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Engaging politics with science

Experience and recommendations based on more than 20 years of practice
of three dialogue platforms of the Swiss Academy of Sciences

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Summary

If you do well and do not talk about it, you only have yourself to blame. We want to absolve ourselves from any such accusation by publishing this report.

In the past few years, scientific policy advice has opened up a field for major European academies in which much is achieved, but little is reported. Justifications for this activity are not lacking, but rather specific descriptions of what has been done in practice and an assessment of the effects.

Few people are probably aware that the Swiss Academy of Sciences (SCNAT) has been actively and successfully involved in the area of scientific policy advice through its forums for more than 20 years. Therefore, it is all the more important to illustrate how topics that are relevant to society and politics and that have far-reaching consequences, such as climate change, maintaining biodiversity or the importance of genetic research, are made a matter for dialogue between science and politics/society through these forums.

In order to facilitate and promote an exchange of experience between similar organisations, this report aims to answer the following questions:

- How are these forums organised and financed as interfaces between science and politics?
- How do they work and with what success?
- What can they pass on as well-established experience?

Although the three forums operate in very different scientific and societal contexts, they do so in a comparable form. Even though the possibilities for measuring the impact of a dialogue platform are limited, the basic design of the forums has proven its worth. It serves as a model when compared and assessed internationally.

Policy advice is not a one-way street, but a dialogue of equals who play different roles. The institutionalisation of the interface between science and politics facilitates the mobilisation of the actors on both sides and at the right time. The creation of dialogue platforms requires longer-term investment in the provision of personnel and professional facilities. Finally, political and economic independence is a central prerequisite for a successful intermediary role between science and politics.

1. Science brought to the market: setting the scene

When the history of the forums of the Swiss Academy of Sciences (SCNAT) began more than 25 years ago, the demand for an ongoing institutionalised dialogue between science and politics was much less evident than today. It is true that even then Gibbons, Nowotny and colleagues (1994, 2001) were challenging science not only to find answers to questions it posed itself, but also to answer questions that were being raised by politics, the economy and society. This new perspective is known as ‘mode 2 scientific knowledge production’ or ‘post-academic science’.

Research funding also began to make new tools available to advance the scientific discussion of problems relevant to society and develop possible solutions in dialogue with administration and politics. With regard to Switzerland, the National Research Programmes (NRP) in particular should be mentioned.

The search for a new, future-oriented relationship between science, society and politics was doubtlessly propelled by the environmental crisis that penetrated public awareness in 1972 with the Club of Rome’s first report (Meadows et al. 1972). Sensitising society to this crisis led to an increased need for knowledge, which science reacted to by developing new research approaches and disciplines.

Today, it is becoming increasingly impossible in democratically constituted societies for politics to ignore the need to underpin their decisions with science, even if trade-offs between knowledge and interests very often characterise political and practical reality.

The private sector adjusted to the hunger for knowledge a long time ago and asserted itself as a provider on the policy-related knowledge markets. These are booming, although administration is becoming increasingly academic and has acquired its own high level of knowledge. The phenomenon of disputes between the experts has, however, led to the question of whether knowledge is becoming harnessed to the service of politics, which can choose the most politically expedient viewpoint from the broad spectrum of expert opinions.

The SCNAT forums that are presented in this document did not evolve from the idea of becoming competitors on these knowledge markets. Rather, they aimed

at establishing a sustainable dialogue between the scientific community and political and administrative bodies, and thus to deal with topics of current relevance to society and would remain so over several legislative periods. The long-term (by political standards) perspective was chosen in order to set in motion an interaction process that can be maintained across institutional structures and outlive personnel changes.

It is striking that academies in Europe increasingly see themselves as ‘honest knowledge brokers’ (Pielke 2007) between science and politics, whereby the emphasis is placed on the idea of ‘honest’ and ‘decent and fair’. In our society, which is constantly being provided with new knowledge and which attributes science with considerable problem-solving potential, the high aspirations of this function lie in the ability to provide scientifically validated knowledge as the basis for political decisions without questioning the primacy of politics.

The present document is the result of self-reflection on more than 20 years of experience in the profession of topic focused scientific policy advice as it has developed within the framework of the SCNAT. In the foreground are three forums that today represent a dialogue model between science and politics, which, in our opinion, largely corresponds to the concept of an honest knowledge broker.

This report on our experience and our specific recommendations for action addresses those scientific organisations that wish to strengthen their voices in politics and society while also knocking on the doors of political and administrative circles that seek an exchange with science.

2. The ambiguous relationship between science and politics

Put simply, two positions can be identified in the discussion on the relationship between science and politics. The advocates of the one position reject the idea that science should exert direct political influence and are of the opinion that it should first and foremost serve the purpose of enlightening society. The supporters of the other position demand that professional interfaces should be set up between science and politics (Figure 1) in order to set in motion a permanent dialogue.



Figure 1: Two paths from science to politics, which do not need to be mutually exclusive:
 a) dialogue with politics via an interface and b) science to inform society for the political debate

Mittelstrass (2013), among others, is an advocate of the first position. He argues for separate worlds and warns against illusions. From his perspective, the idea of science acting in an advisory capacity for politics is a difficult undertaking because the scientific mind is bound by the concepts of truth and justification, whereas the political mind follows the idea of power and practical efficacy in its orientation for action. If science wants to engage directly with politics and politics with science, the result is a fundamental asymmetry. For in our modern world, which to a large degree is the result of modern science, politics cannot disengage itself from scientific arguments. It is therefore tempted to use science for its own ends, but without any obligations. This lack of obligation must necessarily lead to a high level of frustration on the part of science ‘if it enters into service on the one hand but is then unable to act.’ If, as in recent years, different academies (e.g. the National Academy of Sciences Leopoldina in Germany) functioning in their role as scientific institutions offer a contractually governed mandate for political consultancy, it is viewed very critically as an example of this position by Mittelstrass. This could suit politics well because it would be seen as not turning its back on scientific advice while not being under any binding constraints to act. Mittelstrass sees the ‘science advisor’ in the Anglo-Saxon model as the better alternative. In this case, science can remain what it is and

‘politics would not be forced to dispute the difficult business of a transformation of scientific knowledge in its own categories and decision-making practices.’ With his argument that science is primarily the tool of society and not of politics, he finally shifts the definition of the service of science for politics to the central task of enlightenment and education in our modern society. Since this enlightened society must, at the end of the day, legitimise political action, he sees this as the more effective way for science to be politically relevant.

