progress in areas such as earth system sustainability research. This requires global leadership, commitment and resources.

The less developed countries continue to present a major challenge in terms of *enhancing scientific capacity and integration* into global research activities. At the same time these are the countries where the generation and use of scientific knowledge could have greatest socio-economic benefits. Fully integrating the perspectives and needs of less developed countries into ICSU's agenda is an ongoing challenge, which the Regional Offices can play a key role in addressing.

4.1 Principle of Universality

Underpinning the broader concept of universality is Principle of Universality of Science (ICSU Statute 5) which is more narrowly focused on the freedoms and responsibilities of science. Adherence to this Principle is a condition of ICSU membership. The policy Committee on Freedom and Responsibility in the conduct of Science (CFRS) serves as the guardian of the Principle and undertakes a variety of actions to defend scientific freedoms and promote integrity and responsibility.

ICSU Statute 5 (revised wording approved by 30th General Assembly, September 2011):

The Principle of Universality (freedom and responsibility) of Science

The free and responsible practice of science is fundamental to scientific advancement and human and environmental well-being. Such practice, in all its aspects, requires freedom of movement, association, expression and communication for scientists, as well as equitable access to data, information and other resources for research. It requires responsibility at all levels to carry out and communicate scientific work with integrity, respect, fairness, trustworthiness and transparency, recognising its benefits and possible harms.

In advocating the free and responsible practice of science, ICSU promotes equitable opportunities for access to science and its benefits, and opposes discrimination based on such factors as ethnic origin, religion, citizenship, language, political or other opinion, sex, gender identity, sexual orientation, disability or age.

Since the early days, ICSU has had a series of policy committees charged with defending the freedom of scientists. However, the creation in 2006 of CFRS enlarged the focus of ICSU's work from an exclusive preoccupation with defending freedoms to a more balanced approach that incorporated responsibilities. This led to the publication in 2008 of a new handbook – *Freedom, Responsibility and Universality of Science* (ICSU, 2008b) and revision of Statute 5. CFRS has played a leading role in promoting discussion across the global scientific community on issues related to research integrity and was a partner in first and second World Conferences on Research Integrity (Lisbon, 2007 and Singapore, 2010). The Committee has also launched a series of workshops focusing on key topics at the interface between science and society, where the rights and responsibilities of science are often unclear. These include global health, science communication, access to data, science and war, science and the private sector and science and policy-making. A major outcome of the workshops is a series of advisory notes that highlight key issues, challenges and potential solutions for consideration by ICSU's National and Union Members.

At the same time, whilst developing its agenda relating to scientific responsibilities, it is important that CFRS continues to monitor and intervene as necessary to protect scientific freedoms. This includes a broad range of issues, from refusal of travel visas to persecution of scientists and students. The Committee works with ICSU Members to address individual cases and these links need to be strengthened further. The overall pattern and geographical focus of these issues changes with time and CFRS has a critical role to play in alerting the international science community to what is happening and assisting relevant Members to effectively respond.

In 2010 the support to CFRS was strengthened with the provision of dedicated secretariat support from the Swiss Academy of Sciences. This support will enable the committee to continue to implement its ambitious work-plan over the next six years and to deal with more individual cases as necessary. Recent CFRS meetings have included representation from the ICSU Regional Offices and Committees and the Asia and the Pacific Office partnered CFRS in organizing the second World Conference on Research Integrity. This relationship will be strengthened further to ensure the full inclusion of less developed countries. More generally, a greater emphasis will be given to engaging with Unions and National Members, particularly in the debate on scientific responsibilities which is, to some extent, context specific in terms of culture or scientific discipline.

Key partners: International Human Rights Network of Academies and Scholarly Societies, ESF and ORI re. research integrity.

Overall strategy and specific actions

- to support the Committee on Freedom and Responsibility in the conduct of Science in its work with ICSU Members and other partners to defend the freedoms of scientists and to promote the responsibilities of science;
- In this context, to implement the CFRS work-plan 2012-2014, and to:
 - work with Members to develop a systematic monitoring mechanism and effective responses, regarding infringements of scientific freedoms;
 - co-sponsor the third World Conference on Research Integrity in 2013;
 - expand the series of workshops on rights and responsibilities;
 - develop an interactive web forum for rights and responsibilities issues.

4.2 Data and information

The generation of scientific data and information is increasing at an exponential rate and it is estimated that by 2020 it will have exceeded by more than two-fold the current global data storage capacity. Much of these data are produced and/or used by ICSU-sponsored programmes and/

or observing systems. Many Union Members are also heavily involved in data issues from their various disciplinary perspectives. Working with its Members, ICSU has a commitment to ensuring the long-term stewardship, quality, availability and usefulness of scientific data and information. A number of interdisciplinary bodies and committees have evolved over time to enable ICSU to ensure this commitment. Over the next six years there is a need to significantly elevate the importance and role of scientific data and information management throughout the ICSU family and within the development of new ICSU initiatives.

