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foreword

The importance of science, research and innovation for knowledge-intensive societies is now undisputed and will continue to increase in view of the multitude of both global and national challenges. However, this requires framework conditions that encourage people to break new ground and turn ideas into action, to be able to leverage the existing innovation potential in our society for the good of our country. Politics play an important role in shaping these framework conditions. The Government is conscious of this responsibility, and in recent years has taken numerous steps to sustainably improve the starting position for science, research and innovation in this country, and to position Austria in the group of innova-

tion leaders by 2020. This not only includes increasingly better financial support for our research landscape with one of the highest research quotas in Europe – it also includes the RTI strategy presented in 2011, which provides a clear guideline for structural improvements.

The Austrian Council for Research and Technology Development has accompanied the Government in its efforts for many years and is a committed adviser here – sometimes an inconvenient critic, but always a valuable interlocutor.

With this in mind, we thank the members of the Austrian Council for Research and Technology Development for their valuable expertise and look forward to continued rewarding cooperation.



Dr. Reinhold Mitterlehner
Vice Chancellor and Federal Minister of Science,
Research and Economic Affairs



Dr. Hans Jörg Schelling
Federal Minister
of Finance



Mag. Jörg Leichtfried
Federal Minister for Transport,
Innovation and Technology

We live in a period of radical changes, which now affect practically all areas of life and cause social upheaval and revolution at increasingly shorter intervals. A multitude of these changes can be attributed to scientific findings or technological developments – key term: digital revolution. For others on the other hand we require science and research to be able to meet the challenges they bring – example: climate change.

In view of these developments and the challenges they pose, once again we must highlight the key importance of innovations. This is demonstrated over the entire course of human history, which is why entire eras have also been named after the innovations that characterise them. Just think of the discovery of bronze, the development of writing and later printing, the steam engine and electricity – and ultimately the computer and now the digital revolution.

The innovations based on science and research over the last 500 years or so have enabled large sections of humanity to enjoy an increase in

prosperity that was scarcely believed possible. Today the average citizen lives with more amenities and comforts than would have been possible for a king living two hundred years ago. And yet the responsibility connected with this is still not sufficiently perceived as such by this average human. The dangers created by the Anthropocene period, in which humankind has become the most important influence factor on the biological, geological and atmospheric processes on the earth, can no longer be denied.

Today it would appear that much that not so long ago appeared to be science fiction, will indeed soon be possible. These changes will also change our working world, determine our everyday and influence our lifestyle in the years and decades to come. The question then merely remains as to whether or not we will become the drivers or the driven of these developments.

editorial



Hannes Androsch
Chairman
of the Austrian Council

“Set Innovation Free” (The Economist)

A positive shaping of our generation and future generations will only be possible if we succeed in meeting both existing and new challenges with the aid of science, research and innovations. In this context, Austria can and must make its contribution.

All, from individual scientists and researchers to companies and corporations, through to the Federal Government, must play their part here.

The *Research, Technology and Innovation Strategy* (RTI Strategy) presented by the Austrian government in 2011 was an important milestone on this path in making a clear commitment to science, research and innovation in the increasingly more competitive international context and despite the financial crisis and austere budgets. Essentially,

strategy does show the right path here, but it is increasingly “toothless” due to the insufficient formulation of specific implementation measures. Unfortunately, however, the annual analysis by the Research Council on the implementation progress of the Strategy and the feasibility of the originally announced goals shows that a good deal of them, and the 3.76 percent research quota goal in particular, will not be achieved.* And these overall findings have not changed over recent years either, which indicates that implementation intensity and progress dynamic are too low. The overriding goal of positioning Austria in the group of innovation leaders therefore will not be achieved.



Markus Hengstschläger
Deputy Chairman
of the Austrian Council

* See: Austrian Council: Report on Austria's Scientific and Technological Capability 2016. Vienna 2016. Online at: <http://www.rat-fte.at/performance-report.html>

editorial

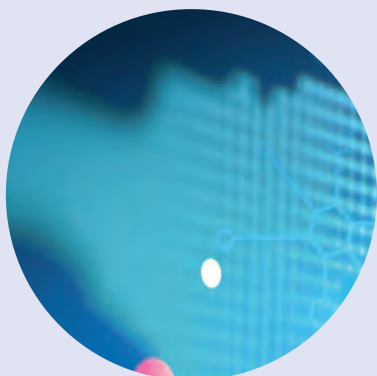
The signals sent at the beginning of 2017 with the government's *Work Programme* for 2017 and 2018 are all the more positive. The goal of making Austria one of the global frontrunners in future-oriented industries was defined herein. The Cabinet had also already adopted an ambitious *Research Package* in November 2016 to achieve the goal defined by the RTI Strategy of becoming one of Europe's most innovative countries by 2020. The strategic objective of pushing forward into the leading innovation nations therefore also con-

tinues to be a significant determinant of the political will. Of special importance here is the fact that, in addition to structural reform proposals, the *Work Programme* and the Research Package also include specific budgetary measures that could allow us to give new impetus to the innovation dynamic, which appears to have stalled, and enable Austria to rejoin the group of innovation leaders.

In every eventuality, the Austrian Council declares itself ready to continue accompanying the Austrian Government in its endeavours.



The Council
from left to right standing:
Hermann Hauser,
Markus Hengstschläger,
Klara Sekanina,
Hannes Androsch,
Jakob Edler
From left to right sitting:
Sabine Herlitschka,
Helga Nowotny,
Sylvia Schwaag-Serger





outlook

We are poised at the beginning of a new age – the age of digitalisation. For some years now we have been witnessing its dawning and development with increasing intensity, whereby these will continue to increase further, as scientific and technological progress has initiated an incredible technological development drive, which permanently boosts itself.

On the basis of the Internet, increasingly more capable sensors, genetic programming, AI processes and machine learning, we are rapidly heading towards *Cyber Physical* systems, i.e. the combination of IT components with mechanical and electronic elements, which communicate via a data infrastructure such as the Internet. The essentially new, indeed practically revolutionary element here, is the fact that these systems are increasingly capable of learning and develop intelligent behaviour patterns, and can react flexibly and independently to situations in equal measure.¹

The progress in the area of Artificial Intelligence (AI) is especially relevant here. With *deep learning* it is already possible today to optimise the cognitive performance of machines and programmes so they significantly surpass that of humans.² This means that not only the Internet will be made “intelligent” in the foreseeable future – so, too, will all connected terminal devices. Microsoft CEO Satya Nadella sees “the

next big thing” here. Quote: “Every new product we design, and how every user is going to interact with the environment, is going to be ‘intelligence first’.”³

With *deep learning* processes and networking with the Internet and the access to the information of the global stock of Big Data that this enables, algorithms and machines have recently been able to “really” act intelligently, and in particular more efficiently than humans. AlphaGo, for example, a self-learning programme from Google, recently clearly beat the Korean multiple world champion, Lee Sedol, at playing the complex board game, Go.⁴ And for the first time ever a machine also succeeded in beating human professionals in the most difficult types of poker, whereby the programme was even challenged to make complicated decisions on the basis of incomplete information, bluffs and deception by its opponent, as well as further cunning tactics.⁵

Self-learning algorithms and the parallel analysis of large data volumes allow AI applications to adjust themselves to external conditions or even to humans depending on a particular situation and to perform complex tasks in close cooperation with them. A multitude of “smart machines”⁶, which perform simple activities such as stacking boxes in storage halls or assembling and welding car parts, as well complex tasks such as compiling news texts, diagnosing

1 U. Eberl: *Smarte Maschinen: Wie künstliche Intelligenz unser Leben verändert*. Munich 2016 (p. 212 ff.);

The Economist (9.5.2015): Artificial Intelligence – Rise of the machines (p. 17 f.); Science (10.10.2014):

The social life of robots. Vol. 346, Issue 6206 (pp. 178–203, p. 186 f.).

2 The Economist (25.6.2016): Special Report: Artificial intelligence: From not working to neural networking.

3 Financial Times (29.11.2016): Artificial Intelligence and Robotics: Can Microsoft get back in the game with AI?

The chief executive reboots in an effort to capitalise on machine learning.

4 Die Zeit (13.3.2016): AlphaGo: Go-Meister gegen Computer 1:3.

5 Neue Zürcher Zeitung (1.2.2017, p. 40): Künstliche Intelligenz: Der Supercomputer als Bluffer.

6 U. Eberl: *Smarte Maschinen: Wie künstliche Intelligenz unser Leben verändert*. Munich 2016.

illnesses or performing financial transactions, already function on this basis.⁷

The technological possibilities appear limitless – as does the potential for social and economic change that they would produce. Therefore, some people, such as Klaus Schwab, President of the World Economic Forum, are already talking about another, or a “fourth” industrial revolution.⁸

This revolution and the entry it enables into the digital age with robotization, artificial intelligence and the “Internet of Things”, require a new education revolution, because in the future only existing and used *brainpower* will decide on the personal success and the successful life of both the individual and the entire state. So if the education system does not stay abreast of technological development, the increasing imbalance will produce social tensions. Our young people must therefore be educated to meet these new challenges, to prevent the emergence of an otherwise rapidly growing new social subclass. This requires a raising of the level of education on a broad basis, together with an increase in education intensity.

But what will happen if the areas of education, science and research themselves fall foul of the wheels of politics? What if politically responsible people no longer want to recognize scientifically proven facts as such, and instead present “alternative facts”? What if education once again

builds on “belief” rather than on facts?”

The United States of America appear to be moving in this direction.

“Sciences,” according to the renowned science historian Michael Hagner, “are among the losers of the American presidential elections, and that is to say both the humanities and the natural sciences.”¹⁰ And indeed the fears for the science and research sector caused by Donald J. Trump’s presidency have now been confirmed. Financial cutbacks in non-military research areas and ideologically determined restrictions, as with the climate change issue, are imminent. Furthermore, it is impossible to estimate what impact the president’s juggling of outrageous claims in the public discourse might have in the USA – not least of all on the acceptance of science among the general public.”¹¹

The USA can in particular thank the fact that since the Second World War it has been the most attractive location for the best scientists and researchers from around the world for its rise to the scientific-technological global power that it is today. Will the new US presidency gamble with this – with still unforeseeable consequences for the country as a whole and its economy in particular?