The second position also recognises that science and politics are two opposing systems that are governed by different rules. However, this leads to the conclusion that professional interfaces must be created that facilitate a dialogue (Hirsch-Hadorn et al. 2008; Lentsch 2010: 110-113). This position is supported by the following argument: modern science has improved our living conditions enormously in many different areas, but it has also become part of many problems and must therefore contribute to their solutions. In addition, it creates new possibilities for technical, scientific and, finally, political action. This leads to a basic and fundamental responsibility of science towards society, which it is becoming increasingly aware of and is reflected in the increase in problem- and solution-oriented research. Within science itself the methodology spectrum has expanded in the direction of interdisciplinary and transdisciplinary research. The latter, in particular, assumes that the joint production of knowledge that starts with the questions and problems of societal stakeholder groups and incorporates their knowledge and experience will result in more socially acceptable solutions and courses of action from which politics will scarcely be able to escape. This joint form of knowledge production, which is based on understanding, will bring science, society and politics closer together. Nonetheless, society remains sceptical towards a science that is becoming ever more complex and differentiated and can almost no longer be understood because scientific language is so far removed from the day-to-day world of society. In addition, this scepticism is growing due to cases of scientific misconduct that keep coming to light, which have shaken the fundamental trust in the academic authority and have given rise to doubts concerning their objectivity and independence.

In the face of a society that shows the greatest respect for scientific achievements on the one hand, but has serious doubts about its probity on the other, various academies regard it as their utmost duty to close this gap of confidence. They do so by advocating the high quality and excellence of scientific statements on questions relevant to society and politics and by safeguarding scientific independence from any appropriation by politics.

Organisations that act as an interface between science and politics are termed ‘boundary organisations’ and their intermediary work is seen as ‘boundary work’ (Guston 2001). This terminology highlights that knowledge transfer must take place across the boundary between two social systems. The differences between the systems become evident from the hurdles that knowledge transfer encounters, which are described as follows in an Australian study (Parsons 2001: 304):

- lack of regular contact between scientists and Members of Parliament
- differing perceptions of budget priorities
- mismatch of political and scientific timeframes
- low levels of science literacy among Members of Parliament and of political literacy among scientists
- cultural divide between politics and science
- linguistic divide
- lack of electoral impact by science

Accordingly, knowledge transfer is more than merely transporting knowledge. It must be separated from the temporal processes, conventions and functionalities of science and adjusted to fit the political processes, conventions and functionalities, but without losing its scientific content in the process. The function that the interfaces fulfil is, as already mentioned, that of the honest broker. The article ‘Twenty tips for interpreting scientific claims’ published in the journal *Nature* (Sutherland et al. 2013), followed by an article in the British daily *The Guardian* (2.12.2013) on the ‘Top 20 things scientists need to know about policy-making’, together illustrate an increasing interest on both sides to understand the other side in order to improve communication.

Over time, numerous think tanks, panels of the wise and expert committees have been active at the science-policy interface. Several units at the Swiss Academy of Sciences, including the forums presented here, have been engaged in this area for more than 20 years. As there are hardly any testimonies on this activity, it is worth recording the insights gained in an appropriate form.

3. Science and politics: two worlds, two systems of logic, two speeds

The two above-mentioned ‘Top 20’ lists clearly illustrate that a purposeful dialogue between science and politics can only be realised if both sides recognise and respect the differences between their respective worlds. To hide these differences would be just as naive as to believe that science generally can enter into a dialogue with politics, since the issue at stake in the political debate defines the contribution that science can deliver in a productive dialogue. It would further overestimate the ability and readiness of science to appropriately participate in the constantly changing political agenda.

The two worlds of science and politics differ from each other in the first instance through their inner logic. The dual logic of science between probably true and/or true and certainly false (K. Popper) faces a triple logic in the political system that presents three reference points: logically consistent, acceptable to society and feasible with respect to material and financial resources.

The second difference lies in the different timeframes of both processes. The scientific production of knowledge can be programmed as little as political agendas. The policy cycle represents the political decision-making and governance process in simplified form by dividing it into four steps: (1) Problem framing: a problem is identified and structured in a particular form. First ideas (policies) as to how to approach it are developed. (2) Policy development: ideas are formulated into specific measures that are ratified by the relevant decision-makers. (3) Policy implementation: measures are implemented. (4) Policy review: success monitoring is carried out to introduce possible corrections to the measures (Jann and Wegrich 2007).

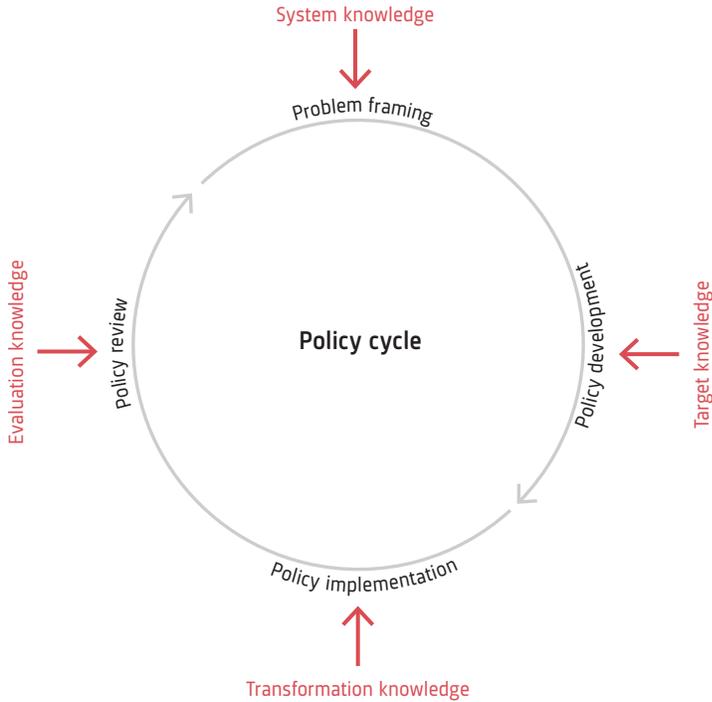


Figure 2: During the course of the policy cycle different knowledge is required from science (according to Quevauviller et al. 2005; Wülser, Pohl, Hirsch Hadorn 2012)