Following a series of strategic assessments and reviews (ICSU, 2004b, 2008c), the decision was taken in 2008 to establish a new World Data System (WDS). At the same time an ad-hoc Strategic Coordinating Committee for Information and Data (SCCID) was established for an initial three-year period (with the possibility of renewal until 2014). This Committee was charged with providing leadership in the field of global data and information for science, and linking the various ICSU data policy and management activities (see Box 1, page 12) with the needs of interdisciplinary programmes such as the International Polar Year. The Committee includes representation from various ICSU Interdisciplinary Bodies and partners involved in this area. Key amongst these is the Committee on Data for Science and Technology (CODATA) and the International Network for the Availability of Scientific Publications (INASP).

There has been steady progress in establishing a World Data System, that links nationally supported data centres and services across different scientific domains to provide worldwide access to interoperable data-sets and data products. This incorporates the remnants of two previous ICSU networks – the World Data Centres (WDC) and Federation of Astronomical and Geophysical data analysis Services (FAGS) and expands these to include new state of the art institutions. Strengthened impetus has been given to this development with the establishment of a dedicated International Programme Office in Japan in 2011. One important initial focus for the WDS has been ensuring the data legacy of the International Polar Year, and the aim is that the large majority of IPY data will eventually be transitioned into the WDS. Looking to the future, the new ICSU programmes and initiative on earth system sustainability will present new challenges in terms of data needs and provision. One measure of success will be how the WDS evolves to meet these needs.

Since 2008, the new ad-hoc SCCID has played a role in improving the communication and coordination between the various ICSU structures dedicated to data and information and other key partners. It has developed principles of best practice in data and information management for all ICSU programmes and identified a number of issues that should be jointly addressed by the dedicated data and information bodies over the coming six years. The SCCID report (ICSU, 2011d) includes a number of recommendations relevant to Unions and National Members.

CODATA was established in 1966 to focus on interdisciplinary data needs, particularly at the data management and policy level. In line with the recommendations from various strategic reviews, CODATA has been actively engaged over the past six years in addressing issues of high priority to ICSU. These include the development of well-received data sharing guidelines for the Global Earth Observation System of Systems (GEOSS) and a Polar Information Commons initiative. CODATA has a central role to play over the next six years in taking forward the recommendations from SCCID and the earlier ICSU Priority Area Assessment of Scientific Data and Information (ICSU, 2004b). In this context, a dedicated review of CODATA is planned in 2012-2013.

INASP was established in 1992 with a goal to ensure world-wide access to scientific information. Initially, this meant ensuring the provision of scientific journals at affordable prices to institutions in less developed countries. This continues to be a priority. However, with the rapid evolution of information and communication technologies, the roles and structures of academic libraries have undergone a rapid transition. The remit of INASP has expanded accordingly to incorporate various capacity building and training activities for librarians and scholars. More recently still, the programme has initiated activities to bridge the science–policy interface in less developed countries. The ICSU Regional Offices also have a major interest in these areas of activity and there is considerable potential for INASP and similar programmes to work with the Offices to extend their activities.

Key partners: WMO, GEOSS, IOC/IODE, UNESCO.

Overall strategy and specific actions

- Building on ICSU's established activities, to play a leadership role in ensuring the long term stewardship and availability of good quality data and information for science;
- to consolidate and expand the ICSU World Data System;
- to consult with Members and take forward relevant recommendations from the *ad hoc* Strategic Coordinating Committee on Information and Data;
- to review the performance and future strategic remit of the Committee on Data and for Science and Technology (CODATA) in 2012-2013;
- working via INASP, CODATA and the Regional Offices to expand access to, and use of, scientific information in less developed countries.

4.3 Reaching out to all countries

The most significant change in the operations of ICSU over the past six years has been the establishment of Regional Offices in Africa, Asia and the Pacific, and Latin America and the Caribbean. These Offices are specifically charged with promoting ICSU's global activities in less developed countries and incorporating the scientific perspectives and needs of these countries into ICSU's agenda.

The three Regional Offices were each subjected to an external expert review of their performance and future plans during 2009-2010. These reviews were very positive overall but also identified a number of weaknesses. Following a combined analysis of all the reviews the future remit of the Offices has been clarified and initial actions have been taken to address some of the structural vulnerabilities. These issues will need to be monitored and further actions and/or corrections made as necessary over the next six years. Progress had also been made on increasing and diversifying the funding available for regional activities, e.g. from development agencies, and this will be expanded. Building on these experiences, the original plan to establish a fourth Regional Office in the Middle East and North Africa region will be implemented.

Limited progress has been made over the past six years in promoting the greater involvement of the former 'Eastern Block', including the Commonwealth of Independent States and Western Balkan countries. A joint ICSU-UNESCO meeting of Academies from Eastern and South-Eastern Europe was held in Moldova (2007) and several related meetings have taken place in Montenegro. The latter included a meeting of all ICSU European Members (2009). As a result of these meetings, four new ICSU National Members have been recruited. In addition to these academy activities, various ICSU interdisciplinary bodies and initiatives also have links with the scientific communities in these countries and there is scope for these to be strengthened and expanded over the next six years. This can work at a number of levels, including selection of Scientific Committee members and hosting of workshops.

Key partners: UNESCO and other UN system regional offices, TWAS.

Overall strategy and specific actions

- To maintain and strengthen ICSU's presence and activities in those countries where it has historically been strong, e.g. in North America and Europe, whilst building closer relationship with less developed countries via ICSU Regional Offices;
- To work with the host organizations to strengthen the activities of the Regional Offices;
- To use the grants programme to strengthen links between the Unions and ICSU Regional

Offices, with a particular focus on capacity building;

- To consult with members in the Middle East and North Africa region and secure support for the establishment of a fourth ICSU Regional Office to serve this region;
- To strengthen interactions with the CIS and Western Balkan countries via the network of European Members and specific actions and activities of inter-disciplinary bodies and initiatives.