The United States are a classic immigration country. With an estimated population of more than 316 million people in 2015, the USA had almost 42 million inhabitants or approxi-

outlook

*“Like so much of American life,
the story of innovation
is a story of immigration ...”*

William J. Burns

7 Y. N. Harari: Homo Deus. A Short History of Tomorrow. London 2016 (pp. 321 ff.); M. Ford: Rise of the Robots: Technology and the Threat of a Jobless Future. Kulmbach 2016 (pp. 109 ff., 159 ff., 177 ff.).

8 K. Schwab: The Fourth Industrial Revolution, Munich 2016.

9 US Vice President Mike Pence, for example, announced that he has doubts about the Theory of Evolution and that the Biblical interpretation of creation should be taught in schools again.

10 M. Hagner: Wissen oder Barbarei. Die Wissenschaften sind in der Defensive – Schaden nimmt die Demokratie. In: Neue Zürcher Zeitung of 11 February 2017, p. 23.

11 S. Titz: Wissenschaft im Schwebezustand. In: Neue Zürcher Zeitung of 25 January 2017, p. 37.

outlook

mately 13 per cent who were born outside the US (see table 1).

The importance of immigration is in particular reflected in the American innovation system, which, beginning with the rise of fascism and National Socialism in the 1930s and the exodus of European scientists to the United States that it brought, profited to an exceptional degree from immigration. The attractiveness of the USA can be seen in two areas in particular – with those studying abroad and with researchers.

The number of students that spend at least part of their studies abroad has increased sharply in recent years. In 2013 more than 4.1 million students went to another country for study purposes, compared with 2.7 million in 2005 and only about 600,000 in 1975. Forecasts assume a further increase to more than 7 million foreign students in 2015 – a thoroughly lucrative trend for the host countries, considering that in 2013 international students in the USA, for example, contributed about USD 24 billion to the American economy; in 2014 it was about USD 27

Table 1: Population of the USA not born in the USA (estimates)¹²

	United States				
	Total	Native	Foreign-born	Naturalized	Not a U.S. Citizen
Total Population	316,515,021	274,797,601	41,717,420	19,448,227	22,269,193
Male	49.2%	49.3%	48.8%	45.9%	51.3%
Female	50.8%	50.7%	51.2%	54.1%	48.7%
Median age (years)	37.6	35.9	43.1	50.5	37.2
Race and Hispanic or Latino Origin					
One race	97.0%	96.9%	97.7%	97.5%	97.8%
White	73.6%	77.5%	47.6%	45.2%	49.7%
Black or African-American	12.6%	13.2%	8.6%	10.1%	7.4%
American Indian and Alaska Native	0.8%	0.9%	0.4%	0.3%	0.4%
Asian	5.1%	2.0%	25.9%	32.2%	20.3%
Native Hawaiian and other Pacific Islander	0.2%	0.2%	0.3%	0.2%	0.3%
Some other race	4.7%	3.1%	14.7%	9.5%	19.6%
Two or more races	3.0%	3.1%	2.3%	2.5%	2.2%
Hispanic or Latino origin (of any race)	17.1%	12.8%	45.8%	32.3%	57.6%
White alone (not Hispanic or Latino)	62.3%	69.0%	18.3%	23.9%	13.5%

¹² U.S. Census Bureau: 2011–2015 American Community Survey 5-Year Estimates. S0501: Selected Characteristics of the Native and Foreign-born Populations. Washington, DC, 2016.

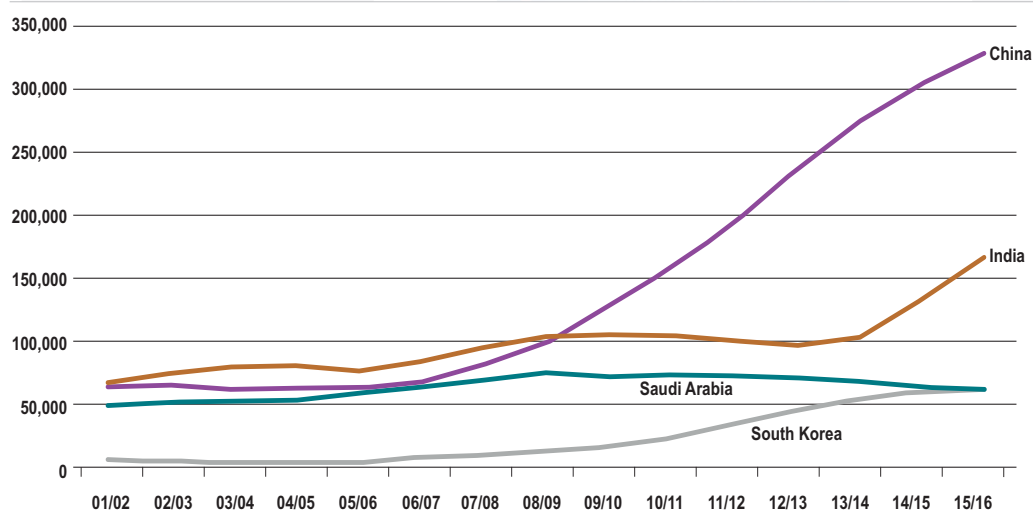
Online: <https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF>

billion¹³, and by 2015 it was already some USD 35.8 billion.¹⁴

The United States continue to be the most attractive country for foreign students. Between 2008 and 2014, for example, the number of international students in the USA increased by 42 per cent and in 2015 it was already 1,043,829 students. The increase is in particular due to students from Asia, which in 2014/15 accounted for 76 per cent of all international students, with the People's Republic of China taking the lead, followed by India, South Korea and Saudi Arabia.¹⁵

Depending on their respective region of origin, the students also tend towards specific studies: In 2015/16 the vast majority of students from India (80.1 per cent), from Iran (79.7 per cent) and Nepal (66.8 per cent) were in STEM subjects. Students of economic sciences mostly came from China (24.3 per cent), Vietnam (29.8 per cent) or Venezuela (28.6 per cent).¹⁶ Of the researchers active in the USA a disproportionately high amount had been born outside the USA. Both the number and the per-

Figure 1: Top 4 countries of origin¹⁷



¹³ A. Ortiz / L. Chang / Y. Fang: International Student Mobility Trends 2015: An Economic Perspective. New York, NY, 2015.

¹⁴ Institute of International Education: Open Doors 2016. Report on International Educational Exchange. Presentation from November 14, 2016. Washington, DC, 2016.

¹⁵ Ibid.

¹⁶ Ibid.

¹⁷ Ibid.

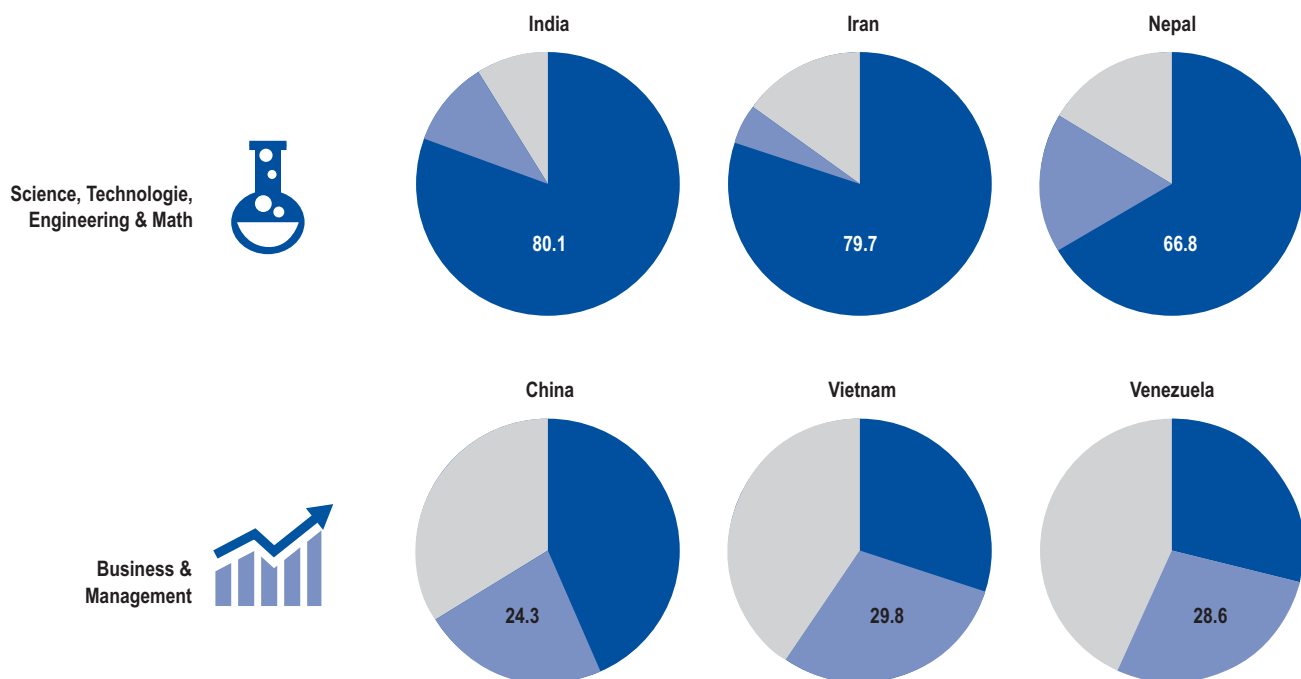
outlook

tage of foreign employees in science/engineering professions have also risen here, and not just absolutely, but indeed relatively as well. In 2011 the percentage of university graduates in S&E professions and born outside the US was 27 per cent, compared to the 13 per cent born abroad in the total population and the 15 per cent with all university graduates.

Those foreign employees working in S&E professions generally also have a higher level of education than US American employees. In 2013, for example, 20 per cent of foreign scientists and engineers had a doctorate as their highest

level of education, compared with 10 per cent of scientists and engineers born in the USA in these professions. In most S&E professions it was shown that the higher the level of education, the higher the percentage of the workforce that was born outside the US. This ratio is also weakest with the social scientists and strongest with mathematicians and engineers.¹⁸ At 39 years old, the foreign employees in S&E professions are also younger on average than their US American peers at an average 42 years old. And employees from Asia account for the majority (59 per cent) of foreign employees in S&E professions. Almost 90 per cent of all Asi-

Figure 2: Top 4 countries of origin¹⁹



¹⁸ National Science Board: Science and Engineering Indicators 2016. Arlington, VA, 2016, p. 102.

