Policy profile Austria

Input paper for the OECD

NIS MONIT Network

Work package 1

Leonhard Jörg – Technopolis GmbH

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Abstract

The report maps the Austrian science, technology and innovation policy system in the light of observed governance. The paper starts with an overview on the Austrian STI-performance and explores the evolvement of the current STI-policy system. After mapping the key actors within the system a range of specific governance aspects are discussed in more detail. Issues addressed are: observed policy mix, new ways of policy delivery (programming), interaction between various policy levels (federal-regional). The last chapter of the report focuses on the learning capability of the STI-system. Important in this context are the availability of strategic intelligence, the involvement of stakeholders and the observed use of evaluation.

Key words: Science Policy, Technology and Innovation Policy, Governance, Evaluation, Learning Systems, National Systems of Innovation

1 Introduction

The following report contributes to the OECD NIS-MONIT project, which aims "to generate a new body of knowledge of OECD countries on how to improve innovation policy governance and create more coherent innovation policy" (*OECD,* 2002).

The report draws on several sources. One important source has been the recent evaluation of two main funding agencies (FFF and FWF) which brought new insights in the governance of the Austrian funding systems and most interestingly the consequences of various forms of stakeholder involvement. As member of the evaluation team the author used interviews conducted in the course of the evaluation to address specific governance issues relevant to the NIS-MONIT project.

The second important source is the survey the tip-consortia has conducted in preparation of the technology report 2003. This survey produced a comprehensive picture on STI-policy measures in place and evaluation activities.

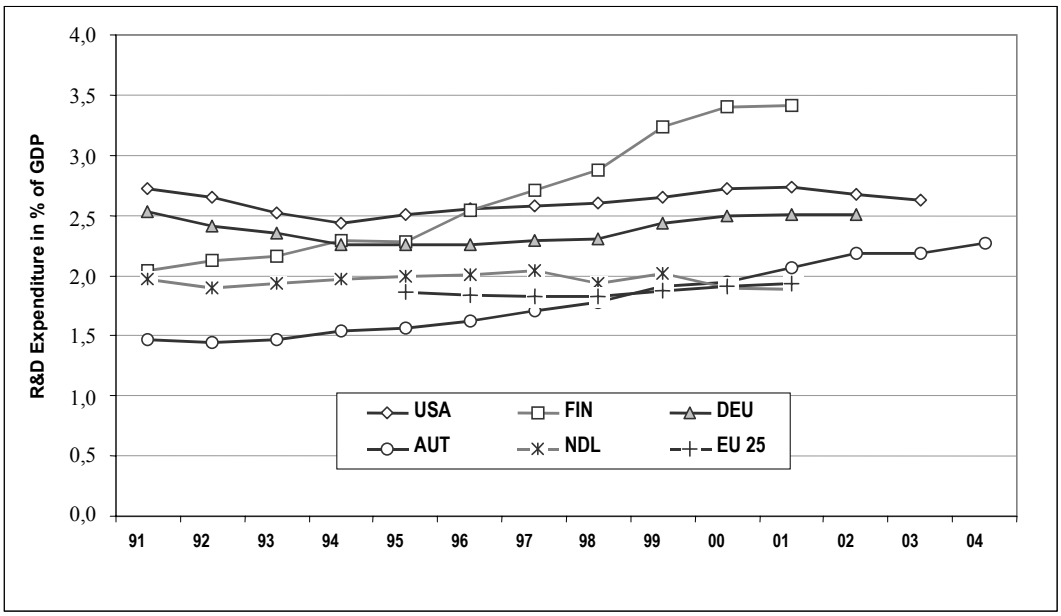
2 STI-Performance

A first sight on the Austrian STI-performance of the last two decades shows the reverse of the 'European paradox'. Rather than high R&D and low economic performance, Austria has had good economic performance while doing comparatively little R&D.

Since joining the EU came onto the national agenda, Austria has made significant strides towards reaching EU levels of R&D activity. Based in low-R&D-intensity industries and with a structural bias towards SMEs, the economy has moved towards the EU average in R&D intensity (see Exhibit 1).

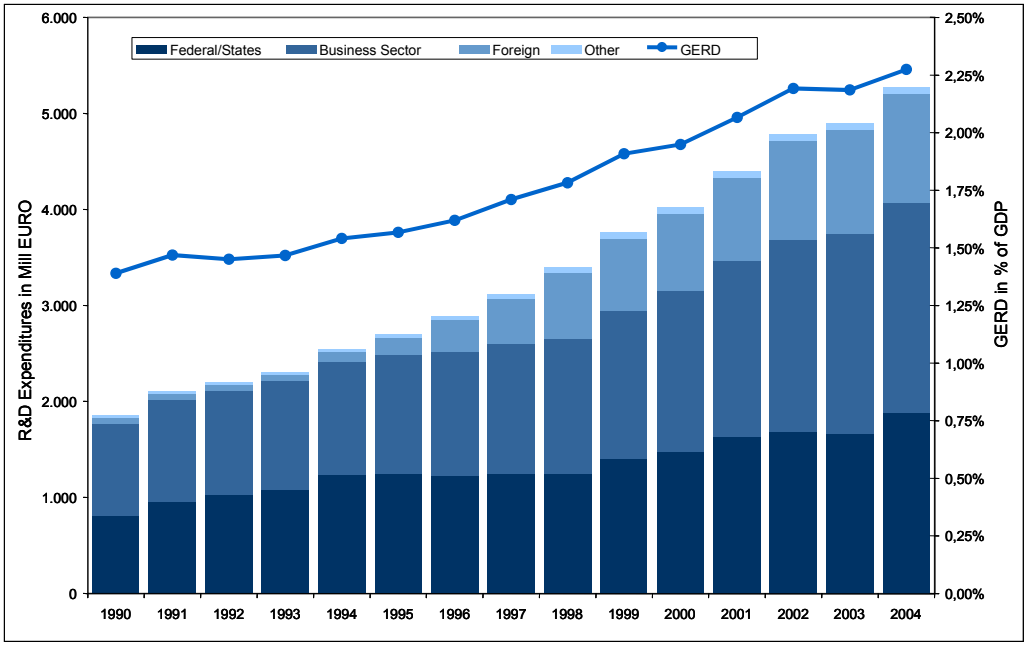
Looking at the composition of R&D expenditures in Austria reveals some interesting developments. Beside the continuous overall growth of financial resources made available for R&D-activities, the distribution of different financial sources has changed over time. Whereas the relative share of public sources (Federal/States) has decreased over time, the business sector has substantially increased its share. Most interesting is the sharp increase of financial inflow from foreign countries. Only Greece and the United Kingdom have reached similar levels in their share of foreign financed R&D.

Exhibit 1: Catching up path of Austria; R&D-expenditures in % of GDP



Source: EUROSTAT (2004), OECD (2003), Statistik Austria (2004); taken from science and technology report 2004.

Exhibit 2: R&D-Expenditure in Austria by source of finance

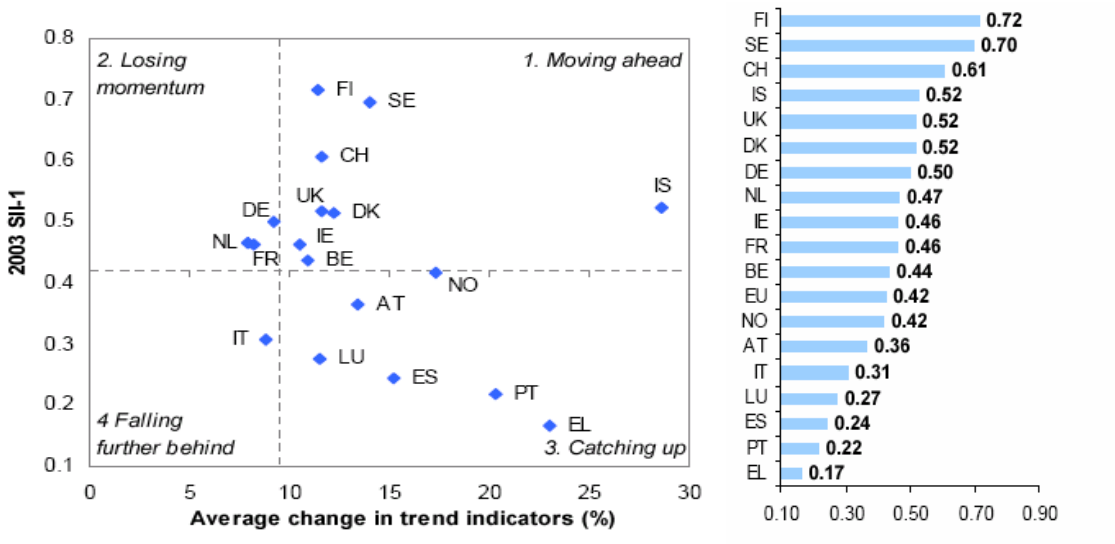


Source: *Statistik Austria* (2004), *taken from science and technology report 2004.*

Even though the share of R&D financed by the business sector has grown, it remains at a low level compared to the most R&D intensive European member states.

The overall growth of R&D-expenditures together with a range of new policy initiatives have put Austria in a catching-up position within the European STI arena. The results of the European Innovation Scoreboard (2003) confirm this (see Exhibit 3). For the first time since the Summary Innovation Index has been published Austria is among the countries moving towards the EU-average and not lagging further behind. Even though improving in relative terms, Austria still ranks relatively low compared to the countries with comparable in size and economic performance.

Exhibit 3: Summary Innovation Index I 2003 (SII-1)



Source: European Commission 2003C, taken from science and technology report 2004.

Given the fact that for Austria the used indicators are based on the R&D-statistics from 1998 and that newer data points to a further increase in R&D-expenditures, the ranking is likely to underestimate Austria's position.

Among the indicators in which Austria lacks behind most the Innovation Scoreboard lists:

- Number of Graduates in science and engineering
- Scientific publications/population
- Share of population with tertiary education
- Business R&D-expenditures/GDP
- International patent applications/population

- Early stage venture capital/GDP

Taken together the indicators point to a national system of innovation with deficits in its science base, low propensity of private sector to invest in R&D and, more generally, an underdeveloped culture of entrepreneurship within the economy. These deficits however have to be seen in the context of the economic structure and technological patterns of specialisation. Austria's economy is considered as a small firms economy strongly anchored in low and medium tech branches. The weak positioning in high tech branches (e. g. Biotech and ICT) as well as a lack of big R&D-intensive firms explain some of the modest positioning of Austria's STI performance as a whole.