4.4 Science education

Science education is an area of great interest to almost all ICSU Members and an area in which ICSU itself has historically been involved. However, it is also an area in which there are many stakeholders and in which most decisions and action are taken at a national or even local level. In 2009 a review was launched to consider ICSU's potential future contribution to this area and, in particular, to assess how any global ICSU activities might add value to what its network of Members and Interdisciplinary Bodies are doing.

The review (ICSU, 2011b) concluded that there is a potentially important role for ICSU to play in promoting exchange between active scientists and educators. Many Unions have dedicated commissions which work to achieve this at the disciplinary level. Over the past six years, international science years, such as the Polar Year or the Union-led years of Physics, Planet Earth, Astronomy and Chemistry provide good examples of how this can be effectively achieved and of how global initiatives can be translated into local action at the level of schools or Universities. Many ICSU National Members have linked to these global activities and integrated them into their own initiatives, amplifying their benefits.

Several ICSU Unions, most notably the International Mathematical Union, are active in the specific area of Mathematics education and this is also an area that was selected by the Regional Office for Latin America and the Caribbean as a priority in 2007. The Office has prepared a detailed analysis of mathematics education challenges in the region (ROLAC, 2009b), which can inform the activities of the various ICSU Members and other regional stakeholders.

Key partners: UNESCO, global and regional educator networks.

Overall strategy and specific actions

- To work with Union and National Members to facilitate the interaction (exchange of knowledge and materials) between scientists and educators. The Regional Offices can play an important facilitative role for the less developed countries;
- To actively promote science education activities within the context of existing and new interdisciplinary initiatives, in particular the Earth System Sustainability Initiative;
- To review progress in the above areas in 2016-2017, prior to the development of the next ICSU Strategic Plan.

4.5 Science and society

The interface between science and society has a major influence in shaping the world in which we live. Science education and literacy are an important aspect of societal trust in science, without which science can neither thrive nor serve society. At the same time, research in many areas and in particular where it addresses complex societal challenges, requires the active involvement of citizens.

Over the past six years public outreach has been a high priority across several ICSU initiatives, most notably the International Polar Year, which had a major media impact in many countries. The ICSU

Regional Offices have published books for a general audience, which highlight achievements by scientists in their respective regions. The UN Commission on Sustainable Development (Section 3.1.1) has provided a forum for multi-stakeholder discussion of key scientific issues relating to sustainable development. And the CFRS has initiated a series of workshops addressing key issues of concern at the science-society interface including science communication (Section 4.1). All of the more recent ICSU research initiatives are explicitly designed to be trans-disciplinary, involving relevant societal stakeholders in their design and implementation. This emphasis on improving the mutual understanding between science and society and strengthening trust in science, will be strengthening across all ICSU activities over the coming six years.

There are a number of major international events that aim to popularize science and stimulate interactions between scientists and civil society. These include the annual meetings of the American Association for the Advancement of Science (AAAS) and the bi-annual Euro-Science Open Forum (ESOF), both of which attract thousands of visitors and considerable media coverage. ICSU has participated to a limited extent in both of these events, but there is considerable potential to work with interested Members to increase this presence. For example, a session on Rio+20 and the science-policy interface is being planned with the European Members network for ESOF 2012.

Overall strategy and specific actions

- To promote interaction and debate between scientists and other members of society across the breadth of ICSU's activities, including Rio+20;
- To develop new trans-disciplinary initiatives, e.g. on earth system sustainability and urban health, that actively involve non-scientific stakeholders;
- Under the aegis of the Committee on Freedom and Responsibility in Science, to organize workshops and provide advice to Members on important issues at the science-society interface;
- To work with interested Unions, National Members and Interdisciplinary Bodies to organize sessions at the AAAS and ESOF meetings



5. Structure–function issues

Goals

To ensure adequate long-term funding to support the planning, coordination and support functions of ICSU and the additional funding necessary to fully implement the new initiatives described in this strategic plan.

**Form and function* – to ensure that ICSU has the necessary Membership, partners, structures and resources to deliver its mission efficiently and effectively.

**Integrating global and regional* – to ensure that ICSU’s global and regional structures and activities are synergistic, efficient and effective in fulfilling the organization’s overall mission.

**Visibility and recognition* – to ensure that the contribution of ICSU to global science for society is fully recognized and valued.

5.1 ICSU and its membership

ICSU is a membership organization and the support, ownership and involvement of its Members is important for any ICSU initiative. At the same time, Members have their own diverse needs and activities which ICSU can sometimes assist with. The global environmental change programmes and, more recently, IPY provide good examples of what can be achieved when the network of ICSU Members is active towards a common goal.

National Members are critical in providing links to national science communities. They also can help, to a variable extent, to provide access to policy-makers and science funding at the national level. Connecting global and national policies and ensuring that these are science-based, is an ongoing challenge for ICSU (see Section 3.2) as is the link with funders (see ahead, Section 5.6.2). Rio+20 (Section 3.1.2) and the new Earth System Sustainability Initiative (Section 2.1.1) provide test-beds for ICSU to work with its National Members to strengthen these links over the next six years.

