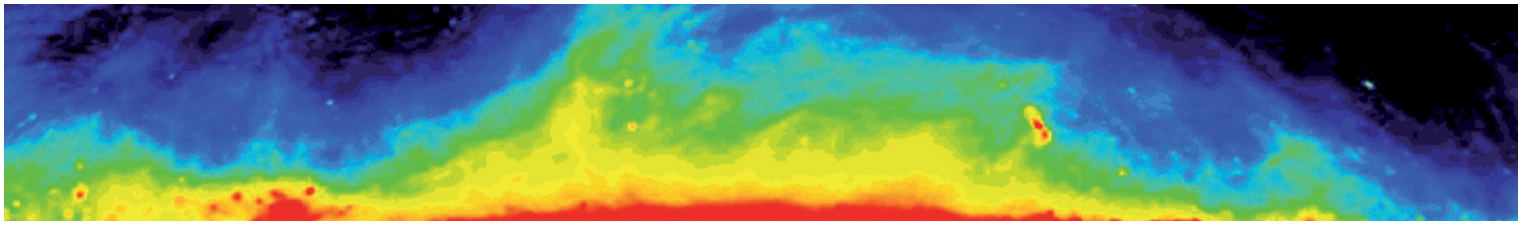
2011 Statutory Review of the
Expert Boards and Committees



Cover pictures (from the top):

• © Delphin Ruché/IPEV

• NGC 6543, the 'Cat's Eye Nebula'
This ESA/NASA Hubble Space Telescope image shows one of the most complex planetary nebulae ever seen, NGC 6543, nicknamed the 'Cat's Eye Nebula'. Hubble reveals surprisingly intricate structures including concentric gas shells, jets of high-speed gas and unusual shock-induced knots of gas. Estimated to be 1 000 years old, the nebula is a visual 'fossil record' of the dynamics and late evolution of a dying star.
© X-ray: NASA/UIUC/Y. Chu *et al.*, Optical: NASA/HST

• Fulmars in a Force 11 gale, mid Atlantic
© Mick Mackey

• Caffeine crystals
Coloured scanning electron micrograph (SEM) of anhydrous caffeine crystals (1,3,7-trimethylxanthine). They were produced by a process called sublimation. Magnification: ×400 at 10 centimetres high.
© Dr Jeremy Brugress/Science Photo Library/Cosmos

• Nuclei consist of protons (red) and neutrons (blue), which are each made up of three elementary quarks held together by gluons.

• Radio Sky at 408 MHz. The map has 0.85 degree resolution and has been compiled from measurements in Effelsberg (Germany), Jodrell Bank (UK) and Parkes (Australia). It clearly shows that the northern and the southern sky need to be accessible for radio astronomy.
Source: A 408 MHz all-sky continuum survey. II – The atlas of contour maps
Authors: Haslam, C. G. T.; Salter, C. J.; Stoffel, H.; Wilson, W. E. Astronomy and Astrophysics Supplement Series, vol. 47, Jan. 1982

Contents

Foreword

The following report provides the outcome of the Statutory Review of the Expert Boards and Committees of the European Science Foundation (ESF) carried out from April to August 2011. In contrast to past reviews, all Expert Boards and Committees have been reviewed by one single Review Panel. The 11-member Panel was constituted from nominations by the ESF Member Organisations and covered all required domains of expertise. I am deeply grateful to the ESF Member Organisations for providing nominations for the Review Panel.

In addition to the five Scientific Standing Committees that cover all fields of science, ESF hosts six Expert Boards and Committees that provide in-depth and focused scientific expertise in selected disciplines. The Standing Committees provide the scientific backbone and the breadth required for realising the mission and operation of ESF in a general sense, whereas, the Expert Boards and Committees address more specific scientific needs, and provide targeted expert advice in areas of research, infrastructure, environment and society in Europe. This two-dimensional structure of expertise has served the scientific communities and the portfolio of ESF activities very well.

The Statutory Review was conducted during a period when the ESF Member Organisations are preparing a transition to science policy-focused collaboration at the European level. Thus, this review provides not only specific advice to the Expert Boards and Committees on re-evaluation and reinforcement of their mandates as well as their makeup and functioning, but also recommendations on the future place of the Expert Boards and Committees in the European Research Area.

I would like to extend my sincere gratitude to the members of the Review Panel for having accepted the invitation and for their attention and contributions to the review and in preparing this Report. The valuable efforts and guidance provided by the Chair of the Review Panel, Professor Martin C.E. Huber, have been crucial for this multi-faceted and complex evaluation exercise. The contributions of the ESF staff supporting the work of the Expert Boards and Committees in coordinating the review exercise and development of the report are highly appreciated.

Professor Marja Makarow
ESF Chief Executive

1. Executive Summary

In this report the Review Panel describes the 2011 Statutory Review of the Expert Boards and Committees of the European Science Foundation (ESF). The Expert Boards and Committees are created to respond to specific scientific needs; they provide scientific and policy advice and initiate strategic developments. Currently ESF is home to the six Expert Boards and Committees outlined below:

- CRAF, the Committee on Radio Astronomy Frequencies
- EPB, the European Polar Board
- MB-ESF, the Marine Board – ESF
- ESSC, the European Space Sciences Committee;
- NuPECC, the Nuclear Physics European Collaboration Committee
- MatSEEC, the Materials Science and Engineering Expert Committee.

In this review the first five Boards and Committees above were subject to a full statutory review, which covered the period from 2004 or 2005 to 2010. MatSEEC which was established in 2009 does not yet require a formal statutory review. However, considering the context and timing of the current reviews – namely the proposed reorganisation of ESF and EUROHORCs – the Panel also briefly comments on the main achievements and perspectives of MatSEEC. It is to be noted that discussions on the future of ESF are ongoing.

The Terms of Reference for this review, as approved by the Governing Council, are provided in Section 2.2. In the past, separate committees have evaluated the Expert Boards and Committees. In order to achieve consistency of the evaluations, it has been decided to constitute only one Panel with the necessary expertise to assess all Boards and Committees in one coherent exercise.

The Review Panel presents the conclusions and recommendations applicable to all Expert Boards and Committees under review (including MatSEEC) in Chapter 4, while Chapter 5 is devoted to specific recommendations for each body. Some of the key general conclusions and recommendations of the Review Panel are given below:

- **The Members of the Review Panel concluded unanimously that all Boards and Committees provide multi-disciplinary scientific services in the European, or even global framework that are indispensable for Europe's scientific landscape, and therefore recommend that their mandate be extended without exception.**
- The Review Panel noted that all Boards and Committees expressed the wish to join Science Europe, but commented on their place in the new organisation as well as their required independence. Indeed, the review panel considers that qualified independence of the Expert Boards and Committees will assure appropriate performance of their mission.
- The Review Panel concluded that the Expert Boards and Committees need to be maintained and recognised as competent entities, yet need to be connected to a strong and credible European science organisation, such as Science Europe.
- Where conducive to the aims of an individual Expert Board or Committee, an appropriate balance in the membership between scientific advice and organisational participation should be considered.
- Given the societal implications of most recommendations emerging from the reviewed Expert Boards and Committees, we advise that a sound gender balance be vigilantly maintained.

2. Introduction

In this section, the purpose, organisation and governance of the ESF, the context and terms of reference for the review as well as the review process itself are summarised, followed by a list of the members of the Review Panel.

2.1 The Context of the Review

2.1.1 Brief description of ESF and its governance[1]

The establishment of the ESF in Strasbourg in 1974 was one of the earliest milestones on the road to achieving real cooperation in European research. The ESF began life with a membership of 42 academies and research councils in 15 countries; in 2011 it has 78 Member Organisations (MOs), including research funding organisations, research performing organisations, academies and learned societies, in 30 countries.

Two main bodies representing the MOs carry out the overall governance of ESF: the Assembly and the Governing Council. The main decision-making body of the ESF is the Assembly which meets once a year bringing together all MO representatives. The Assembly appoints the President, Vice-Presidents and the Chief Executive of ESF. It also approves the annual reports of the Governing Council, the reports of the Committees of the Foundation, and the annual report of the Chief Executive. It ratifies the budget and accounts of the Foundation, admits new members, and approves and amends the Statutes. The Assembly also provides a venue for debate and interaction between the MOs.

The Governing Council is responsible for setting, approving, directing and monitoring the overall strategic direction of the Foundation. It is chaired by the President and is composed of one representative from each 'national group' of MOs. The representatives are heads of organisations from within the ESF membership. The Governing Council normally meets twice a year.

2.1.2 Scientific structure of ESF

The scientific support required for the operations of ESF are provided by five Scientific Standing Committees that cover all fields of science. In addition, six Expert Boards and Committees provide in-depth and focused scientific expertise in selected disciplines as described below.

