

International Geoscience in the 2nd decade of the 21st Century Science and Organizational Strategies for the International Union of Geological Sciences

By the IUGS Strategic Planning Committee

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FOREWORD

The first strategic plan was an important event for the IUGS, a proof that the IUGS was determined to consolidate its relevance in the Earth Science community and in the scientific community at large. This second strategic plan should stress the role of the IUGS and **what IUGS can actually do with its limited resources for serving the Geoscience community of the world.**

Current IUGS vision, mission and major goals continue to be appropriate and much of the foresight and priority assessment done for the first plan remains relevant, but there is the need to further examine specific parts of the first Strategic Plan, such as the effectiveness of IUGS activities (Commissions, Task Groups and Joint Programs). This new specifically targeted foresight exercise may be useful since continuity is important, but some reconsiderations of what IUGS should actually do seem necessary.

- Geosciences are barely visible in society. Therefore, Geoscience education is critically important, and IUGS should play a large role in the effort of raising the awareness of the importance of Geosciences in the general public through schools, media etc.. The very future of our science rests in being able to get the community, especially young people, to understand the crucial role the Geosciences play in understanding both the economic and environmental future of the planet. However, in the past, we feel that the mission of education has not been seen to be important and not even integrated into the other work of IUGS.
- The IUGS owes most of its credit by the international geological community to the standards in stratigraphy and in nomenclature. This is one of the core businesses of IUGS and should be pursued with determination.
- IUGS is committed to provide independent, authoritative scientific advice at the international and national level. Can IUGS really speak for the whole of Geological Sciences? Should IUGS have a rapid response capability and, if so, how does it prepare for this?
- Developing Countries shall participate more fully in the global Geological Sciences agenda, and IUGS should have a major role, acting closely in association with its numerous National members belonging to DC's.
- Organisational change can be challenging, and it is not worth doing unless it will really bring new life into the organisation.
- Interaction with other global actors (IGC, UNESCO, ICSU, ICSU Unions, and others) shall be improved. Moreover, collaborative programs could be performed in partnership with many organizations already affiliated with IUGS, which are related to some aspect of the geosciences, and therefore have a similar mission, in their respective specific field of activity.
- Should IUGS just react to needs of the geoscience community, or should it be proactive (i) converting geosciences knowledge into useable tools to improve practices, (ii) guiding

policy, and (iii) pushing new frontiers of knowledge? IUGS should be reacting to the scientific and political shifts in the global community – with the role of promoting the geosciences as an important and valued player in all debates.

- In the coming years population growth will greatly impact the Earth's finite resources. There will be increasing pressure on water availability, both for drinking and for agriculture. The availability of fertile land is limited, a situation that is exacerbated by the degradation of natural ecosystems.
- Inadequate and polluted water supplies will remain pressing concerns, in particular in less developed regions. Almost half of the global population is projected to live in areas of high water stress. Agriculture is the largest consumer of freshwater; 70 percent of all freshwater withdrawals go to irrigated agriculture.
- There will be increasing demand on finite sources of energy, with fossil fuels having to be extracted from previously unexploited locations. Other rare materials are also being used at rates that are unsustainable, for example, demand for gallium for use in emerging technologies, such as thin layer photovoltaics. Demand for neodymium will also rise dramatically. Geological scarcity is a critical issue, and this is further complicated by the geographical distribution of resources. Not surprisingly, the exploitation of natural resources in the Polar Regions is a topic of increasing economic and scientific interest.

EXECUTIVE SUMMARY

The International Union of Geological Sciences (IUGS) should continue to play and expand its role in the service of international geoscience. However the Union has also recognized for some time that there is a need to change to meet new circumstances including political developments, the needs of the developing world, the challenge of new areas in science, the opportunities provided by the internet, and the changing needs of the community at large. Along with these broader issues are the IUGS's concerns resulting from limited funding and lack of visibility.

In order to address these and related issues, a new Strategic Planning Committee (SPC) was established in 2009 to make recommendations on future directions for the next five years. The SPC makes a few comments and two recommendations on general issues, and 23 recommendations on strategic issues of different types. Most of these are at a fairly high level, and the Committee did not attempt to deal with the details of implementation.

Summary of Recommendations

General

Considering that IUGS has been of great value to the geoscience community, it must be maintained and strengthened.

The IUGS plays a major role in the development of geostandards and a leadership role in developing an internet-based system for dissemination of geoscience information and in promoting geoscience education internationally. IUGS is also a facilitator of communication between a variety of active and emerging groups of geoscientists. However, the IUGS does not perform research – the focus is on building a global geoscience network and community and to provide communications between groups that are active and emerging.

The IUGS Commissions cannot realistically perform any research (primary or secondary) without a budget even if there is a huge extent of good will. Therefore, the value added from IUGS is to provide a framework upon which to form and interact, not in competition with other scientific and technical bodies.

Because of this, in order to improve its performances, IUGS should become even more of a network, connecting all Adhering Bodies, Affiliated Organizations, other international organizations and Unions. Through the IGC, the IUGS brings together, each four years, the members of its network for dialogue and partnering.

Moreover, the IUGS commissions should be strategically oriented, setting priorities and limiting the scope of activities to what is manageable and could be successful. Through maintaining a network, the Union can remain engaged in most if not all aspects of the geosciences that are active and emerging.

A Mission Redefined

The mission of the IUGS is to unite and service the global geological community through a well organised global network and clearinghouse in order to communicate and promote the utility of the geosciences to society and the need to continue to develop the geosciences to meet the future needs of society. To accomplish this mission the IUGS maintains a global network and a publication, holds a global forum every four years (the IGC), and forms Commissions (or Task Groups) to strategically focus on emerging issues and needs. In doing so, it facilitates international collaborations.

IUGS is facilitating the development of the Geosciences by providing international standards. IUGS should also support broad-based innovative studies relevant to the entire Earth system, and applying the results of these and other studies to understanding how humans interfere with the evolution of Earth's natural environment, using all natural resources wisely, improving the prosperity of nations and the quality of human life and promoting our science as an important input to the economic and environmental health of all countries.

The objectives of the IUGS should include the following:

- *1. Produce authoritative scientific standards.*
- *2. Contribute to Earth science education and the advancement of public understanding of the Geosciences and their significance in solving societal problems.*
- *3. Serve as an authoritative international scientific union addressing global issues that involve the Geosciences.*
- *4. Represent the geological sciences in governmental and non-governmental forums to inform, advise, and influence public policy and decision-makers.*
- *5. Help the advancement of geological research throughout the world, including both fundamental geoscience aimed at understanding the global Earth system, and applied Earth science that uses the developing understanding of the Earth system to address problems of particular relevance to the welfare of the Earth's human population*
- *6. Encourage and support new original ideas in basic and applied geological research by means of the creation of ad hoc Task Groups, Commissions, or different adequate bodies.*
- *7. Enhance the visibility of the geosciences and demonstrate their profound influence in planning for rehabilitation and preservation of the future planetary environment by seeking greater involvement in public affairs and by publicizing the critical role that only the geosciences can play.*
- *8. Foster collaboration between developed and developing countries in Earth science research, capacity building, and applications.*

- 9. Encourage, in cooperation with other organizations, more interdisciplinary involvement within the broad spectrum of the geosciences in developing solutions to global problems.
- 10. Improve its presence in ICSU activities.