As mentioned at the outset of this document, one of the three cross-cutting challenges for ICSU over the next decade is to establish a stronger relationship with its existing disciplinary Unions, whilst developing new activities that require a broader range of disciplinary involvement. Meetings every 18 months between the Unions, ICSU Executive Board and Secretariat play an important role in promoting exchange of information and providing a platform for discussion. At the more operational level, the Grants Programme has recently been modified to promote Union involvement

with the Regional Offices and this emphasis can be strengthened. At the same time, the challenge of incorporating the disciplinary strengths of the Unions into ICSU's interdisciplinary activities needs to be actively taken up within the context of specific initiatives such as Urban health. And, ICSU can more actively promote and support Union activities such as international science years. At a higher level, the relationship between ICSU and the Unions should also be considered as part of proposed independent review of ICSU (see ahead, Section 5.6.3).

Overall strategy and specific actions

- To work with Members (National Members and Unions) to facilitate their involvement in the implementation of the activities laid out in this strategic plan;
- With the assistance of the Regional Offices, to expand National membership and improve the engagement of least developed countries in ICSU activities;
- To use the Grants Programme to catalyse closer interactions between the Unions and Interdisciplinary Bodies and the ICSU Regional Offices;
- To formally support, on a case-by-case basis, proposals for international science years from the Unions and contribute more actively to these years;
- To consider the relationship with the Unions as part of the proposed external review of ICSU (see ahead, Section 5.6.3).

5.2 Interdisciplinary Bodies

Most of ICSU's Interdisciplinary Bodies are long-established and their structure and constitutions are modeled on ICSU itself. Whilst it has the advantage of providing long-term institutional stability, this traditional model is not necessarily as dynamic and flexible as is required to meet the current and future needs in certain areas. With this in mind, the more recently established ICSU initiatives (2006 onwards) differ from their predecessors in two very significant ways: (1) they are time-limited from the outset; (2) they are not dependent on multiple Member subscriptions but are hosted by a single country that pays the major proportion of the costs for the International Programme Office. This model worked very effectively for the International Polar Year but this was a short-term, two-year, initiative; the viability and effectiveness of the new model for longer initiatives has yet to be tested. However, it is already clear that effective mechanisms have to be developed for linking new initiatives to a diversity of funding sources – national and international research funding agencies, development agencies and private foundations.

ICSU has a statutory obligation to review its interdisciplinary bodies at regular – normally five-year – intervals. In preparation for the previous Strategic Plan, a number of meta-reviews that essentially covered all ICSU activities were conducted. And over the past six years a number of more specific and detailed performance reviews have been performed on individual bodies. The Committee on Data for Science and Technology (CODATA) has already been identified as a priority for a similar review during 2012-2014 and a rolling programme of reviews needs to be instigated for other activities.

The links between ICSU's global initiatives and regional activities also need to be developed. This has already begun in areas such as disaster risk, ecosystem change and urban health and needs to be strengthened and expanded. The Earth System Sustainability Initiative, with its emphasis on regional and local scales, is important in this regard.

Overall strategy and specific actions

- To monitor closely the new structural model for supporting new initiatives to ensure that they maintain their global remit and focus; to conduct external reviews of each initiative after five years;

- To review those interdisciplinary bodies, starting with CODATA, that have not been individually reviewed for several years and ensure that they are aligned with ICSU's overall strategy and the interests of the ICSU Members;
- To strengthen the strategic and operational links between Interdisciplinary bodies and Regional Office activities.

5.3 Associates

ICSU has over twenty Associate Members, who pay a small annual subscription but do not have voting rights. This is a very diverse grouping of international professional societies and Institutions; some of these are important strategic partners, others have much weaker links with ICSU activities. Yet others have their roots in Union commissions or associations and may eventually apply to be recognized as full Union Members.

The role of Associates was not considered in the development and implementation of the first ICSU Strategic Plan. However, as discussed elsewhere in this document, ICSU's current National and Union Membership is deficient in several respects, including disciplinary coverage and links with funders. The associate status offers an opportunity to address these deficits and building stronger institutional partnerships with organizations that do not fit into the traditional membership categories. There are a number of international interdisciplinary science networks and institutions with whom a stronger association would enhance various ICSU activities at both the global and regional levels. For example, the importance of universities in determining the future international science landscape has been identified in the ongoing ICSU foresight exercise and stronger links between ICSU and various international networks of universities should be explored.

Overall strategy and specific actions

- To conduct a review of the role of associates in ICSU, with a view to strengthening and potentially diversifying the ICSU membership;
- To strengthen regional outreach and impact by encouraging important regional partners to become ICSU associates;
- To strengthen representation of the social, engineering and health sciences within ICSU (cross-cutting issue not limited to use of Associate category, see also for example Sections 1.3 and 2.1.1)

5.4 Governance and the Secretariat

5.4.1 The Secretariat, Executive Board and Regional Committees

Over the past six years, the Secretariat has almost doubled in size, with the addition of two new core staff-members in Paris and ~11 new staff members in the three Regional Offices. In addition, there has been some turnover due to retirements and career progression, which has enabled the introduction of more new faces and ideas into the Secretariat. Most importantly, there have been a number of secondments and internships that have supplemented the core staff and been instrumental in enabling ICSU to implement the first Strategic Plan.

