>> SCIENCE, TECHNOLOGY & INNOVATION POLICY : The ROLE of PARLIAMENTS

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1 INTRODUCTION

The emerging complex of governance of science, technology and innovation, which is related to the complexity of today's Science and Technology system, has major implications for the role of parliaments.

This paper provides a general review of the complexity of science and technology governance as well as of the interaction between the activities of parliaments and the fields of science and technology. It looks at the structures and processes of parliaments in dealing with science and technology legislation and scrutiny of government policy. It presents UNESCO's initiative on Inter- Parliamentary Fora on Science and Technology and it is part of a large effort in the UNESCO to engage government policy-makers, parliaments, scientists, industry, the media, and representatives of the civil society in an active dialogue for a better governance of science and technology.

The paper is also complemented by the Conclusions and Recommendations made by a number of Parliamentary Science, Technology and Innovation Fora organized by UNESCO, in cooperation with ISESCO and other partners, in the framework of the Organization's action to advice Member States in Science and Technology Legislation.

2 SCIENCE AND TECHNOLOGY GOVERNANCE WITHIN PARLIAMENTS

2.1 We are living in a period of unprecedented changes in Science and Technology systems. The need to deal with more complex relationships, including the interplay of phenomena at different time and space scales, calls for new alliances of domains of knowledge. A better understanding of the scientific process and of uncertainty, which is a fundamental aspect of that process, is replacing the traditional practice of the science enterprise.

2.2 In this context, our institutions of governance are expected to assume responsibility for and to deal with the increasing influence of science and technology, as it permeates even more areas of human life. That is, there is not only an increasing concern with scientific and technological developments but also a need for political decision and action. This is the politics of knowledge and technology, in which scientists play a key role of providing policy-makers with scientific categories, standards, descriptions, assessments, etc. Politicians depend on them, in particular, for analysing problems, defining what the problem is and what can be done, and for predicting the consequences or impact of different courses of action.

2.3 Over time, scientific and technical progress has created a situation where increasing levels of scientific and technical skills are required in order to make decisions. But, contemporary governance and regulation is much more diverse and technically and procedurally more demanding than even the most educated politician or representative can accommodate. As a result, effective monitoring, deliberation, and decision-making about many, if not most, policy areas today is far beyond the capacity of a typical parliament (or its parties and its general membership), no matter how large, how capable, how well organised, or how specialised.

2.4 Parliamentary institutions have increasing difficulty in addressing and dealing with the growing complexity, the highly technical character, the rapidity of change, and the fragility of many developments in modern societies, in particular revolutionary technological and knowledge developments. Recent debates and controversies at many parliaments on genetically modified foods, human cloning, genetic testing and therapy, new information technologies, or global warming are all striking examples of the increasing difficulties that parliaments face.

2.5 The problems of developing an overview and legally regulating the many processes of modern society are enormous. Consider the myriad of developments, among others, commerce, industry, financial and monetary institutions, research, education, gender relations, public health care, information technology, bio-technologies and life science developments, environment, natural resources, globalisation, the emerging forms of governance, etc. Parliaments, of necessity, need be concerned about and engaged with key issues in every one of these areas - and the list is not exhaustive.

2.6 To further complicate matters, in many cases science recognizes that there are uncertainties. This is likely to be true particularly when the issue involves very complex systems, as is often the case with environmental questions–a forest, lake or other ecosystem cannot be put in a test tube for experimentation. Conclusions drawn by scientists in these instances involve varying degrees of uncertainty, and different scientists may derive very different inferences from the available data. In fact, disagreements among scientists are nothing new; they are actually an integral part of the scientific process, and the means by which old hypotheses or theories are discarded and new ones accepted. The difference is that these disputes among scientists typically take place in the pages of scientific journals or in the presentation halls at scientific meetings, and not in parliamentary debating chambers, in the courts, or on the editorial pages of newspapers.

2.7 Uncertainty and debate may be implicit in the scientific process, but lack of a clear scientific consensus on an important policy issue makes matters more difficult for decision-makers. However, there are steps that can be taken the better to inform the scientific and technical decisions made by regulators, legislators and the courts.

2.8 Furthermore, societies, aware of these developments, are increasingly concerned about how scientific progress is being used and the risks and harms caused by technological development. While expressing an overall positive attitude to science and technology, the public at large is nevertheless becoming more and more concerned about the risks associated with scientific and technological developments. While citizens increasingly expect to be consulted directly about the thrust of scientific and technological development, they also look towards their elected representatives in parliaments to take a lead in effective scrutiny and positive and reassuring legislative proposals.

2.9 The new patterns of interaction between the state, the market, and civil society - which find their concrete expression in the ways in which government agencies, private industry, non-governmental organisations, educational institutions, research centres, labour unions, professional associations, and similar entities relate to each other - are creating a richly interconnected environment for strategy design and policy implementation. It has now become necessary to map and understand better a host of new institutional arrangements for technology transfer and diffusion, research and development, and higher education, among many other fields, in order to evaluate their impact and consider their applicability.

2.10 In general, parliaments (and the governments that they scrutinize) have not evolved to deal with such a complex array of problems, processes, and new developments. Most members of parliament (and government officials) - as well as almost all citizens - lack sufficient education, training, and experience in dealing with most of this complex world with its many specialties, technicalities, and uncertainties. The understanding, encouragement and regulation of these areas present a considerable challenge to both parliaments and their central government, no matter how sophisticated and well-staffed.

3 STAKEHOLDERS' PARTICIPATION

3.1 Contemporary policymaking is increasingly characterised by the engagement of multiple agents, not only those formally responsible. These include appropriate government authorities or representatives (GOs), private enterprise and other relevant interests along with NGOs.

3.2 As a result of the growing complexity and dynamism of the contemporary world - and the limitations or failings of parliamentary government systems- some new forms of regulation and governance have emerged quickly and displaced established government forms in a number of areas.