IUGS Strategic Plan Executive summary

Strategic issues: Standards

Recommendations	Goals and justification	Actions
Provide international standards.	Provide leadership in the establishment of international geoscience standards. Scientific standards are perceived as the core business of IUGS.	IUGS should consider increasing its activity in this field, also in collaboration with affiliated organizations.

Strategic issues: Science

Recommendations	Goals and justification	Actions
Raise the profile of IUGS in scientific community.	Improve the IUGS importance in basic and applied science.	Recruiting as officers and members of the IUGS bodies the best scientists, offering high-level articles in Episodes and monographic volumes, involving scientists from developing countries, creating scientific awards dedicated to the major topics.
Retain and improve Episodes.	Episodes is an important tool for communication, outreach and education.	Enhance its circulation and distribution and publish a higher proportion of high-quality reviews of topical issues in international Earth science. Include some updates from National Committees and Affiliates.
IUGS shall continue to promote new, high priority geoscience activities of demonstrable relevance to society.	Examples: <ul style="list-style-type: none"> - Reducing vulnerability to natural hazards, and mitigating the effects of waste and pollution. - Understanding human influence on global change (with IUGG) - Understanding the geological processes involved in soil science. - Managing resources and sustaining the environment. - Understanding relationship between geological factors and health. 	IUGS shall identify and promote only new fields and applications with timeliness, and cease to support them once they become part of the usual research activities. Provide support to international programs that highlight the work and role of geoscience to the general community.

Recommendations	Goals and justification	Actions
Review regularly IUGS activities to ensure progress, productivity commensurate with the funding, international perspective maintained.	The SPC regards regular critical assessment of all IUGS-sponsored investigations as necessary to ensure that progress is being made at an acceptable pace towards the declared goals, productivity is commensurate with these same goals and an international perspective is maintained.	The landscape has changed significantly in the last decade. Thus it is time to review the performance of the scientific activities of the IUGS against its strategic objectives. An external review may also lead to fundamental changes in governance and functioning.
Continuing to support outstanding success of IGCP.	Enhancing collaboration with UNESCO and other international bodies in view of supporting young scientists.	In the future, the IUGS shall strive to do more of this kind of broadly international research and place even greater emphasis on issues of 'Geoscience and Society'.
IUGS to seek greater visibility and better financial returns from its program of publications.	All publications stemming from IUGS-sponsored scientific work should carry the IUGS logo and be clearly identified in all respects as IUGS-sponsored publications.	More monographs need to be published on broader subjects.

Strategic issues: Outreach

Recommendations	Goals and justification	Actions
Raise the profile of geological sciences, increase involvement in international programs that highlight the role of geoscience to society at large.	Increase the visibility of geosciences, and their importance for the rehabilitation and preservation of the environment, and for the sustainable use of natural resources.	Preparing position statements on the major issues regarding natural hazards, mineral and energy resources; press releases, and encouraging National Members to organize events involving decision makers are good tools for enhancing visibility. Other means should be envisaged at this end. The participation in the Global Geosciences Initiative is also a way to raise the profile of IUGS..
Provide adequate support for the IUGS website so that it becomes the electronic hub of the Union, and, as such, could contribute enormously to improving communications within the Union.	The IUGS website should contain more information and documents dedicated to public education. It could also be open for specific communication to Adhering Members and Affiliated Organizations. It should contain up-to-date information on the work of Commissions and Task Groups.	The website should be a tool for strengthening the links with Adhering Members. This task could be assigned to a member of the EC (a Vice-President for instance) in charge of the relationships with Adhering Members. The websites of the various IUGS bodies should be improved. The IUGS website can serve the Union in management of operations, data transfer, geologic inquiries, publication sales, secure financial transactions, and dissemination of reports and policy positions. It should become an instrument to reach the general public. External advice is needed for defining the position and the profile of a webmaster and for determining the responsibility of the other officers with respect to the IUGS website.

Recommendations	Goals and justification	Actions
Raise the level of recognition of IUGS for its role in the IGC.	The IUGS is the main scientific sponsor of the IGC.	IUGS should improve its visibility in the IGC, and should continue to receive a significant financial return for its role through the imposition of a levy on the proceeds of all future IGCs. IUGS should receive recognition in the Circulars, in the Program and in the General Proceeding; the opening ceremony should include a presentation of the IUGS Officers and an address of the IUGS President.

Strategic issues: Education

Recommendations	Goals and justification	Actions
Raise the profile in Education community; provide free access to Episodes online and promote its availability in schools.	Improving geological education at every level, from public awareness to education and training of young geologists.	The IUGS needs more concerted effort and the active participation of many more scientists in order to have any significant global impact on the huge education community. The products of its Commissions and Task Groups should be widely advertised and readily available on their websites.
Make technology transfer and geological education a key activity of the IUGS, through Commissions, Affiliates, National Committees, together with global projects like the IGCP.	Geologic phenomena and related Earth-system processes transcend national boundaries and are rarely confined to a single country. Scientific collaboration benefits all participants.	Future program activities involving the IUGS should incorporate both basic and applied science focused on societal issues with a strong Earth science component.

Strategic Issues: Organization

Recommendations	Goals and justification	Actions
Seek to increase IUGS's level of funding by developing new sources.	Raising funds improve the possibility of IUGS to undertake and fund adequately new initiatives	The clear remit should be to seek new external funds by developing new sources. This may include envisaging partnership with private companies in joint programs Some Member Countries may be willing to support a specific initiative with high social impact like geoscience education.

Recommendations	Goals and justification	Actions
Provide a “Permanent” Secretariat that would be in the same place over a significant number of years.	After the end of the support of Norway and the current secretariat in the U.S.A., there is an urgency for finding a new location for the IUGS Secretariat.	Through the kind help of the USGS, an interim Secretariat was established in the U.S.A., but only for three years, which will terminate at the end of 2012. It is therefore very urgent to establish a new Secretariat because without the Secretariat, the Union cannot function effectively. If necessary and appropriate for stimulating candidates, the offer to host the Secretariat for a significant number of years could be an important element for the assignment of an IGC to a country. Another possibility could be to link the offer to host the Secretariat to the choice of the candidates to the position of Secretary General.
Continue to carry out scientific work within the IUGS to continue primarily by Commissions, Task Groups, Joint Programs and Initiatives.	IUGS should not do what the international Affiliated Organizations can do better. The principle of subsidiarity states that: <i>a central authority should have a subsidiary function, performing only those tasks that cannot be performed effectively at a more immediate or local level.</i>	The number of the official activities of such enterprises should be strictly limited by the funding available to provide adequate support to enable these bodies to achieve significant results, and their duration staged so as to create regular opportunities to redirect funds to new Earth science initiatives.