The Executive Board continues to be the body that sets ICSU's overall directions, budgets and work-plans between General Assemblies. It is assisted by the Committee on Scientific Planning and Review (CSPR) and increasingly by the three Regional Committees. Ensuring effective communication and coordination between these various bodies presents an ongoing challenge. To this end an annual meeting of ICSU Officers, Regional Directors and Chairs of Regional Committees has been instigated since 2009. These meetings focus on strategic issues and linking global and regional planning and actions.

As a membership organization, transparency and openness in relation to governance and decision-making is important. Decisions from Board meetings and reports from policy committees are made publicly available on the ICSU web-site and advertised via the electronic newsletter.

5.4.2 Policy, scientific and review committees

ICSU has three policy committees: CSPR and CFRS (see previously, and Section 4.1) and the Policy Committee for Developing Countries (PCDC). This latter committee was established in 2006 as a result of the review that led to the development of the Regional Offices. However, PCDC never really managed to define its niche relative to the Regional Committees and was put into abeyance in 2009. Following the reviews of the Regional Offices, it is now proposed that this committee be formally disbanded.

With regard to ICSU committees more generally, including various ad-hoc review and implementation groups, there is an ongoing challenge to identify and select high-calibre members who are willing and able to give the required time. Significant effort goes into selecting committees that are balanced in terms of disciplines, regions and gender. And there is a delicate balance to be maintained between transparency and openness versus personal sensibilities and confidentiality. In response to a request from Union Members, listings and biographies of all ICSU committee members are made available on the website as soon as they have been confirmed. In addition, draft reports from these groups are invariably made available for consultation before they are finalized. Nevertheless, processes, including the communication of decisions, can be further improved.

5.4.3 Communication and outreach

Over the past six years considerable effort has gone into improving ICSU's communication and outreach, with a full-time communication Officer being appointed to the Paris Secretariat in 2008 and most recently the launching of a new website that incorporates both global and regional activities. However, for many active scientists ICSU remains invisible. Even widely acclaimed ICSU-led successes such as IPY are often not universally identified with ICSU. This partly relates to the way ICSU operates and its role as a convenor and facilitator for scientific initiatives that are subsequently adopted by other institutions and funders, who understandably claim their share of credit. However, in a competitive world it is important that ICSU raises its visibility and is more widely recognized for its contribution to global science. The launching of the new ICSU website in 2011 was very important in this regard and the shift towards greater use of electronic publications as opposed to paper documents will continue over the coming years. The website is designed to integrate both global and regional activities and enable electronic networking via blogs and other tools.

As a global network science organization that largely functions via the efforts of volunteer scientists, personal communication remains an absolutely critical part of ICSU's overall *modus operandi*. Renewed efforts have been made over the past six years to increase personal interactions between the ICSU Secretariat and Board members and ICSU's National and Union Members. For example, Board members have attended the large majority of Union congresses and/or General Assemblies. The establishment of the Regional Offices and Committees has created another cadre of scientists who are well informed about ICSU and able to participate in outreach activities; this potential needs to be more fully exploited over the next six years.

Overall strategy and specific actions

- To continue to strengthen the capacity of the Secretariat both in Paris and in the Regional Offices, with a particular focus on secondments from Member organizations and short-term exchanges between Offices;
- To strengthen the links and communication between the governance and advisory structures at the regional and global level; to formally replace the Policy Committee on Developing

Countries (PCDC) with a new strategic coordination group including the Officers and Regional Chairs and Directors;

- To increase ICSU's visibility and outreach by: making maximum use of the new interactive website; and, exploring innovative ways of deploying social networking, multi-media and other tools; whilst recognizing the importance of personal interactions.

5.5 Strategic partners

ICSU has a number of strategic partners that have been identified in association with various activities throughout this document. These include both Intergovernmental – mainly United Nations – and non-governmental bodies. Partnerships are often, but not always, consolidated in the form of co-sponsorship of activities. In practice, partnerships are important for all ICSU activities. However, during the period of the first strategic plan, it has become clear that there are different varieties of partnership, on a gradient from passive (in name only) to active (significant intellectual and/or financial contribution). Over the next six years the emphasis will be on developing and strengthening active global and regional partnerships, particularly in the context of new initiatives.

Overall strategy and specific actions

- To identify and work with active contributing partners in developing and implementing new initiatives at the global and regional levels.

5.6 Resources and value for money

Historically, the large majority of support for the ICSU Secretariat and its Interdisciplinary Bodies has come from Members in the form of voluntary contributions. Some of the longer-established Interdisciplinary bodies have developed their own membership and dues structure and this is normally based on that of ICSU. Some bodies, such as the Global Change Programmes, or the Polar Year have a need both for 'glue' funding for planning and coordination activities and for project funds. Taking this variation into account, resource needs can be considered in four broad categories:

1. 'Core' support for the ICSU Secretariat, including Regional Offices
2. Support for special projects managed by the ICSU Secretariat and Regional Offices
3. Support for Interdisciplinary Bodies
4. Support for the research activities that are planned and coordinated by Interdisciplinary Bodies.