Although political decision-making processes in western democracies are strongly pre-structured in formal terms, they hardly correspond to the policy cycle model, but are extremely iterative with multiple feedback (Sabatier 1999). Nevertheless, the policy cycle presents a helpful model for structuring and analysing the dialogue between science and politics. Somewhere during the problem framing phase science is therefore faced with the task of making society and the wider public aware of the need for action, as can be exemplified with the problem of greenhouse gas emissions (system knowledge). If it subsequently becomes a question of target formulation (target knowledge) or the formulation of measures (transformation knowledge), expertise of the relevant disciplines is required (e.g. social sciences, ethics, engineering, etc.).

This has implications on the selection of topics and on the organisation of the relevant scientific community. The issue of political controversy must be sufficiently meaningful for it to remain or reappear on the political agenda for a long time. It is only this way that the scientific community can be motivated to engage with new political and societal questions in a timely fashion and on an ongoing basis. In an ideal-typical manner, an organisation operating as an interface between science and politics can be described as a hybrid that fulfils a dual service: on the one hand it must understand and speak the language of both sides, on the other it must win the acceptance and trust of both sides through the quality of its services.

4. Existing communication interfaces between science and politics

Science approaches politics as an honest knowledge broker through various interfaces. Three widespread constellations are: (a) expert boards, (b) interface organisations and (c) interdisciplinary and transdisciplinary research programmes.

- (a) Expert boards enable specialists to answer the questions of political bodies, i.e. politics and administration obtain specialist knowledge on particular topics in direct consultation with established scientists and academics. For example, the molecular biologist Anne Glover, in her role as Chief Scientific Advisor during 2012-2014, provided the President of the EU Commission with ‘independent expert advice on any aspect of science, technology and innovation’ and provided support when it was a question of interpreting uncertain scientific evidence.¹ It is possible for specific questions to be posed on behalf of politics during such an exchange. Scientists present the most current scientific knowledge to the best of their knowledge and belief. The topics on which they are questioned are determined by politics.
- (b) Interface organisations take on the role of brokering knowledge. It is their task to synthesise scientific knowledge available on a particular topic for use

¹ See http://ec.europa.eu/commission_2010-2014/president/chief-scientific-adviser/index_en.htm

by politics. In the EU, the Science and Technology Options Assessment (STOA) summarises the relevant information on new developments in science and technology for the European Parliament and presents options for the future and consequences to be expected from the implementation of the analysed technology.

In Switzerland, the forums of the Swiss Academy of Sciences are topic-focused interface organisations. The country's research community is structured in these organisations in such a way that it can concentrate on one, such as climate, biodiversity or genetic engineering, and prepare reports on the state of knowledge and on questions from the political debate. Such topic-based interface organisations have a long-term duration of years or even decades. In principle, they are bound by their topic, but in individual cases they deal with related aspects or with aspects that are relevant for their current question. For example, the Forum for Climate and Global Change (ProClim) also deals with questions related to energy provision and consumption. The topics are defined by science, which typically takes up questions for which it has identified a need for political action.

- (c) In the policy-oriented research model, politics and administration jointly determine with science the grand societal challenges that need to be examined. Science typically examines these questions in interdisciplinary and transdisciplinary projects. Scientists from different disciplines collaborate on these projects and in some cases also include societal stakeholders in their research. The German Helmholtz Centres carry out their research against this background. In addition to departmental research at federal offices, policy-related research in Switzerland is mainly carried out in the framework of National Research Programmes (NRP) of the Swiss National Science Foundation (SNSF). In these programmes, the exchange between politics and administration on the one hand and science on the other ideally extends across the entire research process, whereby representatives of different interest groups and administration take part in a supporting group for a project. This allows a mutual learning process on the causes of and the possible solutions to a problem.

Model	Board of experts	Interface organisation	Policy-oriented research
Methodology	Advice is provided to the best of knowledge and belief (honest knowledge broker)	Broad-based reports on the state of knowledge (assessments)	Interdisciplinary and transdisciplinary research
Form	Politics/administration consults individual experts for direct knowledge exchange	Independent office compiles summary reports with the help of the scientific community	Politics/administration defines the societal challenges to be investigated by research
Determination of topics by	Politics	Science	Politics and science in mutual exchange
Time until politics receives an answer	Days	Months to years	Several years
International example	Science & Technology Advisory Council (EU President)	Science and Technology Options Assessment (STOA, EU)	Helmholtz Centres (Germany)
Swiss example	Federal Government's Expert Group on economic forecasts	ProClim (SCNAT forum)	National Research Programmes (SNSF)

Table 1: Three common models of interaction between science and politics

5. Three SCNAT forums as topic-oriented dialogue platforms

5.1. Establishment and development

Each forum has its own history, the oldest going back more than 25 years, but their bodies and functions are largely the same. This is in part so because all forums are strategically anchored in the Swiss Academy of Sciences and their professional offices collaborate closely with each other and with the SCNAT Secretariat General. In addition, the oldest forum, ProClim, served as a model for the creation of the two other forums due to its success. Nonetheless, their experience and track records vary, since the topics dealt with differ greatly from each other with regard to their societal and political assessment and resonance. The following section shows how three forums created in line with the ProClim model developed into dialogue platforms over time.