Strategic issues: Operations

Recommendations	Goals and justification	Actions
Improve the effectiveness of the IUGS governing bodies.	The Executive Committee should be made more effective with specific and relevant tasks for each EC member.	The Bureau should run the day to day operations as a body. The Executive Committee could in some cases cover the tasks of an Advisory Board for Research Development (ABRD). Each Vice-President and Councillor should have a specific, important task. The President’s role should be that of representing officially the Union and providing ideas for new developments. One of the two vice-Presidents should be in charge of the external relations, and the other in charge of strategic planning and review (as is done in ICSU).
More efforts must be done to involve scientists from underrepresented groups - such as young scientists, women and scientists from developing countries.	Making all IUGS bodies more representative of the geological community	The IUGS Commissions, Subcommissions and Task Groups should be asked to take adequate measures to include women (say, at least 30%), and young scientists (say, under 35 years of age) among their officers. Stronger links to the YES Network could be developed by having YES members on the IUGS EC, Commissions, and Task Groups.

Strategic Issues: IUGS Partners

Recommendations	Goals and justification	Actions
Continue negotiations with other Unions, other ICSU entities, Affiliated Organizations and other organizations to ascertain their willingness to participate in high-quality, multidisciplinary projects of benefit to science or society.	Effective working partnership should be forged with other ICSU Unions and greater emphasis placed on multidisciplinary, socially relevant studies; together these will enhance the weight of the geosciences within ICSU.	The IUGS is a principal voice of the geological community in ICSU. IUGS should seek to expand its contacts and sphere of influence by reaching out to other organizations with which it might share common interests, especially in influencing public policy and decision-making.
Explore possible cooperation with other UNESCO entities.	IUGS should contact other UN Agencies such as UNIDO, UNITAR, UNDP, and UNCTAD.	The SPC suggests contacting directly these organizations in order to understand the real possibilities of some kind of fruitful collaboration.
Seek greater collaboration of IUGS and its Commissions and Task Groups with Affiliated Organizations and National Committees.	Current arrangements between the Union and these bodies continue to be unsatisfactory.	New and financially more realistic arrangements are required, for example to involve the Affiliated Organizations (albeit on a gradual rotational basis as funding permits) in joint scientific or educational endeavours with the Union.
Investigate other avenues of involvement of the Affiliated Organizations.	Improving collaboration with Affiliated Organizations.	Affiliated Organizations should be urged to consider carefully the recommendations herein and then asked to have a named representative present in each IGC. The <i>ad hoc</i> Task Group should find the way of attracting them at the IGC, e.g. giving them a vote in the Council. A meeting between the senior officers of the IUGS and representatives of the Affiliated Organizations should take place at each IGC.
Continue the recent efforts of the IUGS Bureau and Executive Committee for improving the timeliness and frequency of communications with the IUGS National Committees; encourage the National Committees to reciprocate.	The National Committees constitute an underused and mostly underappreciated resource that should be more directly engaged with the IUGS and support its activities	The interaction with National Committees has always been a concern for IUGS and many initiatives have been unsuccessful, because in many countries the National Committees exist in name only, and where they do exist, they meet very seldom. IUGS should inform the National Committees what is expected from them, and suggest an agenda. It would be useful to ask each "National Committee" about its real status. IUGS and IUGS bodies should start a collaboration on the basis of concrete programs. The E-Bulletin is an important information tool for communicating with the National Committees: it should be continued and enriched.

Recommendations	Goals and justification	Actions
Raise the profile of IUGS within ICSU	Involvement in programs (such as those of ICSU) with a mixture of basic and applied geoscience, as well as interdisciplinary and multidisciplinary studies in cooperation with other partners.	IUGS should take more care in responding to ICSU calls for different proposals: suggestions of programs or nominations. The present aims of ICSU are deeply different from those which characterized its activities in past years. The relevance of the individual Unions within ICSU itself has greatly decreased (ICSU is no longer the Council of Scientific Unions). ICSU is now pursuing complex scientific challenges, where new knowledge and new approaches are necessary. It is promoting trans-disciplinary activities in which natural and social sciences need to work together and is involving many stakeholders outside of science.

Criteria for Priorities

- *Conformability to the mission of the Union*
- *Usefulness for the geological community*
- *Societal benefit*
- *Favorable benefit/cost ratio*
- *Timeliness*
- *High probability of success*
- *Opportunity for international cooperation*
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Priorities

- ***Keep core mission of IUGS standards;***
- ***Develop new activities in Geological Education;***
- ***Improve outreach for increasing the visibility of Geology in the world;***
- ***Increase level of funding developing new sources and partnerships;***
- ***Increase cooperation with partners.***

ACTIVITIES OF THE IUGS

Strategic Plan

In the year 2000, the IUGS developed a formal strategic plan to guide its broad scientific activities around the world – the first such plan in its 50-year history. Since 1961, when the IUGS was founded, the geosciences have changed considerably, as have the general scientific political, and social environments within which they are conducted, funded, and managed. Now changes are occurring even more rapidly. This pace of change is true on all scales, from local to global. Increasingly, scientists view the Earth as an integrated system of dynamic processes – geological, physical, chemical, and biological – rather than as an array of seemingly unrelated phenomena amenable to study by various individual scientific disciplines. As a result, the Earth sciences have become much more interdisciplinary, cross-disciplinary, and multidisciplinary, which has, in turn,

fundamentally changed the character of scientific endeavours and reinforced the need for international cooperation. International meetings dealing with specific subdisciplines have multiplied in number and grown larger. This trend has not reduced the primacy of the International Geological Congress (IGC), which maintains its peculiar character of bringing together scientists from developed and developing countries, from academies, universities, and surveys for scientific as well as organizational interaction.

In light of the above it is imperative that the IUGS develop a new strategic plan to serve as a guide for organizational change and renewal for keeping abreast of the changing needs of science and society.

The first IUGS strategic plan originated at the IGC of Beijing, August 1996, when the Council voted that such a plan be prepared for the Union "no later than the end of 1997." In early 1999 the IUGS funded a formal meeting, at which time resolute preparations for the plan got under way. Peter J. Cook, who was the immediate past Director of the British Geological Survey and broadly experienced in dealing with strategic issues, chaired the strategic planning initiative. The members of the Strategic Planning Committee (SPC) were: **Peter Cook** (Australia), Chairman; **Mohamed Bensaid** (Morocco); **Alan Green** (Canada/Switzerland); **Lewis Gustafson** (U.S.A.); **Petr Jakes** (Czech Republic); **David Murangari** (Zimbabwe); **Jane Plant** (U.K.); **Victor Ramos** (Argentina); **Attilio Boriani** (Italy), *Ex-officio, IUGS*; **Robin Brett** (U.S.A.), *Ex-officio, IUGS*; **Zdenek Johan** (France), *Ex-officio, IUGS*; **John Aaron** (U.S.A.), *Rapporteur*; **Wolfgang Eder** (Germany/France), *Observer, UNESCO*.

The Committee met in Prague, Czech Republic, in September 1999, and spent three very full days carefully and candidly examining the IUGS mission, organization, and programs. On nearly all points of discussion, agreement was unanimous. The resulting strategic plan was approved by the IUGS Council, and the approval was ratified by the IUGS General Assembly in Rio del Janeiro in the year 2000.