Scientific Standing Committees

The five Scientific Standing Committees are composed of leading scientists nominated by the MOs. They are responsible for identifying scientific priorities, formulating strategies, developing research agendas and conducting peer review. The five Scientific Standing Committees cover:

- Humanities
- Life, Earth and Environmental Sciences
- Medical Sciences
- Physical and Engineering Sciences
- Social Sciences

Expert Boards and Committees

Expert Boards and Committees are established as the need arises, giving the ESF the flexibility to adapt to the changing scientific landscape. They provide advice and initiate strategic developments. The six Expert Boards and Committees are:

- CRAF, the Committee on Radio Astronomy Frequencies
- EPB, the European Polar Board
- MB-ESF, the Marine Board – ESF
- ESSC, the European Space Sciences Committee
- NuPECC, the Nuclear Physics European Collaboration Committee
- MatSEEC, the Materials Science and Engineering Expert Committee

1. http://www.esf.org/about-esf/what-is-the-european-science-foundation.html

ESF Office

The ESF headquarters are located in Strasbourg, France, and two offices have been set up in Belgium: the Conferences Unit is based in Brussels and the Marine Sciences Unit in Ostend. The ESF Office is directed by the Chief Executive, assisted by an international staff usually comprising 20 to 30 nationalities.

2.1.3 Statutory requirement for the Review

The ESF Statute requires the Governing Council to review the terms of reference, composition and activities of each Expert Board and Committee at least every five years, including the consideration of whether the continuation of that body is necessary and, if so, the duration of such continuation. The Terms of Reference approved by the Governing Council for this review are provided in Section 2.2.

Under this exercise, from the six Boards and Committees outlined above, five are subject to a full statutory review covering the period from their previous review (undertaken during 2004 or 2005) up to 2010. MatSEEC however, being a Committee only established in 2009, does not need to have a statutory review now. Nevertheless, considering the particular context and timing of this review (see next section), it was decided that the Panel should also review and briefly comment on the main achievements and perspectives of this Committee. Hence, MatSEEC has not been asked to provide a self-evaluation report, but the Review Panel met its representatives and assessed the status of activities undertaken by the Committee so far and its prospective outlook.

In the past, each Expert Board or Committee has been evaluated separately by a dedicated evaluation committee. With the aim of achieving more coherence and consistency in the outcome of the exercise, it has been decided to constitute one panel with the necessary expertise so that all Boards and Committees are assessed by one body.

2.1.4 The changing of context and the creation of Science Europe

A growing number of MOs have asked for major changes to the structure and priorities of the organisation. This has been initiated through the efforts of the European Heads of Research Councils (EUROHORCs) whose membership largely overlaps with that of the ESF. The key element underlying these changes is the need expressed by the major research councils, to achieve a unified and more coherent voice for Science in Europe. Two different options for achieving this have been considered and voted on at a meeting of a special Assembly of the ESF in May 2011. These were: Option 1- establishing a new organisation in Brussels and winding down ESF by the end of 2015; or Option 2- transforming the current ESF based in Strasbourg and opening a new office for policy in Brussels. There was a clear preference by ESF members for Option 1, but the majority of votes needed to reach a decision was not attained for either of the two options. Nevertheless, ESF's activities and operations are now being streamlined in line with the wishes expressed by a majority of the Member Organisations.

The launch of the Brussels-based Science Europe has been announced by EUROHORCs, and ESF supports the development of this new organisation, which is to become the single voice for research performers and funders when engaging with European and international bodies, including the European Commission.

2.2 Modus Operandi and Terms of Reference of the Statutory Review

The mandate approved by the Governing Council, the Modus Operandi and Terms of Reference setting out the scope and objectives of the review, is as follows:

The International Review Panel's tasks will be to review ESF's Expert Boards and Committees in accordance with Article IX of the ESF Statute and using the terms of reference outlined below.

The review of the five Boards and Committees shall be done:

- Based on the self-evaluation reports prepared by the Expert Boards and Committees; their own Terms of Reference; other relevant documents and additionally collected information;
- By taking into account the individual remits of each of the Expert Boards and Committees;
- By taking into account the eventual evolution of ESF activities and new developments in the wider context of the European and global research system in which ESF operates;
- Through interviews with the Chairs of the Boards and Committees and the ESF President.

The International Review Panel will prepare a Report that will:

- Comment on the achievements of the Expert Boards and Committees;
- Consider the strategies, activities and operations of the Expert Boards and Committees in the light of their individual missions;
- Comment in particular on the relationship between ESF Member Organisations and other external Funding Organisations that constitute the membership of the Expert Boards and Committees, both in the light of the budget of the Expert Boards and Committees and with regard to the strategic embedding in the ESF organisation as a whole;
- Recommend such changes to the strategies, activities and structure both for the Expert Boards and Committees themselves as well as within ESF that will be appropriate to allow the Expert Boards and Committees to fulfil their mission;
- Ascertain which of the Boards and Committees, and in which configuration, might participate in a new structure;
- Look at the question of the relation between the Expert Boards and Committees and the Standing Committees, also in the context of a new structure;
- In line with Article XI 2.2 of the Statute, consider whether the continuation of each of the Expert Boards and Committees is necessary and, if so, the duration of such continuation.

Retrospective assessment versus prospective positioning

Based on the stated Terms of Reference and anticipating a possible transformation of ESF to Science Europe, key questions were drafted and proposed to the members of the Panel. These questions were grouped under two categories: retrospective assessment and prospective positioning of the Boards and Committees.

2.3 Main Steps of the Process

In July 2010, the five Boards and Committees under review were invited to prepare self-evaluation reports covering the period of statutory review, 2004 or 2005 until 2010. The Review Panel was constituted during April and May 2011 based on nominations by the ESF Member Organisations. The members of the Review Panel were given access to the self-evaluation reports and other supporting documents through a dedicated webpage, and held a teleconference on 6 June to discuss the review process. The Review Panel convened in a face-to-face meeting on 27 and 28 June, where the members presented their assessments, discussed the format and content of the Panel's report and interviewed the Chairs of the Boards or Committees. The ESF President was also interviewed by the Chair of the Review Panel. The present report was written based on input by the Panel members, and approved by them.

2.4 Review Panel

The International Review Panel had 11 members including the Chair with the distribution between different disciplines summarised in Table 1 and detailed in Table 2.

Declarations of Conflict of Interest

The members of the Panel were requested to declare any perceived or real conflicts of interest that they may have in relation to their membership of the Review Panel and their assessment of the Boards and Committees assigned to them. Some members of the Panel declared

Committee/Board	No of panel members
European Space Sciences Committee (ESSC) Committee on Radio Astronomy Frequencies (CRAF)	3
European Polar Board (EPB) Marine Board–ESF (MB-ESF)	5
Nuclear Physics European Collaboration Committee (NuPECC)	3
Total	11

Table 1: Detailed summary of the Review Panel membership

For CRAF and ESSC
Chair of the Panel
Professor emeritus Martin C.E. Huber, Honorary professor at the Physics Department of ETH Zurich, former Head of ESA's Space Science Department

For CRAF and ESSC
Professor Wolfgang Baumjohann, Austrian Academy of Sciences
– Managing and Research Director of the Space Research Institute (Institut für Weltraumforschung, IWF)
– Professor, Graz University of Technology

For CRAF and ESSC
Professor Michael Garrett, ASTRON, The Netherlands Institute for Radio Astronomy Dwingeloo, The Netherlands
– General and Scientific Director of ASTRON
– Professor, University of Leiden

For NuPECC
Professor Shoji Nagamiya, J-PARC, Japan Proton Accelerator Research Complex
– Director of J-PARC; President of the Physical Society of Japan
– President of the Association of Asia Pacific Physics Societies

For NuPECC
Professor Dan-Olof Riska, Helsinki Institute of Physics, Helsinki, Finland
– Director of the Helsinki Institute of Physics
– Chairman, Commission on Nuclear Physics, International Union of Pure and Applied Physics
– Vice-President, CERN Council

For NuPECC
Professor Dan-Olof Riska, Helsinki Institute of Physics, Helsinki, Finland
– Director of the Helsinki Institute of Physics
– Chairman, Commission on Nuclear Physics, International Union of Pure and Applied Physics
– Vice-President, CERN Council

For NuPECC
Professor John Simpson, STFC, Science and Technology Facilities Council, UK
Daresbury Laboratory; Daresbury Science and Innovation Campus
– Director of Nuclear Physics, STFC, UK

For EPB and MB-ESF
Professor emeritus Hugo Decleir, Vrije Universiteit Brussels, Belgium
– Professor, Department of Geography
– Ex-President of the Belgian National Committee for Antarctic Research and Belgian delegate to SCAR (Scientific Committee on Antarctic Research)

For EPB and MB-ESF
Professor David Hik, Professor and Canada Research Chair in Northern Ecology, Department of Biological Sciences, University of Alberta, Edmonton, Alberta, Canada
– President, International Arctic Science Committee (IASC)

For EPB and MB-ESF
Professor Paula Kankaanpää, Arctic Centre, University of Lapland, Finland
– Director of the Arctic Centre of the University of Lapland
– Chair of the Advisory Board of the Finnish Meteorological Institute

For EPB and MB-ESF
Professor emeritus Temel Oguz, Middle East Technical University, Erdemli, Icel,Turkey
– Professor at the Institute of Marine Sciences