ProClim Forum for Climate and Global Environmental Change

ProClim was founded by the SCNAT in 1988 with the aim of establishing a Swiss climate research programme. Yet, since it was competing with other research projects for necessary funding, was not well received by the academic community. In 1993, a complete relaunch with different objectives took place; in particular, the forum was set to engage in integrating Swiss research into international programmes, supporting interdisciplinary collaboration and stimulating the exchange of information and dialogue with decision-makers.

Today, ProClim promotes an information exchange within research as well as the integration of Swiss researchers into international programmes and activities. On the one hand, it maintains an expert database and provides the research community with regular news through a newsletter and assessment reports. It also keeps the research community updated on international activities such as global climate research programmes or the activities of the Intergovernmental Panel on Climate Change (IPCC). On the other hand, it sensitises the research community to the issues and needs of politics, economy and administration.

Political decision-makers are continuously provided with summaries of the state of knowledge in climate science that is of relevance for current political and societal questions. This information can relate to parliamentary submissions, the legislature (e.g. the CO₂ law) or strategic political setting of the agenda, for example the Federal Council's energy strategy. The information is processed as appropriately as possible for its target audience and in a generally understandable form and is presented in different forms for discussion. The product range includes publications (e.g. factsheets), events (e.g. parliamentary meetings), knowledge management (e.g. assessment reports), position statements on political topics, as well as round tables with experts from the scientific community and stakeholders on specific questions. The ProClim database contains contact details of several thousand experts who work on climate change and who can be contacted for assessments or referred to as experts.

During the last few years the focus in the climate discussion has shifted from the essentials to measures (adjustment to climate change and emission reduction). Therefore, energy policy and social science questions are increasingly moving towards the centre of activities.

Swiss Biodiversity Forum

The foundation of the Swiss Biodiversity Forum was triggered by the Convention on Biological Diversity (CBD), which requested nation states to also conduct research that is aimed at maintaining biological diversity. Switzerland responded with the launch of the integrated biodiversity project in the framework of the SNSF Priority Programme Environment. Following the conclusion of this programme in 1998, the researchers who had been involved were keen to maintain and expand the acquired skills as well as their collaboration with each other and different stakeholders. This aim came to fruition in 1999 with the foundation of the Biodiversity Forum, which took as its model the organisation of the ProClim Forum.

The Biodiversity Forum fulfils a number of different main tasks: it contributes to increasing basic scientific knowledge, processes relevant expertise and disseminates it among various target groups as well as promotes national and international collaboration and networking. The forum strengthens the collaboration between the various biodiversity research disciplines within the relevant scientific fields and develops common ideas on future biodiversity research. Currently, the most important target groups outside of science are decision-makers

in the areas of politics, federal and cantonal administrations, the private sector, professionals in nature and landscape conservation, NGOs and the interested public. The product range includes syntheses in the form of factsheets, books, reports (e.g. 'Wandel der Biodiversität in der Schweiz seit 1900', 'Flächenbedarf für die Erhaltung von Biodiversität und von Ökosystemleistungen in der Schweiz'), periodicals (e.g. the magazine HOTSPOT), events (e.g. the annual SWIFCOB conference) and position statements on draft legislation. The launch of the Intergovernmental Panel on Biodiversity and Ecosystem Services (IPBES), the Swiss branch of which was established by the Biodiversity Forum together with the Federal Office for the Environment (FOEN), and the scientific support in drafting the Swiss Biodiversity Strategy together with the corresponding action plan were particular relevant activities during 2012-2014.

Forum for Genetic Research

The Forum for Genetic Research was founded as a discussion and information platform of the SCNAT in 1996 in the run-up to the vote on the gene protection initiative in order to ensure that the nuances in an already highly polarised debate on genetic engineering would not be lost. Its activity continues to focus on promoting a discussion on genetic engineering that is as broad based and impartial as possible through the dissemination of objective information. The forum adopts a foresight function with regard to developments in genetic engineering relevant to society and promotes the dialogue between society, politics, business and science.

The Forum for Genetic Research is interdisciplinary both in its work approach and in its composition and thus reflects the widest possible range of disciplines involved. In addition to genetic engineering, the focus is on biotechnology in the broadest sense. The available expert knowledge is made accessible to society and politics by specialists imparting it directly or via reports and events. The process is started by open questions from the general public and politics that are taken up and investigated by using an objective, scientific approach. The forum illustrates the vast range of applications for genetic engineering, introduces the current knowledge about benefits and risks of corresponding applications into the discussion, discusses ethical and scientific aspects and presents the corresponding insights to the outside world. Currently, the focus of attention is on the topics 'green genetic engineering' and 'synthetic biology'. Knowledge syntheses are developed and discussed in reports, position statements and public meetings. The database genExpert that has been built up by the forum provides

access to contact details of around 300 specialists in different fields of molecular biology and genetic engineering – experts it can recommend as contacts to the general public and administrative offices.

Mobilisation and processing of the state of knowledge

- Assessments: compilation of the state of knowledge on specific questions by experts with the support of the offices and broad-based, sometimes multiple reviews in the topic-related research community (similar to IPCC)
- Workshops and round tables: discussions of specific questions with representatives from different research disciplines and affected stakeholders
- Preparation of international assessments for Switzerland and politics
- Research database (experts, publications, projects) in the subject area

Information and referral of experts

- Reports, factsheets (based on assessments, depending on scope)
- Events with presentation of results
- Media conferences and media releases
- Newsletters and periodicals (e.g. HOTSPOT, ProClim-Flash)
- Position statements and consultations, possibly recommendations

Communication

- Receive needs and questions from politics, administration, media, etc. and forward them to science
- Expert referrals (upon request)
- Forward information from international research programmes and assessment activities (IPCC)

Dialogue between science and politics

- Parliamentary meetings (discussions between experts and members of parliament)
- Presentation of scientific knowledge (e.g. biodiversity strategy, laws on genetic research, CO₂ law, adaptation strategy for climate change)
- Presentation of the state of scientific knowledge to political committees (e.g. to parliamentary commissions)
- Quality control (with regard to the state of scientific knowledge) of administrative products