Draft Strategic Action Plan

In autumn 2000, a Task Group was formed with the aim of translating the recommendations of the Strategic Plan into actions. The group was composed of **Ed De Mulder** (Chair), **Attilio Boriani**, **Verner Janoschek**, **Jane Plant**, **Tadashi Sato**, and **Peter Bobrowsky** of the Executive Committee (EC) with secretarial assistance by **Hanne Refsdal** of the Permanent IUGS Secretariat. At its 17-15 December meeting in Catania, Italy, the Task Group selected from a variety of options the preferred ones for implementing the plan's recommendations, and proposed follow-up actions. The conclusions of the Catania meeting including the proposed actions were contained in a document entitled "Draft Strategic Action Plan", which was sent to all members of the EC for comments. These comments were received in January 2001 and incorporated into a second version of the draft. During the EC meeting in Hyderabad, India (26 February – 2 March 2001) one day (27 February) was devoted entirely to discussing the second version of the Draft Strategic Action Plan. Consensus was reached on all proposed actions for implementing the recommendations in the Strategic Plan, which had been adopted by Council in Rio.

Mid-term Vision for the International Union of Geological Sciences

In 2001, the International Union of Geological Sciences (IUGS) celebrated its 40th anniversary. During its 40 years, IUGS had witnessed, and played a significant role in, a major revolution in the geosciences. Apart from looking back, however, this anniversary, together with the start of a new millennium, provided a good time for looking forward. Earlier the IUGS Strategic Planning Committee (SPC) had made a critical evaluation of the Union's activities, developed a mission statement for IUGS, defined goals, and indicated potential new directions for scientific research; thus, SPC had already outlined a way forward for IUGS.

In 2002 the IUGS EC prepared a position paper, which appeared officially in 2004 with the title "Mid-term Vision for the International Union of Geological Sciences". The document aimed to

provide a longer-term vision of the desired future development of the IUGS in society and in the global economy as set against the background of anticipated developments in science. This paper addressed two key questions:

- Where should IUGS stand by 2011, when it celebrates its 50th year of existence (vision)?
- How can that position be achieved (action plan)?

The document could be seen both as a response to the Strategic Plan and as its further development into a mid-term plan. The premise expressed by the first recommendation of SPC, i.e. that “the IUGS is of great value to the geoscience community; it must be maintained and strengthened”, served as a solid foundation from which to look ahead towards the Union’s 50th anniversary in 2011.

As the world’s population continues to expand and the impact of humankind on the Earth increases exponentially, the relevance of geological sciences is becoming increasingly clear. It is the responsibility of IUGS to make society conscious of the role the geological sciences can play; however, IUGS cannot do this alone. It should build bridges to all the other unions in the International Council for Science (ICSU) that deal with the Earth so that together they can generate a much stronger public and political profile for the Earth sciences and enlighten society about the benefits of geological sciences.

[NOTE: The only Strategic Plan for IUGS approved by the Council is the plan acted upon in Rio de Janeiro in 2000 after having been circulated many months in advance of that meeting. The second action plan and the mid-term vision are internal documents of the EC, which have not been circulated or formally approved by the Council.]

International Year of Planet Earth

At the end of 2005 Ed De Mulder, former President of the IUGS, announced with pride that at its Plenary Session of 22 December 2005 the General Assembly of the United Nations, proclaimed 2008 the UN Year of Planet Earth, as core year of the 2007-2009 triennium. This was the second UN year for the Earth Sciences, the first being the International Geophysical Year (1957-58). The 21st century IUGS and UNESCO initiative received the political support of 191 UN member countries.

National implementation of the Year of Planet Earth (IYPE) was essential for its success. The year was a major global event in the history of the Earth sciences. Never before had all nations of the world explicitly invited the geoscience communities to convey their knowledge to the public with a view to having decision-makers and governments make use of that knowledge for the benefit of all humankind.

Mainly because of the lack of funding, IYPE was not as successful in the field of public understanding, communication, and education as had been anticipated. The IYPE did achieve success in its outreach activities that were commensurate with the available funds, but it did not generate a significant science program. At the end of the triennium, there was a desire to explore the possible launch of a global geoscience initiative that would use the momentum generated by IYPE and three other international years (International Polar Year, International Heliophysical Year, and Electronic Geophysical Year), and take forward the aims expressed in the Tsukuba Declaration, which had been issued jointly by participants in these programs.

A New Strategic Planning Committee

In February 2009 the IUGS Executive Committee at its meeting in Sydney approved the proposal of the President Alberto Riccardi to create a new Strategic Planning Committee, whose members would include **Attilio Boriani** (Italy), **Jacques Charvet** (France), **Peter J. Cook** (Australia), **Stan C. Finney** (U.S.A.), **Ochir Gerel** (Mongolia), and **Gary Lewis** (U.S.A.). The members of this new SPC were designated in 2009 and by the beginning of November 2009 all had

agreed to participate. A few months later A. Riccardi approved the proposal of A. Boriani (Chairman of the Committee) to add **Umberto G. Cordani** (Brazil).

Background

The International Union of Geological Sciences (IUGS) is one of the largest and most active non-governmental scientific organizations in the world. Founded in 1961, IUGS is a member of the International Council for Science. IUGS promotes and encourages the study of geological problems, especially those of global significance, and supports and facilitates international and interdisciplinary cooperation in the Earth sciences.

At present IUGS gives special consideration to:

- International standards;
- Geoscience education;
- Geoscience information; and
- Environmental management and hazards.

IUGS Commissions, Task Groups and Initiatives are concerned with a wide range of geologic research of direct interest to governments, industry, and academic groups within the Earth sciences. IUGS believes that it is of mutual benefit to establish close links with other organizations engaged in geoscience activities, and especially those organizations whose work relates to some of the major activities of IUGS.

The Union was founded in response to a need to coordinate geoscientific international research programs on a continuing basis. Geoscientists felt that a mechanism was required to take action on global geological problems between the International Geological Congresses, traditionally held every four years. IUGS was also to serve as a vital link in solving problems requiring interdisciplinary input from other international scientific unions operating under the aegis of ICSU (International Council of Scientific Unions, now International Council For Science). Compared to these, IUGS was a "latecomer," although some of its responsibilities had been carried out by the International Geological Congress - a venerable institution over a century old. Since 1961, IUGS has experienced rapid growth in membership, scientific scope and expertise, as well as international prestige.

IUGS fosters dialogue and communication among the various specialists in Earth sciences around the world. It achieves this by producing international standards, organizing international projects and meetings, sponsoring symposia and scientific field trips, and producing publications. Topics addressed span the gamut from fundamental research to its economic and industrial applications, from scientific, environmental and social issues to educational and developmental problems. For example, IUGS is currently involved in:

- identifying and defining the problems critical to an improved understanding of terrestrial and planetary geological processes;
- encouraging formulation and testing of new geological concepts, models, and methodologies;
- focusing effort internationally on the study of critical economic or environmental problems whose resolution may depend on an understanding of geology;
- fostering international agreement on nomenclature and classification in several geoscientific disciplines such as stratigraphy, petrology and tectonics;
- strengthening mechanisms for facilitating international cooperation in geological research and exchange;
- improving publication, dissemination, and use of geological information internationally;
- encouraging new relationships between and among disciplines of science that relate to geology worldwide;
- attracting competent students and research workers who will devote their attention to geology, and to stimulate excellent education for students interested in geology;

- fostering an increased awareness among individual scientists world-wide of what programs are being carried out in geology in each country;
- promoting public understanding and appreciation of the planet Earth, its environment in space, and their study; and
- furthering the public welfare by assuring that geology makes appropriate contribution to public policy decisions of an international nature.