For EPB and MB-ESF
Dr ès Sciences Myriam Sibuet, Plouzané, France
Institut français de recherche pour l'exploitation de la mer (Ifremer)
– Past Director of the Deep-Sea Environment Department and Science and Technology Adviser of the President of Ifremer
– Vice-Chair of the Census of Marine Life International Scientific Steering Committee
– Senior scientist at the Institut Océanographique de Paris

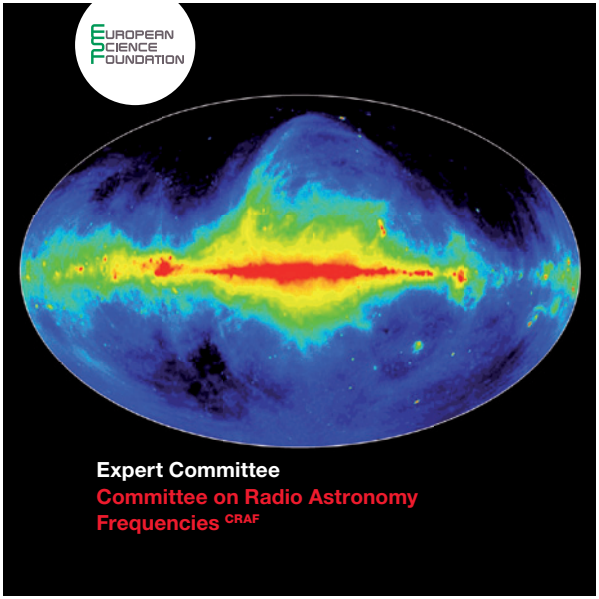
Table 2: Overall summary of the Review Panel membership

past interactions or involvements with the Boards or Committee. These members were then asked to state whether or not they considered that their past involvement or interactions would in any way hinder their objective assessment of the Boards or Committees assigned to them. With these confirmations and further inputs from the Panel, it was decided that all Panel members should fully participate in the assessment while keeping in mind their past involvement and their declarations.

3. Structure and Accomplishments of the ESF Boards and Committees

In this Section we provide an overall description of the six individual Boards and Committees. Furthermore, based on their self-evaluation reports prepared for this review we present selected highlights of the five Boards and Committees.

3.1 Committee on Radio Astronomy Frequencies (CRAF)



Brief Description of CRAF's Mission and Operations

The Committee on Radio Astronomy Frequencies (CRAF) was established by the ESF Executive Council in 1988. After successful reviews CRAF's mandate was extended in 1996 and again in 2003. In this report we cover the outcome of a new review for the period 2004-2010.

Overview of the CRAF mission

CRAF is a committee of scientific experts on frequency issues for radio astronomy. Its principal operating members are the Chair of CRAF and the CRAF Frequency Manager (FM). The costs of the CRAF FM are met by the CRAF partners. The partnership comprises the major radio observatories located in Europe, which operate passive, large-scale radio-telescope infrastructures in the pursuit of fundamental astronomical research. CRAF also has strong connections to the global radio astronomy community, and closely coordinates its activities with similar organisations in North America and Asia.

CRAF aims to:

- Keep the allocated frequency bands of radio astronomical interest free from interference;
- Ensure access to and availability of the radio spectrum for scientific needs;
- Support the scientific community in its need for passive use of interference-free bands of interest.

CRAF delivers these objectives by:

- Coordination of European policy on the protection of frequency bands;
- Promotion of the understanding of the passive uses of frequencies for scientific studies;
- Provision of a discussion forum on interferences in passive uses to increase awareness at the international level;
- Interacting extensively with major bodies at the international level (e.g. CEPT, IUCAF, WRC, EC)[2] on current and potential issues;
- Maintaining connection with national administrations and radio communication organisations via the CRAF national members.

CRAF currently has 20 national institutions and four multi-national organisations as its Member Institutes (MI). These are the major European observatories and international radio astronomical research institutions. The main source of funding of CRAF is contributions from its Member Institutes. This is used to cover the expenses of CRAF's Frequency Manager (FM), including salary, benefits, travel costs and costs to the hosting institute (overheads).

CRAF response to previous Review Panel's recommendations

The Review Panel concluded that most of the recommendations resulting from the previous review have been implemented, although in some cases only partially.

The previous Review Panel recommended the establishment of a Memorandum of Understanding (MoU) for the organisations participating in CRAF. Over the period of this review an MoU was drawn up but has only been signed by 9 out of 20 MIs. The process of further increasing formal membership of CRAF continues but progress is slow.

The Review Panel also recommended that CRAF's profile could be enhanced by taking a seat on the management board of RadioNet FP6 and FP7. CRAF successfully participated in both of these Integrated Infrastructure Initiatives (I3) and a Networking Activity dedicated to CRAF activities was implemented within the overall RadioNet programme. This represents a major success for CRAF and has released significant funds to support the travel costs of CRAF members, and to cover the costs of various radio frequency interference schools and training sessions.

The Review Panel recommended that CRAF's "Charter and Terms of Reference" be simplified and based on the terms of reference proposed by the 1996 Review Panel. The charter and terms of reference are still under review.

The Review Panel recommended that CRAF and its contributing organisations begin now on drawing up

2. Unexplained abbreviations and acronyms are spelled out at the end of the report.

a strategy for the replacement of the FM. A new FM was recently appointed and the Review Panel commended CRAF on the appointment of a person with a strong background in radio astronomy.

CRAF's Perceived Weaknesses

- The process of further increasing formal membership of CRAF should be reviewed and possibly improved given the importance of the Committee's role and mission;
- CRAF's "Charter and Terms of Reference" need to be evaluated and possibly simplified to strongly reflect its mandate and potential added value;
- CRAF should devote explicit and conscious attention to communication and outreach activities in order to disseminate its findings and publications, but also to accentuate the importance of its mission and activities.

CRAF's Performance and Key Achievements (2004-2010)

The Review Panel recognises the following highlights:

1. CRAF obtained detailed and calibrated evidence of the effects of interference produced by the IRIDIUM satellite system on radio astronomy data in the hydroxyl band (1610.6-1613.8 MHz) despite IRIDIUM's previous claim that their transmitters could not be responsible. CRAF completely refuted IRIDIUM's claim of self-generated interference and proved that the external interference was a property of the IRIDIUM satellite transmitter. The evidence was reviewed by a specialist committee of the ECC which included IRIDIUM representatives. All CRAF's findings were approved by all committee members (including IRIDIUM) and are presented in a new ECC report under public consultation. IRIDIUM is now negotiating with CRAF regarding possible solutions to the problem, including the re-design of the transmitters to be installed in the next generation of satellites.
2. CRAF has been instrumental in limiting the introduction of automotive short-range radar systems operating at 24 GHz, threatening astrophysical observations close to the water line at 22 GHz. Due to these actions, the automotive industry is moving to higher frequencies (26 and 77 GHz) where the problem can be contained.
3. CRAF has ensured that the UHF band 608-614 MHz has become available again for radio astronomy observations after more than 20 years. This is the result of careful re-coordination actions within the framework of the "digital dividend".
4. CRAF has promoted the methanol 6.7 GHz frequency band to national and international administrations as being very important for radio astronomy. A consensus has been found here, discussions about details are still on-going in order to protect this band.

Panel members noted that the independent voice of CRAF was greatly respected, and that CRAF's status as an ESF Expert Committee was an essential factor in realising this position. This situation also reflected very well on the ESF – to its credit and benefit. The Panel felt that CRAF's European and, indeed, global status must be maintained in the era of Science Europe.

Communication

The Review Panel considered the quality of CRAF publications to be good: these provide not only a communication medium through its newsletters but also important training material in its handbooks. Circulation is moderate and coverage appears to be patchy – a local census of one major European radio observatory showed that less than 10% of senior staff received the newsletter. Full recognition of CRAF's achievements seems to be particularly poor with respect to scientific staff (astronomers) and junior staff members.

CRAF's involvement in organising technical workshops and schools was further encouraged by the Review Panel. It felt that in general the achievements of CRAF were not well recognised by the community but realised that the resources required to tackle this "outreach" problem were also scarce. In terms of communication with the ESF organisation itself (e.g. the production of informative reports and the delivery of advisory missives) this appeared to be healthy and operating in accordance with standard practice. The Review Panel continues to support CRAF in its activities that involve forming links with other passive radio spectrum users, e.g. remote sensing services. The Review Panel encourages CRAF to consider

and explore whether other passive users might be future members of the organisation. CRAF should seek a closer relation with the European Commission (EC) in terms of educating the EC on the needs and rights of scientific users of the radio spectrum.

CRAF's increased involvement in providing expert advice to the global Square Kilometre Array (SKA) project was greatly welcomed by the Committee. In the next decade, the SKA will be the premier radio telescope in the world, and as an international facility, European scientists expect to have full access to the facility. Together with its sister organisations in North America and Asia, CRAF can play an important role on behalf of the European scientific community, in ensuring that the SKA operates within a pristine radio frequency environment. CRAF's experience in dealing with satellite operators is expected to be especially relevant to this quest.