5.6.1 Member dues and support for the Secretariat

Starting in 2007, ICSU carried out a review and iterative consultation with Members, on its dues structure. This has been based on voluntary contributions but a new dues structure was approved by Members at the 2008 General Assembly. As of 2012, National Member contributions will be index-linked to GDP and Union contributions will be based on their own annual dues income. This restructuring, will mean that several Members will have to pay significantly more than they have been paying to date and a number of Members will be eligible to pay less (although voluntary contributions are encouraged). The transition to the new dues structure will provide additional financial stability and transparency to ICSU's operations but in the current global financial recession it will also present challenges for some Members. This increases the onus on ICSU to help Members justify their contributions as good value for money.

The core support for the Regional Offices comes largely from the host countries with a contribution from the ICSU dues income. The agreements for the three offices have been renegotiated following the external reviews in 2010 and ICSU is committed to provide extra resources and to attract additional funding streams. There are opportunities with a number of funding bodies, including

regional funding agencies, UNESCO, National Members of ICSU, the European Commission and development agencies. Thus far, initial approaches to each of these sources have been positive and led to some additional funding. The challenge over the next six years is to build on this and establish alternative funding streams that bring extra resources into the Offices themselves and into the activities that are being promoted by the Offices.

Considerable progress also has been made in attracting funding from a diversity of sources to directly support the work of the ICSU Secretariat in developing and implementing several of the initiatives laid out in this plan. This includes substantial donations from a number of private companies for Rio+20 activities at both the regional and global level and for the development of the research for the Earth System Sustainability Initiative. It is the first time that ICSU has secured significant private funding and this is clearly an area with potential for expansion during 2012-2017. To this end, it is proposed that a new Committee for Fund-raising be established. In order to avoid potential conflicts of interest and ensure transparency, the policies and processes for soliciting and accepting such funding have begun to be developed and this is an area that will need to be closely monitored.

Key partners: Private donors, UNESCO, private sector donors.

5.6.2 Resources for Interdisciplinary Bodies and Initiatives

As described in Section 5.2, the core support for the International Programme Offices for new Interdisciplinary Bodies such as IRDR, PECS and WDS is being provided by a single host country. The research that is coordinated by these offices is then traditionally supported through standard national and international funding mechanisms. For initiatives such as the International Polar Year this can be incredibly effective, but there are still significant obstacles to funding truly transnational activities. Support for activities in the less developed countries is a particular challenge. New mechanisms need to be developed in cooperation with various research funders and donors to support global programmes and their regional activities.

In the context of the new Earth System Sustainability Initiative (Section 2.1), there has been very positive progress in strengthening the links between ICSU's global research activities and research funding agencies. This initiative is being co-designed with the Belmont Group of funding agencies – a sub-group of the International Group of Funding Agencies (IGFA). ICSU was commissioned by the Belmont Group to produce a report on regional needs for science in relation to sustainable development (ICSU, 2010) and the recommendations from this report have been integrated into the global initiative. Several national funding agencies are already aligning their research funding schemes to fit with the Grand Challenges framework. Whilst this has happened previously, e.g. for IPY, it has mainly been due to unilateral action. The co-design/joint commitment approach is both novel and exciting. Taking this a step further, a Foundations Forum to consider the global sustainability challenges is being planned with partners for 2012.

Key partners: IGFA/Belmont forum, ISSC, UNESCO, private foundations and donors.

5.6.3 Evaluation and value for money

Assessment of the overall performance and value for money of ICSU is an important aspect of the organization's accountability to its Members and other partners. The various components of ICSU – including its Regional Offices and Interdisciplinary Bodies - are subject to performance reviews every 5-6 years. However, ICSU as a whole has not been subject to independent review since 1996 (ICSU, 1996). At the time, this review led to very significant changes in ICSU's structure and directions; effectively it was the beginning of the transition towards a strategic, mission-driven organization.

It is now timely for ICSU to be re-evaluated, relative to its mission and strategic aims, to assess whether the changes that began in 1996 have resulted in an efficient and effective organization to

represent the global science community. What has been the impact of ICSU since 1996? If ICSU had not existed, what would not have happened? And, looking to the future, are ICSU's structure, mechanisms and overall strategic directions optimal?

Overall strategy and specific actions

- To work with Members to ensure a smooth transition to the new index-linked dues structure as of 2012.
- To establish a new Committee for Fund-raising, that will work with the secretariat, and report to the Executive Board.
- To work with public research funding agencies, development agencies, private foundations and donors to ensure funding for planning and implementation of specific ICSU initiatives at both global and regional levels.
- To commission an independent assessment of ICSU to report to the General Assembly in 2014 and/or 2017.