On the positive side, one can observe a relatively high share of innovative SME's, and a high degree of 'flexible specialisation', often leading to commanding shares in niche markets. Furthermore Austria's enterprise sector seems to have developed good absorptive capacities resulting in fast diffusion of new production technologies. Furthermore, Austria seems to have made good progress in improving the co-operative culture within the enterprise sector as well as between science and industry.

3 Evolving governance structures and perceived challenges in the Austrian STI-system

3.1 Historic context

The perception of challenges can hardly be separated from the basic understanding of how the STI-system functions. As in many other developed countries the so called "linear model" set out the basic principals of STI policy in the post war period. In the case of Austria the scope of options on hand however were limited.

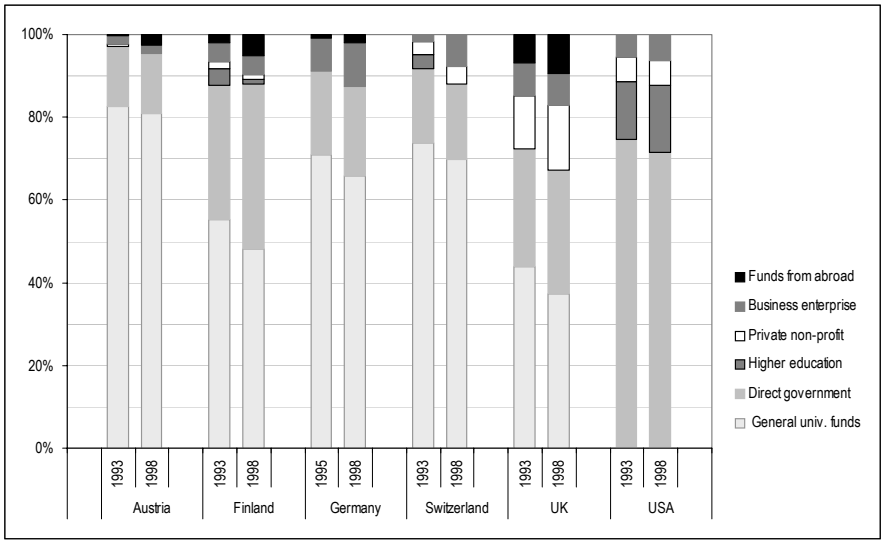
As for **technology and innovation policy**, the exploration of new technological options ranked relatively low on the policy agenda. The perceived challenge was first of all to rebuild and maintain the industry infrastructure and to reduce the technological gap to neighbouring countries. In this context the relatively huge complex of stated own industry in the basic sector absorbed a big share of policy attention. The development of technological capabilities was mainly based on importing new technology and incremental adaptations. From hindsight, these strategies of 'incorporated technological change' and 'continuous improvement' were fairly successful and one of the reasons of the Austrian paradox (good economic performance coupled with low R&D-intensity).

Widening trade balance deficits and decreasing unit-values of exports (and indicator for increasing technological gap) in the late 1980s and early 1990s increased the pressure for a more proactive role of STI-policy.

Science policy in the post-war period was first of all policy for universities. Faced with a weakened science-base after the war, the perceived challenge was first of all to

restore the basic teaching capacity rather then building up new research capacity. On organisational terms, the university sector only became an autonomous body in recent years, when the new law on university organisation (UOG 2002) was adopted. Traditionally universities were managed within the schemes of public servants with little scope for development with respect to research profile. At the same time university funding relied to an exceptionally high extend on general university funds leaving little scope for strategic steering. How persistent such historically grown allocation mechanisms can be, can be seen in Exhibit 4. Even though perceived as problematic the share of GUF in financing the university sector has remained at its high level until the late 1990ies.

Exhibit 4: Sources of Higher Education Expenditure on R&D (HERD)[1]), 1993[2]) and 1998



Source: OECD; own calculations.

In this setting with high shares of financial resources tight up in university budgets, Austria has been fairly cautious, when it came to the establishment of new non university research organisations in new research fields, as seen in many other developed countries. The foundation of the nuclear energy research centre Seibersdorf in 1956 (now ARC – Austrian Research Centres) remains one of few exemptions.

[1]) Higher Education Expenditures on Research and Development.

[2]) Germany: 1995; Switzerland: average 1992/1994.

3.2 Evolvement of the funding system

R&D-project funding as a financing instrument directly linked to performance and with potentially higher steering power was introduced relatively late. The basic principals of the **R&D-funding system** as it has functioned up to recent years, were laid down in the second half of 1960s. With the Research Promotion Act the two main funding bodies FFF (Austrian Industrial Research Promotion Fund) and FWF (Austrian Science Fund) were established. Interestingly on both sides (industrial innovation as well as scientific research) a basic science funding model was applied. Basic principals were: concentration on bottom-up project funding administered by fairly autonomous funding agencies with the main beneficiaries dominating the steering boards. The third major funding agency, the ERP (European Recovery Programme) Funds, entered the STI-funding scene in the early 1980s, when it started to expand its formerly investment focused funding portfolio towards innovation and new technologies.

In retrospective, the foundation of FFF and FWF as two autonomous funding bodies with a fairly narrow mandate on bottom-up project funding set out important conditions for the evolvement of the STI-policy governance structure:

- Short and medium term steering power at the policy level has remained limited as big shares of available financial resources were tight up with general university funds and basic funding of the major research performers in the public realm.
- Bottom-up project funding has remained the dominant funding instrument for industry sector throughout the last three decades.
- The political system with relatively long periods of great-coalition governments as well as the strong role of social partners further supported the formation of an out-balanced system with carefully designed division of influence on the political level. The fact, that up to now the STI-policy agenda has remained distributed among three ministries is one of the most obvious results of this specific political culture, which seems to have ended with the last big-coalition government in year 2000.
- The high degree of independence and the strong involvement of beneficiaries in the steering process of funding agencies reduced the risk of ad-hoc political intervention at the price of reduced steering power. Within the described setting the funding agencies perceived themselves more as lobbying organisations serving their beneficiaries rather than as instrument to implement STI-policy.
- Within this balanced and mostly self-sufficient system, priority setting along selected strategic fields as well as the introduction of new funding instruments remained difficult.

Overall, in the Austrian STI-system as it evolved in the post-war period the balance between conservative and innovative forces seemed to lean clearly towards the preserving side. From the perspective of policymakers the room for manoeuvre was

fairly limited in short and medium term. Be bulk of available resources were tight up with general funds and not disposable for strategic reorientation. Finally, the strong involvement of social partners together with an outbalanced political system dominated by the two major parties favoured a system with broadly distributed responsibilities and influence among the most influential stake holders and ministries.

Against this background, the STI-system has relied for a long time on three fairly separate research communities with the biggest being in the university sector and relatively small ones (compared to other developed countries) in public research institutes on one hand and in the industry sector on the other hand.

3.3 Establishment of new agencies and research organisations

At the latest in the course the oil-price shock in the 1970s the need for a more strategic approach in STI-policy became evident. This was the time when the first technology programmes (energy technology) were launched by responsible ministries. The pressure to take up new challenges in new ways increased with the continuous deterioration of the technological competitiveness of the big industry sectors. Looked-in in low- and medium tech sectors structural change and exploration of new technological fields has been brought on the policy agenda in the 1980s. Accordingly mechanisms for addressing specific technological fields as well as perceived deficits in the absorptive capacities and innovation management of the enterprise sector had to be explored.

Supported by the general commitment of the government to significantly raise the level of public spending on R&D, the portfolio of support measures has been widened extensively in the second half of the 1990s. At the same time a range of new agencies specialising on delivering specific instruments entered the scene.

The following table lists the main milestones in the evolvement of Austrian STI-system.

Exhibit 5: Evolving STI-system, milestones

1954	Bürges	Bürges was set up as a bank specialising in the provision of equity capital for small and medium sized companies. Together with FFG it evolved as one of the two major agencies providing specific capital guarantee products for start-up companies.
1954	ACR	Austrian Cooperative Research (ACR) was established as the umbrella organisation of the cooperative research facilities of the Austrian business community
1956	ARCS	Foundation of the Austrian Nuclear Research Centre Seibersdorf. After Austria opted out of the nuclear energy production (plebiscite 1978) ARCS diversified its research portfolio into areas like new materials, environment research, systems research and livescience.
1959	LBG	Ludwig Boltzmann Gesellschaft. This network of research institutes tackles mid-term, use-oriented research, but do not involve industry. The 135 Boltzmann institutes together employ only 200 people, and are mostly located within universities. The Society is at present relaunching its activities, aiming to link research better with research users and to reduce the fragmentation of the institute system it manages. It has an annual budget of 12M€.
1962	ERP	The ERP Fund was established under the Marshall Plan for European reconstruction after the Second World War to support business development. ERP focuses on supporting technology transfer, R&D and innovation projects that are rather close to market and require significant investments in order to be realised. Support is primarily in the form of loans and guarantees.
1967	FFF	FFF provides bottom-up project funding for the industry sector. It focuses on pre-competitive research and tries to address specific areas (technology fields, sectors) via priority funding lines. Its budgetary scope has continuously increased in the last decades and operates now at the level of around 120 million cash-value of funding.
1967	FWF	FWF is the main funding source for scientific research. After continuous increase during the last decade the available budget to be spent in one year has come close to 100 million €. The bulk of it is still spend on bottom-up defined projects from the university sector. However during the last years FFF increased its efforts to concentrate funding sources on high potential areas and scientific teams.
1969	FGG	In addition to Bürges, FGG provides equity capital for start-up companies as well as tailored guarantee products in specific technology fields..
1972	ASA	Austrian Space Agency (ASA) was set up by the ministry of transport and innovation with the task of coordinating Austria's space activities. In recent years, it has edged into a wider role in high technology innovation programme management (for example in nanotechnology) and operating innovation-related awareness and information campaigns on behalf of BMVIT.
1984	Innovationsagentur	The innovation agency has launched a range of soft measures addressing perceived deficits in: the management of intellectual property rights (TECMA), and in the access to market and technology information (Tecnet). Furthermore the innovation agency has set-up the first Austrian business angel network (i2) and runs several innovation prize-competitions.
1987	ITF	The innovation and technology funds (ITF) was set-up as virtual funds steered by a policy dominated board (Kuratorium) and administered jointly by ERP and FFF. With the establishment of ITF technology programmes as a new way of targeting public R&D-funding was introduced.