Table 2: Procedures and products from the forums' practical work

5.2. A model for different topics

When analysing the histories of the three forums there are quite a few comparative elements. The UN Conference on Environment and Development (UNCED) in Rio de Janeiro in 1992 elevated questions on climate change and biodiversity to the political agenda and, as far as the rapidly developing field of genetic engineering is concerned, an extremely controversial topic was brought into focus. International climate and biodiversity conventions were adopted (UN Framework Convention on Climate Change [UNFCCC], CBD), regularly and inexorably bringing their concerns to the political agenda. International research programmes were also launched, which, in addition to furthering national networking among the research community, forged links among international research institutions. Further significant for all three forums is that they initially concentrated on networking national research and integrating into international programmes. It was in the next step that an institutionalised dialogue with different stakeholders was established, which led to the current structure of the forums and their networks (Figure 3). Typically, the paths illustrated in Figure 1 are dealt with simultaneously.

Although the three forums operate in rather different scientific and social contexts, they do so in a comparable organisational form (Figure 3). This formal consistency of the forums' organisation is juxtaposed with major differences regarding to the topics and the way they are dealt with in the political discourse, such as illustrated in the following three examples.

Climate and global change remain abstract and theoretical on the global scale, but at the local level they are clearly discernible, such as in the shape of a melting glacier or rising sea level. Despite this, the voices of the climate sceptics with scientific backing are on the rise, demanding that both the scientifically proven and unproven should be communicated. Since the topic touches on the most diverse of economic and political interests with regard to impact and measures to be taken, science remains much sought after.

At first sight, the topic of biodiversity seems more accessible with regard to perception and opinion. Changes in biodiversity are often invisible at first, however, and the data sources have huge gaps for many aspects. The aims of the Convention on Biological Diversity are broadly supported by politics and society, but implementation quickly meets with resistance once other users' interests, such as energy production or raw material extraction, are at stake. This chal-

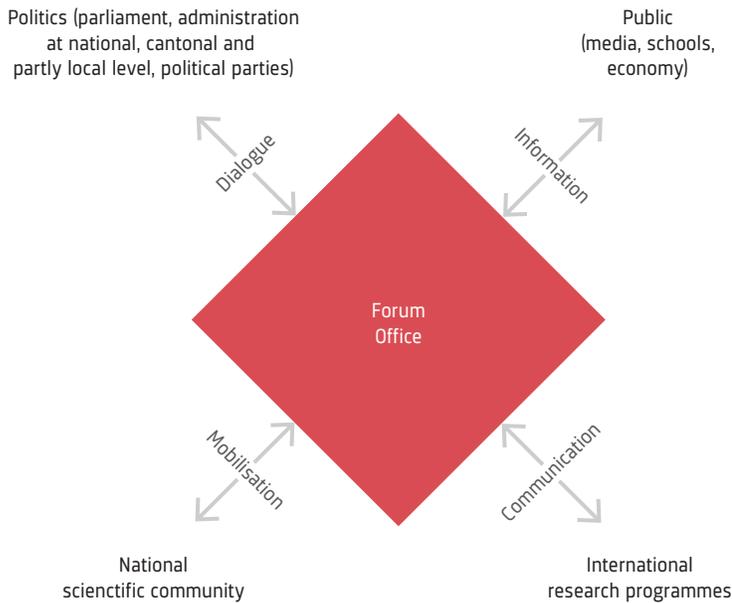


Figure 3: The dialogue and communication partners of the SCNAT science policy forums

lenges science to uncover the reasons for the changes in biodiversity and its implications, and to derive options for action to preserve biodiversity and ecosystem services in the long term.

Green genetic engineering and its possible applications remain extremely controversial, as this raises fundamental ethical questions due to the selective interference in genetic material. Also, society ranks the risks from genetically modified organisms as high. Accordingly, the challenges are equally high when it comes to communicating the different scientific and ethical positions and illustrating their implementation in political options and the resulting consequences.

5.3. A tried-and-tested differentiation of politically relevant knowledge

In 1997, the Conference of the Swiss Scientific Academies (CASS), the predecessor of the Swiss Academies of Arts and Sciences, illustrated in its book ‘Visionen der Forschenden’ the knowledge categories with which research should contribute to the societal and political design of global change and sustainable development (CASS and ProClim 1997). These knowledge categories proved to be extremely helpful both in internal communication (i.e. among the scientific disciplines) and in promoting understanding between researchers as well as political and societal target groups because they describe three logical steps to science-based action. In addition, they can be located in the policy cycle (Figure 2), whereby the entire dialogue process becomes well-structured with regard not only to time scale but also to content. These knowledge categories are as follows:

- System knowledge: knowledge about the systems in which the problem can be described and the systems in which solutions can be sought
- Target knowledge: knowledge about which targets are worthwhile and the conditions under which they can be achieved
- Transformational knowledge: knowledge how to get from the current situation to the desired target state

In order to develop these different knowledge components, it is necessary to include not only the different scientific disciplines, but also to support their interdisciplinary cooperation. For this reason, the three SCNAT forums reach far beyond the natural sciences even today and incorporate the other academies with the disciplines they represent.

Finally, the forums have developed and tested a number of procedures and products to support the knowledge acquisition process, problem-oriented knowledge integration and dialogue management.

At present, the forums are structurally and institutionally organised in such a way that they can outlast legislature and they are recognised and accepted as an honest knowledge broker among the main target groups. Their openness and willingness to enter into an interactive learning process have contributed to their good reputation, which is also accompanied by strict quality controls for published products. In addition, the forums' publications are broadly supported in the relevant research communities and do justice to the spectrum of opinions amongst the experts. The forums have therefore become a reference point in the political discussion and in shaping public opinion. The forums' dialogue work is illustrated by means of the following two examples.