3.3 A complex of these governance forms develops parallel to and in interaction (either cooperative or competitive) with parliamentary government. This variety of forms is largely based in, and involves agents of, civil society, although in many instances, these interface with, and interpenetrate, state agencies. The agents of civil society are not only market agents and economic interests, but public interest groups, social movements, self-help organisations, and other associations of many kinds. They are motivated by diverse goals and interests (economic, political, professional, idealistic, etc.) and usually engage themselves selectively in specialised public issue and policy settings: whether industrial and labor market conditions, the environment, natural resources, consumer interests, genetic screening and bio-technologies more generally, etc.

3.4 In current discussions on the governance of science and technology, there is much interest in ways of ensuring adequate participation of "stakeholders" in arriving at social decisions about both technological choices and more broadly about alternative development paths. The term "stakeholders" covers suppliers and users of technology, including external donors or multinational companies as well as many different internal groups potentially affected by possible benefits as well as potential side-effects of the policies chosen. Much can be learned about processes for stakeholder involvement from recent experience in industrialised countries where the tradition and practice of public participation has come a long way in the last two decades, and is still evolving.

3.5 For stakeholder participation to be more than symbolic, decision makers must be genuinely willing to allow others a say, to encourage both public understanding of the (sometimes complex) issues and constructive public debate. Indeed, one of the most debated issues regarding the social management and control of technology is the degree and form of public participation in decisions about its development, deployment, and regulation. Increasingly, decision makers are required formally to demonstrate how they have taken into account the conclusions of such debate in reaching their decisions.

4 HOW PARLIAMENTS HANDLE SCIENCE AND TECHNOLOGY

4.1 Preliminary remarks

4.1.1 It should be noted that the discussion below applies not only to *national level* parliaments. Many countries have devolved parliaments, which may have a formal competence in, (and, more widely, a general concern with), matters related to science and

technology. In two cases [1], devolved parliaments have established the formal technology assessment structures discussed in Annex A. The supranational European Parliament of the European Union also is relevant and similarly has a formal technology assessment service.

4.1.2 Another consideration is whether the parliament is uni- or bi-cameral. In some countries, the basis on which members of the second chamber are selected may give it a specific relevance to science and technology. This aspect is not systematically explored further in this paper.

4.1.3 For the purpose of this examination, parliaments are analysed as having:

- formal structures, e.g. committees
- formal procedures, e.g. debates
- informal structures, such as various unofficial groupings

4.2 Formal structures

4.2.1 A quick overview of parliaments around the world suggests that there are eight different ways in which they may formally address science and technology issues through 'structures' (essentially committees or similar). In some parliaments, the system directly mimics the 'competence' of a government ministry whose policies the parliament scrutinizes. In other cases the parliamentary structure does not directly parallel the government ministerial structure.

4.2.2 The different models are:

1. Having a fully-fledged' **Science and Technology** committee - i.e. a totally autonomous committee, equivalent in status and procedures to all other permanent committees of the parliament. This does *not* necessarily mean that these other committees do not themselves also address matters with a major science and technology element, for example, defense technology matters will invariably be examined by a defense committee.

2. Placing science and technology within the remit of a **'Trade and Industry'** committee (Commerce, Economic Affairs, etc, are other titles that may be given to such committees. 'Science' and/or 'Technology' may, or may not, be specifically identified in the title). Not surprisingly, such a *locus* for science and technology tends to occur in countries where there is a strong emphasis on the 'wealth creation' and 'innovation' aspects of science and technology.

3. Placing science and technology within the remit of a committee concerned with **Education** (sometimes the title is Education and Research, which gives a more explicit recognition to at least a component of science and technology, but again 'Science' and/or 'Technology' may, or may not, be specifically identified in the title). This is perhaps the most 'traditional' of the models, reflecting the evolution of science and technology within an academic setting. In several parliaments, science is grouped with cultural affairs - a recognition of it as an 'ennobling' intellectual endeavour.

4. Explicitly or implicitly giving a responsibility for science and technology to a **subject area** committee. This usually arises because that committee happens to have conducted an enquiry with a strong science and technology component in the not-too-distant past. Almost by default, this committee 'acquires' science and technology as a continuing responsibility. Evidence suggests that (at least in the recent past) parliamentary committees concerned with the environment are the most likely to experience this process of acquisition.

5. Creating an *ad hoc* parliamentary **'Commission'** or **'Delegation'** with a fixed life span, frequently charged with producing a specific subject report. Such a strategy is often adopted in response to some form of perceived 'crisis', such as a country's allegedly economically damaging shortfall in scientifically or technologically competent workers. 'Commission' is also the title sometimes given to an *ad hoc* structure which involves non-parliamentary, as well as parliamentary members.

6. Addressing science and technology through a committee that scrutinises the **Prime Minister's function**. Prime Ministers usually have responsibility for inter-ministerial aspects of government. As science and technology is manifestly such, some governments give responsibility for it to the Prime Minister, sometimes through a specific Prime Ministerial agency.

1. for example, in Flanders, Belgium - the Vlaams Instituut voor Wetenschappelijk en Technologisch Aspectenonderzoek (Flemish Institute for Science and Technology Assessment) and in Catalunia, Spain, Comissió Assessora de Ciències i Tecnologia.

7. **No specific structure** for addressing science and technology - i.e. a complete lack of any structural parliamentary recognition of the subject area. This does not, of course, mean that such parliaments do not give *any* attention to science and technology - this may be done through other subject committees, or through more generally established *procedures*, such as parliamentary debates, questions, etc (see below).

8. Recognition of a **distinctive and overarching need** to address science and technology that is met by creating a dedicated function of one form or another - frequently referred to as a **technology assessment** (TA) function. This is the most evolved form of parliamentary structural response. To date, such systems have been created only by parliaments in Europe and North America. They are discussed in more detail in annex A. Such special science and technology services are complementary to, and not in any way a substitute for, the more 'traditional' parliamentary means of addressing science and technology. For example, the German Bundestag has such a service through its *Büro für Technikfolgen-Abschätzung beim Deutschen Bundestag* (TAB), but it also has a conventional parliamentary committee, the Ausschuss für Bildung, Forschung und Technikfolgenabschätzung, (the Committee for Education, Research and Technology Assessment), which indeed determines TAB's work programme. Such TA functions will usually assist a wide range of committees and often also parliamentarians in general, and by no means restrict their support to any parliamentary committee with a formal remit to examine the field of science and technology.