1989	CDG	Christian Doppler Gesellschaft (CDG) was established in 1989 and supports fairly small-scale co-operations between industry and academic research, using on-campus CD laboratories for the purpose. These are, in effect, similar to the Kplus competence centres, but operate on a much smaller scale. In 2003, the CDG had a budget of 11.3 M€ and supported a total of 44 companies and 9 universities across 33 individual 'CD Laboratories'.
1993	BIT	BIT was set up in preparation of Austrian membership of the EU. It provides information and practical help to Austrian applicants to the EU R&D and innovation programmes. Its beneficiaries include both companies and parts of the knowledge infrastructure. It hosts the Austria Innovation Relay Centre, providing technology and partnership brokerage.
1998	TIG	Technologie Impulse Gesellschaft (TIG) was established in order to run the K*plus* competence centres programme, which brings together industrial consortia and academic research over a seven-year period. TIG has since grown to become the specialised agency dealing with programmes that aim to create some degree of structural change or change in the way institutions work. Thus, several of its programmes address science-industry links. All TIG's instruments use rather formal calls for proposals and competitive processes for selecting projects. Its 2002 budget was some 15 M€.
1993	Polytechnics	Polytechnics have been set-up to expand the portfolio of tertiary education. The aim was to offer qualification close to industry needs with immediate practical relevance. Furthermore polytechnics should help regional states with no university infrastructure in place to round up their education portfolio.
2000	RTD-Council	The Council for Research and Technology Development was set-up by the new government coalition as an advising body to the government at federal level as well as for regional authorities. This task involves development of long-term strategies as well as monitoring functions.

The presented milestones can be read as a list of innovations the system put forth to react on perceived challenges. At this level of observation innovations stand for new funding agencies and research performing bodies with more or less specified tasks and portfolios. One level below the portfolio of initiatives, programmes and platforms launched by those agencies has flourished. A survey conducted by tip[3]) in preparation of the technology report 2003 revealed 115 different measures, which were active at the federal level at the time the survey was carried out.

The latest entry in the presented list of organisations established refers to the governance structure of the system itself. With the establishment of the Council for Research and Technological Development the government reacted on a perceived lack of strategic intelligence within the system. As an explicit measure to improve coherence within the system the establishment of the Council sets the starting point for the reorganisation process which has been launched in the same year and is still under way these days.

The evolvement of the STI-system to some extent reflects also the upcoming of new concepts and heuristics. With its reliance on three fairly separate pillars (universities, non-university research institutes and enterprise sector) and its funding system focused on bottom-up funding, Austria implicitly followed the linear understanding of scientific performance and technological change throughout the 1960s and 1970s.

In the 1980s things seem to change in a substantial way. With the establishment of the Innovation Agency (Innovationsagentur) in 1984 public support of firm's innovative activities went beyond the mere financial aspect. It offered support in management IPR issues and gathering market information.

In 1987, the Innovation and Technology Fund (ITF) was established, so that the Ministry of Public Economy and Transport could integrate innovation into its activities and in order to allow the funding of larger innovation projects than those contemplated by FFF – while, in fact, FFF played a central role in the administration and implementation of research-based projects approved by this new fund. ITF gave the ministries a potentially powerful instrument for bypassing FFF's focus on 'bottom-up' funding by running their own 'top-down' programmes and for developing a national research and innovation strategy (see also *Knoll,* 2004).

On the side of scientific research and higher education the most influential change came with the introduction of polytechnics. They were established in reaction of the perceived lack of high qualified personnel in general, high drop-out rates at universities and deficits in the regional distribution of tertiary education.

Exhibit 6 illustrates the positioning of the various agencies and new research performers within the broader STI-system.

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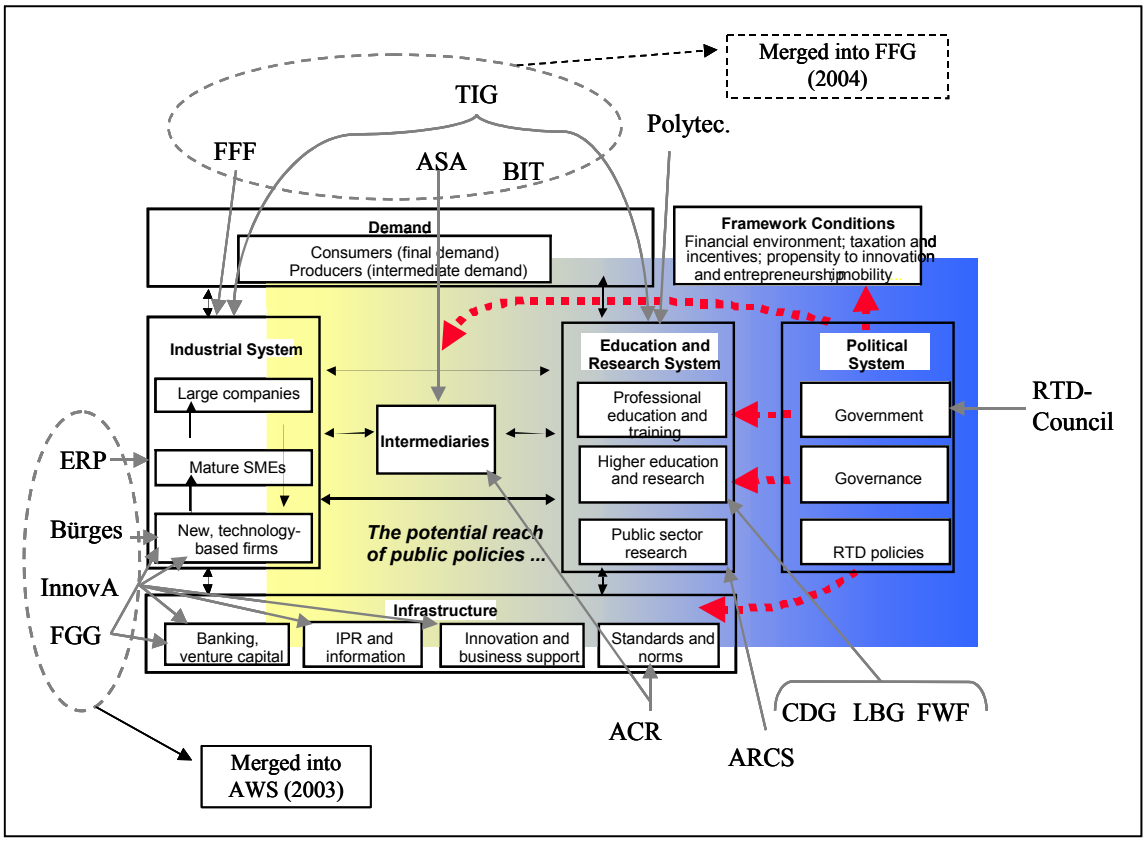
[3]) tip is a research and consulting platform established and financed jointly by the ministry of transport and innovation, the ministry of education and science and the ministry of labour and economic affairs.

Exhibit 6: Policy delivery in the Austrian STI-system



Source: based on: Erik Arnold and Stefan Kuhlmann, RCN in the Norwegian Research and Innovation System, Background Report No 12 in the Evaluation of the Research Council of Norway, Oslo: Royal Norwegian Ministry for Education, Research and Church Affairs, 2001.

As seen, the Austrian STI-system has evolved a range of new agencies, research performing institutions and policy advice bodies during the last three decades. Interestingly the rate of "policy-innovations" seems not to be stable over time. Similar to what Schumpeter observed for industrial innovations it seems also to apply within the STI-policy system itself: Policy-innovations seem to cluster in time.

3.4 Perceived challenges

Before we explore the governance structures in more detail the following section gives a short summary of major issues one can find on the STI-policy agenda in these days.

As stated in the first chapter of this paper, STI-policy only established itself as a policy field on its own right in the last decade. The emancipation of STI policy was further supported by a number of developments which seemed to change Austria's economic positioning within the European context in a profound way: To mention here are:

- The transition of **eastern European countries** increased the competitive pressure most of all in Austria's low- and medium tech industry.
- In 1995 **Austria jointed the European Union**. In the pre-accession period it proved hard to mobilise the Austrian scientific community to actively participate in the EU-FP. Thus internationalisation and integration into the wide EU-context became an import challenge for STI-policy.
- Beside these political developments a range of **new technology fields** evolved attracting not only financial markets but also the STI-policies. Against this background STI-policy also in Austria moved more and more into the centre of political attention. Due to size and industry structure Austria seemed poorly prepared to exploit these new opportunities.

Particularly the opening up of eastern European countries and the European integration created a sense of urgency. Being confronted with new competitors in low and medium tech sectors on one hand and lacking obviously behind in new markets, put the Austrian paradox (good economic performance coupled with low R&D-spending) more and more under question.

The challenges, which raised most political attention - beside the general conviction, that more financial resources are needed - can be grouped in four main blocks:

- **Low R&D-intensity of the enterprise sector**: As already shown, the share of R&D-expenditures of the enterprise sector on total R&D-expenditures has been extremely low in Austria compared to other EU-member states. Partly this is related to the economic structure. Another important characteristic in this context is seen in the lack of big R&D-intensive firms. In the translation of these deficits into policy strategies a strong emphasis was put on enhancing the leverage of public R&E-funding on private R&D-expenditures. Most outstanding examples of way to improving the leverage are the various competence centres programmes which introduced fairly advanced public-private partnership settings. Here public funding is explicitly linked to long-term commitment of private sector to bring in substantial own financial resources. Beside direct measures additional fiscal incentives were introduced to mobilize additional private resources.
- **Structural change and new markets**: Persistent low rates in the creation of new companies together with weak positioning in new high-tech markets raised concern about the entrepreneurial drive of the Austrian economy as a whole. A range of support measures for increasing the number and quality of business start-ups have been launched during the last decade. In this context another weakness of the Austrian innovation system became obvious: Austria lags behind when it come to availability of risk capital. Even though the gap to its European counterparts was shrinking during last three years Austria remains at a low level.
- **Fragmented science base.** For a long time Austrian science policy was reluctant to actively encourage the creation of critical mass in selected scientific fields. The

university sector has relied to a high extent to general university funds, which again created not the environment to develop patterns of scientific specialisation. Fragmentation and mediocre scientific output were the results of this hands-off approach. Against this background science policy increased the degree of autonomy of universities (University Act 2002) and introduced a range of governance mechanisms to enhance priority setting and professional management.