3.2 European Polar Board (EPB)

Brief Description of EPB's Mission and Operations

The European Polar and Marine Boards were created in 1995 under the auspices of the European Science Foundation following a recommendation by the European Committee for Ocean and Polar Sciences (ECOPS), a joint EC-ESF committee set up to address Grand Challenges. The boards functioned under a common structure, European Marine and Polar Sciences (EMaPS), in the late 1990s and eventually, after discussions and agreement, by 2000 the structure was split into two independent Boards. They have separate budgets paid by Member Organisations.

Overview of the EPB mission

The European Polar Board (EPB) is Europe's strategic advisory body on science policy in the Arctic and

Antarctic. It is a platform for European engagement in international science programmes and provides strategic science policy advice to the European Commission and international bodies.

EPB Strategic Objectives are stated as:

- Influencing European Institutions (European Commission, European Parliament and supranational actors) in regard to research investment and strategies in the Polar Regions;
- Enhancing relations between Europe and key international partners;
- Seeking opportunities for a long-term Europe-wide effort to convince the public and politicians of the importance of research in the Polar Regions, and to secure continued investment;
- Enabling the development of Polar research or infrastructure partnerships at the European level (based on initiatives of mutual interest identified by several European countries);
- Facilitating European-level coordinated policy advice on Research in Polar Regions;
- Developing a Vision of European Integrated Polar programmes;
- Enabling a stepwise progression to integration of Polar programmes in Europe;
- Establishing funding and common peer review mechanisms;
- Coordinating access to Polar research Infrastructures at the European level.

The Board comprises an executive office (secretariat). The management structure of the Office consists of an overseeing Head of Unit who is at the same time Head of the Life, Earth, Environment and Polar Sciences Unit; two senior science officers; two project managers; and two administrators.

The current 26 funding organisations of the European Polar Board in 22 countries are in large part the same as those who are currently members of the ESF Governing Council. There are a number of exceptions such as the Russian Federation, and some University based Institutions.

The EPB has an Executive Board with currently six members, including the Chair of the Committee. They are elected directly by the Board in majority consensus or voting.

The institutions participating in the Committee provide for the main financial contributions that support the core operation of the Board. In some countries the contributions to the budget are shared between two agencies. The membership fees comprise three levels of contribution: 20 k€, 7.0 K€ and 2.5 K€ (with some additional differences owing to historical negotiations). In addition, the EPB has managed the “European Polar Consortium” and the “ERICON AURORA BOREALIS project” that are funded by the European Commission Framework Programmes six and seven, respectively with a combined value of 7 M€, as well as from the launching of the PolarCLIMATE Programme with a total of 10 M€ commitments (including direct financial commitment and estimated in-kind support) by the participating organisations for funding collaborative research projects.

EPB’s response to previous Review Panel’s recommendations

EPB should continue its efforts in implementing its response to the recommendations of the previous review particularly on the composition of the Board and its required scientific strength and independence. That is, “to obtain a much stronger connection to, and representation of, the scientific research community”. EPB has stated that some countries have nominated high-level scientists in addition to mostly science managers making up the Board. It is crucial that the EPB ensures that scientific independence and eminence at the European level is indeed represented in the Boards especially from the key supporting countries.

Another recommendation of the past review has pointed to the apparent “overabundance of organisations trying to coordinate and provide advocacy for polar science and infrastructure”. The past Review Panel asked the EPB to take an active and leadership role in “rationalising, interconnecting and possibly reducing” the number of actors with more or less the same agendas.

The past review recommended that the EPB should try to influence the FP8 agenda on Polar research. EPB has taken on this important and major challenge, however influencing of European Commission's Framework Programmes agendas more effectively would likely be facilitated if the above-mentioned issues are addressed more rigorously by the EPB.

EPB has responded well to the other recommendations of the previous review such as involvement of Observers, although on selected agenda items, and also on its activities for International Polar Year.

EPB's Perceived Weaknesses

- Contracts have advantages in bringing additional resources, but they could potentially distract the EPB from its core mission. EPB should sharpen its focus on its core strategy and policy activities and be very selective in engagement with "extra-mural" contracts.
- EPB should pay more active and rigorous attention to improving the composition and engagement of the Board and of participants in its various events. Particularly, features such as gender and age balance in addition to scientific standing and eminence should be reviewed and improved.
- Perceived and genuine levels of openness and transparency of the Board need to be reviewed and improved.

EPB's Performance and Key Achievements (2005-2010)

A Brief Description of a selected number of achievements is provided below.

EUROPOLAR ERA-NET managed by EPB

The EUROPOLAR ERA-NET (2005-2009) managed by EPB was a consortium of 25 Ministries, Funding Agencies and national Polar research authorities from 19 European countries and of the ESF-EPB to encourage and support a closer relationship between national Polar programmes. The project was funded by the EC with 2.5 M€ and was coordinated by the Institut Polaire Français Paul Émile Victor.

Memorandum of Understanding

The European Polar Consortium project culminated in a Memorandum of Understanding (MoU) for a 'European Polar Framework' which was signed by 26 funding organisations from 19 countries at the European Polar Summit on 24 June 2009, and was subsequently passed to the European Polar Board. The MoU forms a framework for future collaboration in terms of policy, infrastructure and research programmes and was the first of its kind to connect the polar agencies of Europe.

EPB Strategic Position Paper on the future of European Research in the Polar Regions

The EPB strategic position paper was published in November 2010. It prioritises themes for the next decade and prepares for the new Strategic Framework Programme 8.

INFRAPOLAR

The "European and International Polar Research Stations Services Platform supporting Climate and Environmental Observations and Monitoring in the Arctic and Antarctic Regions" was conceived by the EPB as a large-scale strategic initiative to support the networking and transnational access to more than 70 European and international research stations in the Polar Regions.

ERICON AURORA BOREALIS Project

This has been a major initiative of the European Polar Board during the last 5 years, funded since March 2008 by EC-FP7, and connected with ESFRI. ERICON AB has been dedicated to the generation of the required frameworks for the construction and running of an unprecedented pan-European Polar research icebreaker named AURORA BOREALIS. Significant efforts by the EPB office staff were required for the project including overall project management and coordination.

The PolarCLIMATE Research Programme

The European Polar Consortium, which included 20 ministries and funding organisations from 18 European countries, launched the first pilot call for pre-proposals within the PolarCLIMATE Programme. Six collaborative research projects in the Arctic and Antarctic were funded.

3.3 Marine Board – ESF (MB-ESF)

Brief Description of the Mission and Operations of the MB-ESF

Overview of the MB mission

The Marine Board was established in 1995 as part of the European Marine and Polar Sciences (EMaPS) structure, which comprised two boards. In 2000 EMaPS was disbanded and the two boards became independent – the Marine and the Polar Boards, respectively. Since then, the MB has represented the wider European marine community in promoting science and technology in sustainable ocean development and governance.

The MB serves as a pan-European platform to meet future science and societal challenges and opportunities for its 31 Member Organisations from 19 countries. Its main objectives are:

- To facilitate enhanced cooperation between national research institutes, funding agencies, and European marine and maritime stakeholder communities;
- To develop common research priorities and perspectives towards a European strategy for marine science;
- To advance marine research;
- To bridge the gap between science and policy;
- To provide policy advice on marine research to national agencies and governments, and to European institutions and agencies;
- To promote the establishment of a European Marine Research Area.

The Marine Board operations are overseen by an Executive Committee which comprises a Chair, six Vice-Chairs, and the Executive Scientific Secretary. The operations are performed by the Secretariat which consists of the Executive Scientific Secretary, three science officers and one administrator. The Secretariat of the MB is located in Ostend, Belgium.

The Board itself meets twice a year; it comprises representatives of its 31 Member Organisations. The activities of the Board are financed through: (i) contributions of the Member Organisations; (ii) the external sources that are mostly the EU Framework Programme projects; (iii) special contributions; and (iv) in-kind contributions from the Flemish Government.

The Strategic priorities of the Marine Board can be summarised as:

- Playing a major role in the development of the Integrated Maritime Policy for Europe and the European strategy for Marine and Maritime Research;
- Providing foresight and strategy deliberations to advance marine science in Europe;
- Maintaining its independence;
- Contributing to ongoing development of the ERA for Marine Science.

The MB uses different instruments to bring together all European marine research stakeholders in plenary meetings, forums, working and vision groups, workshops, panels, partnership projects and initiatives, science policy conferences and European Council Presidency events.

MB's response to previous Review Panel's recommendations

Although in the self-evaluation report prepared by the MB for this review, responses to the recommendations of the past review are not explicitly provided, the Board has addressed the main recommendations on representation and terms of reference. Activities undertaken during 2010 on guidelines, membership strategy, communication and impact strategy are commendable.

MB's Perceived Weaknesses

For good reasons, the MB places great reliance and reflections on the views of the participating Member Organisations on marine and maritime issues. The Review Panel believes that, in order to achieve the required scientific independence, eminence and authority at the international level, it is necessary to underpin these views within the relevant and prominent scientific communities. The MB should continue its efforts in establishing the right balance.