Membership in the IUGS is open to all countries or defined geographical area, usually through a national academy, geological survey, or comparable institution. The Union has 121 Adhering Members. Associate membership is open to national and international bodies (governmental and non-governmental), private enterprises, and individuals with IUGS-related interests.

The IUGS conducts its day-to-day scientific work through its Commissions (including their Subcommissions), its Task Groups, and its Joint Programs with other scientific organizations. It counts also on the international activities of Affiliated Organizations (currently 53). to provide a valuable link to a wide cross-section of the world's Earth science community. The Affiliated Organizations, primarily international scientific societies, range in size from less than 100 to nearly 40,000 individual members.

The Union is the scientific sponsor of the quadrennial International Geological Congress and advises and assists the Congress organizers in formulating the scientific program for this important meeting. The IUGS also maintains continuity of activity between Congresses.

Governance Structure

The **Council** of the Union, composed of one representative of each active national or regional member and selected other non-voting members, meets during each Congress. Between quadrennial meetings of the Council, the IUGS **Executive Committee**, composed of the President, Secretary General, Treasurer, Past-President, two Vice-Presidents and four Councillors, directs the affairs of the Union.

The IUGS **Bureau**, consisting of the President, Secretary General, and Treasurer, attends to day-to-day matters. The regular administration of the Union is handled by staff of the IUGS **Permanent Secretariat**, now located in Reston, Virginia, U.S.A. Neither the Bureau nor the Permanent Secretariat uses IUGS funds for its operations, salaries, or travel, unless a Bureau member comes from a developing country. All expenses are generally borne by the governments of the respective members. The IUGS could not operate without this assistance. The very generous support of the current contributing countries – Argentina, Italy, Canada, France, and the U.S.A. – is praiseworthy.

Periodic replacement of the Union's senior executive officers is a responsibility of the Council, following consideration of the recommendations of a Nominating Committee. The Nominating Committee is appointed by the Council and consists of seven members, not more than three of whom, including the IUGS Past-President, may be members of the concurrent Executive Committee.

From time to time, as needed, the Executive Committee establishes advisory boards and *ad hoc* committees to deal with key matters.

Scientific Activities

The scientific work of the IUGS is carried out primarily by Commissions, Task Groups, Initiatives, and Joint Programs. The number of such enterprises is limited by the funding available to provide adequate support to enable these bodies to achieve significant results within the time frames specified for their respective endeavours. Their duration is staged so as to create regular opportunities to redirect funds to new Earth-science enterprises. All funded entities annually submit to the Executive Committee a report summarizing their activities and accomplishments.

Commissions are established for broad scientific undertakings, the nature of which clearly requires long-term (~8-12 years) attention and funding. Because of their international applicability

and importance, topics addressed by Commissions and their component Subcommissions require long-term study. Current Commissions are:

Geoscience Education, Training & Technology Transfer (COGE)
Geoscience for Environmental Management (GEM)
History of Geological Sciences (INHIGEO)
Management and Applications of Geoscience Information (CGI)
Stratigraphy (ICS)
Tectonics and Structural Geology (TECTASK)

Task Groups are formal, project-oriented activities with a prescribed structure under the Executive Committee. Task Groups pursue limited objectives of shorter duration, typically are funded for no more than 4 years, and may in some cases be elevated to Commission status. Areas currently being addressed by Task Groups are:

Global Geochemical Baselines (TGGB)
IUGS Taskforce on Global Geoscience Workforce (TGW)
Geoheritage
Heritage Stone Designation
Task Group on Adhering Members
Task Group on Affiliated Organizations

Initiatives are informal, project-oriented activities organized under the Executive Committee with no prescribed structure, considerable freedom of operation, and no time limit on their duration. Initiatives may in some cases be elevated to Task Groups. Forensic Geology is a current Initiative.

Joint Programs are scientific enterprises, principally of long duration, carried out in collaboration with one or more other organizations that share with IUGS the responsibility for funding and/or managing the activity. The active Joint Programs are:

International Geoscience Program (IGCP)
Scientific Committee on the Lithosphere (ILP)
Geological Applications of Remote Sensing (GARS)
International Geological Congress (IGC)
Isotopes and Geochronology (TGIG)

Other Organizational Entities

The **Committee for Publications** reviews the publication policy of the Union and of its Commissions giving particular attention to the IUGS journal *Episodes*, examines all applications to the Executive Committee for funds involving publication, and advises on publication standards, methods, and techniques in the presentation of geological results.

The **Strategic Planning Committee** is at work preparing a new strategic plan for the next five years.

The **Finance Committee** has been reestablished to look into the financial health of IUGS.

The **Statutes Committee** is reviewing the Union's Statutes and will recommend changes necessary to keep IUGS at pace with times.

Communications

The IUGS publicizes its work in four ways:

- IUGS sustains the quarterly journal, *Episodes*, which publishes scientific articles and reviews, news about the Union, reviews of new books and maps, conference reports, and a calendar of events.

- The Union publishes **monographs** of various kinds, giving results of its scientific programs. Articles and monographs on IUGS-sponsored research also appear regularly in professional journals and governmental and private-sector publications.
- The Union maintains a comprehensive, frequently up-dated, user-friendly world-wide **website** – <http://www.iugs.org>. This provides all relevant, topical information about the Union, including the content of recent publications.
- **Publications by IUGS entities** and bearing the Union's logo, are published by the Geological Society of London. These are mostly proceedings volumes.
- IUGS produces and distributes regularly the E-Bulletin, an important tool of information and communication.

IUGS Constituency

Public geoscience research organizations, such as geological surveys and university Earth science departments have a particular significance to IUGS. In some countries, national geological surveys provide the primary national contact with the Union and offer a great deal of support for its programs and activities. In turn, the IUGS can provide advocacy support, as well as influence at the international level, which can benefit the national surveys. The IUGS offers access to a variety of broad-based international Earth science projects and, potentially, some funding to research and academic institutions. All these organizations concerned with the Earth sciences, therefore, have a vested interest in ensuring the continuing success of the IUGS.

Similarly, the resource industries, particularly as they become increasingly global, gain benefit through IUGS activities in education and training, technology transfer, and international cooperation and standardization. It is increasingly clear that society as a whole has the most to gain from IUGS activities, not only with respect to resource issues but more and more in relation to environmental issues. In other words, the IUGS constituency is broadly based and international.

The IUGS is of great value to the geoscience community; it must be maintained and strengthened.