- **Co-operation.** Since the heuristic of national innovation systems was brought into the Austrian debate on STI-policy, enhancement of the co-operation culture both within the enterprise sector as well as between scientific research and industrial innovation became an integral element of almost every new policy measure to be launched since the mid 1980ies.

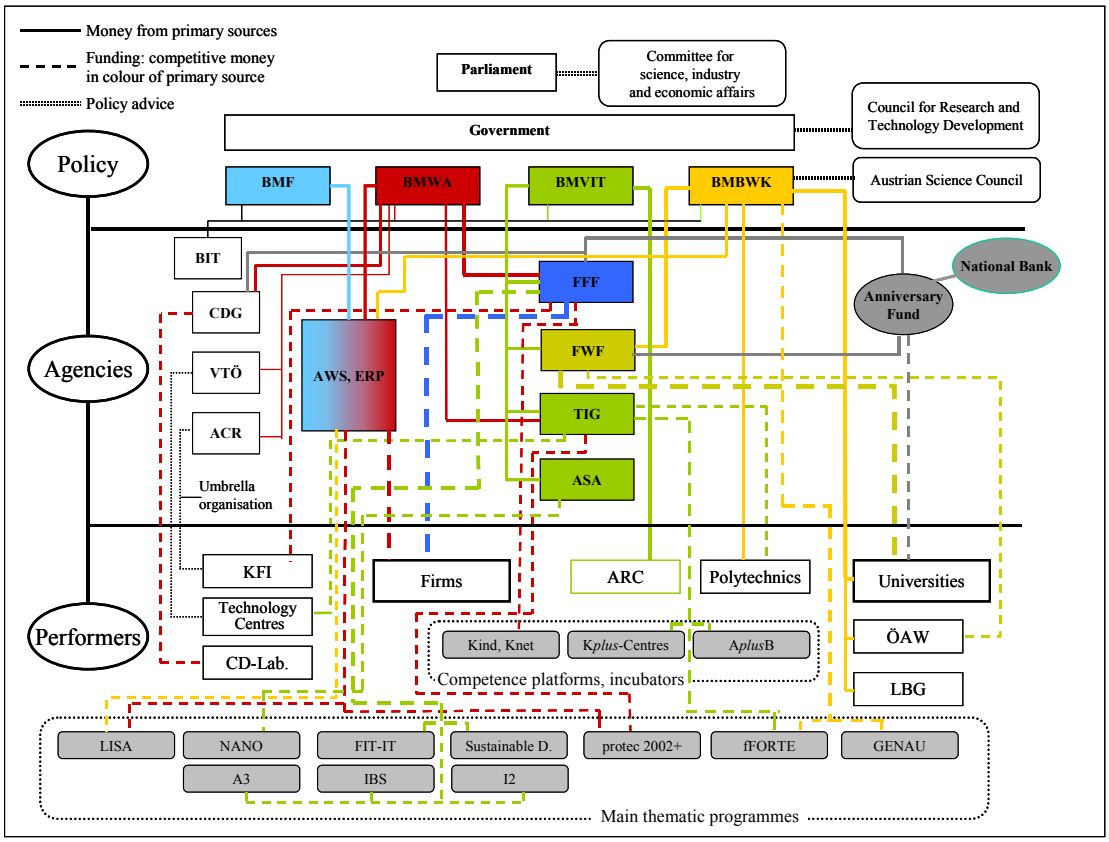
The perceived challenges highlighted above address specific deficits of the Austrian innovation system. What is interesting though, is that almost every challenge or bottleneck brought into the discussion is underpinned by international benchmarks. Apparently, the underlying rational is still strongly anchored in the logic of a catching-up country trying to reduce perceived gaps to a peer group of foreign countries. An illustrative example of this lagging-behind attitude is the "National Research and Innovation Plan" brought forward by the Austrian Council for Research and Technology Development[4]) in 2003. The empirical evidence provided to underpin the proposed strategies consists mainly of elaborations of recent benchmarking exercises.

4 Overview of the current innovation system: Key actors and roles

Exhibit 7 shows the institutional map of the Austrian STI-policy system. The map differentiates between three levels: policy-level, agency-level and performance-level. Flow of money (lines) and ownership (colour) are used to illustrate the basic interrelations between different players.

[4]) *Austrian Council,* National Research and Innovationplan; Vienna 2003.

Exhibit 7: The Austrian STI-Policy map, funding relations



Source: Technopolis.

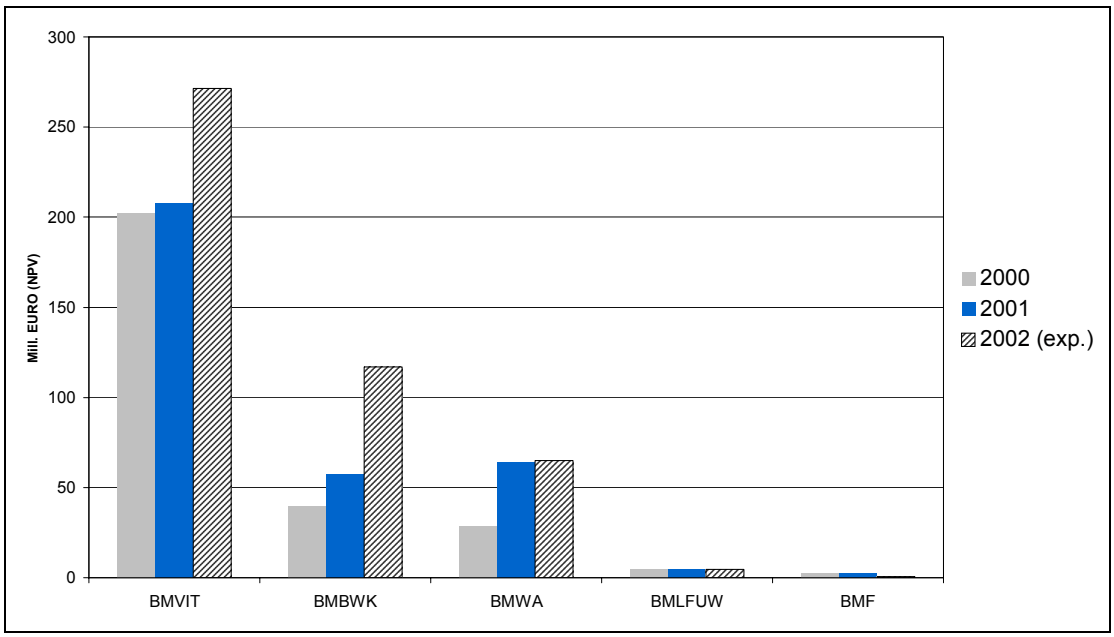
4.1 Key players at the policy level

At the policy level core responsibilities are distributed across three ministries. The ministry for Education, Science and Culture (BMBWK) governs the higher education sector including universities, polytechnics and the academy of science. The Ministry for Transport, Infrastructure and Technology (BMVIT) is responsible for the major non university research organisations. Moreover most of the technology programmes implemented so far in Austria have been launched by BMVIT. The third ministry, which has innovation and technology policy issues on its agenda, is the ministry for Economy and Labour (BMWA). It supports a range of organisations of the Austrian innovation support infrastructure for SME's. To name here is the association of Austrian Technology Centres (VTÖ) or the Austrian Cooperative Research (ACR). Beside the infrastructure based policy BMWA has set-up several programmes. Key issues addressed in those are technology transfer, innovation management and mobilisation of equity capital for high-tech start-up.

Exhibit 8 illustrates the distribution of financial resources for STI-related programmes and initiatives. Covered are direct measures. As can be seen, BMVIT and BMBWK and

BMVIT dominate the picture. The first conclusion here is, that STI-issues seem fairly marginalised in other ministries. This can be taken as an Austrian specific, as in other countries significant impulses and resources come from other directions as well (see *Arnold et al.,* 2003; *Boekholt et al.,* 2002).

Exhibit 8: Programmes and initiatives of responsible ministries, in Mill EURO



Source: tip survey 2003.

Even though BMF does not directly get involved in financing STI-activities, it plays an important role within the STI-policy system because it governs the allocation of financial resources and sets at least implicitly standards in design and monitoring of new programs. In this context the establishment of the council for research and technology development was important (see also *Leo,* 2002). Even though the council's mandate does not foresee formal decision power in approving proposed programmes or initiatives, it received it de-facto as the BMF committed itself to follow the recommendation brought forward by the council. Thus the council has been become the central body de-facto allocating additional financial resources made available by the government. In fulfilling this task the council has set up an assessment scheme for programmes including explicit requirements for monitoring and evaluation. From hindsight, the establishment of the council and the commitment of the BMF to listen to its advice brought a new quality into the system. For the first time new initiatives brought forward by the ministries faced a common point of reference and more importantly a kind of referee with real control over the allocation process.

Overall it remains difficult to see the underlying rationale behind the division of labour at the policy level. At first sight responsibilities seem to be bundled in ministries along

specific target groups. In a simplified picture BMBWK addresses the scientific research community, whereas BMWA focuses on SME related issues and BMVIT deals with the big industrial R&D-themes addressing the high-performers among the Austrian firms. Underneath this simplified picture however, things become messier. Overlapping can particularly be observed between BMVIT and BMWA.

The most illustrative example in this context are the competence centres programmes which both ministries have launched in parallel during the last five years. K*plus* launched by BMVIT and managed by TIG, was the first. BMWA followed with the establishment of Kind and Knet, both managed by FFF. All three programmes address the science-industry interface by supporting the establishment of co-operative research platforms with a strong involvement of industry partners. All three claim a high level of aspiration in terms of scientific quality and aim at enhancing the creation of critical masses in areas of strengths. Real differences between the programmes can be observed only in involved funding volumes, timeframes and, more generally, styles in programme management.