MB's Performance and Key Achievements (2005-2010)

Position Papers (PP):

- PP15: *Marine Biotechnology: A New Vision and Strategy for Europe* (2010);
- PP14: *Science Dimensions of an Ecosystem Approach to Management of Biotic Ocean Resources* (2010);
- PP13: *The Effects of Anthropogenic Sounds on Marine Mammals* (2008);
- PP12: *Remote Sensing of Shelf Sea Ecosystems* (2008);
- PP11: *Marine Board Responses to the European Commission's Green Papers* (2007)
  (i) Towards a future Maritime Policy for the Union: A European vision for the oceans and seas,
  (ii) ERA New Perspectives – EC Green Paper on: Maritime Policy, and the ERA;
- PP10: *European Ocean Research Fleets – Towards a Common Strategy and Enhanced Use* (2007);
- PP9: *Impacts of Climate Change on the European Marine and Coastal Environment* (2007);
- PP8: *Navigating the Future III* (2006);
- PP7: *Modelling in Coastal and Shelf Seas – European Challenges* (2005).

Vision Documents (VD)

- VD2: *Marine Renewable Energy – Research Challenges and Opportunities for a New Energy Era in Europe* (2010);
- VD1: *Marine Board – EuroGOOS Vision Document on EMODNET* (2008).

Forum Proceedings

- 1st MB Forum: *Marine Data Challenges: from Observation to Information* (May 2008, Ostend);
- 2nd MB Forum: *Towards a European Network of Marine Observatories for Monitoring and Research* (September 2010, Brussels).

EurOCEAN Conference Reports

- 2010 Conference Report and Ostend Declaration: Grand challenges for marine research in the next decade;
- 2007 Conference Report and Aberdeen Declaration.

Statements

- Towards a European Network of Marine Observatories;
- Joint Marine Board – EuroGOOS: Response to the EC Consultation Roadmap for EMODNET;
- WISE-MARINE: Extending WISE to Serve as a Common Reporting Platform for the Marine Environment Community under the EU Maritime Strategy;
- EU Action to promote Offshore (Wind) Energy: Open Consultation on EU Action;
- Invasive Alien Species (IAS) – a European Concern;
- Adapting to Climate Change in Europe – Options for EU Actions;
- Towards a Future Maritime Policy for the Union: (GP, June 2006) – published in PP11;
- The European Research Area: New Perspectives (GP, May 2007) – published in PP11.

3.4 European Space Sciences Committee (ESSC)

Brief Description of ESSC's Mission and Operations

The inception of the ESSC goes back to 1974 when under the auspices of the UK Royal Society, European funding agencies created the Space Sciences Committee (SSC) with the aim of creating a forum for European planetary scientists. Less than a year later, SSC joined ESF. Today ESSC is represented in several important bodies of the European space community: ESA ministerial councils, EU space advisory structure, joint EC-ESA ministerial conferences on exploration, ESA's scientific advisory structure (e.g. SSAC and HESAC). It is also represented permanently or in an ad hoc fashion in various international fora: the US NRC Space Studies Board, COSPAR, the UN Action team 14 on NEOs, OECD Global Science Forum, etc. Furthermore there exist framework agreements with ESA that deal with a number of issues ranging from peer-review to planetary protection to foresight on programmes or technology development aspects.

Overview of the ESSC mission

The mission of ESSC is to provide an independent European voice on European space research and policy. ESSC is ESF's expert body on space research.

In the Global context, ESSC is the European counterpart to the US Space Studies Boards, and of similar institutions in other countries. ESSC's domain is clearly multi-disciplinary.

ESSC normally meets twice a year in plenary meetings. The agenda of plenary meetings is proposed by the Chair, in consultation with the Core Group (see below).

There are four ESSC disciplinary panels; they identify future opportunities and set priorities for consideration by the committee:

- **AFP**, the Astronomy and Fundamental Physics Panel covers the areas of stellar physics and exoplanets; galactic astronomy; star formation and interstellar medium; cosmology and high-energy astrophysics; fundamental physics and astroparticle physics;
- **ESP**, the Earth Sciences Panel covers the domains of atmospheric chemistry and physics; solid Earth; oceanography and continental interfaces; glaciology and cryosphere; biosphere and land; GMES and disaster management; space policy and law;
- **RWP**, the Research in Weightlessness Panel covers all life and physical sciences in space, i.e. material sciences; fluid physics and complex plasmas; fundamental physics in space; dust physics; biology; physiology and neurophysiology;
- **SSEP**, the Solar System and Exploration Panel deals with Earth and space physics; solar and heliospheric physics; planetary sciences, moons and small bodies; exobiology.

The panels meet in splinter sessions during ESSC plenary meetings, or on specific occasions after agreement by the Chair and Executive Scientific Secretary. The panel meetings are led by panel Chairs, appointed by the ESSC Chair. The panel Chairs constitute the ESSC Core Group,

whose task is to support the ESSC Chair between plenary meetings. The Core Group is convened by the ESSC Chair.

Currently there are 23 ESSC members from 11 European countries.

Contrary to the custom in other structures, ESSC members are chosen "ad personam", i.e. based on their individual scientific expertise and recognition. Accordingly, they are not representatives of countries, member organisations or research councils. Nevertheless, according to the ESSC Terms of Reference, members are "*…required to maintain links with their national ESF member organisation(s) involved in space science and in space technology applications for science and research…*"

ESF is the legal entity of ESSC and provides management support on financial and contractual matters as well as on human resources, communication, administration, IT and on legal affairs. In return, the ESSC contributes for its share of infrastructure to the ESF. The participating funding organisations contribute to the main financing of ESSC.

Following the publication of the ESSC Strategic Plan (2007-2010), an implementation plan and a financial plan were prepared and discussed with the participating funding agencies. A principle agreement was reached and a Financial Plan 2008-2012 was subsequently published. It was recognised that the operational mode of ESSC and its corresponding resources have become unfit for a whole new range of activities and for the role the committee now plays in Europe. ESSC, therefore, has expressed a need for increased funding.

ESSC's response to previous Review Panel's recommendations

ESSC's self-evaluation report reflects on three observations from the last review and provides responses to them. These are:

- *Independence and membership renewal*: The Committee's key feature that needs to be fully safeguarded is its independence. Therefore the issue of funding should not be regarded as a potential threat to the independence of the Committee. The supporting countries should expect a strong and independent ESSC if it is to continue serving its mission correctly. The usefulness and added value of the Committee should determine the level of participation and therefore funding for the Committee. ESSC should continue its efforts in engaging the most prominent and independent experts, and in communicating its role and potential added value to the participating organisations and other partners;
- *Relations with Funding Organisations and financial aspects*: ESSC has reflected on the potential conflict between the required independence and the financial dependence on both national Member Organisations and the space agencies. The issue of clarification on who the ESSC's real stakeholders are needs to be further considered. In the current scheme, and unless this is explicitly modified, although ESSC engages in studies and provides valuable input to space agencies and primarily to ESA, it appears that the main stakeholders for the Committee should continue to be the participating funding organisations;
- *Role of ESSC*: ESSC's response to last review's recommendation for being more proactive than reactive is somewhat vague. This Review Panel believes that although the task of being proactive in the face of other major players particularly ESA and NASA, appears to be formidable, it is achievable, given the right mandate, an appropriate make-up, and focus by a strong Committee. It is assumed that the right mandate will entail the necessary financial and other necessary resources.

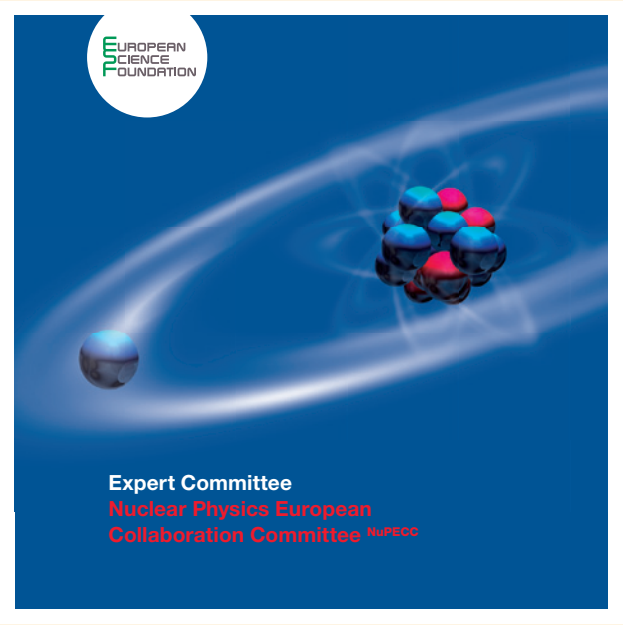
ESSC's Perceived Weaknesses

It has become evident that only about one-third of the members of the Committee are really active and engaged with Committee business. It is hoped that an eventual transition to a new organisation such as Science Europe would serve as a unique opportunity to address and vitalise membership and engagement.

ESSC's Performance and Key Achievements (2004-2010)

- ESSC has become the space-related privileged Science Partner and Consultant for the EC;
- As one of their latest achievements, the review panel highlights ESSC's recommendation following its FP8 consultations;
- The Committee is deeply embedded and listened to in the ESA Advisory Structure.