4.3 Formal procedures

4.3.1 The importance of parliamentary committees is already firmly established, or growing, in most parliaments but they are not the only mechanism available for parliamentary examination of science and technology. More general procedures (and various types of informal structures discussed in the next section) can also play a part.

4.3.2 The archetypical formal parliamentary procedure is the **debate**. The ways in which subjects are chosen for parliamentary debate vary considerably from parliament to parliament, but various routes exist whereby science and technology matters can become subjects for debate.[2] For example, an agency with a science and technology function may be required to make an annual report to parliament, which then debates that report.

4.3.3 Some, but by no means all, parliamentary debate focuses on proposed **legislation**, which must, of course, receive parliamentary approval before it can become the law of a country. Legislation may also be scrutinised at some stage by special parliamentary committees. **Budgets**, proposals to raise funds through taxation and other levies and statements of how a government proposes to spend these funds are a special form of legislation.

4.3.4 Most, but not all, parliaments have a procedure for parliamentary **questions**, put by members to government ministers or senior civil servants. This channel obviously provides a means for individual members to raise all manner of subjects. In some parliaments, regular time-slots are allocated for questions to individual ministers. Interested members of parliament can therefore ensure that science and technology-related matters are raised systematically and regularly.

4.3.5 In some parliaments, members can make their opinions known by indicating their support of various **'motions'** or **'petitions'**. Some of these may go on to formal debate and even to become the basis of legislation but most do not. They can, however, be strong indicators of the 'mood' of a parliament when a large proportion of members sign up to them.

4.3.6 In the case of parliaments of at least two countries, systematic research studies have shown that, over the past years, the amount of time and attention devoted to science and technology through such procedures has increased noticeably.[3] Anecdotal evidence suggests that this is true on a much wider basis.

4.4 Informal structures

4.4.1 In many parliaments, various forms of **party-based groupings** of members exist, with differing degrees of formality and permanency of existence. Often they have the function of conveying the views of 'ordinary'

2. Obviously, committee reports themselves frequently are debated in plenary by a parliament.

3. Science moves to centre stage, Padilla, A and Gibson, I, Nature, 403 (27) , 357-9, Jan. 2000; Science in Parliament, Haritash, N, National Institute of Science, Technology and Development Studies, New Delhi, India, httpistads.res.in/contents/reshigh/rh-nirmal1.htm The wok on the UK Parliament will shortly updated by an article in the journal Science.

members to government ministers. Some parliaments have such specific party-based parliamentary groups for science and technology policy.

4.4.2 The interaction between members of parliaments and the world outside is, of course, critical. To promote this, all manner of **'clubs'**, **'associations'**, etc., may exist to bring together members and non-parliamentarians with common interests. In the field of science and technology, examples are:

- in Sweden - Föreningen Riksdagsmän och Forskare [RIFO] - the Association of Members of the Riksdag and Researchers [4]
- in the UK - the Parliamentary and Scientific Committee [5] (P&SC), the longest-established of all such 'clubs' at the UK parliament, founded in 1939

4.4.3 The structure and operation of such 'clubs' may be formally regulated by parliaments, usually to ensure that they are non-partisan and cannot exert undue lobbying influence on parliamentarians.

4.4.4 Finally, in many countries, a wide range of non parliamentary entities - science and engineering academies, learned societies, organisations promoting medical or other research, environmental pressure groups, technically-based trades unions, commercial trade associations and even large individual companies with a science and technology base - have created 'parliamentary liaison offices', recognising the importance of a dialogue with the parliament. Again, anecdotal evidence suggests that there has been a marked increase in such activities. Obviously, a specific lobbying function permeates such organisations.

5 SUPPORT FOR PARLIAMENTARY SCIENCE AND TECHNOLOGY ACTIVITIES

5.1 Parliaments vary greatly, even between countries at the same level of economic development, in the type and degree of support services they provide to enable their various functions to occur. Support services can be classified into three types:

a) those which exist to support the activities of a particular parliamentary structure - committees, 'delegations', etc., in the form of staffing and budgets;

b) those which exist for the full range of parliamentary activities, often focused on serving individual members, such as 'libraries', 'research services', etc.;

c) special support services, dedicated to science and technology, arising from recognition of a particular need for support in this area.[6]

5.2 As well as their primary function - to improve the efficacy of the parliamentary activity - such support services may well have an important secondary function. They provide a permanent institutional 'competence' and 'memory' that can compensate for the ephemerality arising from the unavoidable fact that members of parliaments themselves are subject to periodic re-election - and may not be returned to parliament.

5.3 Parliamentary committees usually are serviced by at least one parliamentary official or 'clerk'. Such staff are not generally technical specialists and may rotate quite frequently, or serve several committees at the same time. In some parliaments, committees also have 'specialist assistants', or 'committee specialists' who *are* professionally qualified specialists in the area of the committee's concern. Committees may also be able to appoint further specialists on an *ad hoc* basis and may have a dedicated research consultancy budget, or may be able to make bids to draw on central parliamentary funds for this purpose.

5.4 Most parliaments have a central research and information service, frequently within, or closely associated with, the parliamentary library. As these have grown over time, in several parliaments, specific science and technology sections have been established. A fairly common characteristic of these services is a focus on providing a service to individual members, often in answering queries raised by constituents.[7] Parliaments vary in the extent to which these services support committees and the more general parliamentary procedures (e.g. in providing background briefings for parliamentary debates). There is also great variation in the overall level of resources made available to the services. Some may have dedicated budgets for specific research studies.

4. Which includes researchers from areas beyond science and technology.

5. Despite its title, the P&SC is not in any way an official parliamentary committee.

6. Such recognition for special support may also be given to, for example, legal services and financial scrutiny services.

7. Obviously, this applies only in those parliaments where members have geographical constituencies to represent.

5.5 Over the past thirty years, several parliaments have specifically responded to the marked growth in the extent to which science and technology-related matters permeate all their activities by creating special dedicated parliamentary science and technology assessment services. These can be seen as the most highly developed form of parliamentary science and technology interface.