4.2 Key players at the agency level

Exhibit 7 shows that each of the three ministries have at least one funding agency within their area of responsibilities. Consequently the positioning of the funding agencies seem to reflect the overall orientation towards specific target groups of their mother ministry. At the side of scientific research FWF is the main funding body university researcher refer to at the national level. On the side of industry research and development FFF and ERP are the main funding organisations. The division of work between FFF and ERP follows roughly the innovations cycle, with FFF covering the research part and ERP supporting closer to market development work and innovation oriented investment activities. The described division of labour reflects the historic mission of the funding agencies.

In the last decade R&D-funding in Austria sow some substantial changes which altered also the division of labour at the agency level. Additional public funding together with increased programme orientation and the retreat of the policy level from programme implementation lead to a broadening of the portfolio of most funding agencies as well as the establishment of new ones. In practice the assignment of agencies to ministries does not any longer go along with the flow of money (see Exhibit 7). Agencies can implement programmes for different ministries. The important message here is, that growing diversity of funding instruments lead to a fragmentation of policy delivery. Several agencies operate next to each other with no clear specialisation pattern in terms of target groups, applied instruments, competence and visibility. In this context the evaluation[5]) of the two biggest agencies, FFF and FWF came to following conclusion:

[5]) *Arnold, et al.,* Evaluation of the Austrian Industrial Research Promotion Fund (FFF) and the Austrian Science Fund (FWF). Synthesis report. Vienna 2003.

- "There is a wide diversity of governance practice and therefore unclear interfaces between the ministries (as principals) and the agencies (their agents). In some cases, a ministry even simultaneously maintains different governance styles in its relationship with a single agency about different activities. This incoherence helps prevent ministries and agencies alike from building the right amount of strategic intelligence to maintain a coherent division of labour".
- "Differences in governance styles limit the possibilities for individual agencies o serve multiple ministries. The growing importance of knowledge and research in the responsibilities of all ministries means that such agencies working for multiple principals will increasingly be needed".

This assessment highlights the costs of organisational fragmentation. Interestingly, this rather black picture has not be drawn for the first time. Fragmentation both at the policy level as well as the agency level has been on the policy agenda for quite some time. It has been highlighted already in the policy white papers on the strategic orientation of the Austrian STI-policy in 1994 and 1996. The most recent signal in this context came from the council when it stressed the need for re-organisation of the funding-system in its research and innovation plan in 2003.

Apparently there has been a considerable amount of inertia within the system (in this context see also *Kuhlmann,* 2002) as far as the organisational structure is concerned. The observed time lag between the perception of the problem and activities to solve it was fairly big.

As the evaluation of FWF and FFF has shown, one of those conserving powers has been the high degree of autonomy of the established agencies reinforced by the strong involvement of beneficiaries (universities at the side of FWF and firms at the side of FFF) in their managing boards. Consequently funds acted more as servants of their beneficiaries rather than as agents of STI-policy. Furthermore the strong involvement of beneficiaries seems to have caused a general reluctance to adopt new, more strategically oriented ways of funding. Apparently a fairly autonomous funding system with strong involvement of beneficiaries in the allocation process finds it difficult to set priorities. This partly explains that programming as one way to concentrate available resources on selected priority areas found its way into the Austrian funding practice relatively late.

Against this background the last initiatives to re-structure the agency level can be read as attempts of the principal (STI-policy maker) to recapture steering power back from its agents.

First steps to reduce fragmentation on the agency level were taken by BMWA in 2003 when it merged three agencies into AWS (Austrian Wirtschaftsservice). On the side of BMVIT a similar step is under way. In September 2004 the new law for the establishment of the Forschungsförderungsgesellschaft (FFG) will become operative. FFG brings FFF, TIG, BIT and ASA under one roof. Both mergers are expected to substantially change the Austrian STI-arena.

To sum up, the Austrian STI-system as described above has seen an increasing degree of fragmentation as far as number, size and positioning of agencies are concerned. Whereas the organisational structure at the agency level was perpetuated throughout the 1980ies and 1990ies, the pressure to take up new funding modes and set priorities increased in the same time. Other than in countries with big integrated agencies which tend to build up own strategic intelligence as well as design capacities, the Austrian agencies largely remained focused on their historic and, in most cases, rather narrow mandate. Faced with fairly autonomous agencies the ministries more and more got involved in design and even implementation of new measures. This further contributed to the "wide diversity of governance practice".

5 Governance: Structures and instruments

After mapping the Austrian STI-system in its basic configuration the following chapter explores observed governance practice in more detail. As the Austrian STI-policy system is currently in a process of reorganisation involving the mentioned mergers at the funding agency level as well as a far reaching reorientation of the university sector, the chapter first recapitulates this development in the light of its expected implication to the governance of the whole system. The following parts explore more specifically governance issues, which have been identified as central within the NIS-Monitoring project (see conceptual paper). In sum we aim at a more profound understanding of how the Austrian STI-system functions and what can be learned from it in an international context.

5.1 Changing governance regimes

In recent years governance regimes have changed considerably. Most of all research policy has made some substantial interventions introducing new players as well as changing governance of established ones. Up to the mid 1990ies research policy took place in a more or less self-sufficient policy environment with BMBWK being the master ministry and FWF the main funding source for research projects. Up to recent years universities were part of public administration. Accordingly research policy had a fairly limited portfolio of steering instruments on hand. It relied most of all on allocating general university funds and the assignment of new professorships. The room for strategic orientation and priority setting was fairly limited. Even more so as competitive funding at national level remained relatively small in volumes and mostly reserved for bottom-up project funding via FWF.

At the latest with Austria joining the EU in 1995 the need for a more strategic approach became obvious. Fragmentation and fairly mediocre scientific performance raised concerns about whether Austria's scientific community will be able to fully exploit the opportunities for positioning itself within the European research community. Furthermore the danger, that Austria's science base is becoming a real bottleneck for the future performance of the whole innovation system became more and more

evident. More so as with information technology and biotechnology two high-tech markets showed, that scientific research can have immediate economic relevance. Most of all the later draw the attention to science-industry linkages as one limiting factor for the performance of the whole STI-system. In this context Austria's science system was perceived as rather isolated from enterprise sector resulting in poor economical relevance of produced research output and at least questionable practical relevance of curricula's in place.

With the increasing pressure on the science system to better link up with the rest of the innovation system the ground for substantial changes was prepared. The first refers to the **establishment of polytechnics** in 1994 which was prepared by the respective law in (Fachhochschul-Studiengesetz) 1993.

Polytechnics as a new player in the Austrian science system were established to

- improve practical relevance and efficiency of tertiary education,
- better meet industry demand for high qualified personnel in emerging high-tech sectors (most of all IT-related), and
- broaden the regional base of science and qualification infrastructure.

All three reasons can be read as deficits of the existing university sector. With the establishment of polytechnics universities lost their monopole status as the only provider of tertiary education. Consequently, for universities the pressure to become more responsive to perceived needs as well as to sharpen research portfolios increased. The lesson to be learned in this context is, that policy choose to address perceived deficits by bypassing the dominating player (in this case universities) as it establishes new institutions and indirectly unleashing competitive powers in a formerly monolithic sector. The very same pattern was observed in the Austrian funding system, when TIG (Technologie Impulse Gesellschaft) was founded in reaction to the reluctance of the established funds to take up new funding instruments.

The second substantial change came with the **university reform** which started with the University Act in 2002. The new regime will fundamentally change the governance of the whole university system. While traditionally 'autonomy' was mainly restricted to the freedom of scholarship and teaching, the diversity of theory, methods and doctrines and a certain autonomy in the recruitment of academic staff, the Universities Act 2002 has broadened the scope of autonomy to the freedom of (i) allocation of budgets, (ii) of curricula planning, (iii) the internal organisation of the universities and (iv) to the autonomy of recruitment of staff, which is expressed by the fact, that staff members are no more employees of the ministry, but of the university.

Governance between the state (i.e. the ministry) and the university is restricted (i) to global budgets, based on a performance contract and (ii) the joint nomination of the university council. Generally, government has withdrawn from direct intervention, relying mainly on 'context steering'.

The last example we mention here for illustrating new approaches in steering the science sector refers to the establishment of **Christian Doppler (CD) Laboratories** in 1998. From hindsight this has been an interesting attempt to directly link scientific research to industry needs. The starting point was an obvious innovation deficit within the state own industries and increasing worries, that the only big players in the Austrian industry are looked-in in old trajectories. To help the industry to enter new markets and technological fields the industry should receive direct access to selected research teams at universities. In a joint effort of the responsible ministry (BMVIT) and the Austrian industries (holding of state own industries) a cluster of laboratories along technological fields of strategic relevance for the state owned industries has been set up. The majority of the so called Christian Doppler Laboratories were hosted by universities. Financing was provided in a public-private partnership model carried by the ministry and industry partners. Even tough reorganisation of state own industries as well as tight budgets put the future perspective of CD-laboratories under question three years ago they have managed to position themselves successfully as a institutionalised form of industry lead scientific research.

Overall the described changes point to a profound change both of roles as well as governance structures. First of all, policy has reduced its involvement in the management and administration of performing bodies. With the new university regime **performance contracts** replace public administration ruling. The second observation which can be preserved is the fact, that policy at least implicitly can create **competitive environments** within the system. Finally the examples indicate an increased willingness to create new organisations which focus on a specific problem.

5.2 Policy Mix

The status of STI-policy within the broader policy arena obviously improved during the last years. As result not only the budgets increased but most of all the diversity of measures, initiatives or programmes in place. A survey conducted by tip in preparation of the technology report 2002 revealed about 120 different schemes in operation only at the national level. Even though there are still discussions about possible gaps in the promotion portfolio ("Förderlücke") the attention has shifted from the identification of gaps to the reduction of diversity ("Förderdschungel"). The National Research and Innovation Plan[6]) put forward by the council in 2003 points to the same direction, when it organised its suggestions along the following 10 principals:

- greater concentration on activities with a strong leverage effect from public to private funding
- achieving critical masses and dimensions
- emphasising market economic elements

[6]) *Austrian Council,* National Research and Innovation Plan, Vienna 2003.