Example 1: Statement of the Academies on the Federal Council's Energy Strategy 2050 (January 2013)

Work stages in writing the statement

- The Academies decide on their Energy Commission to draft a statement on the Federal Council's Energy Strategy 2050.
- The Energy Commission members and additional experts from the research disciplines concerned by the question (e.g. energy technology, energy sector, health, spatial planning) submit comments. The forums' office compiles a first draft.
- This draft is discussed at a Commission meeting and amended.
- The draft is sent for review to a wide circle of experts from all possibly concerned research disciplines.
- The comments are incorporated in the draft.
- The draft is amended at a further meeting, where ambiguities are clarified and it is determined how to handle differences (e.g. participants refrain from contrasting two different solutions with their advantages and disadvantages).
- The Academies' Board of Directors ratifies the statement, whereupon it is sent to the Federal Office of Energy (SFOE).

Impact (status prior to the consultation process in the National Council)

- The Academies are one of the most quoted institutions in the SFOE's consultation report.
- The Academies are invited to send experts to the consultation process at the Committee for the Environment, Spatial Planning and Energy of the National Council (CESPE-N).
- Nine modifications suggested in the Academies' statement are more or less implemented *mutatis mutandis* in the revised version of the government's legislative proposals and in the majority proposal of CESPE-N. 14 modifications are not adopted and some are no longer relevant due to the changes.
- A document with the Academies' non-implemented proposals is made available upon the request from Parliament for input to the debate in the National Council.

Example 2: Biodiversity Strategy Switzerland

Background history

- 1994: Switzerland ratifies the UN Convention on Biological Diversity: Art. 1 requires the formulation of a national biodiversity strategy.
- 2004: The postulate for drafting a Swiss Biodiversity Strategy (SBS) is introduced.

Activities and impact

- 2004: The Biodiversity Forum publishes its book ‘Biodiversität in der Schweiz: Zustand, Erhaltung, Perspektiven. Grundlagen für eine nationale Strategie’ (Biodiversity in Switzerland: current state, maintenance, perspectives. Foundations for a national strategy) and presents the results at a parliamentary meeting. One month later the parliamentary group Biodiversity and Species Protection is formed.
- 2007: The final declaration of the NATUR congress, co-organised by the forum, calls for a national biodiversity strategy. The OECD criticises Switzerland for its lack of a strategy.
- 2008: Parliament includes the drafting of an SBS in its legislative planning 2007-2011.
- 2009: The Biodiversity Forum takes its seat on the Federal Office for the Environment’s (FOEN) panel of experts.
- 2010: The forum publishes its book ‘Wandel der Biodiversität in der Schweiz seit 1900. Ist die Talsohle erreicht?’ (Change in the biodiversity in Switzerland since 1900. Have we hit the bottom?), which illustrates the need for action by different actors if the negative trend is to be stopped. As the book was published in 2004, this work also becomes an important foundation for the SBS.
- 2011: A consultation on SBS is held. The forum organises an information event for the organisations invited to participate in the stakeholder consultation process.
- 2012: The Federal Council adopts the Biodiversity Strategy Switzerland. The action plan is to be drawn up within 24 months.
- 2013/14: The forum prepares different scientific principles for the action plan, including a report on the space requirements for the conservation of biodiversity and ecosystems in Switzerland.

5.4. Current self-understanding of the forums

In order to position themselves clearly as interfaces, it is important for the forums to recognise and communicate their own competences and to further develop them based on their experience. However, it is crucial that the research community should identify a clear benefit from this activity, because only then will researchers be prepared to carry out timely collaboration in the long term. Certain services that the forums provide for researchers also have a motivational impact, such as making their activities visible, providing information or making effective use of the work of the scientific community through products such as factsheets and reports on the state of knowledge (assessments). Referring experts is also part of the service of the forums (Table 2 on page 19).

In addition, the forums employ different dialogue forms that are appropriate to each specific situation. In the case of science hearings in commissions, presentations in round table discussions and in the media, the communication by 'highly gifted voices of science' is crucial. In contrast, regular and firmly institutionalised discussions in agreed upon meetings with agendas take place with members of parliament, administrative committees and stakeholder groups. In the case of drafting legislative proposals, implementation programmes and strategy papers that have a longer time horizon, mixed working groups with representatives from science, administration and politics have proved to be beneficial in utilising both scientific knowledge and practical experience.

The knowledge bases brokered by the forums stands out from other information in that they are evidence-based and widely supported by the scientific community. It is therefore important for the forums to clearly communicate the robustness of their results together with the remaining uncertainties and controversies. In so doing, the forums have gained the trust of politicians, resulting in their products enjoying a high reputation.

The following section critically takes stock of the forums' experience and make recommendations for the establishment of additional dialogue platforms.

6. Achievements and insights

6.1. Achievements

Recognition as discussion partner

What is the evidence that the forums operate successfully? It would be tempting to conclude that the forums have gained a firm position on the ‘policy advisory scene’, based merely on their many years of existence and the permanent further development of their skills. However, it can probably be argued that the three forums have succeeded in mobilising the scientific community and in keeping it in a constant dialogue with administration and politics throughout the entire period (Figure 4). Their products also enjoy a high reputation and the authors are recognised as impartial voice, often resulting in invitations to participate in important consultation processes.

It is far more laborious and difficult for the forums to demonstrate the direct impact of their advisory activities if their arguments cannot be directly traced in legal texts, political proposals and strategies, ordinances or public pronouncements of politicians or opinion leaders. Even if they could be, the question would remain whether the same result would also have been achieved without the forums’ efforts. However, this must and should not be a source of irritation, since the forums remain one voice amongst many, particularly in an open political system that allows itself to be informed and belaboured by many different channels. It is already a success to be recognised and respected as an important voice.

Role model function

By international comparison the forums can be seen as a model. There is substantial evidence for this: ProClim and the Advisory Body on Climate Change (OcCC) were copied by Austria (Austrian Council on Climate Change [ACCC]). The experience of ProClim and the forums takes a prominent position in the creation of the new global research programme Future Earth: ProClim was requested by Future Earth as one of only five institutions worldwide to provide extensive input in the creation of the new organisation and to contribute its experience. The suggestions put forward by ProClim were integrated into the Future Earth strategy. In view of the forums' existing institutionalised policy advisory service, Switzerland is ahead of many other countries. This is illustrated by the international demand for its expertise and experience by countries such as Germany, Austria and Finland, which have also set in motion the creation of policy advisory committees.