¹⁹ Ibid.

ans working in S&E professions were born outside the US.²⁰

Building on this, the innovation system in the USA is also disproportionately characterised by innovators born abroad. A study published in February 2016 on “The *Demographics of Innovation in the United States*”²¹ showed the important role that innovators born outside the US also played here. The most important results of the study:

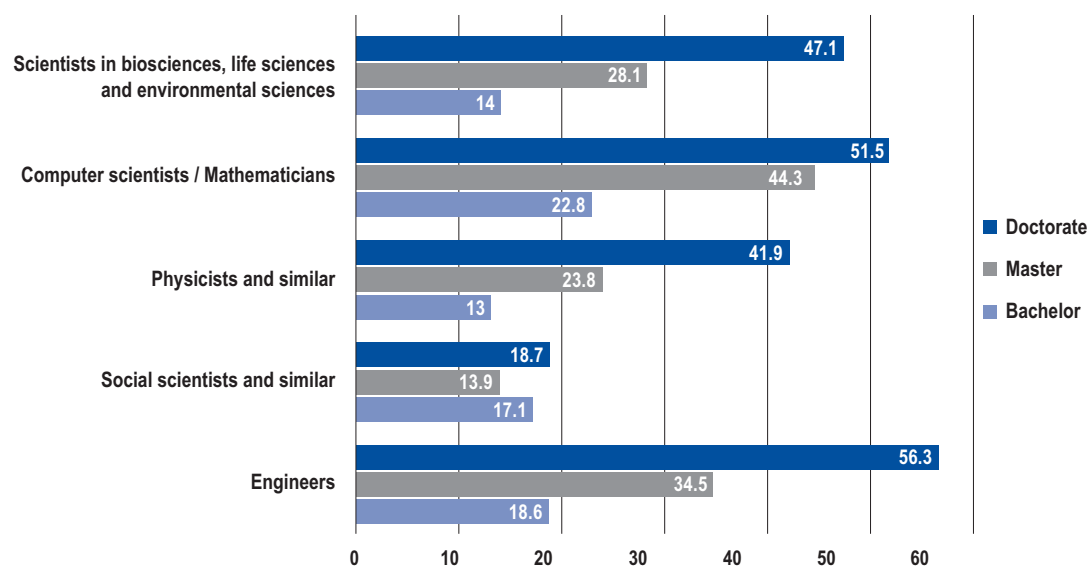
- Immigrants form a large and vital component in US innovation.
- More than one third or 35.5 per cent of US innovators were born outside the US, even

though that demographic only accounts for about 13 per cent of all US inhabitants.

- A further 10 per cent of innovators were born in the US, but have at least one parent born outside the US.
- More than 17 per cent of innovators are not US citizens, but they make inestimable contributions to US innovation.
- With immigrants that were born in Europe or Asia the probability that they will produce an innovation is more than five times as high as with comparable US citizens.
- On average, innovators born abroad are also

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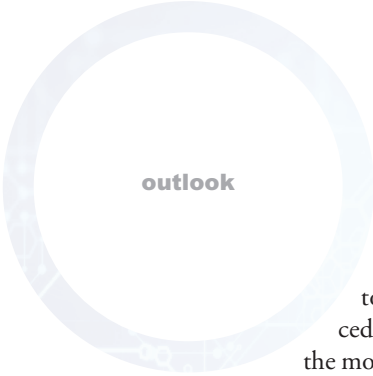
Figure 3: Foreign-born scientists and engineers in S&E professions according to their highest level of education²²



²⁰ Institute of International Education: Open Doors 2016. Report on International Educational Exchange. Presentation from November 14, 2016. Washington, DC, 2016.

²¹ A. Nager / D. Hart / S. Ezell / R. D. Atkinson: The Demographics of Innovation in the United States. Washington, DC, 2016.

²² Institute of International Education: Open Doors 2016. Report on International Educational Exchange. Presentation from November 14, 2016. Washington, DC, 2016.



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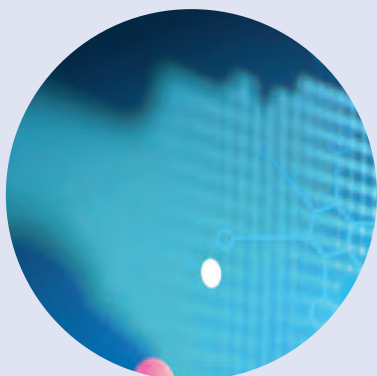
better educated than those born in the US, with more than two thirds having doctorates in STEM subjects.

According to the study authors this could to some degree be due to a selection procedure for foreign innovators, with which the most talented and best motivated innovators

come to the US because its opportunities and possibilities are so promising.

From the US American point of view the current developments, which could massively damage the attractiveness of the United States for students, researchers and innovators, must therefore be seen to be all the more alarming.





Recommendations for 2016

Recommendation on funding universities and public sector research and development in Austria in the federal funding framework 2017 to 2020, chapter, “Science and Research” – Recommendation dated 5 February 2016

The Austrian Council recommends

- The resources for the competitive funding of public and private research within the scope of awarding funds of the FWF and the FFG be guaranteed by increasing the budget framework for science and research in the Federal Fiscal Framework Act (BFRG) for 2017-2020 by EUR 800 million. This means raising the federal fiscal framework in the 2017-2020 period by EUR 200 million p. a.
- Defining the increase in basic funding for universities to improve teaching and research conditions to the tune of approx. EUR 1.4 billion for the 2019-2021 performance agreement period.
- Increasing funding to boost excellence (in addition to the funding already approved for IST Austria) (e. g. for the Academy of Sciences, international memberships and participation in research infrastructures) by EUR 100 million p.a.
- Setting up the legal framework conditions for capacity and performance-oriented study place management at the universities, to establish adequate capacity-oriented university funding.
- Further developing a socio-economically balanced composition of students and graduates at universities, mode and amount of the student grants.
- Achievement of the set goals of the RTI Strategy by 2020 in terms of secured funding of the second five-year period with swift for-

mulation of the planned research funding act, before the end of 2016.

- To exclude spending for science and research from the general savings measures in the area of discretionary expenditure (“cost dampening”) or from restrictive budget performance with regard to transfer to reserves. This should occur as a contribution to achieving the set goals in science and research.
- Securing appropriate funding of the National Foundation for Research, Technology and Development, especially the provision of a compensation allocation in the federal fiscal framework (BFRG) 2017-2020 in the event of a reduced allocation by the Austrian National Bank and the ERP.

Background

In March 2011 the Cabinet adopted the Federal Government’s RTI Strategy with the goal of becoming an innovation leader by 2020. The cornerstones of this strategy are a research quota of 3.76 per cent of GDP by 2020, a quota of 2 per cent of GDP for the tertiary sector, and the percentage of basic research is to reach 0.94 per cent of GDP.

The results of the Report on Austria’s Scientific and Technological Capability 2015²³ of the Austrian Council for Research and Technology Development and current calculations²⁴ for the research quota goals once again indicate insufficient performance with the majority of the

²³ See Austrian Council: Report on Austria’s Scientific and Technological Capability 2015.

²⁴ K. Hranyai / J. Janger: Research quota targets 2020. Update, December 2015. Study performed by WIFI commissioned by the Austrian Council, 2015.

indicators used for this, in order to achieve the goals set in the RTI Strategy.

Awarding Competitive Research Funding

Without losing sight of the overall goal for 2020, the Austrian Council believes specific sub-areas must now be funded as priorities due to the current funding situation.

With a relatively constant basic research quota in the sector of 0.53 per cent in recent years, measured on GDP Austria is actually among a group of scientifically stronger countries, however a continuous increase²⁵, especially in the percentage of competitively awarded funds, could not be achieved. In this important funding area for research, Austria has not been able to reduce the considerable distance to the innovation leaders over the considered period²⁶.

The Austrian Council therefore believes this is extremely urgent and recommends, the percentage of competitively awarded funding be rapidly increased and a trend reversal be achieved. As the most important funding agency for basic research, the FWF has approx. EUR 200 million per year at its disposal. A budget increase of EUR 100 million a year for four years would highlight this accordingly and should be fixed in the federal fiscal framework (BFRG) 2017-2020. A comparison with the Swiss National Fund, which, with approx. EUR 800 million and about the same population, has 4 times the annual budget for funding basic research at its disposal, shows the high catch-up requirement.

The translation of research results into applica-

tion-oriented research and development is equally important. **The Austrian Council recommends** the percentage of competitively awarded funds that are invested as part of the FFG awarding of funds also be increased by EUR 100 million each year for four years in the BFRG 2017-2020. This in particular requires the securing and expansion of the COMET programme, in particular the successful C (Competence) centres, if it is to meet strict requirements.

Basic Funding of Universities

The universities are key institutions in the national innovation system and represent an important scientific and economic location factor in Austria. The existing potential must be utilised.

The tertiary education system is analysed with 15 indicators in the Report on Austria's Scientific and Technological Capability. The goal of achieving the benchmarks predefined by the innovation leaders has only been achieved to date in specific categories. On the whole, however, it must be said that the development to date will not even come close to achieving the goals set for 2020²⁷. The goal formulated again in the Government Programme 2013-2018 of raising the university expenditure quota to 2 per cent of GDP by 2020 cannot be fully achieved either on the basis of the current federal fiscal framework 2016-2019²⁸. The recently adopted performance agreements 2016-2018 between the universities and the Federal Ministry of Science, Research and Economic Affairs reflect the unsatisfactory funding situation at the univer-

recommendations

²⁵ The target value for the basic research quota is 0.94 percent of GDP by 2020. According to current calculations (see research quota targets 2020, update 2015) basic research funding would have to almost double from EUR 1.9 billion to EUR 3.7 billion. In view of the financing situation and the budget distribution illustrated in the BFRG 2016-19 it is very unlikely that this goal will be achieved.

²⁶ See http://www.rat-fte.at/charts_diagramme.html. The data is generated on the basis of defined indicators for the Report on Austria's Scientific and Technological Capability.

²⁷ See Report on Austria's Scientific and Technological Capability 2015.

²⁸ See Strategy Report on the Austrian Federal Fiscal Framework Act 2016-2019.