3.5 Nuclear Physics European Collaboration Committee (NuPECC)



Brief Description of NuPECC's Mission and Operations

The Nuclear Physics European Collaboration Committee, NuPECC was founded in 1988 as an autonomous Committee by the directors of the most important national laboratories in Western Europe that performed basic research in Nuclear Physics. The establishment of the Committee has been in response to a need for creating a more coherent approach for the running, and for the planning, of new large-scale Nuclear Physics research infrastructures in Europe. In 1997, NuPECC joined the ESF as an associated Committee and is now supported by its Subscribing Institutions, which are in general Member Organisations of ESF that are involved in nuclear science and research or operate research facilities.

The mission of NuPECC is "to strengthen European collaboration in nuclear science through the promotion of nuclear physics research and its trans-disciplinary use and application through collaboration between research groups in Europe and in particular with countries linked to ESF".

NuPECC regularly meets and discusses issues three times a year in one of the participating countries. It is loosely associated with ESF's Standing Committee for the Physical and Engineering Sciences, PESC. The chair of NuPECC has observer status on PESC and reports to the PESC plenum at regular intervals, usually once a year.

The Committee currently has 28 members from 20 countries represented by high-level scientists and laboratory directors. The recommendations of NuPECC – aimed at guiding the strategy of nuclear physics in Europe – reach out to a large constituency of scientists, engineers and technicians.[3]

The subscription fees to NuPECC have been kept constant at the level of 5.6 k€ per member for many years.

NuPECC's response to previous Review Panel's recommendations

NuPECC's self-evaluation report contains a thorough treatment of the five recommendations arising from the last review. A brief summary is provided below:

1. Improve NuPECC's role as a forum, by broadening the representation of the nuclear physics community in the Committee: This has been addressed to a large extent and there is now a "good balance between NuPECC members from universities and national laboratories".
2. NuPECC to seek more interaction with related committees such as ECFA and the EPS, through cross representation of members: In addition to EPS and ECFA, there is now cross membership with American and Asian sister organisations, the DoE/NSF Nuclear Science Advisory Committee, NSAC, and the Asian Nuclear Physics Association, ANPhA. In addition, NuPECC is the advisory body to the EU FP7 Nuclear Physics ERA-NET "NuPNET" of 18 European national funding agencies from 14 countries.
3. NuPECC's activities to be better aligned to the mandate of ESF. ESF should provide NuPECC with more specific questions to facilitate this: Significant and commendable steps have been taken by NuPECC towards closer integration and alignment with the mandate of ESF. Currently, NuPECC is involved in many strategic activities of the ESF under the Member Organisations Fora. In addition, the NuPECC Chair is a member of the Scientific Advisory Committee and of the Steering Committee of the ESF-EU FP7 Coordination and Support Action MERIL (Mapping of the European Research Infrastructure Landscape). The NuPECC Chair regularly participates in the meetings of PESC, the quarterly ESF Chairs meetings called by the ESF Chief Executive, some meetings of the Scientific Advisory Board, some meetings of the Governing Council, and the annual Assembly meetings. The recent Forward Look "NuPECC Long Range Plan 2010" was jointly funded by ESF and NuPECC.
4. The Panel recommended a stronger bottom-up approach for the establishment of Road Maps, which can be updated yearly. Furthermore, it was recommended that NuPECC should work on a European strategy in a global context: NuPECC has produced its 2010 Long Range Plan (LRP2010), and has stated that annual updates may not have desirable effects and updates shall be made when necessary. Concerning the bottom-up approach, NuPECC has reasonably taken the necessary measures in this direction, specifically, the Long Range Plan 2010 has been prepared at a Scoping Workshop at FIAS in Frankfurt in autumn 2009 together with around 150 senior scientists from all over Europe. Subsequently, drafts of LRP2010, and in particular of the recommendations and road map, have been published on the NuPECC website for consultation and scrutiny. The final LRP2010 has been discussed and decided upon at a Consensus Conference under the Spanish EU Presidency in Madrid in summer 2010 with more

3. Mainly through the scientific Journal *Nuclear Physics News*, with 6000 copies published every three months and distributed to subscribing institutions in Europe, Canada, the USA, Japan, and, in the future, China.

than 250 participants. Finally, the LRP2010 has been launched at a Publication Conference under the Belgian EU Presidency in Brussels in December 2010.
With regard to international involvement, NuPECC has stated that it is the European representative in Working Group 9 on "International Collaboration in Nuclear Physics" of the International Union of Pure and Applied Physics, IUPAP, and that it represented Europe on the Nuclear Physics Working Group of the OECD Global Science Forum.

5. The Panel advised NuPECC to address and coordinate developments in theoretical nuclear physics more strongly. NuPECC has stated that it does have existing links with the theoretical nuclear physics community, but it is not clear how these links can contribute to "addressing and coordinating developments in theoretical nuclear physics more strongly".

NuPECC's Perceived Weaknesses

- NuPECC's formal interactions and relationships with similar organisations world-wide should be enhanced;
- NuPECC should also strengthen its coordination of applied nuclear physics. The Review Panel noted many activities at national levels, but not much coordination on a European level. Areas of interest are for example nuclear technology based medical diagnostics and therapy, security, environmental science and nuclear energy.

NuPECC's Performance and Key Achievements (2004-2010)

Production

- Regularly updated NuPECC roadmaps for nuclear physics in Europe; the two most recent versions were published in 2004 and 2010;
- The NuPECC Handbook that describes international access to European nuclear physics facilities; 4000 copies of the 2004 version were distributed;
- Nuclear Physics News, issued every three months. Distributed over many countries in Europe, Asia and the USA. This "News" is the sole nuclear physics magazine in the world and is free to subscribers. 6000 copies of each issue are distributed worldwide;
- Web page: www.nupecc.org;
- Survey of Human Resources for nuclear research;
- Outreach activities in the form of public awareness activities and brochures.

European influence

- NuPECC advised ESFRI to ensure that two major projects, FAIR in Germany and SPIRAL II in France were included in the ESFRI list;
- EU FP-4 to 7: NuPECC initiated 7 Networks, I3s and IAs with around 2000 scientists and engineers each. NuPECC also initiated the ERA-net "NuPNET" (18 ministries and funding agencies).

International relations

- NuPECC has an active interaction with IUPAP (International Union for Pure and Applied Physics) through its working group WG9, which includes directors of major laboratories;
- NuPECC has had active interactions with the Global Science Forum of the OECD;
- NuPECC also interacts regularly with NSAC in the US and with ANPhA in the Asia-Pacific region.

Initiation of new projects – EU Framework Programmes 6 and 7

- FP6: Integrated Infrastructure Initiatives, I3s: Hadron Physics, EURONS;
- FP6: Design Studies: FAIR, EURISOL;
- FP7: Integrating Activities, IAs: HadronPhysics2, HadronPhysics3, ENSAR, SPIRIT;
- FP7: ISOL@MYRRHA, Nuclear Physics@ELI, ENC and PAX@FAIR, LHeC@CERN.

Public understanding of nuclear science

NuPECC has continued to provide web-based documentation, information, books etc. for its PANS (Public Awareness of Nuclear Science) activities. This is an area which is becoming ever more important and where more could be done.

Nuclear applications

NuPECC has undertaken several investigations into

applications of nuclear physics. There is the wish to expand this area of involvement.

Basic guideline

NuPECC has provided a valuable role for the European nuclear physics community. NuPECC's advice and strategy, as being from the community itself, must continue. It should continue to advise the various European institutions and funding agencies.

Significant changes regarding ESF

- As significant changes to ESF are expected, it is highly desired that NuPECC is converted into a new high-level strategic scientific organisation in Europe together with Science Europe;
- NuPECC wishes to continue its strategic and scientific work in this new organisation;
- NuPECC wishes to have direct access to, and participation in, the new organisation. NuPECC feel that direct transfer of expert advice and information to the top-level management and governance is important.

3.6 Materials Science and Engineering Expert Committee (MatSEEC)

Brief Description of MatSEEC's Mission and Operations

MatSEEC, a newly established Committee is associated with ESF Standing Committee for Physical and Engineering Sciences (PESC). It was given a 5-year term from 29/10/2009 – 28/10/2014. MatSEEC is financially supported by contributions of 5 k€/year from its 23 member institutions that are located in 15 European countries, as well as other key European organisations (E-MRS, EMF, ESA). Plenary meetings of two days each are held twice a year; in addition, there are 2-3 working group meetings held each year. MatSECC has a current gender ratio of 19 male to 4 female members; most committee members are strongly engaged and participating in MatSEEC activities. MatSEEC has already published a Science Position Paper on *Computational*

Techniques, Methods and Materials Design (March 2011), and co-published a major foresight report on *Materials for Key Enabling Technologies* (July 2011).

Mission and Objectives

The main aims of MatSEEC are:

- To produce scientific forecasts on future challenges to materials science and engineering including related research activities. To describe the next generation of demands on materials science and engineering including applied fields; and to advise on requirements for educational standards in academic training as they arise;
- To provide strategic and scientific policy advice to PESC, to ESF Member Organisations and to European bodies based on their identified strengths and weaknesses, and on assessments of the relevant research infrastructures and best practices;
- To deliver scientific assessments on recent research results and current scientific and technological developments, including best practice for technology transfer, potential for innovation and development of academic and industrial partnerships.