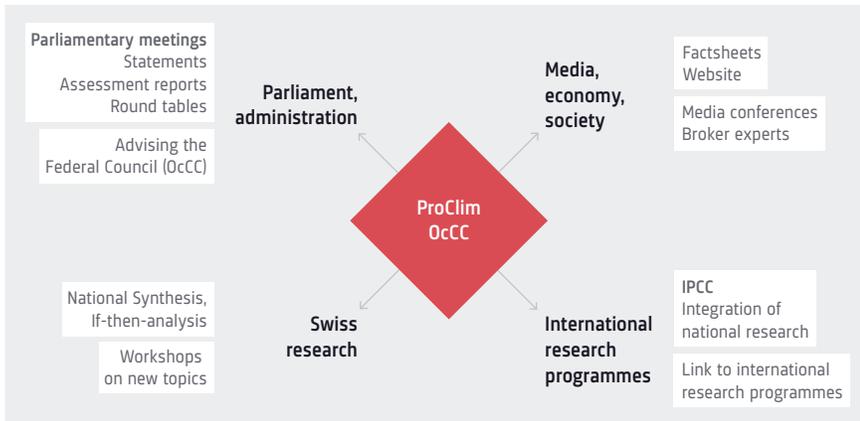


Figure 4: Dialogue partners and products of the Forum ProClim with the OcCC

6.2. Insights

- Science is not helped if it is reduced to one voice. The recurrent demand that science should speak with one voice sounds enlightened and seductive. The assumed clout of this ‘one voice’, which also refrains from clearly communicating the nuanced ‘ifs and buts’, puts in jeopardy a lot of credibility on the part of policymakers and the public. The success in the media of simple messages is a temptation to which one should not succumb.
- Compromise is unavoidable, even if one or the other side presents this as weakness. Compromise is often inevitable if it is a question of weighing up scientific accuracy against general understanding. This applies both to talks with political decision-makers and media interviews. Comprehensible messages always need to have a correct scientific justification.
- Science is dependent on stages where it can enter into discussion in a targeted manner with representatives from politics, administration and the public. This saves time and ensures that the exchange takes place at the right time and with the right people. The forums’ operational offices create these stages, broker the contacts and support the contextual preparation.
- Third-party assignments also create dependencies. Third-party funding often comes from administration that wishes to be informed of the latest developments in scientific knowledge. This offers the opportunity for preparing the current state of scientific knowledge with advisory groups from politics and administration. However, such funding also creates dependencies and certain thematic specifications. A balanced ratio of free and committed funds for financing the operational offices is decisive for the forums’ independence and timely flexibility.
- The provision of the workforce for and financial support of dialogue platforms is decisive. The workforce at the forums’ offices is a critical issue. The mutual willingness to maintain a long-term dialogue between science and politics, but also among the scientific community, essentially depends on the services that the offices can provide. This requires a minimum of personnel resources, making the appointment of qualified staff members critical and essential. This entails longer-term investments for the academies and must be the object of strategic decisions.

- The recruitment of qualified academic staff is not easy. The search for suitable personnel for the offices represents a challenge, since there is no training for the specific competences required for the dialogue between science and politics. Relevant persons must know the language of both cultures, be sufficiently qualified scientifically to gain the necessary recognition among the scientific community and be able to reliably moderate the dialogue between science and politics from the background. This learning on the job, which the forums had to do in the past, is no longer sufficient for the future. Efforts need to be made to promote young scientists and provide for further education.
- Institutionalisation facilitates dialogue. The forums' experience is evidence of the advantages of institutionalising dialogue. It is best if this institutionalisation is achieved via an interface that can broker specific dialogue partners or produce knowledge on different questions and topics through its broad network. In addition, an interface is able to follow the political agendas of the decision-makers as well as the latest developments in science on a continuous basis and to react to these quickly. In other words, the level of readiness and the ability to react quickly are developed correspondingly. Moreover, the creation of a relationship of trust between the dialogue partners has proved to be vital. This is, of course, dependent on longer-term collaboration. If the interface has the necessary credibility both in politics and among the research community, dialogue with a certain level of trust can take place even between discussion partners who do not know each other.

7. Recommendations for the establishment of additional dialogue platforms

Whoever operates in the area between science and politics need to be aware that this space does not exist automatically, but has to be created. Every attempt to bring these worlds into a productive interaction therefore represents a construction that requires a conscious and consistent approach. The forums' many years of experience allow conclusions to be drawn on tried-and-tested approaches that are worth being taken into account for the future.

There is no room for one-way streets when it comes to political advice.

This principle must be binding for the operational management of the forums (i.e. for the steering committee and the office) and needs to be communicated to the scientific community. No scientific one-way advice leads directly to political decisions, but alternative routes to optional solutions, each with their own advantages and disadvantages. For the dialogue between science and politics to work properly, it must use a grammar and vocabulary that transparently communicate the opportunities and risks of each option as well as the related uncertainties. This places high expectations on all discussion partners involved.

Crisis situations create windows of opportunity for the creation of dialogue platforms.

The SCNAT forums are active in fields that have developed into major political and social fields of action in the meantime. Crisis situations raise the need in society for political and scientific orientation. Alarming findings on climate change and the decrease in biodiversity led to the establishment of relevant forums. Yet, developments in the field of science itself, such as genetic engineering, also give rise to an enormous potential for conflicting views in society and therefore strengthen the need for dialogue. It is also the task of the academic world to recognise such windows of opportunity and to set up the corresponding dialogue platforms.

Independence is a central requirement for an intermediary between science and politics.