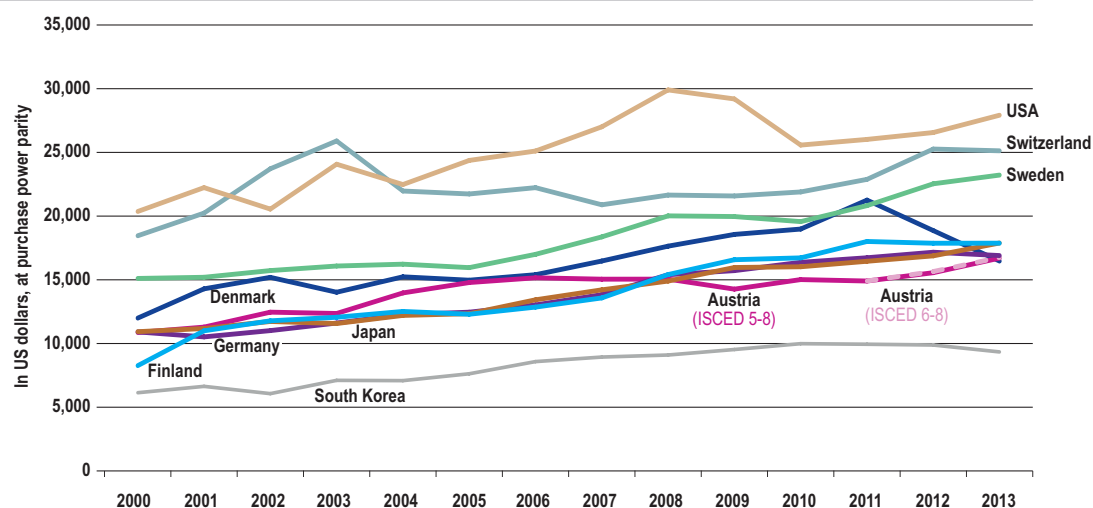
recommendations

sities in this respect. Even if cuts have not been made compared with other areas, with regard to the multitude of university tasks, under-funding still continues, and the distance to the leading nations cannot be reduced.

In figure 4, the updated version of the research quota goals²⁹ shows the development of university expenditure measured on the number of students in the international comparison, in US dollars, at purchase power parity. The graphic shows how, despite the increases achieved in the university sector, the per capita expenditure in Austria has levelled off due to the sharply rising number of students.³⁰

The basic budget for Austria's 22 universities, including parts of the higher education area structural funding available during the performance agreement period for 2016 to 2018, is approx. EUR 8.367 billion. Due to the stressed framework conditions (e.g. the high number of students, partially insufficient supervisor-student ratios and infrastructural failings), expenditure per student does not increase, as also shown in the graphic. An improvement in study conditions is therefore only possible within limits. A comparison of Austria with Switzerland and Bavaria shows different framework conditions at the universities. In 2014 a total of approx. 350,000 people studied at Austrian universities,

Figure 4: Expenditure on higher education by student numbers and compared to other countries



Source: EAG; students in full-time equivalents; Austria: students not on basis of full-time equivalents

29 K. Hranýai / J. Janger: Research quota targets 2020. Update, December 2015. Study performed by WIFI commissioned by the Austrian Council, 2015.

2000–2011: Classification according to ISCED 1997 (ISCED 5A/B & 6); 2012: Classification according to ISCED 2011 (ISCED 5–8).

30 For the comparison it should be noted that the OECD does not differentiate between full-time equivalents and head-counts and these must be considered for the evaluation.

of which approx. 45,600 were at technical colleges. In Switzerland at 12 universities³¹ it was 144,000 people and 90,000 at technical colleges, and in Bavaria there were 238,000 people at 23 universities³² with 122,000 at technical colleges. In Austria therefore, per number of inhabitants, about twice as many people study at universities than do in Switzerland or Bavaria. The percentage of students at technical colleges in Austria is 13.1%; in Switzerland it is 38.4%; and in Bavaria it is 33.9%.

A comparison of the budget³³ (see table) shows a clear difference in the available funds per student or graduate. For the next PA period 2019-2021 the Austrian Council recommends an increase in the basic budget available for universities by approx. EUR 450 million each year, therefore a total of EUR 1.35 billion. A considerable percentage of the students in Austria is included in the statistic as “not exam-active”. For the 2013/14 study year 176,550

	Students at universities 2014/2015	Spending in EUR billions	Funding/ graduates in EUR	Funding/ students in EUR
Austria	304,160	3.838	102,869	12,619
Switzerland	143,961	7.220	216,284	50,152
Bavaria	242,160	6.308	142,415	26,051

students were included as “active”.³⁴ If we apply this number and increase the annual funding by the recommended EUR 450 million of the basic budget for the universities, the funds per student could be almost doubled and the funding situation at Austrian universities would be more or less balanced with that in Bavaria.

Improved Framework Conditions At Universities

An improvement in the funding situation alone is, however, too little to achieve future improvements in the study and research conditions, which in turn would result in an increase in the benefit for society as a whole. In this respect it is rather necessary to create parallel framework

conditions that enable an efficient organizational structure and therefore reduced administration expense for the universities and the Ministry. However, it is also important that the prospective students coming from the education levels upstream from the tertiary sector have an appropriate level of education. The current situation in Austria is insufficient for this. The quality in the entire education chain must be raised to international level.

Study Place Management And Study Place Funding

A measure that is repeatedly required is the swift introduction of capacity-oriented university funding (“study place funding”).³⁵ Access

31 10 canton universities, Swiss Federal Institute of Technology Zurich and Swiss Federal Institute of Technology Lausanne.

32 Of these, 12 universities, 3 theological universities and 8 art colleges.

33 Data given refers to values for 2013, if not otherwise specified. For Bavaria: Bayerisches Landesamt für Statistik; for Switzerland: Statistik Schweiz.

34 Source: The all-Austrian university development plan 2016–2021, table 8.

35 See, Recommendation of the Austrian Council for University Governance and Management Structures, March 2015.



recommendations

regulations, which only allow a predictable number of students in a small number of subjects, as well as a high number of students with (too) low study success (about 40 per cent of students are classified as study-active), however, hinder a capacity-oriented study place funding model here. The legal preconditions must therefore be put in place to determine the existing capacities in teaching and research at the universities, and building on this in coordination with the Ministry, to define the number of capacity-oriented study places. This could only be achieved to an unsatisfactory degree with the current provisions. To be able to also use the capacities at the universities for optimum teaching and research, parallel to this, adequate access management is also required, as is consistent management of the study courses taken.

An increase in exam-active students will also be promoted in the all-Austrian university development plan. The number of exam-active students will be raised by the 2017/18 study year by 10 per cent compared with the 2014/15 study year. The offered performance at the university must also be met with a performance-oriented study attitude by the students and this must also be encouraged accordingly. Those who cannot show good reason for no or too little study activity must expect to lose their study place as a result.

Due to the existing study place funding the technical colleges have a clear benefit with the selection of students. In Austria, this results in the curious situation, whereby candidates rejected at technical colleges, (can) bypass to the universities without any access hurdles and must be accepted there.

In the discussion on access and study place management it must in any case be taken into account that social obstacles to study access or study success will be removed as much as possible with a suitable (improved) study assistance system and an equivalent study access will be targeted. To enable an increase in the percent-

age of “non-traditional admissions”, the Austrian Council believes the scholarship system must also be further expanded parallel with this. In this context, we would refer to the final report of the “Social Security Students” work group of 2013, whose results could now be implemented immediately.

Efficient Control And Administration

In addition to the benefits it brings, the far-reaching autonomy of the universities also results in more reporting and administrative duties. With regard to the sharply growing administration staffing levels in some places and the costs this brings, possibilities for a lean administration and reporting system must be considered and possible synergies between the universities and the responsible ministry must be worked out.

Within the scope of content-related control, in view of the increasing specialization with parallel rising complexity at the universities, the need to interlink subjects with one another and with IT and digital tasks, as well as on another level with the humanities and social and cultural sciences, also increases. On this basis Open Innovation therefore also increases in importance all the time.

The Austrian Research Funding Act

The RTI Strategy explicitly explains the need for a stable and secure funding environment to generate private research and development funding. Medium-term funding options, goal formulations in an impact and output-oriented innovation system should also be defined in a new research funding law to be worked out. Quote: *“In addition to the principles and goals of the research policy, this law will also include specific objectives, the definition of a corridor for research and development investments by the Federal Government, the new version of the research funding law, planning and allocation principles, a code of conduct and a reporting system.”* Frequently required, to date there is still no research funding law that would enable im-

proved planning capability and therefore more security for a sustainable funding strategy. The Austrian Council recommends achievement of the goals set by the RTI Strategy by 2020 in

terms of secured funding of the second five-year period with the swift formulation of the planned research funding act, before the end of 2016.

recommendations

Recommendation regarding the use of the funding provided by the National Foundation for RTD for 2016 – Recommendation dated 10 February 2016

Preamble

Based on the invitation of the Foundation Council of 19 October 2015, in accordance

with § 11 para. 1 item 1 of the RTD National Foundation Act, on 30 November 2015 the

Beneficiary	Name	Applied for total in millions	Recommendation
FFG	“Competence Headquarters” program	10.00	5.00
FFG	Bridge building programme / BRIDGE	20.00	
FFG	Research partnerships – industry-related dissertations	5.00	
FFG	R&D infrastructure funding	15.00	
FFG	Spin-off & Start-up initiative within the scope of GIN	8.00	
FWF	Special research areas and PhD	17.10	5.00
FWF	Matching Funds for supporting young researchers and women	3.001	
ÖAW	PostDoc Fellowships	3.00	0.00
ÖAW	goldigital: Projects for scientific digitalisation	2.00	2.00
ÖAW	HumanIS – Humanities and Information Science	4.00	0.00
LBG	Start-up / Expansion Internationall Research Center for Open Innovation in Science	6.00	2.00
CDG	10 CD labs	10.109	2.00
aws	Venture Capital Initiative (VCI)	5.633	2.00
aws	Social Business Initiative	6.75267	
aws	aws First – from idea to entrepreneurship	4.50	
aws	Service-Start-up-Initiative	5.8159	
Total		125.91157	18.00

recommendations

Austrian Council submitted a recommendation on the use of the Foundation's funds for 2016 for the following possible scenarios:

- 1) EUR 40 million
- 2) EUR 50 million
- 3) EUR 60 million
- 4) EUR 15 million – worst case scenario

The total application volume for 2016 is **EUR 125,911,570 m.**

As part of its recommendation the Austrian Council has asked to be consulted once again in the event of a figure above EUR 15 million but below EUR 40 million with the allocation of National Foundation funds.

In view of the actually available funds for 2016

of EUR 18 million, the Foundation Council asked the Austrian Council in its letter of 16 Dec. 2015 for a renewed referral with the Foundation's applications.

On this basis the Austrian Council recommends the available **EUR 18 million** be awarded to Foundation funds for 2016.

Recommendation

A prioritization is only possible within limits on the basis of the low allocation of the National Foundation in 2016. For this reason, the AWS, FFG and FWF agencies will be exempted from the use of allocated funds for the respective applications. The respective use must be in accordance with optimum efficiency and quality.