5.6 Once again, several models exist, and these vary in the resources they command. Six distinct types can be identified, described in annex A.

6 MAXIMISING THE EFFECTIVENESS OF INTER-PARLIAMENTARY EXCHANGE

6.1 The membership volatility of international parliamentary organisations is well-known. With elected parliamentary assemblies[8], there are periods of between three to seven years between general elections. Even during a single parliament, members may find their interests changing (for example by being appointed to a committee, or because of developments in their constituencies). Multiplying this by the overall number of parliaments and the fact that election cycles are not in any way synchronised, means there is an inevitable fluidity of membership of international parliamentary organisations and from this an almost inevitable tendency to focus on the short term.

6.2 On the other hand, inter-parliamentary programmes of work tend to have a longer term perspective. This inevitably gives rise to a challenge of maintaining continuity and momentum.

6.3 The most effective way of meeting this challenge is to ensure that parliamentary *support staff*, as well as members themselves, are involved as far as possible in any activities and are given some sense of 'ownership', along with the parliamentarians themselves.

7 THE INTER-PARLIAMENTARY FORUM ON S&T: UNESCO'S INITIATIVE

7.1 In the context of UNESCO's action to advise Member States on Science and Technology Policies, an international Roundtable on "Science Technology and Innovation Policy: Parliamentary Perspective" was organised in Helsinki by the Parliament of Finland, UNESCO and ISESCO, on 13-14 January, 2003. Delegates from 31 countries from across the world participated and focused on how parliaments could develop the structures, methods and concepts through which they deal with science, technology and innovation policy.

7.2 In order to respond to a strong recognition of the need for closer co-operation between parliamentarians, policy-makers, scientists, journalists, industry (public and private) and civil society at all levels from the sub-national to the international, the participants recommended the creation an international forum of parliamentary science committees, the scientific community and the representatives of civil society. The participants concluded that such a forum could help to achieve these goals in several ways, including by:

- exchanging experiences of, and information on, science, technology and innovation policy-making
- supporting the strengthening of the capacity of parliamentary science committees in emerging democracies, in part by drawing on best practice from national and regional parliamentary organisations that have a significant operational experience
- strengthening partnerships between legislators, scientists, the media, public and private sectors in developing national innovation systems
- discussing the desirability of harmonising the principles underlying any governmental regulation, or promotion, of scientific or technological activities, all the time recognising the great diversity of circumstances that exist in different parts of the world
- not only convening regularly as a traditional forum but also maintaining a continual activity through newsletters, websites, regional workshops, etc

7.3 As a result of the above mentioned Round Table UNESCO has launched regional pilot projects aiming at building Inter-Parliamentary S&T Policy Fora that regroup parliamentary science committees, government policy-makers, scientists, industry, the media, and representatives of the civil society.

8. Some parliamentarians are not directly elected, or may even be appointed - e.g. members of the UK Parliament's House of Lords.

7.4 The project aims at:

- providing parliamentary S&T committees with a platform for dialogue with scientists, the media, public and private sectors and civil society in developing national science, technology and innovation systems;
- identifying good practices and building on lessons learned from existing mechanisms for S&T decision making;
- promoting the development of parliamentary mechanisms and practice for governance of science and technology;
- exchanging experiences of, and information on, science, technology and innovation policy-making processes;
- supporting the strengthening of the capacity of parliamentary science committees in emerging democracies, in part by drawing on best practice from national and regional parliamentary organisations that have a significant operational experience.

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List of Annexes

ANNEX A

PARLIAMENTARY TECHNOLOGY ASSESSMENT SERVICES: A TYPOLOGY

As mentioned in the main text, some parliaments in Europe and North America have developed particular structures in response to a widespread perceived need for support services specifically targeted to enhancing their capacity in the field of science and technology. Six different structures for such services currently exist:

- a **specific office within the parliament**, staffed by technical specialists, serving the parliament exclusively, **where these staff primarily prepare the research studies**. The archetype of parliamentary technology assessment services – the Office of Technology Assessment (OTA) at the US Congress, is of this form.[1] Other examples are the Office Parlementaire d'évaluation des Choix Scientifiques et Technologiques (OPECST) at the French parliament, the Vlaams Instituut voor Wetenschappelijk en Technologisch Aspectenonderzoek, (viWTA) at the Flemish regional parliament and the Parliamentary Office of Science and Technology at the UK parliament. Again, these vary in the resources they command. At its peak, the OTA had a staff of 120 (and the act establishing it actually specified a ceiling of 200). POST and viWTA have 7-9 established staff.

- a **specific office within the parliament, that acts as a research manager** for studies done by outside contractors. STOA at the European Parliament is an example. It is managed by a 'Panel' composed of representatives from various parliamentary committees.[2]

- a **specific parliamentary committee** (usually with modest support staff), where the members themselves actually (at least to some extent [3]) conduct research and prepare reports. (e.g. Finland, Italy). Such committees are different from the 'orthodox' science and technology committee, or other subject committee, described in section 3.2.2 of the main text, in that they can have a remit to feed into the deliberations of other parliamentary committees, and possibly an ongoing remit to consider broader, longer term governmental policies with a science and technology component. The most highly developed is the Committee for the Future of the Finnish Parliament. The Finnish government is required periodically to prepare 'white papers' on the future of Finland, which the committee formally reviews. It may also, at their request, make statements to other parliamentary committees concerning future-related issues (especially long-term issues such as energy policy). The Committee also pursues a key role in developing the methodologies of technology assessment and 'futures research'.[4]

- a **specific office external to the parliament, located within an existing larger research organization.** This organisation receives a fixed-term contract from the parliament to manage an office to serve it exclusively on a regular basis. The role model here is TAB, whose reports are fed into the German Bundestag through the parliamentary Committee on Education, Research and Technology Assessment.