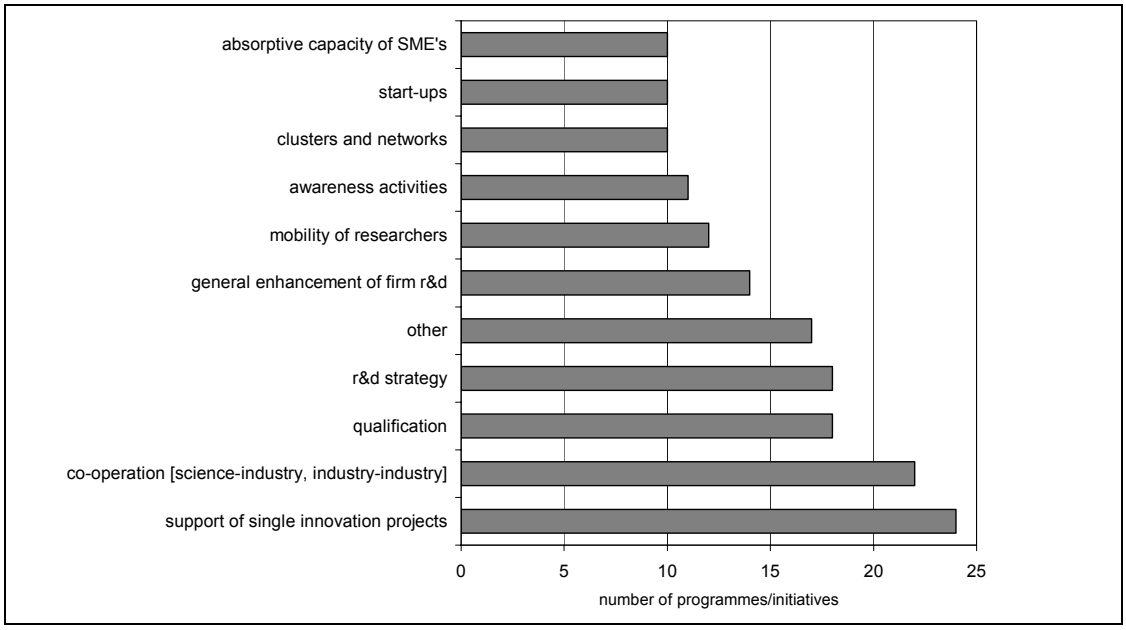
- promoting excellence in basic research
- close linkages of RTI and qualification policy issues
- improved co-operation of various R&D-producing sectors by "solving" the interface problem
- simplification of the complicated institutional and organisational promotion structure
- improving coordination between national government and the Länder
- planning certainty for programmes and initiatives
- quality assurance systems for RTI-initiatives – improving the evaluation culture

Whereas the first six principals highlight priorities in the existing portfolio, the last four explicitly address the governance of the system.

The list of issues addressed by various programmes initiatives (see Exhibit 9) gives a rough picture of where the priorities in the current policy portfolio lie. As can be seen, single innovation projects can still refer to the highest number of support measures. The second highest entry ("co-operation, science-industry, industry-industry") however points to a profound shift in the promotion system. **Encouraging co-operation** within different actors of NIS has become one of the standard goals of new measures. Interesting in this context is, that co-operation deficits have long been perceived as a specific Austrian characteristic. Having seen, that enhancing co-operation has become one of the most prominent goals of STI-policy in recent years, it remains to be seen whether the stated deficit is still valid. The question to be raised here is, to what extent policy is able to fine-tune its interventions over time. As some of our interviewees pointed out, fostering of co-operation has increasingly become a goal in itself rather than a mean of achieving primary goals.

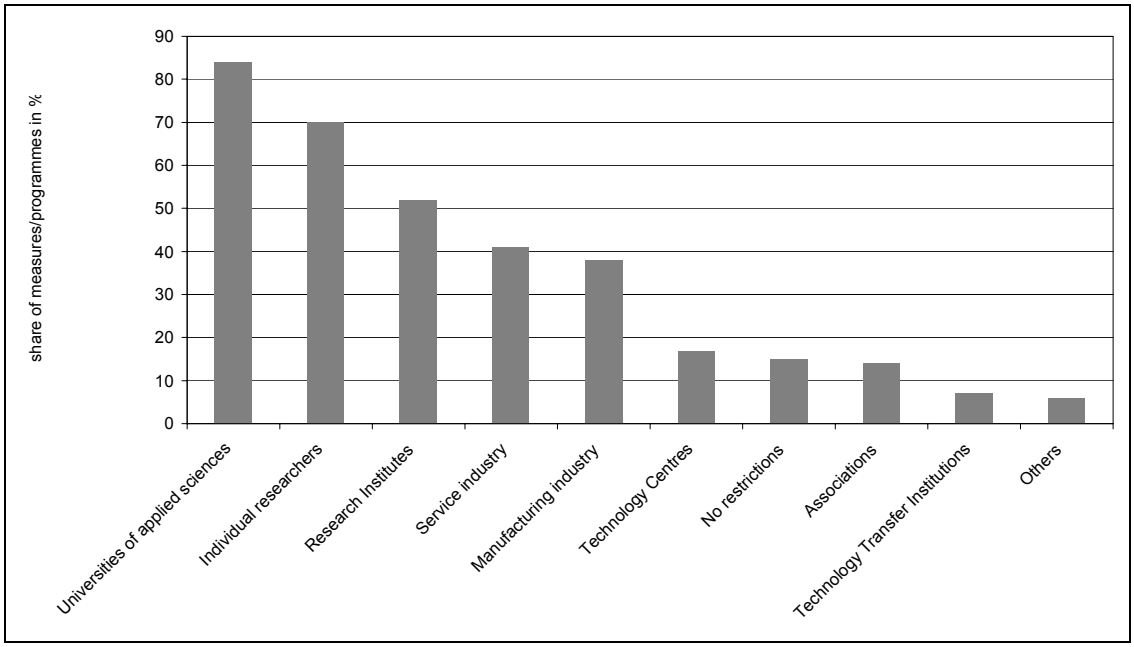
Another remarkable observation revealed by Exhibit 9 is the fact that every issue is at least addressed by 10 measures in parallel. Even though the issues do overlap and may be difficult to assign to single measures the presented numbers seems high. Even more so if we consider, that the whole range of measures launched at the regional level is not included in this analysis. This again, underlies the picture of an overly fragmented STI-portfolio.

Exhibit 9: Issues addressed by various programmes/initiatives [1,75 entries on average]



Source: tip survey.

Exhibit 10: Target groups of measures/programmes in % (multi-entries)

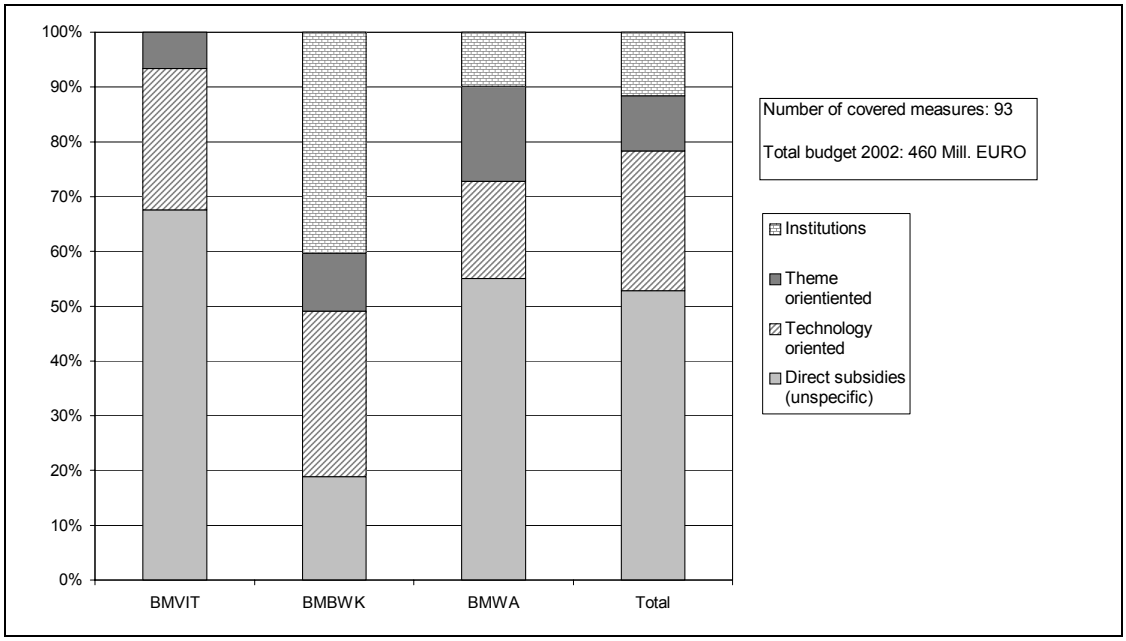


Source: tip survey.

Bringing the analysis to the level of addressed target groups (see Exhibit 11) reveals a somewhat surprising picture. The presented ranking sees public research bodies (universities and research institutes) together with single researchers clearly ahead of industry. This is partly due to the used indicator: Number of measures in place does not correspond with budgets devoted to target groups. As most programmes and measures address more than one group, it is difficult to isolate involved financial resources. Nevertheless the observed pattern points to an interesting way of how interventions are targeted to groups. In the Austrian case the scientific community seems rarely excluded from specific measures whereas the number of available support schemes for the enterprise sector tends to narrow down in practice.

The presented picture doesn't say anything about the clustering patterns of groups. As most programmes established in recent years flag enhancement of co-operative R&D as one of their goals we would expect the appearance of typical or dominating networks. So far the empirical evidence on network or clustering effects of various measures is still meagre. The relevant point at this stage is that **multi-actor programmes** have become a significant element in the policy mix (see also *Schibany et al,.* 2002).

Exhibit 11: Distribution of thematic orientation of support by providing ministry, 2002



Source: tip survey.

The last chart shown in this context refers to the broad orientation of the measures in place. Exhibit 11 uses net present values of covered measures (N=93) and illustrates the respective distribution. About 52% goes to unspecific direct subsidies. In this

category we find most of all bottom-up project funding as it is provided by the three biggest funding agencies (FWF, FFF and ERP). Theme oriented and technology oriented measures categorise specific programmes[7]). Together their share amounts to about 37% of available funding. The remaining 10% goes to specific support measures for institutions (excluding global university budgets).