The main problems for the Union seem to be:

- **a perceived lack of focus in its scientific programs;**
- **poor visibility in the scientific community;**
- **lack of money and influence;**
- **lack of self-promotion.**

Recommendations

Recommendations are organized around seven strategic issues: standards, science, outreach, education, organization, operations, and IUGS partners.

STANDARDS

Provide international standards.

Provide leadership in the establishment and maintenance of international geoscience standards. Scientific standards make IUGS known in the global geological community, and are perceived as the core business of IUGS.

Standardization programs should continue to be a vital part of portfolio. IUGS should consider increasing its activity in this field, and Commissions should collaborate and coordinate their activities with affiliated organizations. As standards are formally established, announcements of them should be widely disseminated especially to all affiliated organizations.

SCIENCE

Raise the profile of IUGS in scientific community.

Improve the IUGS importance in basic and applied science.

Raising the scientific profile of IUGS implies recruiting as officers and members of the IUGS bodies the best scientists, offering to the geo-scientific community high-level articles in Episodes and monographic volumes. High scientific quality should however be combined with the involvement of scientists from developing countries, because of the international character of this union. IUGS could promote research by creating scientific awards dedicated to the major topics, including the societal relevance. For a greater impact, it would be good to increase valuable review articles in Episodes. Another action, already planned, is to give scientific awards. Furthermore, IUGS should disseminate its decisions, activities, plans, etc. widely, particularly to its affiliated organizations and encourage those organizations to further disseminate this news through their publications.

Retain and improve Episodes.

There is urgent need of high-quality review articles. But there is also the need to include some updates coming from National Committees and Affiliates. Episodes is a very important tool for communication, outreach and education.

Episodes should continue to provide information about the IUGS's activities and programs and the calendar of future international scientific events. *Episodes* needs to enhance its circulation and distribution and to publish a higher proportion of high-quality reviews of topical issues in international Earth science. Although its impact factor increased recently, high-quality review articles are vital for the sustaining and improving the ranking of the journal. Such articles are also critical for the geological communities of developing countries; for some of them *Episodes* is the only geo-scientific journal readily available.

IUGS shall continue to promote new, high priority Geoscience activities of demonstrable relevance to society.

Examples of geoscience activities in which IUGS could take a larger role are:

- *Reducing vulnerability to natural hazards.*
- *Mitigating the effects of waste and pollution.*
- *Understanding human influence on global environmental change (with IUGG)*
- *Understanding of the geological processes involved in soil science . Managing resources and sustaining the environment.*
- *Understanding the relationship between geological factors and health.*

IUGS has achieved important success in such areas as promoting environmental geology and medical geology.

In keeping with the principle of subsidiarity, IUGS shall not invest in scientific activities that are already extensively developed within the geological community. IUGS shall identify and promote only new fields and applications with timeliness, and cease to support them once they become part of regular research activities.

IUGS should provide support to international programs that highlight the work and role of geoscience to society in general. In particular, IUGS should be a visible actor in the new Global Geoscience Initiative, which is in preparation and expected to be launched soon.

Review regularly IUGS activities to ensure progress, productivity commensurate with the funding, international perspective maintained.

The SPC regards regular critical assessment of all IUGS-sponsored investigations as necessary to ensure that (a) progress is being made at an acceptable pace towards the declared and approved goals of the projects, (b) productivity is commensurate with these same goals and with the level of approved funding, and (c) an international perspective is maintained.

The landscape has changed significantly in the last decade. Thus it is time to review the performance of the scientific activities of the IUGS against its strategic objectives. An external review may also lead to changes in governance and functioning.

Continue to support outstanding success of IGCP. The new International Geoscience Program fits well with technology transfer, capacity building, science for society: it focuses on encouraging young scientists.

Enhancing collaboration with UNESCO and other international bodies in view of supporting young scientists.

In the future, the IUGS shall strive to do more of this kind of broad international research and place even greater emphasis on issues of 'Geoscience and Society', because it is needed, broadly and readily understood in its relevance, appealing in terms of attracting international funds, and well-suited to the Union's revised mandate. Furthermore, summaries of results or highlights of individual IGCP projects should be regularly distributed to affiliated organizations for publication in their outlets.

IUGS to seek greater visibility and better financial returns from its program of publications.

All publications stemming from IUGS-sponsored scientific work should carry the IUGS logo and be clearly identified in all respects as IUGS-sponsored publications.

More monographs need to be published on broader subjects. The partnership agreement with a single external publisher, the Geological Society of London, improved the success and the financial return of the IUGS-sponsored publications. The IUGS EC should establish detailed guidelines on the use of the IUGS logo, and those of its Commissions, for a variety of publications, products, and announcements.

OUTREACH

Raise the profile of geological sciences, increase involvement in international programs that highlight the role of geoscience to society at large.

Increase the visibility of geosciences, and their importance for the rehabilitation and preservation of the environment, and for the sustainable use of natural resources. IUGS should constantly funnel the scientific discoveries of the geosciences into Society. IYPE, despite the limited funds available, was a good tool for outreach. IUGS now needs to be involved more thoroughly in the birth of the Global Geosciences Initiative, should it become a reality.

Preparing position statements on the major issues regarding natural hazards, mineral and energy resources, issuing press releases, and encouraging National Members to organize events involving decision makers are good tools for enhancing visibility of the geosciences. Other means for reaching this end should also be explored.

Much more needs to be done. Opportunities abound for the IUGS to make enormous contributions to strengthening the role of the Earth sciences in public affairs, especially in developing countries. The need is critical because the expanding world population will place inordinate demands on mineral, water, and land resources and potentially contribute significantly to environmental degradation. The Earth sciences are in a unique position to illuminate the growing public debate about policy issues related to developing resources, minimizing environmental damage, and mitigating geological hazards, and thus the Earth sciences can help society to make wise decisions.

A greater involvement in GEO is to be sought. IUGS is a participating organization but with a rather modest input so far. The participation in this intergovernmental institution increases the visibility of the Union. The recent introduction of the theme geo-resources in the work plan is an opportunity for more involvement. In particular, IUGS should take the opportunity to appoint a representative for the Task Group on post-2015 GEO work plan. The participation in the Global Geoscience Initiative is also a way to raise the profile of IUGS and the geological sciences.

Provide adequate support for the IUGS website so that it becomes the electronic hub of the Union, and, as such, contributes enormously to improving communications within the Union.

Among other changes, the IUGS website should contain more information and documents dedicated to public education. It could also be open for specific communications from Adhering Members and Affiliates. If the IUGS website is to be truly useful, much of the information it draws upon, that of its Commissions and Task Groups, needs to be up-to-date and readily available through well-designed websites for those groups. Additionally, highlights of products, decisions, and activities of the constituent scientific bodies of IUGS

should be posted on the IUGS homepage under “NEWS” with links to more detailed information on the web pages of those bodies.

Significant progress in enhancing the IUGS website has been achieved, but more is needed. The website should also be a tool for strengthening the links with Adhering Members, for instance by publishing some significant events and/or results related to the relevant countries. The recent addition of the “Committee Highlights” heading is a good step in that direction and a means to encourage communication with Adhering Members. This task could be assigned to a member of the EC (a Vice-President for instance) in charge of the relationships with Adhering Members.