- a **self-standing office, external to the parliament**, which receives a **major component** of its funding to perform technology assessment activities for the parliament, although it may also undertake other activities, e.g. for the government, or may generate its own activities which are not directly related to parliamentary requests.[5] Examples are the Danish and Norwegian Boards of Technology and the Rathenau Institute in the Netherlands.

- a **self-standing office, external to the parliament**, which receives **occasional contracts** from the parliament to

1. Contrary to a common misunderstanding, the OTA still exists as a congressional institution, although since 1995 the US Congress has not voted it an annual budget. Since then, there have been several attempts to refund the OTA in a more modest fashion The annual budgets proposed would support a staff of about 20.

2. Since September 2005, this external contracting role has been provided to STOA by a grouping of five of the national parliamentary TA offices in Europe, from Germany (lead partner) Denmark, Flanders, the Netherlands and the United Kingdom.

3. Research work may be contracted out, and/or external specialists seconded to assist the members.

4. Discussions are currently ongoing to establish a similar committee, or possibly a 'delegation' (see 3.2.2.e in the main text) at the Swedish parliament.

5. for example, organising 'national debates' on controversial technological issues.

conduct technology assessments, on a 'most favoured partner' basis, but whose major work activity is unrelated to parliamentary technology assessment. An example is the *Institute of Technology Assessment*, a research facility of the Austrian Academy of Sciences.

In summary, two main factors lie behind the range of models described above:

- the strictness, in any individual country, of any requirement of separation of funding and service provision between parliament and government - e.g. very strict in the UK, less strict in Norway.
- the relationship between the parliament and the *national academy of sciences and/or engineering*. In some countries, these academies enjoy a special status with the parliament, which treats them as its favoured institution for providing S&T advice. In others, they are seen as having some lobbying aspirations and/or as too 'institutionalised' and therefore inadmissible as a source of independent advice to the parliament.

ANNEX B
HELSINKI DECLARATION
HELSINKI, FINLAND, 13-14 JANUARY 2003

An international roundtable on "Science Technology and Innovation Policy: Parliamentary Perspective" was organised by the Parliament of Finland, UNESCO and ISESCO, during the period 13-14 January 2003 in Helsinki. Delegates from 31 countries from all regions attended this important meeting.

The participants discussed major fundamental factors affecting national and global science, technology and innovation policies. Creativity and innovativeness, effective networking and sharing of knowledge, and capacity building in science at all levels were especially identified as factors with significant importance in developing knowledge-based economies and social structures.

It was also noted that the future of economic success is more and more built on national innovation systems with special emphasis on well-targeted regional and local innovation policies. Further it was recognized that increases in investments in science education and in research and development are of crucial importance in government policy.

The participants also exchanged and shared their national and regional experiences with issues such as legislation, technology assessment and other aspects of policy-making and learned of complexity of the decision-making in these areas. It was also noted that there are a number of key analytical lessons that can be learned from national parliamentary experiences. In particular, the successful experiences of Sweden and Finland as well as of EPTA and the Council of Europe in this area were recognized.

As a result of the discussions, the Roundtable concluded that the following future policies should be considered and acted on by parliaments around the world:

1) Policymakers should continue to set ambitious aims for lifelong learning and research and development, with special emphasis on funding.

2) The large-scale development of a national innovation system is an on-going process. The foremost priority in the internal development of an innovation system is continually to enhance quality, efficiency and relevance.

3) The co-operation and interaction of the innovation system with other policy sectors must be further developed and deepened.

4) The conditions for basic research and strategic development of technologies should be strengthened.

5) Inter-disciplinarity and multi-disciplinarity in education and in research, as well as the cluster approach in industry and economic policy, should be improved and extended.

6) In-depth co-operation of companies, universities and research centres launched within welfare, information and communication clusters should to be expanded to other clusters, and further deepened.

7) A global perspective in science, technology and innovation policy is important. Innovations should be targeted to integrate the new and the old industries and economies.

8) More focus should be placed on deeper understanding of innovation processes and innovation in general.

9) Future work force competencies should be developed. Special care must be taken to ensure the availability of well-trained personnel to promote R&D in industry, to increase the supply of knowledge intensive services wherever needed, and to issue regulations for the protection of intellectual property, as well as other regulations which affect innovation.

10) Parliaments should further develop their own concepts through which they deal with science, technology and innovation policy. A good example of such concepts is the way the Committee for the Future operates at the Finnish Parliament among other parliamentary committees with a permanent status. An association of parliamentarians and scientists has proven in some countries to be a useful tool for contacts and exchange of information between parliamentarians and scientists. The setting up of such associations of scientists and parliamentarians is encouraged. Another example is the regional networking between parliaments in Europe through EPTA - European Parliamentary Technology Assessment Network.

11) The role of media has been acknowledged as an essential element in communicating science to the policy-makers, Parliamentarians and the public at large. The need for closer co-operation between journalists and scientists has been recognised.

RECOMMENDATIONS

Recognising the need for closer co-operation among policy-makers, parliamentarians, scientists, journalists, industry (public and private) and civil society at national as well as at international levels, the participants recommend:

The setting-up of an International Forum of the parliamentary science committees, the scientific community and the representatives of civil society, that aims at:

- Exchanging experiences and know-how in science, technology and innovation policy-making.
- Strengthening partnerships between legislators, scientists, the media, civil society, public and private sectors in developing national innovation systems.
- Supporting capacity-building by science parliamentary committees in emerging democracies, making use of best practice from national and regional experiences of organisations such as the Committee for the Future, EPTA, etc.
- Discussing the merits for harmonization of principles guiding the basis for regulation of applications of scientific and technological investigation, at the same time recognizing diversity due to regional constraints. Regulations are needed not only in developing but also in developed countries.

The Forum should convene regularly and have continuous communication through newsletters, websites, etc.

International Scientific Parliamentary Conferences should be organized preferable once every two years with the support of such bodies as IPU and The Council of Europe.

The participants to the International Roundtable on "Science Technology and Innovation Policy: Parliamentary Perspective", Helsinki, 13-14 January 2003,

Call on UNESCO and regional partners to organise regional workshops in national parliaments,

Call on the Organizers, namely the Parliament of Finland, ISESCO and UNESCO, to establish such a Forum, in consultation with national, regional and international parliamentary actors.