At the level of the three main funding ministries the distributions vary. BMBWK spends about 60% on institutional funding, whereas BMVIT has no specific funding schemes for institutions. First of all the distribution reflects division of labour at the policy level with BMWK and BMWA being responsible for a wide range of the science and technology infrastructure and BMVIT for the main funding agencies operating extensive bottom-up funding. As for the whole system it remains difficult to reflect on whether the distribution is appropriate or not. The general conviction that Austria's funding system is too strongly focused on unspecific direct subsidies however is not confirmed by the presented numbers.

The presented policy mix underlines the relevance of the strategic guidelines brought forward by the Austrian council. In its core the council pointed to the need for consolidation and clear priority setting in the portfolio. As it stands, portfolio management remains difficult.

So far we have discussed only direct support measures. This of course is only one part of the policy mix. Indirect measures (taxation) or regulation have not been discussed yet. As for illustration of the way Austria has used regulation to serve STI-policy aims, we refer to the two Austrian case studies on Information Technology (Joanneum, Technopolis) and Transport Technology (ARCS).

Indirect measures have become increasingly important in Austria. Recent tax reforms have brought a significant expansion of tax credits related to R&D-activities. Compared to other member states has now one of the most attractive tax credit regimes for R&D-intensive firms. Interestingly, up to now empirical evidence on mobilisation effects, distribution over branches and broader impacts are not available as no specific monitoring is in place. The message here is that portfolio management that covers the whole range of instruments requires a comprehensive monitoring.

5.3 Programme orientation

The way policy is delivered has changed substantially changes during the last decade. In retrospect the most influential trend driving the changes has been the increasing separation of policy making and policy implementation. Traditionally ministries remained strongly involved in policy implementation and direct funding of R&D activities.

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[7]) The distinction between theme and technology-oriented programmes is not always clear, as some theme oriented programmes can address specific technologies as well. One illustrative example the programme on technologies for sustainable development which addresses in one priority funding line energy technology.

With the upcoming of technology programmes as a way to mobilise R&D activities in selected themes the pressure to outsource implementation tasks increased. Pressure came first of all from limited management capacities in the public administration. Under this constraints first outsourcing steps were usually limited to single tasks in the implementation process. An interesting and well documented example was the first transport technology programme launched by BMVIT in the mid 1980ies. Various steps of the implementation was distributed across three agencies and consulting firms, with, ITF being the virtual funding body, FFF handling the financial execution and AMC being the programme manager and BMVIT supervising and coordinating the whole implementation process. The evaluation of the programme[8]) not only recognized the benefits of outsourcing (increased transparency, avoidance of role conflicts) highlighted also the drawbacks of the chosen model (high transaction costs, unclear division of roles, management capacity remaining tight up in micromanagement). With this learning experience BMVIT became one of the pioneering ministries that increasingly strove for a clear cut separation of policy and implementations.

Exhibit 12 illustrates the current outsourcing practice in the three main STI-ministries.

As can be seen, in the realm of BMVIT and BMWA outsourcing of policy implementation has almost become the standard model. BMBWK diverges somewhat from this picture. More than half of the covered measures launched by the ministry (24 out of 41) are also implemented there. This has partly to do with the high share of institutional measures, which in practice are support schemes for research organisations. Here the management components seems less important. Thus outsourcing has not become such an issue yet.

From the perspective of addressed target groups increased programming has substantially changed the rules of the game for accessing public support. Following aspect seem most important:

- Programmes do not only have **thematic focuses** but tend to set very **specific requirements** with respect to co-operative settings, information on results, monitoring and evaluation standards.
- **Selectivity.** As most programmes use tenders for project acquisition and selection. Compared to the established bottom-up project funding, rejection rates have turned out to be significantly higher in tender procedures.
- The prize for higher selectivity and more demanding project requirements are generally **higher funding rates** as proportion of project costs.
- **Timing.** In order to participate in tenders applicants have to align their project planning to externally set deadlines.

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[8]) *Ohler F., Arnold E., Jörg L., Corsten, D.,* Evaluation of the ITF-Transport Technology Programme, Seibersdorf 1988.

Exhibit 12: Policy responsibility and programme management

	Policy responsibility			
Programme management	BMBWK	BMWA	BMVIT	Total
BMBWK	24			24
FFF		2	12	14
FWF	7		6	13
BMWA		9		9
ÖAW	6			6
AWSG		11	1	12
ERP		4		4
TIG		1	3	4
ASA			3	3
BMVIT			3	3
BIT		2		2
HIS	1			1
MAK	1			1
ÖAD	1			1
ÖFG	1			1
WKÖ		1		1
Total	41	30	28	99

Source: tip survey.

In sum, policy using increased programming has generally lift the funding bar in Austria. At this stage increased programming seem to foster the **evolvement of communities.** By communities we mean relative stable networks of firms, research institutions and universities focusing of concrete innovation challenges. In this context programs are expected to support the development of critical masses. Ultimately programmes should increase the level of organisation among research performers.

5.4 New ways of interaction between federal and regional STI-policy

As other member states also Austria has seen a regionalisation of STI-policy. Most Austrian regions developed STI-strategies and mobilised substantial financial resources to implement them. This development raised the question about how the federal STI-policy interacts with its regional counterparts. At this stage no clear cut model has evolved as there seems to prevail a high level of diversity among the regions. Whereas some regions rather follow a strategy of **complementarity** others focused their resources on **supplementary funding to federal funding activities**.

Most illustrative in this context is the supplementary funding granted to firms, that successfully applied for project funding from the industrial research promotion fund (FFF). Several regions offer this type of funding. In do so they delegate the project assessment to a federal funding agency. This saves administrative costs and sets

additional incentives for firms to access federal funding resources. From the perspective of federal policy this approach seems to increase the leverage effect of its funding as additional funding provided by regions allows to keep own funding rates relatively low. With respect to efficiency of public funding supplementary funding provided by regions seem problematic. Additionality of total funding is expected to be reduced as funds provided by regions are not likely to have any impact of project size and project orientation. In sum supplementary funding is first of all seen as reward for investing in R&D-activities.

An interesting example of how federal STI-policies can interact with regions is the **K*plus* programme** launched by BMVIT. The competence centres programme supports the establishment of research platforms bringing together scientific research and innovative firms. Public funding is provided jointly by the federal state and regional government. In this setting federal STI-policy sets programme goals and defines the rules for implementation. Participation of regions as co-funding partners in competence centres increases commitment to the programme and the established centres.

A*plus*B and REG*plus* are other examples of how federal programmes set regional impulses. AplusB supports the establishment of incubator facilities at universities or other public research institutions, REG*plus* addresses technology centres and supports competence building and networking activities in the region.

The presented examples indicate an increasing sensibility for how to manage the federal-regional axis. Co-ordination takes place most of all on basis of concrete programmes. Federal STI-policy clearly has taken the leading role. From the perspective of regions federal funding imposes at least implicitly some sort of competition between regions.

On a broader perspective co-ordination between federal and regional STI-policy seems underdeveloped. Federal STI-policy clearly has taken leading role both in terms of financial capability as well as in setting the agenda. From the perspective of regions federal policy is most often taken as the starting base on which regional policies can be built up.

5.5 Learning system

The Austrian STI-system is in flux. The trend of separating policy making and policy implementation has changed the governance of the whole system. At first instance the division of roles has become more transparent over time. Furthermore increased programming triggered the establishment of dedicated programme management organisations. This in turn raises a range of management issues. First of all information flows between policy and agency level become crucial as policy makers who are not any longer involved in implementing their policies are deprived from relevant information relating to the success of taken measures. Ultimately the challenge is to develop a learning system aware of strengths, weaknesses and opportunities and able to reflect on past experience.

The following chapter explore the ability to learn of the Austrian system along three critical tasks: (i) strategic intelligence and agenda setting, (ii) stake-holder involvement and (iii) evaluation.

5.5.1 Strategic intelligence and agenda setting

The evaluation of the two major funding agencies, FWF and FFF, found a general deficit of strategic intelligence capacities in the Austrian system. This has to do with a high degree of fragmentation both at the policy level as well as the level of agencies delivering policy measures. In practice fragmentations stands for small organisational units (at the policy level) spread over several ministries and relatively small agencies. In both cases it remains difficult to built up strategic intelligence. Furthermore Austrian ministries traditionally kept a strong involvement in the implementation of measures (even though outsourcing has increased) binding tight resources further, more so as Ministries have suffered from personnel shortage due to continuing recruiting stop.

In lack of own capacity the Austrian STI-policy strongly relies on external expertise. Historically the social partners played an important role in this context as they had huge policy consulting units covering major policy agendas. With their continuous retreat from decision making processes deficits in strategic intelligence became evident.

Against this background the establishment of **tip** as a consulting and information program is an interesting example. tip has been set-up jointly by the Ministry of Innovation and Transport, the Ministry of Science and Education and the Ministry of Labour and Economics. It thus reflects a common need for policy advice based on state of the art research on science and technology policy. The tip-platform was the organisational vehicle to jointly commission research and consulting projects to expert groups. In its first setting (1992-1995) WIFO and ARCS were on the contractor side. Joanneum Research and Technopolis joined the consortia in the running tip (tip III).

In retrospect tip has not only been an institutionalised form of buying in external advice but – probably more importantly – a platform for discussing STI-policy issues overarching fields of responsibilities. In fact, tip played a leading role in introducing the NIS concept to the Austrian discussion. Having said this, one has to main realistic on the role consulting platforms can play. Ultimately they can contribute the agenda setting process and generally improve the information base for STI-policy. They can not however substitute strategic intelligence as such.

Agenda setting

Explicit mechanisms for agenda setting are rare within the Austria STI-system. Agendas seem rather evolve informally and in insular settings.

First attempts to define agendas for the whole STI-system can be traced back to the mid 1990ies when the government commissioned an expert group for the preparation of the White paper on research and technology policy. The latest crucial step towards a

more transparent and explicit agenda setting process was the establishment of the council for research and technological development in the year 2000. One of its core tasks is to develop long-term strategies integrating the whole spectrum of STI-policy. The National Research and Innovation Plan (2002) has been the first input in this context. Unlike the produced white papers which were not binding and left relatively little traces in the policy making process, the National Research and Innovation Plan seems to have more practical relevance. Obviously this is supported by the fact, that the Council has indirectly gained substantial influence in the allocation of financial resources.