Priorities for awarding the funds of the RTD National Foundation 2017 –

Recommendation dated 8. April 2016

The RTD National Foundation plays a very important role in the Austrian RTI system as an additional funding source for long-term strategic measures. The Council therefore once again regretfully acknowledges that the funds provided to the National Foundation have steadily decreased in recent years, and on average are already significantly below the amount proposed

in the annotations to the law. We therefore wish to make clear once again that a sufficient and sustainable allocation of funds is necessary for the National Foundation to perform its functions.

The orientation here follows the principle of the National Foundation's long-term planning capability and continuity.

Following detailed discussion and on the basis of the priority areas of action identified in the Report on Austria's Scientific and Technological Capability 2015, the Council Board recommends the following content-relevant orientation for awarding funds 2017:

(Recommendation of the Austrian Council in March 2016)

- Strengthening the national human potential base
- Strengthening competitive funding in basic and applied research
- Strengthening the research infrastructure with initiatives with appropriate critical variables and risk potential
- Measures to strengthen location Austria for research-active companies
- Strengthening risk capital
- Strengthening innovation potential with "Open Innovation"
- Coordination and harmonisation of regional and federal RTI activities

Recommendation for funding research and development in Austria – Recommendation dated 30 May 2016

recommendations

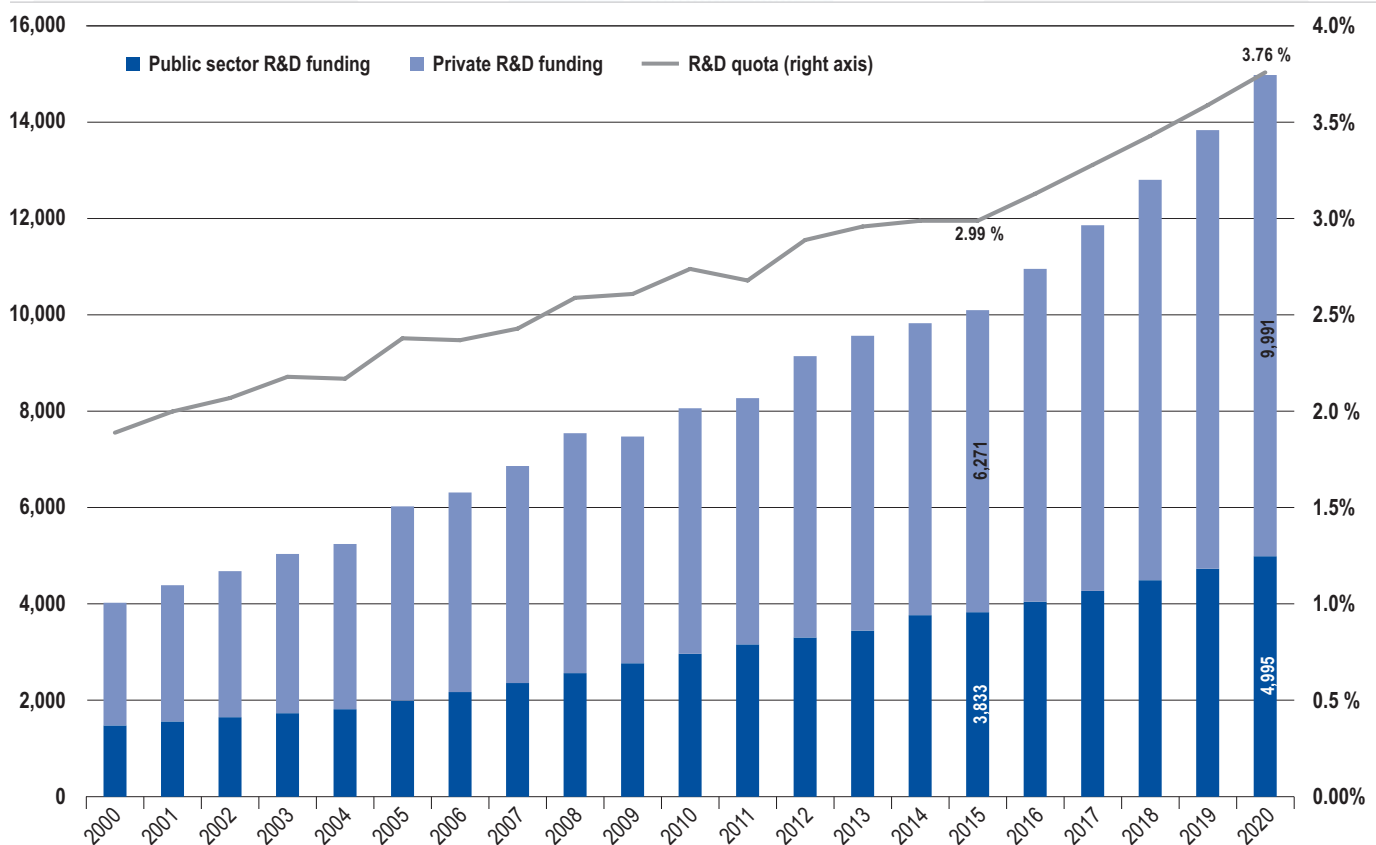
Background

Current Estimate of Research Quota Goals

The achievement of an R&D quota of 3.76 per cent of GDP by 2020 was defined as a goal within the scope of the implementation of the Federal Government's Strategy for Research, Tech-

nology and Innovation in 2011 – as a requirement for joining the leading innovation nations. According to the latest global estimate by Statistik Austria, Austrian R&D expenditure in 2016 was 3.07 per cent of GDP.³⁶

Figure 5: Financing path for achieving the R&D quota goal (3.76 per cent) in 2020 (in EUR millions)



Source: WIFO research quota targets 2020, update 2015. K. Hranay / J. Janger (2015): research quota targets (2020). Study on behalf of the Austrian Council for Research and Technology Development. Vienna, WIFO.

³⁶ Statistik Austria (2016): Global estimate 2016: Gross domestic expenditure for R&D funding of research and experimental development performed in Austria.



recommendations

The research quota therefore stagnated for the third year in a row at just over 3 per cent.³⁷ As a consequence, Austria has fallen behind five years in a row in the Innovation Union Scoreboard (IUS) since 2010.³⁸

Calculations by the WIFO, which were made on behalf of the Austrian Council, also show that the increase rates in R&D expenditure are not sufficient to achieve the R&D quota of 3.76 per cent by 2020.³⁹ For this to happen, the R&D expenditure would have to increase from currently EUR 10.1 billion to around EUR 15 billion in 2020 (see figure 5).

Assuming two different scenarios (pessimistic/optimistic), WIFO specifically concludes that by 2020 the quota will be between 2.97 per cent (pessimistic scenario) and 3.35 per cent (optimistic scenario). The funding gap to the target in 2020 here is between approx. EUR 1.6 billion (optimistic scenario) and EUR 3.1 billion (pessimistic scenario). With the current funding framework (see insert) this gap cannot be closed and the R&D quota goal of the RTI Strategy definitely will not be achieved.

Despite the need for budget consolidation in view of the scarcity of funding resulting from the financial crisis and from long overdue structural reforms⁴⁰, there is still an urgent requirement for an increase in the funding for education, research and innovation. This is especially necessary because investments in these areas require more time to be able to fully develop their macroeconomic impact. It is therefore imperative that greater parts of the budget be freed

up for the future areas of education, research and innovation.

Special importance is awarded in this respect to securing sustainable, long-term funding of the universities. As centres of education and research they are guarantors for these two key factors of the future capability of a knowledge-based economy and society. As the result of a National Council resolution proposal at the end of 2008, the Federal Government formulated the goal in its work programme 2013 to 2018 of raising the university expenditure quota to 2 per cent of GDP. This alone would require added annual expenditure of an average EUR 400 million.

The new funding framework 2017-2020

The Federal funding framework up to 2020 was presented on 26 April 2016. The fears articulated in the preliminary stage by the RTI community have therefore been confirmed: There will be no additional budget for education, science, research and innovation. The percentage of the budget for education, research, art and culture of the overall budget will even fall from 17.9 per cent in 2015 to 17.1 per cent in 2020. By way of comparison: The budget for pensions alone (Austrian General Social Security Act – ASVG, and civil servants) will rise by 2020 from 25.7 to 29 per cent.

It is therefore evident that it will not be possible to achieve the budget goals formulated in the RTI Strategy and the Federal Government's Work Programme. Corresponding recommendations of the Austrian Council of 5 February 2016, 7 September 2015 or from the Report on Austria's Scientific and Technological Capabili-

37 It should be noted however that the Austrian R&D quota is therefore already above the European target value for 2020 of 3 percent.

38 The IUS for 2016 only appears in July of this year. However, it is likely that Austria will improve by one place. This is not due to an improvement in performance, but rather attributable to a change in the statistic procedure with the IUS.

39 K. Hranyai / J. Janger: Research quota targets 2020. Study commissioned by the Austrian Council for Research and Technology Development. WIFO, Vienna, 2015.

40 See Report on Austria's Scientific and Technological Capability 2015.

ty 2015 have evidently not been considered sufficiently.

The RTI Strategy explicitly explains the need for a stable and secure funding environment – not least of all to increase private R&D funding. Medium-term funding options, goal formulations in an impact and output-oriented innovation system and therefore improved planning capability and more security for a sustainable funding strategy should be defined in a research funding law, which is still not in place. Unfortunately, the Federal funding framework does not take this suggestion into account and does not set any recognizable priorities in future-oriented fields.

A “New Deal” for Austria

Federal Chancellor Christian Kern called for a “New Deal” for Austria in his inaugural address in the National Council.⁴¹ The Coalition’s new start, also envisioned by Vice Chancellor Reinhold Mitterlehner, is dedicated to combating this stagnation. This “New Deal” focuses on two critical aspects:

- The short-term increase in willingness to innovate and the interlinking of private and public investments on the basis of clearly defined future scenarios, and
 - the longer-term formulation of answers to the challenges of digitalisation and globalisation with their effects on the labour market, social security systems and the education system.
- On the basis of this announcement the outlined development of the R&D budget with all its consequences is clearly insufficient. This is because research, and basic research in particular, plays an important role for both named aspects of the “New Deal”. If the policy of faith in the

future called for by the Government actually materialises and comes into effect, this must also be reflected in a realignment of political prioritisation. And true to the principle that budgets are politics cast in figures, at the end of the day this will also have to be reflected in budgetary terms. Future areas will have to be strengthened for this at the expense of less productive or merely consuming areas.