If science gets near politics, allegations will soon be voiced that science was tied to the reins of politics. Criticism is also voiced when an expert opinion is questioned by a counter expert opinion. This can be prevented if science avoids being played off by presenting joint opinions that clearly reveal consensus and dissent. In contrast, the request for science to speak with one voice appears unenlightened; it also contradicts today's understanding that science constructs a reality with its own methods that will never result in one coherent view of the world. Different findings will always require a weighing up of the different propositions and conclusions. It is precisely this process that needs to be done in dialogue.

Scientific independence is best safeguarded through quality control in the international review process, which verifies the methodically correct processing of knowledge and which has established itself in the scientific community as the central quality control mechanism. This therefore requires a broad selection of recognised experts when it comes to formulating the voice of science. It is further important that the forums preserve their financial independence by and large. Our experience shows that this requires the academy to have a considerable amount of own resources.

Scientific excellence is a fundamental prerequisite for political acceptance.

The three forums document that it is possible to mobilise thematically relevant research in the national context, to position it in international networks and to engage top-level research in debates. This alone provides science the reputation and acceptance in politics and society so as to be taken seriously as a dialogue partner. Its knowledge is sought after when events fall into place that lie outside the accepted explanations, when scientific discoveries open up new fields of action and when political targets are formulated for which solutions must first be found, an example of which is the energy transition.

Methods for knowledge integration need to be further developed.

The challenging work of problem- and solution-oriented knowledge integration must primarily be carried out by the forums' offices. This is one of the central services that this operational unit must provide for the benefit of the scientific community. Accordingly, these units must be staffed by qualified personnel. There are repeated indications (Spangenberg 2013; Schneidewind 2013) of the still inadequate methodological competences in these service areas and of the lack of inner-scientific recognition for this challenging work.

Switzerland finds itself in the privileged position of having a Network for Transdisciplinary Research (td-net). Supported by the Swiss Academies of Arts and Sciences, it develops and tests methodologies for the transdisciplinary co-production of knowledge and its integration, and it makes these skills available to the topical forums. These methodological competences need to be advanced in parallel to the development of the forums, since the quality of the forums' central services depend on this.

The creation of dialogue platforms requires considerable and longer-term investment.

Society has only a limited capacity to capture imminent problems at an early stage, such as illustrated by the financial crisis in 2008. A reliable methodological basis is lacking for the early identification of looming crises. In these situations, the dialogue platforms are asked to sharpen problem awareness in politics and society and thereby create the prerequisites to launch a dialogue topic and to manage it systematically. In addition, experience shows that the stakeholders involved in the dialogue can come across new questions and topics that can be processed more easily because a scientific network is already in place that is in a position to mobilise the necessary expertise. The reputation of an existing platform also creates good preconditions for thematic expansion. However, the continuous development of the topics dealt with requires adequate long-term and sufficient investment.

The basic design of the forums has proved itself.

The format of the forums has proved itself through a solid basis in the scientific community, the high scientific reputation of its experts and a strong presence in important political and societal decision-making bodies. It is decisive that a permanent readiness for dialogue can be maintained and that the publication of important products such as assessment reports are attuned to the political calendar. It is further key that a differentiated dialogue, i.e. tailored along the requirements of the respective counterpart, is conducted with all relevant stakeholders – from the higher echelons of politics to the elementary primary school level. In the absence of an informed public, there is often too little pressure on politics. This consolidated form of dialogue platform, however, needs to be constantly scrutinised, adjusted to meet the changing situations and developed further.

The possibilities of impact assessment are limited.

Who claims to know precisely what she or he does, does not necessarily know exactly what her or his impact is (see Chapter 6.1). Whilst experience shows that administration has a history of more often following the recommendations of science, politics may always be guided by other considerations in its decisions. Apart from the optimum case where scientific arguments and recommendations are applied word for word or *mutatis mutandi* in legal texts and ordinances, the success of dialogue platforms can primarily be measured in that science has become a well-respected and valued voice in politics and that the dialogue between science and politics functions reliably via established channels and has done so for a longer period of time.

8. Further development of dialogue platforms is necessary

The contents of this report are the result of reflection on a specific practice of scientific policy advice with the aim of making the obtained self-understanding accessible to others. At present, this lacks the counterpart experience in science-policy dialogue against which our own experience can again be reflected and measured. It is undoubtedly a weakness in our reporting that we cannot make any clear reference to other forms of dialogue, models or experience. However, this justifies all the more making this report available to the interested public on both sides of the dialogue. Irrespective of this, we are aware that it cannot only be a case of taking on further topics with the same approach, but that it must also be a case of advancing the approach from an organisational and temporal perspective as well as better assessing its impact. In order to direct this development, we join the request recently formulated by Edenhofer (2014) at the Helmholtz Centre for Environmental Research in Leipzig: ‘Scientists must learn to draw maps of policy options; politicians must learn to read them.’

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Who are we?

The Swiss Academies of Arts and Sciences link sciences regionally, nationally and internationally. They specifically engage in the fields of early warning and ethics and advocate for an equitable dialogue between science and society.

The Swiss Academies of Arts and Sciences is an association of the four Swiss scientific academies

- Swiss Academy of Sciences (SCNAT)
- Swiss Academy of Medical Sciences (SAMS)
- Swiss Academy of Humanities and Social Sciences (SAHS)
- Swiss Academy of Engineering Sciences (SATW)

as well as the centres of competence

- Centre for Technology Assessment (TA-SWISS)
- Foundation Science et Cité

SCNAT – network of knowledge for the benefit of society

The Swiss Academy of Sciences (SCNAT) and its network of 35 000 experts works at the regional, national and international level for the future of science and society. It strengthens the awareness for the sciences as a central pillar of cultural and economic development. The breadth of its support makes it a representative partner for politics. The SCNAT links the sciences, provides expertise, promotes the dialogue between science and society, identifies and evaluates scientific developments and lays the foundation for the next generation of natural scientists. It is part of the association of the Swiss Academies of Arts and Sciences.

The «Platform Science and Policy» (SAP) of the Swiss Academy of Sciences (SCNAT) deals with topics that are interdisciplinary and relevant for society. By providing scientific knowledge to the discourse with politics, administration, economy and society, it supports the development of solutions to societal issues.