The work of the Committee is structured around seven working groups that cover the following areas:

1. Future Materials and Challenges;
2. Tools, Facilities and Infrastructure;
3. Computational Techniques, Methods and Materials Design (see report summary);
4. Technology and Knowledge Transfer;
5. What kind of Funding?
6. Education and Training;
7. Public Outreach and Visibility.

4. General Conclusions and Recommendations

In this chapter the Review Panel presents its general conclusions and recommendations that are applicable to all five Expert Boards and Committees under review (and also to MatSEEC). Chapter 5 is devoted to specific recommendations for each body.

1

The Members of the Review Panel concluded unanimously that all Boards and Committees provide scientific services in the European or even global framework that are indispensable for Europe's scientific landscape, and therefore recommend that their mandate be extended without exception.

2

The Expert Boards and Committees deal with issues that require a proactive and concerted international and multi-disciplinary scientific effort.

3

In many cases the Expert Boards and Committees investigate an environment that is common and vital for society, and therefore must be observed, investigated and monitored.

4

The actions recommended by the Expert Boards and Committees ensure the continued vitality of the environment, and its partial preservation as a pristine scientific resource.

5

The Review Panel noted that all Boards and Committees expressed the wish to join Science Europe, but commented on their place in the new organisation as well as the required independence. Indeed, a qualified independence of the Expert Boards and Committees will assure a better delivery of their missions.

6

Specifically, the Review Panel concludes that the Expert Boards and Committees need to be maintained and recognised as competent entities, yet need to be connected to a strong and credible European Science Organisation, e.g. Science Europe.

7

The Expert Boards and Committees promote and facilitate a culture of top-quality science in Europe, and provide crucial guidance and advice for science policy issues in a timely manner.

8

In general, the Expert Boards and Committees should carefully ensure that a good balance is maintained in their membership between scientific and policy advice: in view of the societal implications of most recommendations emerging from the Expert Boards and Committees, gender balance must remain a steady concern and thus vigilantly maintained.

9

The issue that Member Organisations of Expert Boards and Committees will most likely not be congruent with those of Science Europe needs to be resolved.

10

Proper arrangements for communications by and outreach for the Expert Boards and Committees need to be established.

5. Specific Recommendations

5.1 Recommendations for the Committee on Radio Astronomy Frequencies (CRAF)

Overall summary

The Review Panel fully concurs with the views of the previous 1996 and 2003 Review Panels in stressing the scientific importance of CRAF's mission and activities. In the opinion of the Review Panel, the aims and objectives of the Committee remain highly relevant to the European scientific community and have been properly and fully executed by CRAF during the period of this evaluation.

CRAF and its relation to Science Europe

CRAF serves the interest of passive users of the radio frequency spectrum and plays a vital role in protecting the rights of scientific users in Europe and beyond, in particular the global radio astronomy community. It is absolutely crucial that CRAF maintains its special status as an organisation that is recognised at the highest European level. Such recognition provides CRAF with the necessary credentials to fully engage with national and indeed multi-national commercial, industrial and civil users of the radio spectrum. It should be noted that unlike many of the ESF Expert Committees, CRAF is an operational group and is unable to represent the radio astronomy community in terms of determining or advising on overall scientific priorities in the field or other high-level strategic issues. Its goal is to sharply focus on the protection of the radio spectrum for astronomers in particular and passive users in general. It requires special status and special recognition at the highest European level in order to fully realise these aims and objectives.

The recommendations of the review panel to CRAF are grouped under primary and secondary as outlined below:

Primary recommendations

1. ESF should continue to strongly support CRAF and its mission – in particular the mandate of CRAF should be extended for a minimum period of 5 years;
2. CRAF should maintain its special status as an Expert Committee of the ESF or an equivalent status in any new organisation that may replace the ESF, e.g. Science Europe.

Secondary recommendations of the panel

1. CRAF should (as resources permit) engage more actively with the radio astronomy community in order to highlight the Committee's achievements and also to understand the needs and trends of telescope users;
2. CRAF is encouraged to continue to engage with other passive users of the spectrum and to investigate whether these organisations might also aspire to CRAF membership;
3. Over the next five-year period, CRAF's involvement in the global SKA project should continue to increase – CRAF can play an important role in representing European astronomers' interests in terms of providing advice on frequency management issues, and in particular the regulation of satellite transmissions.

5.2 Recommendations for the European Polar Board (EPB)

Overall summary

The Polar areas, both the Arctic and the Antarctic, are key regions in Earth system research and studies of climate change. At the same time, the Arctic has become a focus in national and international politics fed by various economic and social interests and environmental concerns. Due to lack of scientific information, the

harshness of the natural environment and, particularly their remoteness, the Polar areas are destined for increased international cooperation.

Main recommendations

1. The EPB should continue its functioning in the new organisation of Science Europe;
   - The EPB should promote realisation of ground breaking science in Polar research in European context.
2. The EPB should focus its work especially to facilitate and promote European integrated Polar research infrastructures and logistics:
   - The EPB fills a critical void in European Polar activities when it coordinates and facilitates the use of infrastructures as well as logistics supporting Polar research in Europe and seeks to find synergies for use of these resources. This includes activities to bridge the infrastructure needs of Polar science with European science funders as well as to promote coordination of research logistics, infrastructure, access, monitoring, fieldwork, observations and modelling.
3. The EPB should widen its agenda:
   - The EPB should widen its agenda from supporting logistics and infrastructure of mainly bio- and geosciences to include social, health and technical sciences;
   - The EPB should place greater emphasis on enhancing European polar research activities over priorities of national Arctic and Antarctic programmes. Some member countries do not necessarily have official Polar programmes but still may have extensive research activities in Polar research. Furthermore, the actors are not necessarily the countries, but also institutions and organisations.
4. The EPB should increase its transparency:
   - The EPB should market its services more direct to the end users namely the scientists themselves;
   - The EPB should increase contacts and engagements with other international Polar organisations.
5. Representatives:
   - The EPB should include both national and organisation representatives;
   - The EPB should improve its gender balance;
   - Appointments to the EPB should have a limited term;
   - The EPB should have a policy to improve its age balance and invite young scientists into its meetings.

Other recommendations

- The EPB should prioritise its core mission of promoting, activating and facilitating polar scientific research and minimise committing its personnel and resources for managing the research or operational activities.
- AURORA BOREALIS is a massive and expensive infrastructure project, and the EPB should seek and analyse alternatives for deep sea drilling operations.
- The EPB is encouraged to continue developing good cooperation with Russia.

5.3 Recommendations for the Marine Board–ESF (MB-ESF)

The MB-ESF is an independent and self-financed think-tank organisation for the European Commission and the European Parliament on marine science policy issues. Examples are the documents that the MB has produced, such as *Navigating the Future III, the Aberdeen Declaration* and *the Ostend Declaration* for the use of Parliament.

One key role of the MB is to facilitate interactions and cooperation between national research institutes, funding agencies and European marine and maritime stakeholder communities.

The Board also plays a unique role through its ability to give policy advice on marine research to national agencies and governments, and to European institutions and agencies.

A potential weakness of the Board may be its strong

reliance and reflections on the views of the Member Organisations on marine and maritime issues, as this may not necessarily be aligned with the views of the scientific community, nor with the general concern on increasing human activity, which involves climate-induced stressors and threatens biodiversity and ecosystem functioning.

Recommendations

The Marine Board

- could place more emphasis on population welfare and societal issues such as briefing the community on the impacts of major oceanographic processes (such as for example the impacts of climate change);
- should develop a global vision to address the identified global marine science challenges,
- must be more proactive for delivering the key messages;
- should place more emphasis on issues related to marine technology and ocean engineering;
- should enhance participation of research organisations at scientist level on the Board; one way of achieving this may be to have two delegates from each country (one representing a funding organisation, and one distinguished scientist from a research organisation).

The Review Panel

- commends the active role of the MB through its direct interactions with the European Commission;
- encourages a more active role in international programmes;
- encourages a more active role for developing a broad vision on the EU marine and maritime research and technology;
- encourages the MB to establish a leading role on the development of long-term comprehensive science and implementation plans;
- encourages the MB to have stronger interactions with other stakeholders to increase the impact of the Board's activities.

5.4 Recommendations for the European Space Sciences Committee (ESSC)

ESSC has established a unique advising role within the European space arena. Specific recommendations made by the Review Panel are:

- ESSC should continue its successful advising of the European Commission and Parliament on space-related matters (e.g. recommendations for the Framework programmes);
- The Committee is encouraged to continue their efforts towards establishing a "European Space Board";
- It is recommended that ESSC makes the internal structure of the Committee more efficient. To this end, reducing the number of Board members may be considered;
- The Committee is encouraged to extend its reach to their counterparts in Japan and in the BRIC states (Brazil, India and China).

5.5 Recommendations for the Nuclear Physics European Collaboration Committee (NuPECC)

Continuation of the role of NuPECC

NuPECC should continue to provide its valuable, unique and essential role for the European nuclear physics community. NuPECC should continue to provide European strategy guidelines, strengthen collaboration and coordinate European bids and projects.