ANNEX C

DECLARATION OF BUENOS AIRES[6]

LATIN AMERICAN FORUM
BUENOS AIRES, MARCH 07-08, 2005

The representatives of the parliamentary committees on science, technology and productive innovation of Argentina, Brazil, Chile, Ecuador, El Salvador, Mexico, Panama, Paraguay, Peru and Venezuela, met at the city of Buenos Aires, Argentine Republic, on March 7-8, 2005 during the First Latin American Forum of Chairmen of Parliamentary Committees on Science and Technology.
The meeting was organized by the Committee on Science and Technology of the Honorable House of Representatives of the Argentine Nation, UNESCO Regional Office of Science and Technology for Latin America and the Caribbean and the Secretariat of Science, Technology and Productive Innovation of Argentina.

Having considered the "Declaration of Santo Domingo"[7] which recognizes that Latin America and the Caribbean confront the absolute need to increase the quality of life of their inhabitants and make progress in economic, social and environmental sustainable development where science, technology and innovation processes may contribute to: increase the quality of life of the population, raise its cultural and educational level, promote a genuine protection of the environment and natural resources, create more opportunities for the employment and qualification of human resources, increase economy competitiveness, help to transform production processes of goods and services, and reduce regional unbalances. In short, it is imperative to establish a social compromise (contract) of science and technology with society, which shall be based on poverty eradication, assuring a continuous increment in the quality of life of the population and promoting a harmonious relationship between nature and sustainable development.

As set out above, this compromise or social contract of science and technology with society should include a series of explicit objectives jointly adopted by governments, the entrepreneurial sector, academic and scientific communities, other collective actors and international cooperation. It is necessary to establish solid foundations for long term strategies and policies on science, technology and innovation activities for self-sustainable human development, implying the adoption of measures that effectively promote scientific research, technological development and productive innovation in order to obtain original solutions for the specific problems of the region countries.

Having considered the Declaration of Lima[8], that recognizes the imperative need to work for the wide acceptance and recognition of science, technology, engineering and innovation as fundamental elements for the development of a social and economic growth strategy and their inclusion in national and regional development plans in order to reduce poverty in the hemisphere, and that also tries to achieve, for 2007, that all the States of the region adopt efficient national policies on science, technology, engineering and innovation clearly integrated to economic and social policies -being necessary, for this purpose, to enact legislation and legal frameworks to guarantee and promote these policies in the future.

6. The translation from Spanish into English was made by Nora Izetta from the Translation Department of the National Congress of Argentina.

7. Regional Meeting of Consultation for Latin America and the Caribbean of the World Conference on Science, Santo Domingo, Dominican Republic, March 10-12,1999.

8. Meeting of Ministers and Principal Authorities on Science and Technology, organized by the Inter-American Council for Integral Development, Organization of American States, November 11-12, 2004, Lima, Peru.

Considering that regional integration in the activities of scientific research, technological development and productive innovation should imply the use of a powerful instrument to encourage synergy among the different individual groups of our countries, optimizing, in this way, physical, human and economic resources and favoring the existence of projects which may solve fundamental problems in Latin America, such as the quality of life of their inhabitants, the conditions for the preservation of the environment and natural resources, and the encouragement and promotion of creation and innovation processes in every aspect of human activities.

Taking into account the experiences and successful proposals of regional cooperation, integration and development among different governments implemented by the Regional Program of Scientific and Technological Development of the Organization of American States[9], different initiatives adopted within the framework of the member countries of the "Andean Pact", the Iberoamerican Program of Science and Technology for Development (CYTED)[10] and MERCOSUR Specialized Meeting on Science and Technology (RECYT)[11], it is recognized that the region is characterized by an asymmetrical development not only of its science, technology and productive innovation institutions, but also of its parliamentary committees, which are responsible for the legal frameworks that regulate the activities of the former. Meanwhile some countries have a consolidated institutional structure, others are just beginning institutionalization processes for scientific and technological activities. Certain phenomena such as institutional instability and lack of continuity in policies implementation limit the evolution of the scientific and technological systems of some countries in the region.

Considering the recommendations of the "Declaration on Science and the Use of Scientific Knowledge"[12] which suggests that governments, and particularly parliaments, should systematically turn to the cooperation of scientists and technologists in order to create adequate policies and legislation for the processes of economic, social and technological transformation. The contribution of these experts should become a part of the parliamentary advisory programs. This is an increasingly top priority in the decision-making processes and in the design of short, medium and long-term national and regional policies.

THE LATIN AMERICAN LEGISLATORS WHO PARTICIPATE IN THE FIRST LATIN AMERICAN FORUM OF CHAIRMEN OF PARLIAMENTARY COMMITTEES ON SCIENCE AND TECHNOLOGY DECLARE THAT:

1. It is essential to take measures tending to promote the institutional and organizational strengthening of the legislative Committees devoted to the design of legislation and legal frameworks for the performing and financing of scientific research, technological development and productive innovation activities, which permit the formulation, implementation, execution, evaluation and management of adequate national and regional policies.

2. It is imperative to consider science, technology and innovation activities as a fundamental axis of national and regional development, reducing the investment gap that separate us from the developed countries, implementing adequate measures in national budgets and favoring private investment in such sector.

3. The region's parliaments should propose and adapt national legislation to encourage systematic activities directly and specifically related to scientific and technological development, through the generation, spreading,

9. OAS Regional Program of Scientific and Technological Development was created in 1968 by decision of America's presidents during a meeting held at Punta del Este (Uruguay).

10. The Iberoamerican Program of Science and Technology for Development (CYTED), which was created in 1984 by means of an Inter-Institutional Frame Agreement signed by 19 countries of Latin America, Spain and Portugal, is defined as an international program of multilateral scientific and technological cooperation, with horizontal character and Iberoamerican basis.

11. The Specialized Meeting on Science and Technology of MERCOSUR (RECYT) was created at the II Meeting of the Common Market Council (CMC), held in June 26-27, 1992 in Las Lenas (Argentina).