Recommendation

In the interests of the constructive realignment of the cooperation in the Federal Austrian Government the Austrian Council recommends:

- The funding gap be closed so the goal of an R&D quota of 3.76 per cent of GDP defined in the Federal Government’s RTI Strategy can be achieved by 2020.
- The goal formulated by the Federal Government on the basis of a resolution proposal of the National Council in its Work Programme 2013 to 2018 to raise the university expenditure quota by 2020 to 2 per cent of GDP be vigorously pursued.
- The immediate implementation of the announced and required measures of the RTI Strategy for achieving both quota goals.
- The swift and conclusive formulation of the planned research funding law, to secure the funding of the second five-year period of the RTI Strategy by 2020 and the further implementation of the measures included in it.
- The enforcing of structural reforms to reallocate existing resources from less productive areas into future-oriented areas, such as education, research and innovation.

recommendations

⁴¹ <http://www.bundestkanzleramt.at/site/6598/default.aspx>

recommendations

Insert on the recommendation on the funding of research and development in Austria – the current Federal funding framework 2017-2020 – date issued: 26 April 2016

Tables 1, 2 and 3 show the developments of the three RTI-relevant UAs: UA 31 (science and research), UA 33 (research and economics) and UA 34 (research, transport, innovation and technology), each in EUR millions.

These figures show how the expenditure of UA 31 rises marginally, while that of UA 33 and UA 34 remains unchanged.

Table 1: Comparison of Federal Fiscal Framework Act (BFRG) 2016–2019 and 2017–2020, UA 31 (science and research), in EUR millions

UG 31	BFR 2016–19	BFR 2017–20	
	Payouts	Payouts	Deviations from previous BFRG
BVA 2015	4,119.5	4,106.5	
BFRG 2016	4,278.3	4,283.3	5.0
BFRG 2017	4,310.1	4,315	4.9
BFRG 2018	4,345.6	4,401.3	55.7
BFRG 2019	4,366.0	4,421.9	55.9
BFRG 2020		4,443.8	

Table 2: Comparison of Federal Fiscal Framework Act (BFRG) 2016–2019 and 2017–2020, UA 33 (research and economy), in EUR millions

UG 33	BFR 2016–19	BFR 2017–20	
	Payouts	Payouts	Deviations from previous BFRG
BVA 2015	101.6	109.6	
BFRG 2016	101.6	101.6	0
BFRG 2017	101.6	101.6	0
BFRG 2018	101.6	101.6	0
BFRG 2019	101.6	101.6	
BFRG 2020		101.6	

Table 3: Comparison of Federal Fiscal Framework Act (BFRG) 2016–2019 and 2017–2020, UA 34 (research, transport, innovation and technology), in EUR millions

UG 34	BFR 2016–19	BFR 2017–20	
	Payouts	Payouts	Deviations from previous BFRG
BVA 2015	429.2	429.2	
BFRG 2016	428.1	428.1	0
BFRG 2017	428.1	428.1	0
BFRG 2018	428.1	428.1	0
BFRG 2019	428.1	428.1	0
BFRG 2020		428.1	

Sources: BMF.

Recommendation regarding the use of the funding from the Austria Fund 2016 –

Recommendation dated 30 May 2016

recommendations

Preamble

As part of the Tax Reform Act 2015/2016, Federal Law Gazette I no. 118/2015, the legal basis for a new funding mechanism in the Austrian RTI system was created. According to article 12 of this act the RTD National Foundation was allocated an additional EUR 33.7 million in 2016 by way of the “Austria Fund”.

The funds from the “Austria Fund” were allocated on the basis of the RTD National Foundation Act, similar to the previous allocation of funds from the National Foundation through the Foundation Council with consideration of the recommendation by the Austrian Council for Research and Technology Development. The applications must differ from the applications of the beneficiaries for the funding from the National Foundation.

The funding of the “Austria Fund” will be used, in accordance with § 3 para. 2 of the RTD Na-

tional Foundation Act, for funding basic research and applied research, as well as for funding technology and innovation development. Based on the invitation of the Foundation Council of 12 April 2016, the Austrian Council for Research and Technology Development recommends the awarding of the EUR 33.7 million available to the Austria Fund 2016.

Recommendation

On the basis of the sharp over-subscription of the Austria Fund with EUR 74 million compared with the available EUR 33.7 million, unfortunately it is not possible to recommend full funding for all applications.

On the basis of the allocation allowed for in the explanations on Article 13 of the Tax Reform Act – 50 per cent funding for basic and applied research (column 1) and 50 per cent for

Beneficiary	Name	Applied for total in millions	Recommendation
FFG	Fronrunner package	27	11.2
FWF	“doc.funds” FWF doctoral colleges follow-up program	10	10
FWF	Jahoda-Lazarsfeld Program (Incoming/Reintegration)	7	3
CDG	Funding of application-oriented basic research in the Life Sciences area in 2 CD labs	5	2.5
LBG	Open(ing) Careers	2	2
ÖAW	Sir Karl Popper doctoral candidates	12	0
aws	Technology internationalisation of Austrian frontrunner companies	5	2
aws	IP.Market: Knowledge transfer and exploitation of intellectual property of Austrian SMEs	5	3
Total		74	33.7



recommendations

the research and development of basic industrial technologies in the programmes, production of the future, mobility of the future, energy of the future and information and communication technologies of the future (column 2) – a corresponding grading of the funding percentages was therefore performed, as documented in the table.

The Austrian Council also determined that the content-related prioritisation allowed for in the Act was only conditionally complied with by the applicants. This is in particular shown for the second column, where the thematic focus was scarcely considered. There were therefore also corresponding deductions with the funding recommendations.

The **Frontrunner Package** of the **FFG** only reflects the content-related focus points allowed for by the Act within limits (e.g. town, production, mobility of the future). An increased headquarters focus is far more evident. The Austrian Council welcomes the IP check proposed in module 4, but it would rather be considered a part of awards due to its strong competencies in the IP area. The Austrian Council recommends the Frontrunner Package be supported with EUR 11.2 million, whereby those modules that are close in topic to the legal requirements will in particular be supported.

To be emphasized here as particularly positive is the intensive addressing of young talent funding, as it is explicitly quoted by law for the first column, by the **FWF** with its doc.funds applications and the Jahoda-Lazarsfeld programme. The **doc.funds** in particular are an important and beneficial revised restructuring of the previous doctoral colleges. The Austrian Council welcomes the autonomy this provides the institutions in shaping the doctoral programmes. The Austrian Council therefore recommends doc.funds be supported with **EUR 10 million**. The Austrian Council believes the **Jahoda-Lazarsfeld programme** shows a low level of innovation with existing measures. There are al-

so duplications here with the existing offering at EU level in this area. Increased cooperation with the **ÖAW** is recommended with a view to the Sir Karl Popper doctoral candidates it has submitted. An opening of the doctoral candidates for all researchers and their funding via the FWF would provide more valuable stimuli to human capital development. With regard to the Sir-Karl-Popper doctoral candidates the Austrian Council recommends the Jahoda-Lazarsfeld programme be allocated **EUR 3 million**.

The **CDG** addresses the important and legally explicitly defined Life Science area with its structures proven in applied research. In view of the scarcity of funds the Austrian Council recommends funding a **CD lab** with **EUR 2.5 million**. The Austrian Council believes the Open(ing) Careers are a valuable and in particular a “new” element in young talent funding. It is, however, regrettable that it is restricted to people within the **LBG**. The Austrian Council recommends full funding of EUR 2 million, but it would very much welcome a check by the applicant to determine the degree to which the concept could also be opened up for people outside the **LBG**. The **ÖAW**-submitted **Sir Karl Popper doctoral candidates** are a good mechanism for young talent funding, but structurally would be better at the FWF. An opening for non-ÖAW members must in particular be targeted. As already quoted above within the scope of the application for the Jahoda-Lazarsfeld Programme, the Austrian Council recommends the ÖAW also seek cooperation with the FWF here with regard to funding.

The **technological internationalisation of Austrian frontrunner** companies makes a valuable contribution to the market transition and international market development for Austrian SMEs in the important technology areas. Due to the scarcity of funding the Austrian Council recommends the project be funded with **EUR 2 million**.

The IP.Market Initiative is an important mechanism in the accession process of Austrian SMEs

to the potential of better exploitation of their intellectual property. The proposed package of measures, especially the setting up of an IP marketplace and cooperation with the Patent Office, are very welcome. The Austrian Council

suggests checking the integration of the IP check proposed by the FFG into this package of measures. The Austrian Council recommends **IP.Market** be supported with **EUR 3 million**.

recommendations

Recommendation for innovation-promoting public sector procurement in Austria –

Recommendation dated 1 September 2016

The Austrian Council recommends political support and specific full-coverage implementation

The Austrian Council for Research and Technology Development recommends the political support for innovation-promoting public sector procurement be increased further.

The Austrian Council for Research and Technology Development also recommends the full-coverage implementation of innovation-promoting public sector procurement across and beyond department boundaries be enforced and innovation procurement plans be compiled, and subsequently coordinated and monitored at a central location.

Improvement in the data situation for (innovation-promoting) public sector procurement

The Austrian Council recommends a standardised, full-coverage and obligatory recording of the volume of public sector procurement in Austria in general and the introduction of innovation-promoting public sector procurement in particular.

Awareness creation and qualification of all involved in the procurement process

The Austrian Council recommends the introduction of a standardised usage and assignment

profile for public sector procurement personnel in combination with a standardised, extensive qualification for this work. The awareness creation and qualification of all participants, especially decision makers, must also be ensured and promoted.

Motivation And Risk Sharing

The Austrian Council recommends the integration of technically competent people into the procurement process to support the operative procurement personnel and shape the incentive systems, which encourage the acceptance of risks and increase readiness to participate in innovation processes in public sector administration.

Background

In recent years, increasingly more attention has been paid at both European and international level to demand-side innovation support measures, which, in addition to funding and other supply-side mechanisms, can be used to increase innovation.

The intensive efforts of the European Union in the last 10 to 15 years in particular were the critical trigger for an in-depth reappraisal of the issue by the member states⁴².