In relation to the new organisation

Although significant changes regarding ESF are expected, as it potentially goes through the transition into Science Europe, it is highly desired that NuPECC should be converted into a new high-level strategic scientific advisory organisation in Europe.

Direct access in Science Europe

The European strategy and recommendations defined by

NuPECC should be directed to the highest management level within Europe, the new organisation, research organisations and the EC. Ideally, as all the Expert Boards and Committees, NuPECC should be involved in the governance of Science Europe more directly. The Review Panel notes the wish of NuPECC that Chairs of Expert Boards and Committee be granted observer status on the Science Europe Governing Board.

Pan European communication

There is a need of pan-European communication on science results and achievements. A web page description in addition to Nuclear Physics News should be considered.

International relations

NuPECC should foster stronger relationships with similar organisations world-wide.

Public awareness

NuPECC is encouraged to develop further its PANS (Public Awareness of Nuclear Science) activities.

Nuclear applications

NuPECC should strengthen its coordination of applied nuclear physics. To our knowledge there are many activities at national level, but not much coordination on a European level. Areas of interest are for example nuclear technology based medical diagnostics and therapy, security, environmental science and nuclear energy.

5.6 Materials Science and Engineering Expert Committee (MatSEEC)

- MatSEEC should continue to promote CECAM (Lausanne) as a focal organisation to support and develop European activity in computational materials science. This would enhance cooperation among national and grass-roots research networks and offer opportunities for sustainable funding, researcher training, support for database and code development, maintenance, distribution and support, as well as opportunities for technology transfer to industry. A policy unit should be established at CECAM to discuss scientific priorities and advise funding agencies;
- MatSEEC has shown that Europe has a highly skilled work force and world-class research and development activities in Materials Science and Engineering (MSE); however, these activities are fragmented and there are difficulties in transferring the fundamental research to applications (examples are the lack of a common European patent and of entrepreneurial investment). Consequently, MatSEEC should prioritise efforts of the Working Group on technology and knowledge transfer;
- MatSEEC has demonstrated capacity and flexibility in quickly responding to the request to produce a joint document with E-MRS that reviews European key enabling technologies (KET) strategies in various fields of materials science and engineering. MatSEEC is encouraged to contribute to other emerging opportunities to promote materials science and engineering.

6. Concluding Remarks

Terms of Reference and Mission Statements of the Expert Boards and Committees

1. The Expert Boards and Committees have been created to provide advice on scientific policy and strategy, for which concerted efforts are needed across scientific disciplines and national borders. The present Expert Boards and Committees have performed effectively and their mandates continue to be of genuine importance. *The Review Panel therefore unanimously recommends that the mission of all the ESF Expert Boards and Committees be extended for at least five years.* MatSEEC, although still in its initial five-year term clearly has the potential to serve beyond their first five years. The MatSEEC Committee itself should therefore reflect on its future activities and on the span of its operational life, and inform the participating organisations and ESF accordingly.
2. Additional funding opportunities through acquisition of external contracts from, for example EC Framework Programmes, should be pursued only if such contracts are congruent with the core mission of a given Board or Committee. The management of contracts should not become a main part of the engagement of the secretariats of the Expert Boards and Committees. The Review Panel acknowledges that besides the additional funding, external contracts can also bring exposure and credibility for the secretariats; however, we stress that the authority and credibility of the Boards and Committees are determined by the stature of the members and the activities of the Expert Boards or Committees themselves.

Operations including Finances

3. The Expert Boards and Committees are self-financed, mainly through contributions of the participating organisations that, in most instances, overlap with the ESF membership. Expert Boards and Committees therefore do not create additional financial requirements for the hosting organisation. Currently, the Expert Boards and Committees themselves contribute a portion of their income to ESF for their share of infrastructure.

Opportunities arising with the Change of Organisation

4. Given the societal implications of many recommendations emerging from the evaluated Expert Boards and Committees, we advise that the new organisation insists on a sound, vigilantly maintained gender balance.
5. The time of change for ESF provides a good opportunity to enhance the positioning, authority and role of the Boards and Committees. It is crucial that the participating organisations ensure that the Boards and Committees do have the required resources for properly carrying out their mandate, and that – where appropriate – a balance is maintained between scientific expertise and representation of organisations and institutions. Most importantly, however, the new organisation must ensure that the members of the Expert Boards and Committees are of high scientific or administrative standing, and promise to be active in the deliberations of their Boards and Committees. We also note that the Expert Boards and Committees expressed their wish to be properly integrated into the governance of the new organisation.

6. Finally, the Review Panel suggests that the major reorganisation of ESF and EUROHORCs be also used to identify further areas of societal concern where a scientifically outstanding Expert Board or Committee would facilitate enhanced cooperation between national research institutes, funding agencies and European stakeholder communities within a host, such as Science Europe.

Declaration of the Chairs of ESF Expert Boards and Committees

All the Chairs of the ESF Expert Boards and Committees (EBCs) welcome the findings and outcome of the 2011 Statutory Review which concluded that "*…all boards and committees provide multidisciplinary scientific services in the European, and even global framework, that are indispensable for Europe's scientific landscape and therefore recommend that their mandate be extended without exception…*"
The EBC Chairs met in London on 29 September 2011 to consider their future operations and assess the implications of the anticipated changes to ESF and the establishment of the new Science Europe organisation.

The EBC Chairs concluded the following:

- Their continued commitment to providing strategic advice in their respective domains in the context of the European Research Area.
- The importance of maintaining a stable base for their operations within the current ESF organisation, at least in the short term.
- The need to be proactive in defining a common position concerning their potential future role and contribution to Science Europe.

The EBCs will be engaging the leadership of ESF and Science Europe to identify the appropriate mechanisms and measures to facilitate continuation of their mission.

London, 29 September 2011

7. List of Abbreviations and Acronyms

ANPhA: Asian Nuclear Physics Association

BRIC: Brazil, India and China

CECAM: Centre Européen de Calcul Atomique et Moléculaire

CEPT: Conference of European Post and Telecommunication administrations

CERN: European Organisation for Nuclear Research (Conseil européen pour la recherche nucléaire)

COSPAR: Committee on Space Research

CRAF: Committee for Radio Astronomy Frequencies

EC: European Commission

ECFA: European Committee for Future Accelerators

EEC: Electronics Communications Committee (CEPT)

ELI: Extreme Light Infrastructure, Bucharest

EMF: European Material Forum

EMODNET: The European Marine Observation and Data Network

E-MRS: European Materials Research Society

ENC: Electron Neuron Collider

EPB: European Polar Board

EPS: European Physical Society

ENSAR: European Nuclear Science and Applications Research (FP7 project under the specific programme 'Capacities')

ERA: European Research Area

ESA: European Space Agency

ESFRI: European Strategy Forum on Research Infrastructures

ESF: European Science Foundation

ESSC: European Space Sciences Committee

EURISOL: European Isotope Separation On-Line Radioactive Ion Beam Facility

EuroGOOS: the European Global Ocean Observing System

EUROHORCs: European Heads of Research Councils

EURONS: European nuclear structure integrated infrastructure initiative

FAIR: Facility for Antiproton and Ion Research

FIAS: Frankfurt Institute for Advanced Studies

FM: Frequency Manager

FP: Framework Programme

GMES: Global Monitoring for Environment and Security

GP: Green Paper

HESAC: Human Spaceflight and Exploration Science Advisory Committee

I3: Integrated Infrastructure Initiatives

IA: Integrating Activities

ISOL@MYRRHA: ISotope OnLine separation at Multi-purpose hybrid research reactor for high-tech applications in Belgium

ITU(R): International Telecommunications Union (Radiocommunication Sector)

IUCAF: UNESCO's Inter-Union-Commission on the Allocation of Frequencies

IUPAP: International Union for Pure and Applied Physics

KET: Key Enabling Technologies

LHEC: Large Hadron Electron Collider

MatSEEC: Materials Science and Engineering Expert Committee

MB: Marine Board

MERIL: Mapping of European Research Infrastructure Landscape

MI: Member Institute

MO: Member Organisation

MSE: Material Sciences and Engineering

NEO: Near Earth Objects

NRC: National Research Council

NSAC: US Nuclear Science Advisory Committee

NuPECC: Nuclear Physics European Collaboration Committee

NuPNET: Nuclear Physics ERA-NET (A Networking Scheme funded under European Commission's Framework Programmes to promote coordination and cooperation between national research Programmes within the European Research Area).

OECD: Organisation for Economic Co-operation and Development

PANS: Public Awareness of Nuclear Science

RadioNet: a project of the EC's FP 6 & 7 Integrated Infrastructure Initiative (I3) for Radio Astronomy

SKA: Square Kilometre Array

SPIRAL II: Second Generation System On-Line Production of Radioactive Ions (Système de production d'Ions Radioactifs en Ligne de 2e génération)

SPIRIT: Support of Public and Industrial Research using Ion beam Technology

SSAC: Space Science Advisory Committee

WISE-Marine: Water Information System for Europe-with Marine data

WRC: World Radio communication Conference

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