12. "World Conference on Science" held at Budapest (Hungary) from June 26 to July 1, 1999, under the auspices of the United Nations Educational, Scientific and Cultural Organization (UNESCO) and the International Council for Science (ICSU).

transmission and application of knowledge, technologies and productive innovations deriving from the creation of scientific and technological systems and the traditional knowledge of every country.

4. It is necessary to harmonize national legislation in order to favor international cooperation mechanisms for scientific research, technological development and productive innovation which should contribute to: (i) the stable installation of fundamental scientific capacities in the less developed countries; (ii) the training of young researchers integrated with their own social realities; (iii) the adequate management of researching agendas according to the values and priorities of the region and a global perspective.

5. Horizontal cooperation should be encourage among the region's countries, and particularly among their parliaments, creating unprecedented possibilities to allow the exchange and supplementation of human, physical and financing capacities among the different parliamentary groups which have the responsibility for legislating about science, technology and innovation matters.

6. It is fundamental to update information for legislators and other individuals responsible for decision-making processes on subjects related to science, technology and innovation, which continuously expand their influence to all human activities.

7. Permanent dialogue mechanisms with academicians, scientists and all the experts' community should be established in order to promote the development of the necessary information at decision-making processes related to science, technology and innovation activities.

8. It is necessary to study the possibility of implementing an interparliamentary Latin American network of advice and evaluation of legislative bills on science, technology and innovation, in order to share the necessary resources, keep academic excellence in the advice and evaluation processes and undertake joint working actions among the region's parliaments.

9. It is essential to promote the establishment of national parliamentary forum as a way to study medium and longterm strategies and scenarios in order to design policies stimulating the application of science, technology and innovation in the improvement of the region's inhabitants life conditions.

10. The systematic studies of different national laws and existent bilateral and multilateral treaties shall be considered in order to harmonize, if possible, the different national laws and legal frameworks to promote regional integration on science, technology and innovation subjects.

11. Nations know that the exchange, among them, of the information about science, technology and innovation legislation, shall facilitate knowledge about our respective legal frameworks. For this purpose, the Argentine Republic offers, in this first stage, the data base on MERCOSUR science and technology legislation of the Secretariat of Science, Technology and Productive Innovation (SECyT) to include there the data of the other participant countries, In order to systematize the analysis and search in the future regional data base, the legislation to be send shall be grouped in the following categories: (1) institutional organization of the science, technology and productive innovation system; (2) training and technological development; (3) tax incentives: exemptions and deductions; (4) financial credit; (5) non tax incentives: economic assistance; (6) others; (7) copyright; (8) biosecurity; and (9) international treaties on scientific technological cooperation.

12. Parliaments should prepare legislative bills promoting the exchange of teachers and researchers among Latin American countries in order to take advantage of the existing capacities in science and technology and to increase the critical mass, in relevant subjects for the region, by means of Master's degrees and Doctorates.

13. It is necessary to propose another meeting of Latin American legislators, specialized in science, technology and innovation subjects, in order to establish an agenda that guarantees the regional integration process and the viability of the social contract during the following decade. This declaration is signed at the Autonomous City of Buenos Aires on March 8th, 2005.

THE FOLLOWING REPRESENTATIVES, CONGRESSMEN AND PARLIAMENTARY MEMBERS SIGN THE DECLARATION:

Luz Doris Sânchez Pinedo de Romero (Republic of Peru);
H. Guadalupe Larriva Gonzâlez (Republic of Ecuador);
Edmundo Villouta (Republic of Chile);
Julio César Côrdova Martllnez (United Mexican States);
Lilia J. Puig de Stubrin (Argentine Republic);
André Zacharow (Federative Republic of Brazil);
Luis Guillermo Berdugo Rojas (Bolivarian Republic of Venezuela);
H. L. Jassir Purcait (Republic of Panama);
Fernando Oreggioni (Republic of Paraguay);
Carlos Larreguy (Argentine Republic) and
Rubén Orellana (Republic of El Salvador).

ANNEX D

SOUTH- ASIAN SCIENCE POLICY FORUM

FIRST CONFERENCE ON SCIENCE AND TECHNOLOGY POLICY: FUTURE CHALLENGES IN THE CONTEXT OF GLOBALIZATION

Under the auspices of Regional Council for Science Technology and Development and Co-sponsored by UNESCO; Indo-US S&T Forum; CSIR; Department of Science and Technology; Department of Biotechnology and Ministry of Human Resources Development, Government of India

RECOMMENDATIONS

Main recommendations

In the four days deliberations, scientists, science policy scholars, government officials and Parliamentarians around the globe participated and discussed cooperation in the area of science policy to face future challenges in this new era of globalization.
The participants recognized the need of closer cooperation between parliamentarians and policy makers, scientists, industry (public and private) and the media at all levels from the sub-national to International.

Following suggestions were made:

a. Exchanging experiences of, and information on, technology and innovation policy-making.

b. Supporting the strengthening of the Parliamentary Science Committees in active democracies, in part by drawing on best practice from national and regional Parliamentary Organizations that have a significant operational experience.

c. Strengthening partnerships between legislators, scientists, the media, public and private sectors in developing National Innovation Systems.

The first meeting of the Forum could be organized in India early 2006; a provisional Secretariat is to be established in India to organize the first meeting in cooperation with UNESCO and other international organizations. A permanent Secretariat would then be established and may rotate among the countries of the sub-region. The

Forum could convene regularly also by maintaining a continual activity through newsletters, websites, regional workshops, etc.
There is also a need to have a common Science and Technology Policy for the States in North West Region of India, covering Punjab, Haryana and Himachal Pradesh. The conference recommended to the respective State Governments to cooperate and evolve a policy, particularly oriented in promoting industrial and agriculture development in the region, with due regards to environmental protection and tapping energy resources.