⁴² The Lisbon Strategy (2000) applies as the starting point for this development, in which innovation was focused on as the essential motor for economic growth and whose declared goal is to make Europe a competitive economic region in the next 10 years. Public sector procurement has in the meantime become firmly defined in the strategies at EU level as an innovation driver and an important part of the strategy for Europe 2020 (European Commission 2010) within the framework of the "Innovation Union" initiative (European Commission, 2010).

recommendations

Edler & Georghiou⁴³ define demand-side innovation policy as follows: “*Set of public measures to increase the demand for innovations, to improve the conditions for the uptake of innovations and/or to improve the articulation of demand in order to spur innovations and the diffusion of innovations.*” According to this definition, demand-side innovation policy not only has the primary goal of supporting the development of new innovations, but rather must also promote their diffusion with the procurement of already existing innovations.

The area of innovation-promoting public sector procurement is a demand-side innovation policy tool. The most important difference here is between the commercial procurement of innovations (PPI – Public Procurement of Innovation) and the pre-commercial R&D procurement (PCP – Pre-Commercial Procurement). Furthermore, as part of the national implementation of Directive 2014/24/EU on public sector procurement a new award procedure called “Innovation Partnership” will also be introduced, whereby public sector procurement personnel have the use of another mechanism to shape public sector procurement as more innovation-promoting.

Commercial Procurement Of Innovations (PPI)

Commercial public sector procurement of innovations is the procurement of innovative products or services by the public sector. This in-

volves a test purchase or a first purchase or the procurement of innovative products for the procuring side.

Pre-Commercial Public Sector R&D Procurement (PCP)

Pre-commercial public sector R&D procurement mostly involves a longer joint process, in which the procurement personnel and innovation-drivers determine and specify shared requirements for innovative solutions.

If we consider the volume of an average 14 per cent of GDP⁴⁴ per year, which flows within the EU into the area of public sector procurement, we can see the high potential embodied in the systematic increase in demand for innovative products and services.

The increase in demand for innovative products and services will in particular strengthen domestic small and medium-sized enterprises (SMEs), which will then have better opportunities in the otherwise highly regulated and generally low-risk award processes. On the other hand with more innovation-promoting public sector procurement it will itself become more innovative and can consequently offer the general public improved products and services.

The benefits of innovation-promoting public sector procurement are indeed undisputed. This is, however, a still very new and partially un-researched topic and implementation as part of a broad demand-side innovation policy is often linked with significant difficulties.

⁴³ J. Edler / L. Georghiou (2007): Public procurement and innovation – Resurrecting the demand side. *Research Policy*, 36, 949–963, 2007.

⁴⁴ European Commission (2014): Public Procurement as a Driver of Innovation in SMEs and Public Services. Belgium: European Union, 2014.

Demand-Side Innovation Policy In Austria

In addition to specific best practice examples, with the innovation-promoting public sector procurement guiding concept, since 2011⁴⁵ there has been a thoroughly ambitious initiative in Austria, which has set itself the goal of increasing the percentage of innovative and innovation-promoting procurements in the whole of public sector procurement. A study on behalf of the Austrian Council for Research and Technology Development⁴⁶, which primarily focused on the topic of innovation-promoting public sector procurement in Austria with regard to the current state of implementation, attested positive findings to the initiative. Considered as a whole, it must be said that Austria is also positioned well in the international comparison of countries.⁴⁷ However, the Austrian Council's study also shows specific areas of action for the future, which represent the key points of this Council recommendation.

The innovation-promoting public sector procurement guiding concept essentially addresses two impact directions. On one hand innovation-promoting public sector procurement will be broadly improved, to increase the general probability that procuring parties in Austria will prefer innovative solutions more. On the other hand strategic procurement will be used as a policy mechanism to achieve economic and political goals. Both directions should be maintained and implemented more consistently in the future.

Political Support And Comprehensive Implementation

One thing is extremely important with all areas of action shown – broad political support. Austria has set itself the goal of joining the innovation leaders by 2020, and on the whole is not badly positioned. However, a closer examination of recent years allows us to assume that this goal cannot be achieved without ambitious and consistently implemented measures⁴⁸.

Innovation-promoting public sector procurement can be an innovation policy tool, but it requires good embedding in a broad policy mix. And it also requires high political attention, accompanied by specific resources and supportive measures. We cannot assume that innovation-promoting public sector procurement can be implemented comprehensively and sustainably without additional resources. Furthermore there are no legal regulations for an obligatory percentage of innovation-promoting public sector procurement.

Innovation in public sector procurement will be supported on the political side not merely with concepts and strategies, but rather with a binding dimension that actively promotes and encourages innovation as well. Innovation procurement plans of public institutions that illustrate a clear positioning of their own future requirement are indispensable in this context. These plans should be compiled and discussed

recommendations

45 ÖB (2012): Innovation-promoting public sector procurement guideline concept (on behalf of the BMVIT and the BMWFW with the support of the BBG and AIT).

46 D. Murhammer-Sas: "Innovation-promoting public sector procurement in Austria – overview, obstacles and definition of further areas of action." spe-consulting gmbh, Vienna, July 2015.

47 Federal Austrian Government: Austrian Research and Technology Report 2015.

48 Austrian Council: Report on Austria's Scientific and Technological Capability 2015.



recommendations

cross-department. A central office, which should be based in a department equipped with coordination competencies, could coordinate these plans and check them as part of monitoring on the basis of clear goals.

The definition of innovation procurement plans and their monitoring by a central office would make it easier to achieve penetration of the entire level of the public sector. The coordination at the ministries' side in particular could therefore be made easier and already procured innovations, whose penetration is often especially slow, could be better diffused.

The Austrian Council welcomes the fact that, with the innovation-promoting public sector procurement service office and the competency and contact points, a responsible contact partner has been set up for innovation-promoting public sector procurement. The assignment to the BBG must, however, be questioned, as this is only responsible for a fraction of public sector procurement. An even broader use of the service office would have to be endeavoured, which should range from support in determining requirements to the creation of business cases and in particular the performance of the actual process. The long-term goal of the service office should, among others, be for the purchasing entities to change their processes and structures to favour an more intense consideration of innovation in procurement.

The Austrian Council for Research and Technology Development recommends the political

support for innovation-promoting public sector procurement be increased further.

The Austrian Council for Research and Technology Development also recommends the full-coverage implementation of innovation-promoting public sector procurement across and beyond department boundaries be enforced and innovation procurement plans be compiled, and subsequently coordinated and monitored at a central location (such as the Federal Chancellery, for example).

Data Situation

Estimates indicate that the volume of all public sector procurement in Austria is approx. 35 to 40 billion EUR per year⁴⁹. Despite Austria's obligation to report data on public sector procurement to the WTO and the European Commission, a standardised and central recording system has still not been set up. The Austrian Court of Auditors has referred in several reports⁵⁰ to the urgent requirement of central recording and underscored this recommendation with detailed specifications with regard to clear criteria to guarantee the comparability and goal-oriented analysis of data. Based on currently available data it is not possible, however, to assess the percentage of innovation-promoting public sector procurement or total public sector procurement in Austria. As part of the innovation-promoting public sector procurement guiding concept there was indeed a survey by Statistik Austria⁵¹, but this data is only conditionally significant because it is voluntary in nature and the return was very low.

49 W. Clement / E. Walter (2010): Innovation-promoting public sector procurement in Austria – contributions for a guideline concept for the programme of action (on behalf of the BMWFJ).

50 Rechnungshof (Court of Auditors; 2015a): Report by the Court of Auditors: Internal control system with direct awards in selected departments, BMVIT and BMWFW.

Court of Auditors (2015b): Statement: Amendment to the Federal Law on the setting up a federal procurement company with limited liability.

51 See http://www.statistik.at/web_de/fragebogen/oeffentliche_einrichtungen/innovations_foerdernde_beschaffung/index.html for details.

A standardized recording of the volume could serve as the basis for an objective to be derived from it, with regard to the volume and phased increase in innovation-promoting public sector procurement, and would therefore result in an increase in public sector expenditure in research, technology and innovation.

The Austrian Council for Research and Technology Development recommends a standardised, full-coverage and obligatory recording of the volume of public sector procurement in Austria in general and the introduction of innovation-promoting public sector procurement in particular.

Qualification

Operative procurement personnel faces new and increasingly complex requirements. In addition to economical aspects, social, ecological and innovative criteria are also considered with public sector procurement. However, the satisfaction of these requirements requires appropriate human resources, which are frequently not available in sufficient numbers. Added to this is the often insufficient know-how and experience of the procurement personnel. In many cases there simply is not enough knowledge of new technologies and innovations and therefore there is insufficient expertise to evaluate these. Furthermore, the process leadership with innovative procurement projects in many organisations is in the hands of legal and administrative professional groups, and consumers, users or political decision makers are only rarely involved.

In Austria there are no specific job titles for public sector procurement personnel, and nor is there any standardised qualification for this work. In addition to special information and further training measures of the innovation-promoting public sector procurement service office and in cooperation between the innovation-promoting public sector procurement service office and the administrative academy of the Federal Government, there is actually a regularly offered basic and advance seminar on

the topic of innovative and sustainable procurement. These measures are a good basis, but they are not a standardised qualification. Installation in the administrative academy of the BKA or a technical college as own study course might be a possibility.

The focus here should be on supporting and relieving the burden on the procurement personnel. Innovation-promoting public sector procurement must, however, also be seen as a collective process, which begins at management level and moves across all levels of the organisation. The strategic specifications on the owner and policy side should in particular be considered with regard to risk behaviour. A high level of competence of all involved, and not just the operative procurement personnel is indispensable. This must be guaranteed with the qualification and awareness formation of all participants.

The Austrian Council for Research and Technology Development recommends the introduction of a standardised usage and assignment profile for public sector procurement personnel in combination with a standardised, extensive qualification for this work. The awareness creation and qualification of all participants, especially decision makers, must also be ensured and promoted.

Motivation And Risk Sharing

In view of the complex requirements of procurement personnel there are often hardly any objective reasons to purchase innovative products or services. The costs are mostly higher, at least in procurement, the empirical values with the products are low by nature, costly preliminary searches are required and in the pre-commercial area in particular the specific procurement projects are connected with significant added expenditure in terms of time. Added to this are fears connected with legal requirements, so that often the known, frequently less innovative path is travelled with public sector procurement. With this multitude of risks, the

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operative procurement personnel are generally left alone and are only given specific support with, for example, the acceptance of financial risks.

The Austrian Council for Research and Technology Development recommends the integration of technically competent people into the procurement process to support operative procurement personnel and shape the incentive systems, which encourage the acceptance of risks and increase readiness to participate in innovation process in public sector administration.

Outlook

As the next step, the Austrian Council suggests the further implementation be discussed and an expansion of the concept be agreed on, in par-

ticular for the obligatory definition of innovation-promoting public sector procurement in procurement plans.