References

- ICSU, 1996 Final report, ICSU Assessment Panel
- ICSU, 2002a Report of ICSU's CSPR Panel for Review of Committee on Science and Technology in Developing Countries
- ICSU, 2002b Identification of Key Emerging Issues in Science and Society: an International Perspective on National Foresight Studies
- ICSU, 2002c *ICSU Series on Science for Sustainable Development*. A series of 11 reports
- ICSU, 2003 Environment and its Relation to Sustainable Development. Report of the CSPR Assessment Panel
- ICSU, 2004a Foresight Analysis: Report of the CSPR
- ICSU, 2004b Scientific Data and Information. A Report of the CSPR Assessment Panel
- ICSU, 2004c A Framework for the International Polar Year 2007-2008
- InterAcademy Council, 2004 Inventing a Better Future. A Strategy for Building Worldwide Capacities in Science and Technology
- ICSU, 2005a Science and Society: Rights and Responsibilities – a Strategic Review
- ICSU, 2005b Capacity Building in Science: Report of the CSPR Assessment Panel
- ICSU, 2006 Strategic Plan for the International Council for Science, 2006-2011
- ICSU, 2007 Towards a Systems Analysis Approach to Health and Wellbeing in the Changing Urban Environment (scoping study)
- ICSU-ROA, 2007a Natural and Human-induced Hazards and Disasters in Sub-Saharan Africa
- ICSU-ROA, 2007b Sustainable Energy in sub-Saharan Africa
- ICSU-ROA, 2007c Health and Wellbeing in sub-Saharan Africa
- ICSU, 2008a A Science Plan for Integrated Research on Disaster Risk
- ICSU, 2008b Freedom, Responsibility and Universality of Science

ICSU, 2008c Report from the ad hoc Strategic Committee on Information and Data

ICSU-UNESCO-UNU, 2008 Ecosystem Change and Human Well-being: report from an ICSU-UNESCO-UNU ad hoc Group

ICSU-ROAP, 2008a Science Plan on Hazards and Disasters: Earthquakes, Floods and Landslides

ICSU-ROAP, 2008b Science Plan on Hazards and Disasters: Special Vulnerability of Islands

ICSU-ROAP, 2009 Science Plan on Sustainable Energy

ICSU-ROLAC, 2009a Understanding and Managing Risk Associated with Natural Hazards

ICSU-ROLAC, 2009b Mathematics Education in Latin America and the Caribbean: a reality to be transformed

ISPRES, 2009a Research and Development on Renewable Energies: A Global Report on Photovoltaic and Wind Energy

ISPRES, 2009b Research and Development on Renewable Energies: A Preliminary Global Report on Biomass

ICSU, 2010 Regional Environmental Change: Human Action and Adaptation (“the Belmont report”)

ICSU-ISSC, 2010 Earth Systems Science for Global Sustainability: the Grand Challenges

ICSU-ROLAC, 2010 Biodiversity and Human Wellbeing in Latin America & the Caribbean

UNESCO, 2010 UNESCO Science Report 2010: The Current Status of Science around the World

ICSU, 2011a ICSU Foresight: International Science in 2031

ICSU, 2011b Report of the ICSU Ad-hoc Review Panel on Science Education

ICSU, 2011c Health and Wellbeing in the Changing Urban Environment: a Systems Analysis approach

ICSU, 2011d Ad-hoc Strategic Coordinating Committee on Information and Data: an interim report to CSPR

ICSU-ROAP, 2011 Science Plan on Health and Wellbeing in the Changing Urban Environment

ICSU-ROLAC, 2011 Sustainable Energy in Latin America and the Caribbean: Potentialities for the future

Royal Society, 2011 Knowledge, networks and nations: Global scientific collaboration in the 21st century



List of Acronyms

AAAS	American Association for the Advancement of Science
CAETS	Council of Academies of Engineering and Technological Sciences
CFRS	Committee on Freedom and Responsibility in the conduct of Science
CODATA	Committee on Data for Science and Technology
COSPAR	Committee on Space Research
CSD	Commission for Sustainable Development
CSPR	Committee on Scientific Planning and Review
DIVERSITAS	An international programme of biodiversity science
ESF	European Science Foundation
ESOF	Euro-Science Open Forum
ESSP	Earth System Science Partnership
FAGS	Federation of Astronomical and Geophysical Data Analysis Services
FAO	Food and Agriculture Organization of the UN
FMSH	Fondation Maison des Sciences de l'homme
GA	General Assembly
GCOS	Global Climate Observing System
GEC	Global Environmental Change
GEO	Intergovernmental Group on Earth Observations
GEOSS	Global Earth Observation System of Systems
GOOS	Global Ocean Observing System
GTOS	Global Terrestrial Observing System
IAC	InterAcademy Council
IAP	InterAcademy Panel on International Issues
IB	Interdisciplinary Body
ICSU	International Council for Science
IGBP	International Geosphere-Biosphere Programme
IGFA	International Group of Funding Agencies for Global Change Research
IGY	International Geophysical Year
IHDP	International Human Dimensions Programme on Global Environmental Change
IIASA	International Institute of Applied Systems Analysis
INASP	International Network for the Availability of Scientific Publications
IOC	Intergovernmental Oceanographic Commission

IPBES	Intergovernmental Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
IPY	International Polar Year
IRDR	Integrated Research on Disaster Risk
ISO	International Standards Organization
ISSC	International Social Science Council
IUGG	International Union of Geodesy and Geophysics
MA	Millennium Ecosystem Assessment
NGO	Non-Governmental Organization
NSF	National Science Foundation (USA)
OECD	Organisation for Economic Cooperation and Development
ORI	Office of Research Integrity (USA)
PCDC	Policy Committee on Developing Countries
PECS	Programme on Ecosystem Change and Society
REN21	Renewable Energy Network for the 21st century
Rio+20	UN Conference on Sustainable Development, 2012
ROA	Regional Office for Africa
ROAP	Regional Office for Asia and Pacific
ROLAC	Regional Office for Latin America and the Caribbean
SCAR	Scientific Committee on Antarctic Research
SCID	Strategic Committee for Information and Data
SCCID	Strategic Coordinating Committee for Information and Data
SHWB	Science for Health and Wellbeing
TWAS	Academy of Sciences for the Developing World
UN	United Nations
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNU	United Nations University
WCRP	World Climate Research Programme
WDC	World Data Centres
WDS	World Data System
WFEO	World Federation of Engineering Organizations
WHO	World Health Organization
WMO	World Meteorological Organization
WSSD	World Summit on Sustainable Development