ANNEX E

WORLD SCIENCE FORUM

BUDAPEST, HUNGARY , 10-12 NOVEMBER 2005
SPECIAL SESSION - SCIENCE IN A DEMOCRATIC WORLD: THE ROLE OF PARLIAMENTS

The roundtable session, organized by UNESCO, the Islamic Educational, Scientific and Cultural Organization (ISESCO) and the Finnish Parliament, regrouped representatives of parliamentary science committees from Europe, Latin American, Asia, Africa and the Arab states, as well as scientists and representatives of regional and international organizations. The participants listened to and discussed various experiences as well as the role of parliaments in the science, research, technology and innovation.

CONCLUSIONS AND RECOMMENDATIONS

- Today's legislative process increasingly involves multiple agents, well beyond those who are formally responsible. Policymaking is a process that brings together appropriate government authorities or representatives (GOs), business, think-tanks, journalists and other relevant interests along with non-governmental organizations (NGOs).

- The essence of an efficient connection between science and parliamentarians lies in enhancing communication between scientists and policymakers. Scientists are responsible for conveying their research in a faithful and intelligible manner, clarifying gaps in knowledge and outlining uncertainties to policymakers, so the media and in particular science journalists play a vital role here.

- The need to train parliamentarians in future scientific developments, and the potential benefits or impacts generated by them, point to a need for better knowledge of various technological methodologies and means, technology assessment and technology foresight. The participants called on UNESCO to serve as a clearinghouse for all existing procedures.

- Recognizing that decision-making still takes place primarily at the national level, there is a need for strengthening networking and cooperation among countries, to exchange experiences and expertise.

- Noting the difference in timescales between the concerns of science and the political world, the need for long-term policies - particularly with regard to scientific infrastructures that were made to last through generations, not from election to election - was emphasised.

- A national science policy forum needs to include parliamentarians, science and technology policymakers, journalists, business, political parties and civil society organizations.

- UNESCO and ISESCO were called upon to provide an international platform of cooperation among parliamentary science committees, scientists and different stakeholders in order to share experiences and practices and to improve national legislative processes.

ANNEX F

CENTRAL AND SOUTH WEST ASIA FORUM ON SCIENCE AND TECHNOLOGY POLICY FOR SUSTAINABLE DEVELOPMENT

TEHRAN , IRAN, 21-23 JANUARY 2006

The Participants of the Central and South West Asia Forum on Science and Technology Policy for Sustainable Development: Experts and representatives of governments, academic institutions and parliaments of Iran, Pakistan, Afghanistan, Kyrgyzstan and Uzbekistan, together with resources persons from China and South Korea as well as representatives of International Organizations, UNESCO, ISESCO and UNIDO, held their first meeting in Tehran from 21-23 January 2006.

The participants heard presentations by UNESCO, ISESCO, China and Korea and shared their national experiences in the area of science and technology policy formulation, implementation and assessment. Participants of the Central and South West Asia Forum recommended the following:

- That the Central and West Asia Forum proposed by UNESCO and ISESCO be set-up with the objective of acting as a platform for cooperation in the areas of Science and Technology and Innovation (STI), and of facilitating the exchange of information on science and technology policies, planning, development and training.

- That the sub-regional Central and West Asia Forum should meet annually in a regional capital, the choice of this to be determined each year by the participating countries of the region.

- That governments and decision makers should affirm the belief of the Forum that STI is essential for knowledge-based economic growth and that it should be put at the top of the development agenda.

- That appropriate investment, both public and private, should be made in STI, which will generate returns in the form of improved living standards, poverty alleviation and equitable and sustainable development.

- That provision should be made to assess the current state of STI policy and practice in each country to establish baseline needs and strategic direction.

- That evidence-based realistic science and technology policies should be developed and that Member Governments should encourage a balance between investment in research (science), and in applied industrial and technological development. Partnerships between academic institutions and industry could be facilitated, for example, by agencies such as technology parks or incubators.

- That strategic research programmes in STI be developed, including through scholarships and support to talented students, as well as a system of sharing experiences, best practices and knowledge at regional and global levels. This strategic programme should take into account the priorities and requirements of each country.

- That each government should establish appropriate institutional and financial mechanisms, including programmes of capacity building and training, to ensure that national STI development policies can be implemented.

- That communication of STI issues through mass media should be developed and supported as an essential aspect of policy formulation and public information.

The Forum called upon UNESCO and ISESCO to support through their Offices in Tehran, the organization of the Sub-Regional Forum recommended above, as well as other initiatives supporting the implementation of the recommendations of the Forum.

>> SCIENCE, TECHNOLOGY & INNOVATION POLICY: THE ROLE OF PARLIAMENTS

In the context of increasing globalization, policy makers have to respond with policies, programmes and partnership that will maximize the economic opportunity of the countries. Therefore, it is crucial to have a range of mechanisms to ensure that both government decision-makers and those in the Parliaments responsible for Science, Technology and Innovation (STI) can operate effectively on S&T related issues. In particular, Parliaments face increasing difficulties in addressing and dealing with the growing complexity of S&T and in defining research priorities aimed at addressing the needs of population as well as overall national development goals.

- *What are the major constraints the Parliamentarians encounter in science and technology legislation?*
- *What ways and means adopted or need to be adopted in coping with the complexities involved in the development of S&T as well as in the formulation of science policy?*
- *What is role of the scientific community in S&T legislative process?*
- *How to create or improve a constructive dialogue between scientists and parliamentarians?*
- *How to involve different components of society, including the public and the media, in the science legislation process?*

These are among the key issues addressed by the Working Paper "Science, Technology and Innovation Policy: the Role of Parliaments".

The paper is part of UNESCO's work aimed to finding new forms of interaction between the scientific community, policy-makers and society and new institutional arrangements between the different areas of government necessary to improve science and technology policy's coherence and consistence. In fact the Organization has, since 2003, developed experience in working with Parliaments in S&T related issues. In this context it has launched, as a result of International Conference on "Science, Technology and Innovation: The Parliamentary Perspective", jointly organized by UNESCO, ISESCO and the Committee for the Future of the Finnish Parliament in Helsinki (January 2003), national and regional pilot projects aiming at building Inter-Parliamentary S&T Policy Fora that regroup parliamentary science committees, government policy-makers, scientists, industry, representatives of the civil society and the media.

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