To clarify the role of the Council it has to be remembered, that the Council has no mandate for proposing concrete measures. This leaves the question where in system design of new measures is done. Compared to countries with a big agencies (e. g. Tekes in Finland) which often take the leading role in programme design, in Austria the ministries have kept the leading role. Taking the current programme portfolio as evidence base, the majority of programmes has been prepared and designed within ministries. Programmes have become the currency of policy making. They flag areas of influence, create visibility and ultimately determine the influence of policy makers as they supervise programme budgets.

In sum these preconditions create a competitive environment at the policy making level. This is one of the underlying dynamics which lead to the observed fragmentation of measures in place. On the positive side this specific type of **policy entrepreneurship** kept the system innovative and highly responsive to perceived needs.

5.5.2 Stakeholder involvement

Traditionally, stakeholder involvement has been strong in the Austrian STI-system. Again the most illustrative examples are the two main funding agencies (FWF and FFF) with beneficiaries dominating the **steering boards** and thus having a strong say in strategic decisions. In the case of FFF the Federal Chamber of Commerce played a leading role as it nominates the majority of delegates to the presidium.

Involvement of stakeholders has also been institutionalised in the university sector. The University Act 2002 established universities councils for each university. The **University council** has important supervisory functions including the appointment of the rectorate. Members of the councils are appointed by the university senate (internal representation) and the ministry. Observed practice shows that the ministry usually seeks to involve perceived external stakeholders (customers) of the universities. Against this background, university councils can be seen as intermediary between internal stakeholders and external stakeholders.

Another form of institutionalised stakeholder involvement represents the **Austrian council for research and technological development**. Members are appointed by the ministries. In the current composition of the council shows strong representation of

industry (mostly representatives of Austrian innovation champions) and scientific research.

On the level of programme development, involvement of stakeholders is not institutionalised. In practice assessment of needs in preparation of new programmes involves some sort of active communication with potential beneficiaries. Principally the question of how and at what point of time stakeholders are involved proved to be most sensible for final design decisions. The challenge is to remain responsible to articulated needs without allowing, that beneficiaries capture the design process.

Overall involvement of stakeholders is seen at different levels. The influence of interest groups – most of all the social partners – seems to have been reduced in favour of "opinion leaders" directly appointed by ministries to represent their group in various councils and boards.

5.5.3 Evaluation

Programme orientation together with the increasing propensity of ministries to outsource the management part have accelerated the creation of dedicated programme management capabilities at the agency level. Even though explicit competition between agencies is still rare, the pressure to adopt good practice and accepted quality standards in programme management has increased. At the same time evaluation has been increasingly used to assess performance and impacts of launched measures.

The establishment of the Platform Research & Technology Policy Evaluation[9]) in 1996 underlines the progress made in anchoring evaluation as learning instrument within the policy making process. Among the members of the platform one finds the three STI-ministries, the major funding agencies as well as a group of policy consulting and research firms. As for the state of affairs, the platform has launched evaluation standards and runs a workshop programme which aims at improving the spread of good practices in evaluation.

The Austrian council has supported the systematic use of evaluation by introducing evaluation requirements in its assessment scheme for new programmes. Furthermore it has put forth an evaluation strategy for evaluating programmes financed by additional financial resources invested by the government in recent years ("Sondermittel"). With these impulses the Council signals its commitment to evaluation as a policy instrument and positions itself as portfolio manager, that depends on systematic information on performance and impact of launched measures.

Interestingly, neither at the level of policy making (ministries) nor at the agency level evaluation capabilities has been built up so far. Relevant expertise is almost entirely bought in from external firms and institutions. As the response on offered training

[9]) www.fteval.at

workshops by the evaluation platform has shown recently, the need to build up internal evaluation competence seems high.

The following tables summarize the results of the tip survey concerning the use of evaluations. As for the overall evaluation frequency, 30 out of the 110 measures covered by the survey have been evaluated within the last 7 years. Differentiating between ministries reveals that evaluation cultures differ. Whereas BMWA has evaluated 45% of its measures the respective rate for BMVIT is 25% and for BMBWK only 19%.

The focus of most evaluation exercises covered by the survey is clearly the assessment of impacts (see Exhibit 13). Only 36% of conducted evaluations focus on processes and management of measures.

Exhibit 13: Main focus of conducted evaluation, in % of all evaluations conducted within the last 7 years

• Processes and management	36% of conducted evaluations
• Impacts (economic, scientific)	73%
• Quality of work	36%
• Other	33%

Source: tip survey.

Exhibit 14: How have the results of the evaluation been used?

Impacts of conducted evaluation	N	%
Ex-post legitimating of the programme	27	90%
Re-allocation of funds	10	33%
Input for stop-or-go decisions	6	20%
Substantial change of funding policy	9	30%
Change of processes	2	7%
Other	9	30%
Total	30	

Source: tip survey.

Exhibit 14 reveals, that evaluations have most of all a legitimating function (90%). Only one fifth of evaluations are used to make stop-or-go decisions. Only in 2 out of 30 cases evaluations lead to changes of programme management processes.

In sum, quite some progress was made in anchoring evaluation as a helpful policy tool. Nevertheless a somewhat defensive use is observed in the sense, that most evaluations have first of all a legitimating character. The use of evaluation as a learning tool, that helps to continuously improve programme implementation and allocation of resources still plays a minor role. The strong involvement of policy in the implementation of measures partly explains the defensiveness in the use of evaluations.

6 Summary

We have seen that Austria's STI-policy system is currently in a flux with changing steering regimes and substantial reorganisations under way. Against this background the assessment of newly established regimes remains difficult. The main challenge ahead seems to master the re-organisation process initiated by the University Act 2002 on one hand and the reforms of the funding system on the other hand.

Nevertheless it is worthwhile to reflect on the governance of the "old" system. The following table summarizes the main findings.

Organisational setting at the policy level	STI-agendas are spread over three ministries. Historically the ministries were focused on specific target groups with BMBWK addressing the university sector, BMVIT being responsible for the state owned industries and BMWA focusing on SME's and basic STI-infrastructure for firms. This division of labour has been blurred over time. At this stage distribution of agendas at the policy level is perceived as over fragmented. The fourth ministry playing an active role in STI-policy is BMF (ministry of finance). It has recently reorganised the funding basis for public funding and plays and important role in the allocation process. STI as horizontal policy field seem underdeveloped. On basis of funding activities about 95% of public funding of research, technology and innovation is governed by the four mentioned ministries.
Organisational setting at the agency level	Historically the funding system was built on three main agencies. Bottom-up funding of single projects was the prevailing funding instrument. Governance of the funding system was based on strong involvement of beneficiaries with limited steering power left for policy. Increasing programming

	lead to the establishment of new dedicated programme management agencies as well as expanding portfolios of the established ones. In result the funding system became increasingly fragmented. In reaction policy has started a re-organisation process which involves the merger of funding agencies into two new ones.
Policy Mix	Traditionally institutional funding and bottom-up project funding have been the dominating instruments. During the last decade increasing programming together with continuous increase of public expenditures on R&D lead to a high diversity in the policy mix. Institutional funding still plays an important role. General university funds are still extremely high in international comparisons. Indirect measures (taxation) have expanded substantially in the course of the last tax reforms. Systematic management of the policy mix seem underdeveloped.
Steering instruments	Recent changes indicate a profound shift in steering regimes. Overall policy has tried to retreat from the operational level while setting up not control and incentive structures. The most outstanding example of this development is the university reform which introduces performance contracts as the central steering instrument between policy and university.
Strategic intelligence	Corresponding to the high degree of fragmentation the development of strategic intelligence capacities has been difficult. So far policy has relied to a high extent to external expertise. To some extent the establishment of a consulting platform (tip) bringing together the three STI-ministries and several research institutes compensated deficits in strategic intelligence. Furthermore the Austrian Council has taken up strategic tasks. Current discussions on the re-organisation of the funding system brought the question about where to locate strategic "strategic intelligence" capacity back to the agenda. It is expected that involved ministries further retreat from policy implementation and focus on more strategic tasks.
Agenda setting and policy entrepreneurship	Institutionalised mechanisms for agenda setting are rare. Often agenda setting seems to be driven by a specific type of policy entrepreneurship. This has to be seen in the context of fragmented institutional settings, which creates competitive environments at the policy level. In practice competition is seen in programming activities with programmes being the "currency" of the policy making process. Programs flag areas of influence

	and define room for manoeuvre in terms of control of financial sources.
Stakeholder involvement	Involvement of stakeholders is seen at different levels. Institutionalised forms of stakeholder involvement have been established through boards at universities and major funding agencies. Moreover the composition of the Austrian council to some extent represents one form of stakeholder involvement. Overall the influence of interest groups – most of all the social partners – seems to have been reduced in favour of "opinion leaders" directly appointed by ministries to represent their group in various councils and boards.
Evaluation	Quite some progress was made in anchoring evaluation as a helpful policy tool. Nevertheless a somewhat defensive use is observed in the sense, that most evaluations have first of all a legitimating character. The use of evaluation as a learning tool, that helps to continuously improve programme implementation and allocation of resources still plays a minor role.

Lessons

The NIS-MONIT project explores innovation policy governance in different national contexts. Ultimately observed practices should allow to identify something like "successful" models and illustrate lessons. What lessons can be learnt from Austria? At this level of analysis the following three "lessons" seem worthwhile to preserve:

Policy makers act in a competitive environment. More so when areas of responsibilities overlap between ministries. Policy entrepreneurship creates fragmentation and does not substitute strategic intelligence. On the positive side policy entrepreneurship stimulates innovations and responsiveness to policy customers.

To maintain innovatiness while keeping fragmentation at acceptable levels STI-policy systems needs a centre of gravitation and some sort of referee supervising the allocation process and imposing a common point of reference for performing communities and policy makers.

Autonomous funding agencies with beneficiaries in the driving seat tend to preserve status quo. Stakeholder involvement can not compensate for deficits in strategic intelligence at the policy level. Reduced flexibility of established systems encourage management by surpassing and "extra budgets".

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