Annex 1: Summary of response to key actions from first Strategic Plan 2006-2011

Note: the thematic headings listed in the table below are those used in the first Strategic Plan. In many cases they are similar but not identical to those used for the future period, 2012-2017.

Planning and coordinating research

Theme	Proposed actions, 2006-11	Progress and current status
Global Environmental Change (GEC)	Performance reviews of programmes	Reviewed existing programmes (IHDP, IGBP, WCRP) and ESSP. Completed consultation exercise to identify Grand Challenges. New Earth System Sustainability Initiative being planned.
International Polar Year, 2007-2008	Programme implementation	IPY successfully implemented and now addressing legacy issues.
Natural and human-induced hazards	Develop potential new programme	New programme (IRDR) launched in 2009 and IPO established in 2010.
Millennium Assessment follow-up	Develop new research and methodologies	Scoping carried out and new programme (PECS) launched in 2009, with IPO established in 2011.
Energy	Establish an International Science Panel	ISPREE established in 2007 and produced two reports. Activity ceased in 2009.
Human Health	Develop potential new programme	Scoping carried out and new Urban Health programme plan to be presented to GA in 2011.
New scientific horizons	Facilitate joint activities by Members and conduct second Foresight exercise	Grants programme reviewed in 2007 and re-launched in 2008. Two joint ESF Europe-Africa workshops convened (2008 and 2010). Foresight Scenarios exercise to be presented to GA in 2011.

Science for policy activities

Activity	Proposed actions, 2006-11	Progress and current status
Global Earth Observation Systems	Advise on implementation of new Global Earth Observation System of Systems	ICSU and its IBs, particularly COSPAR, CODATA and DIVERSITAS, playing lead role in various GEOSS activities.
Sustainable Development	Contribute to selected WSSD follow up policy activities.	WSSD recommendations integrated across new programmes and science for policy activities.
Commission on Sustainable Development (CSD)	Develop multi-stakeholder science agenda Provide scientific input on specific topics	ICSU, together with WFEO, has led S&T Major Group in contributing to annual CSD sessions and now planning for Rio+20.
Millennium Ecosystem Assessment	Facilitate interaction among sub-global assessments	PECS programme developed and ICSU, together with DIVERSITAS, has been key player in IPBES discussions.

Strengthening the Universality of Science

Activity	Proposed actions, 2006-11	Progress and current status
Universality Principle	Establish new Universality of Science Committee	CFRS established in 2007 and workplan approved at GA in 2008. Dedicated Secretariat established in 2010.
Data and Information	Restructure ICSU activities and develop new international Framework	SCID report approved by GA in 2008. New World Data System under development.
Intellectual property and copyright	Develop mechanisms for effective interaction with WIPO and WTO	Plan for IPR Observatory developed in 2007 and put 'on hold'.
Science and Society	Ensure that all new initiatives consider science and society issues	IPY had major outreach and education campaign. IRDR and PECS specifically designed to address science-society issues. CFRS organizing workshops in key science-society areas.
Regional Offices	Establish three further Offices	Three Offices in Africa, Latin America and Asia fully operational and underwent first review in 2008-09. Plans for Middle East and North Africa Office pending.
Eastern and South-Eastern European countries	Strengthen links to national science communities	Several meetings organized with Academies from the region.
Capacity building	Integrate into new initiatives and build up Regional Office-Union/ Interdisciplinary Body links	New programmes (PECS, IRDR, Urban Health) have major interdisciplinary capacity building elements. Grants programme restructured in 2008 to promote Union/IB-Regional Office links.

Other major activities

Activity	Proposed actions, 2006-11	Progress and current status
Grants programme	Seek additional funding	UNESCO funding no longer available and no other funding secured. More modest programme implemented in 2008.
Unions meetings	Further meetings in 2007, 2008(GA) and 2010	All meetings held as planned.
National Member meetings	Organize periodic regional meetings of National Members	Regional Office consultation meetings organized with National Members. European Members convene annually.
Membership	Expand representation and ensure better communication	15 new National Members and one Union admitted since 2006.
Corporate communication	Recruit new Communication Officer	Communication Officer in place since 2007.
Partners	Strengthen strategic partnerships and develop new partnerships on a 'case-by-case' basis	Strengthened strategic partnerships, e.g. with ISSC and UNEP. Several new partnerships developed, e.g. with CAETS, FMSH.
Funding	Review dues structure and attract additional 'external' funding	Review of dues structure completed and new structure approved at GA in 2008. Special annual subvention of €500k p.a. secured from France since 2007. Increased grant funding from NSF. Other activities, e.g. Young Scientist Conference (2007) and 'Visioning' (2009-2011) and Rio+20 attracted foundation and business sector funding.

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