The websites of the various IUGS bodies should be improved. If the IUGS website is to be truly useful, much of the information it draws upon, that of its Commissions and Task Groups, needs to be up-to-date and readily available through well-designed websites for those groups.

The IUGS website should evolve into an electronic hub that can serve the Union and its traditional constituency in new, more effective ways, such as in management of operations, data transfer, geologic inquiries, publication sales, secure financial transactions, and dissemination of reports and policy positions. Moreover, the website should become a key instrument through which to reach the general public, as well as the education community, worldwide, with well-conceived and well-designed electronic products tailored to their interests and needs. These could include general-interest publications; lecture notes and related graphics and reference materials; and charts, diagrams, photographs, and video clips illustrating geologic phenomena, directly or via links to the dataset.

A key issue to resolve is who should be responsible for the various types of content posted on the website, especially if the Union is to increase significantly the number of posted contributions? Who should have the control? External advice is needed for defining the position and the profile of a webmaster – someone with knowledge of the IUGS structure – and for determining the responsibility of the other officers with respect to the IUGS website.

The website should also become a tool for strengthening the links with Adhering Members, for instance by publishing some significant events and/or results regarding the relevant countries.

It is also desirable to improve the websites of the various IUGS bodies, and stimulate the creation and/or improvement of the websites of Adhering Members.

Raise the level of recognition of IUGS for its role in the IGC

The IUGS is the main scientific sponsor of the IGC

IUGS should improve its visibility within the IGC. Also, in recognition of the contribution to the scientific program made by the IUGS Commissions, Task Groups and Affiliated Organizations, IUGS should continue to receive a significant financial return for its role through the imposition of a levy on the proceeds of all future IGCs. A memorandum of understanding (MoU), which documents all the commitments, should continue to be signed between the IUGS and the national Organizing Committee, as soon as the committee is established. The MoU should be a condition for the assignment of an IGC to a specific country or consortium of countries. IUGS should receive ample recognition during the Congress, in the Circulars, in the Program and in the General Proceedings; the opening ceremony should include a presentation of the IUGS Officers and an address of the IUGS President.

EDUCATION

Raise the profile in Education community; provide free access to Episodes online and promote its availability in schools and colleges internationally.

Improving geological education at every level, from public awareness to education and training of young geologists.

The IUGS needs more concerted effort and the active participation of many more scientists in order to have any significant global impact on the huge education community. The terms of reference of the Commission on Geoscience Education, Training and Technology Transfer (COGE) are a good catalogue of useful initiatives. They are broad in their scope and bold in their thrust, but implementation requires many committed scientists and support personnel, and significant sums of money. To increase its leverage and advance its efforts in these respects, the Union should seek appropriate partners, such as ICSU, other Earth science Unions, UNESCO, and Affiliated Organizations. In particular, IUGS should take part with UNESCO in the Initiative for Africa. IUGS should encourage the educational work of some of its Commissions and/or sponsored programs, including sponsorship of field courses.

The IUGS should consider starting a new initiative, through COGE or other avenues, that would contribute actively to the improvement of Earth science education in schools and universities.

The IUGS should scope, adjust, and adopt a position statement on the importance of the geosciences based on the one produced by the National Science Foundation of the U.S.A. and considered by IUGS COGE. Such an IUGS-adopted position statement could be a tool to be made available to countries around the world for facilitating changes in school curricula.

One possibility is the preparation of *international geoscientific standards*, following the example of the American National Science Education Standards (NSES), to be included in school curricula. Another possibility could be to make available to teachers worldwide through the IUGS website a variety of teaching materials, such as power point presentations, images, lectures, booklets, etc. Free access online to *Episodes* should also be considered, but this might entail some changes in the scope of the journal to make it more relevant to the education community. To encourage teachers to continue to promote geosciences within their classrooms, the IUGS could prepare, and disseminate via the web, geological kits for education and best-practice teaching resources. The IUGS should work with the National Committees on geological education programs in their countries.

Make technology transfer and geological education a key activity of the IUGS through its Commissions, Affiliates, National Committees, and together with global projects like the IGCP.

Geologic phenomena and related Earth-system processes transcend national boundaries and are rarely confined to a single country. Scientific collaboration benefits all participants.

Future program activities involving the IUGS should incorporate both basic and applied science focused on societal issues with a strong Earth science component.

ORGANIZATION

Seek to increase IUGS's level of funding by developing new sources.

Raising funds improves the possibility of IUGS to undertake and fund adequately new initiatives.

The clear remit should be to seek new external funds by developing new sources. This may include: i) envisaging partnership with private companies in Joint Programs; ii) recruiting more Associate Members; and, iii) giving consideration to establishing a category of "Individual Members", which would differ from Associate Members, which currently may be individuals or organizations. IUGS should provide funding for strategically valuable areas. Geoscience Education falls in this category. Some member countries may be willing to support a specific initiative with high social impact like geoscience education.

Provide a "Permanent" Secretariat that would be in the same place over a significant number of years.

After the end of the support of Norway and the current secretariat in the U.S.A., there is an urgency for finding a new location for the IUGS Secretariat.

After the end of the support of the Norwegian Government, through the kind help of the USGS, an interim Secretariat was established in the U.S.A., but only for three years, which will terminate at the end of 2012. It is therefore very urgent to establish a new Secretariat, which, if possible would be in place for a significant number of years. This problem is crucial; without the Secretariat, the Union cannot function effectively. The workload of the Secretariat, which has increased steadily through the years, is now at a level requiring the employment of at least two people full time (about 1800 hours). It is essential, therefore, that a new Permanent Secretariat be established with the same number of people or, if possible, with an enlarged staff. A letter from the President of the Union was sent recently to Adhering Members, asking for volunteers. If necessary and appropriate for stimulating candidates, the offer to host the Secretariat for a significant number of years could be an important element for the assignment of an IGC to a country. Another possibility could be to link the offer to host the Secretariat to the choice of the candidates to the position of Secretary General.

Continue to carry out scientific work within the IUGS primarily through Commissions, Task Groups, Joint Programs and Initiatives.

IUGS should not do what the international Affiliated Organizations can do better. The principle of subsidiarity states that: a central authority should have a subsidiary function, performing only those tasks that cannot be performed effectively at a more immediate or local level. IUGS should identify and promote

only new fields and applications with timeliness, and cease to support them once they become part of the regular research activities.

The number of official activities of such enterprises should be strictly limited by the funding available to provide adequate support to enable these bodies to achieve significant results within the time frames specified for their respective endeavours, and their duration should be staged so as to create regular opportunities to redirect funds to new Earth science initiatives. All funded entities shall annually transmit to the EC a report summarizing their activities and accomplishments. Commissions should be established (or continued) for important scientific undertakings, the nature of which clearly requires long-term (say, 8 to 12 years?) attention and funding. Task Groups should be project-oriented enterprises of shorter duration, typically funded for not more than 4 years.

OPERATIONS

Improve the effectiveness of the IUGS governing bodies.

The Executive Committee should be made more effective with specific and relevant tasks for each EC member.

The role of the Bureau should be better defined. For example, should the Bureau run the day-to-day operations as a body, or should each Bureau member manage a specific task? (The Strategic Planning Committee thinks that the Bureau should act as a body.) The Executive Committee could in some cases cover the tasks of an Advisory Board for Research Development (ABRD). The President's role should be that of representing officially the Union and providing ideas for new developments. Each Vice-President and Councillor should have a specific, important task. One of the two Vice-Presidents should be in charge of the external relations, and the other in charge of the Strategic Planning and Review (as is done in ICSU).

More efforts must be done to involve scientists from underrepresented groups - such as young scientists, women and scientists from developing countries – in IUGS operations and activities

Making all IUGS bodies more representative of the geological community

The IUGS Commissions, Subcommissions, and Task Groups should be asked to take adequate measures to include women (say, at least 30%) and young scientists (say, under 35 years of age) among their officers. A new opportunity for identifying and involving younger scientists comes from the support IUGS has given to the YES Network. The IUGS should be actively seeking to develop future leadership within the geoscience community and should ensure all appointees meet a standard for "scientific background in the geosciences". Many IUGS programs, particularly IGCP, but also GARS, ILP, and IGC, provide opportunities for young scientists to broaden their experience and knowledge.

Consideration should be given to expanding the scope of the Hutchison Fund beyond the IGC participation in order to support a larger number of young scientists in attending international meetings. More young geoscientists may be encouraged to participate in IUGS activities, which would greatly benefit the Union, by a special category of IGCP projects reserved to young people. Also, *Episodes* and the website could be used to advertise the availability of internships, opportunities to collaborate with senior scientists, training sessions, and similar developmental experiences. Stronger links to the YES Network could be developed by having YES members on the IUGS EC, Commissions, and Task Groups.

Develop a mentor program through which IUGS EC could train an early career geoscientist to work within the IUGS structure. Invite and fund early career geological scientists to attend IUGS EC meetings and Commission meetings.

IUGS PARTNERS

Continue negotiations with other Unions, other ICSU entities, Affiliated Organizations, and other organizations to ascertain their willingness to participate as fully recognized team members in high-quality, multidisciplinary projects of obvious benefit to science or society. This has begun with IUGG; it could be extended to other unions and organization.

Effective working partnership should be forged with other ICSU Unions and greater emphasis placed on multidisciplinary, socially relevant studies; together these will enhance the weight of the geosciences within ICSU.

The IUGS is a principal voice of the geological sciences in ICSU, has joint programs with the International Union of Geodesy and Geophysics (IUGG), with IUPAC, is part of the GeoUnions cluster in ICSU, and has

contacts with the International Atomic Energy Agency (IAEA), the World Conservation Union (IUCN), the World Heritage Center (WHC), and the Organization of Petroleum Exporting Countries (OPEC). The Union should continue these important representational duties. It should also seek to expand its contacts and sphere of influence by reaching out to other organizations with which it might share common interests, especially in influencing public policy and decision-making.

Explore possible cooperation with other UNESCO entities.

IUGS should contact other UN Agencies such as the United Nations Industrial Development Organization (UNIDO), the United Nations Institute for Training and Research (UNITAR), the United Nations Development Program (UNDP), the United Nations Conference on Trade and Development (UNCTAD).

The SPC recommends contacting these organizations in order to understand the possibilities for fruitful collaborations.

Seek greater collaboration of IUGS and its Commissions and Task Groups with Affiliated Organizations and National Committees.

Current arrangements between the Union and these bodies continue to be unsatisfactory.

New and financially more realistic arrangements are required to involve the Affiliated Organizations (albeit on a gradual rotational basis as funding permits) in joint scientific or educational endeavours with the Union. OneGeology is a good example of collaboration with Geological Survey organizations.

The IUGS EC can facilitate this collaboration by providing chairs of Commissions and Task Groups with contact lists of Affiliated Organizations and National Committees, as well as by developing the contact lists further. (See also the recommendations in the editorial by A. Riccardi (2011): IUGS Adhering and Affiliate Members: Actors or Spectators? Episodes, 34 (3): 146-147.)

Investigate other avenues of involvement of the Affiliated Organizations.

Improving collaboration with Affiliated Organizations.

Affiliated Organizations should be urged to consider carefully the recommendations contained in the IUGS Strategic Plan; they should also be asked to have a named representative present at each IGC. The *ad hoc* Task Group on Affiliated Organizations should be a means of attracting them to the IGC; another way might be to give them a vote in the Council. Interaction with Affiliated Organization has always been a concern for IUGS. Generally speaking, their contributions to the scientific program of the IGC have been fundamental, but many initiatives have been unsuccessful for a variety of reasons such as: Affiliated Organizations are extremely different from one another. Some of them have a partial international membership, with mostly national aims and programs, but show interest in international issues. Many of them have a fully international membership and have international aims and programs.

The SPC recommends that the officers of each Affiliated Organization should be contacted personally to ascertain possible common actions and/or programs. A meeting between the senior officers of the IUGS and representatives of the Affiliated Organizations should take place at each IGC.

Continue the recent efforts of the IUGS Bureau and Executive Committee for improving the timeliness and frequency of communications with the IUGS National Committees; encourage the National Committees to reciprocate.

The National Committees constitute an underused and mostly underappreciated resource that should be more directly engaged with the IUGS and support its activities.

The interaction with National Committees has always been a concern for IUGS and many initiatives have been unsuccessful, because:

- i) In many countries the National Committees exist in name only;
 - ii) Where they do exist, they meet very seldom, and, when they meet, they realize that they have almost nothing to do.
 - iii) In some countries the National Committee is just a contact person in a Geological Survey, a Research Council, an Academy, a Geological Society, a Committee, or in a Ministry.
- IUGS should inform the National Committees what is expected from them, and suggest an agenda.

It would be useful to ask each “National Committee” about its real status, its composition, and its activity. Once the “real” National Committees have been identified, and once their effectiveness has been ascertained, IUGS and IUGS bodies should start a collaboration on the basis of concrete programs. The E-Bulletin is an important information tool for communicating with the National Committees: it should be continued and enriched.

Raise the profile of IUGS within ICSU

Involvement in programs (such as those of ICSU) with a mixture of basic and applied geoscience, as well as interdisciplinary and multidisciplinary studies in cooperation with other partners.

The present aims of ICSU are deeply different from those which characterized its activities in past years. The relevance of the individual Unions within ICSU itself has greatly decreased (ICSU is no longer the Council OF Scientific Unions). ICSU is now pursuing complex scientific challenges, where new knowledge and new approaches are necessary. It is promoting trans-disciplinary activities in which natural and social sciences need to work together and is involving many stakeholders outside of science. These initiatives should be politically (and commercially) sensitive, and raise issues of equity and openness.

ICSU is implementing new programs:

Integrated Research on Disaster Risk (IRDR)

Ecosystem Change and Society (PECS)

Health and Wellbeing in the Changing Urban Environment

Foresight and Strategic Planning

Visioning of Earth System Science (ESS)

Improving IUGS’s presence in ICSU requires a strong effort by the IUGS officers. Contacts with the ICSU headquarters in Paris should be regular and ongoing.