Special attention should be paid to the area of innovative SMEs, which often do not succeed in winning procurement projects from the public sector. Efforts should be increased in this area to identify the barriers to access for innovative SMEs and to offer solutions.

Generally speaking in Austria there must be more new cooperation projects between the public sector and companies and new structural inroads must also be made in this area. Initiatives in Scandinavian countries such as Sweden and Denmark⁵² can serve as role models for this access.

Recommendation for funding education, research and development in Austria –

Recommendation dated 5 September 2016

Background

The general theme of the Alpbach European Forum 2016 was the “New Enlightenment”. This was to bring attention to the need to renew the Enlightenment Project with its focus on education, science and research in times of major upheaval and global “grand challenges”. To meet this challenge the Technology Forum in particular dedicated itself to the search for new paths and tools for shaping the future.

The debates and discussions in the plenary session, in the work groups and in the informal setting made one thing clear: More than ever we require a well-functioning education system, excellent science institutions, efficient research and effective implementation of research re-

sults in market-enabled innovations. Appropriate financial resources are required for this. Leading innovation nations such as the USA, Switzerland, Sweden, Finland or Denmark have determined consequences of this and increased investments in these areas for some time now. In Austria, securing funding for education, research and innovation ranks among the greatest challenges. The Federal Government also specified this in its Research, Technology and Innovation Strategy (RTI Strategy). The Federal Government’s decision to commit funds resulting from the reform of bank levies to education, science and research is evidently oriented on this.

⁵² V. Lember / R. Kettel / T. Kalvet (2014): Public Procurement, Innovation and Policy. International Perspectives. Heidelberg: Springer.

Bank Levies Funding for Education And Research

In the Cabinet meeting of 12 July 2016 the Federal Government reached an agreement on the reduction of bank levies and the distribution of advance payments of the banks to the tune of EUR one billion. This funding will be used to finance future investments in the areas of education, research and innovation.⁵³

Basically, the intention to provide additional funds for important future areas is a very positive step and is expressly welcomed by the Austrian Council for Research and Technology Development. Specifically, EUR 750 million are committed to the expansion of all-day schools. A further EUR 100 million will flow into the expansion of the technical colleges' offering, whereby some 5,000 study places will be created in the STEM area in particular. EUR 50 million are earmarked for the Education Foundation and EUR 100 million for the National Foundation.

The expansion of the all-day school is also a key education policy topic, as are the steps initiated for the education reform in this regard. As the Austrian Council has repeatedly determined with its evaluation of Austria's scientific and technological performance, appropriate measures for early childhood development and for tackling early social selection in the school system with parallel performance differentiation and talent development are urgently required.⁵⁴ The expansion of the technical colleges' offering in the area of the STEM subjects is also very

positive, and indeed corresponds with the increasing demand from the economy.

The Austrian Council also welcomes the commitment of EUR 100 million each for the expansion of technical college study places and for the additional allocation of the National Foundation. However, the following should be noted here: Since its foundation in 2003, the National Foundation for Science, Technology and Development has pursued the objective of sustainable funding for Austrian RTI system projects. EUR 125 million a year were originally earmarked for this. Due to the negative interest rate trends in recent years, the revenue from ERP funds and the National Bank, from which the Foundation is funded, have fallen continuously. Prior to this, there was an additional allocation of the National Foundation from funds provided by National Bank profits, which is also hoped for this year. But this doesn't provide the original amount of the payouts either. And nor will the EUR 100 million from the bank levies change anything here.

From an overall perspective of the Austrian RTI system, the additional funds must therefore be seen as a drop in the ocean and clearly insufficient. The "fresh money" hoped for from the bank levies is an important signal at best. However, on the whole it is still too little to achieve the research quota goal that the Federal Government actually set itself.

recommendations

⁵³ See www.apa.at/News/6330811234/regierung-einigte-sich-auf-senkung-der-bankenabgabe.html

⁵⁴ Austrian Council (2016): Report on Austria's Scientific and Technological Capability 2016, p. 19; Austrian Council for Research and Technology Development (2015): Report on Austria's Scientific and Technological Capability 2015, p. 34.



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RTI Strategy Funding Goals Cannot Be Achieved

The Federal Government defined the goal in the RTI Strategy of increasing the research quota to 3.76 per cent of GDP by 2020 to catch up with the quotas of the innovation leaders. In order to actually achieve this goal, between 1.6 and 3.1 billion EUR would be additionally required (for this, see the target values shown in figure 5, which now actually differ considerably from the actual values). Even with the funds now provided from the reform of the bank levies, it will not be possible to close this substantial gap to the goal of an R&D quota of 3.76 per cent of GDP.

The same applies for the Federal funding framework up to 2020 adopted on 26 April 2016.⁵⁵ This does not allow for an increase in the budget for education, science, research and innovation. On the contrary: The corresponding percentage of the budget will fall from 17.9 per cent in 2015 to 17.1 per cent in 2020. By way of comparison: The budget for pensions alone (ASVG and civil servants) will rise by 2020 from 25.7 to 29 per cent.

The Federal Government's RTI Strategy explicitly explains the need for a stable and secure funding environment – not least of all to increase private R&D funding. Medium-term funding options, goal formulations in an impact and output-oriented innovation system and therefore improved planning capability and

more security for a sustainable funding strategy should be defined in a research funding law, which is still not in place. Unfortunately, neither the Cabinet decision on the allocation of funds from bank levies nor the Federal funding framework up to 2020 nor the Federal Government's activities to date take this request into account. Despite the positive signals, the Austrian Council must emphasise the absence of a dedicated and clear prioritisation of future areas and the investments they require.

The Austrian Council therefore believes the budget goals formulated in the RTI Strategy and in the Work Programme will clearly not be achieved. Corresponding recommendations by the Austrian Council on 7 September 2015, 5 February 2016, 30 May 2016 or from the Report on Austria's Scientific and Technological Capability have evidently not yet been considered sufficiently.

Despite the need for budget consolidation in view of the scarcity of funding resulting from the financial crisis and from long overdue structural reforms, there is still an urgent requirement for an increase in the funding for education, research and innovation. This is especially necessary because investments in these areas require more time to be able to fully develop their macroeconomic impact. It is therefore imperative that greater parts of the budget be freed up for the future areas of education, research and innovation.

⁵⁵ Austrian Federal Law Gazette, issued on 8 June 2016: Federal Fiscal Framework Act 2017 to 2020 and amendment to the Federal Budget Act 2013, of the Federal Fiscal Framework Act 2016 to 2019 and the Federal Fiscal Act 2016 (NR: GP XXV RV 1096 AB 1120 p. 128).

Budget Development – Universities And FWF As An Example

The development of the budget for the universities in the time frame of the five periods of the performance agreement (PA) from 2004 to 2008 and the financial funding of the science fund (FWF) for 2005 to 2015 are illustrated in the following as examples for an insufficient increase in the funding for education, research and innovation.

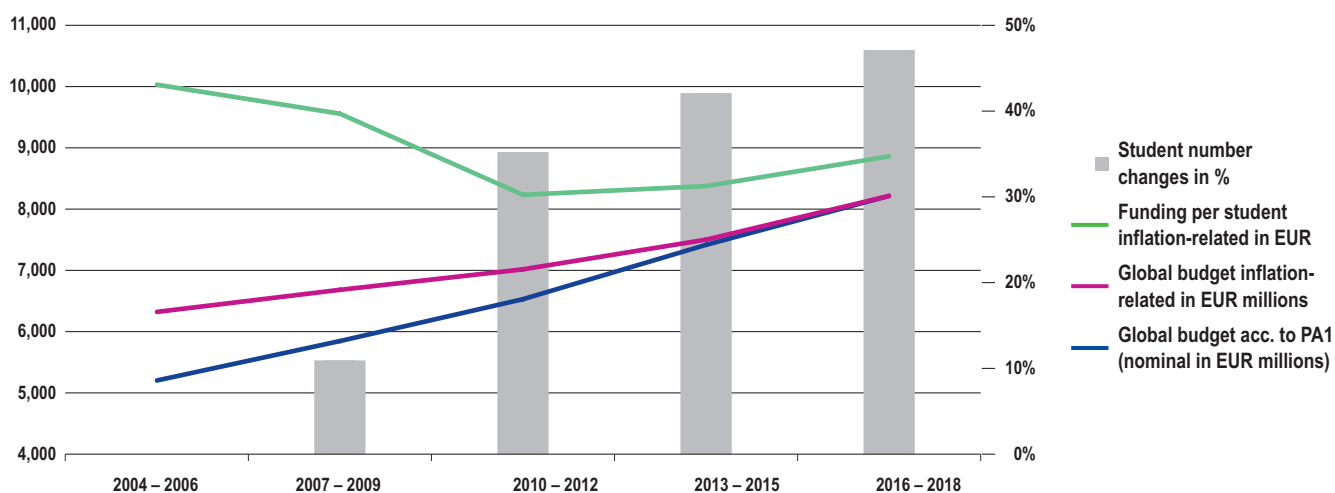
The global budget for universities rose in the observed period more or less linear. EUR 5.2 billion was awarded to the universities for the PA period 2004-2006. This rose to EUR 8.2 billion for the PA period 2016-2018. This is an increase of 57.9 per cent. However, in the same period (2004-2015) the number of students rose by more than 47 per cent. If we now cal-

culate the changes relative to the consumer price index (HICP 2004), a drastic reduction in the funds per student becomes evident with the global budget (see figure 6).

A similar situation is observed for the budget trend with the FWF. Total funding rose here from EUR 122.4 million in 2005 to EUR 173.4 million in 2010. In 2015 the total funding rose to EUR 204.7 million. However, CPI-adjusted in particular, the increase in funds between 2010 and 2015 is still low. In the same period, both the number of applications and the number of people funded from the projects also rose. 2,156 researchers were funded in 2005; in 2015 it was 4,110. This reduced the approval rate, which in 2015, with regard to the total application amount, was only 21.4 per cent.⁵⁶

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Figure 6: Evolution of financing of global budgets for universities



Source: unidata; university performance negotiations; global allocation without third-party funding; Statistik Austria: VPI values.

⁵⁶ FWF Annual Report 2015.

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These developments result in falling availability of funds relative to the funded people (see figure 7).

Comparatively speaking, the leading innovation nations have increased their budgets in this respect. In Austria this increases the danger of losing highly qualified researchers and damaging Austria as a science location.

Innovation Leader Goal Remains Distant

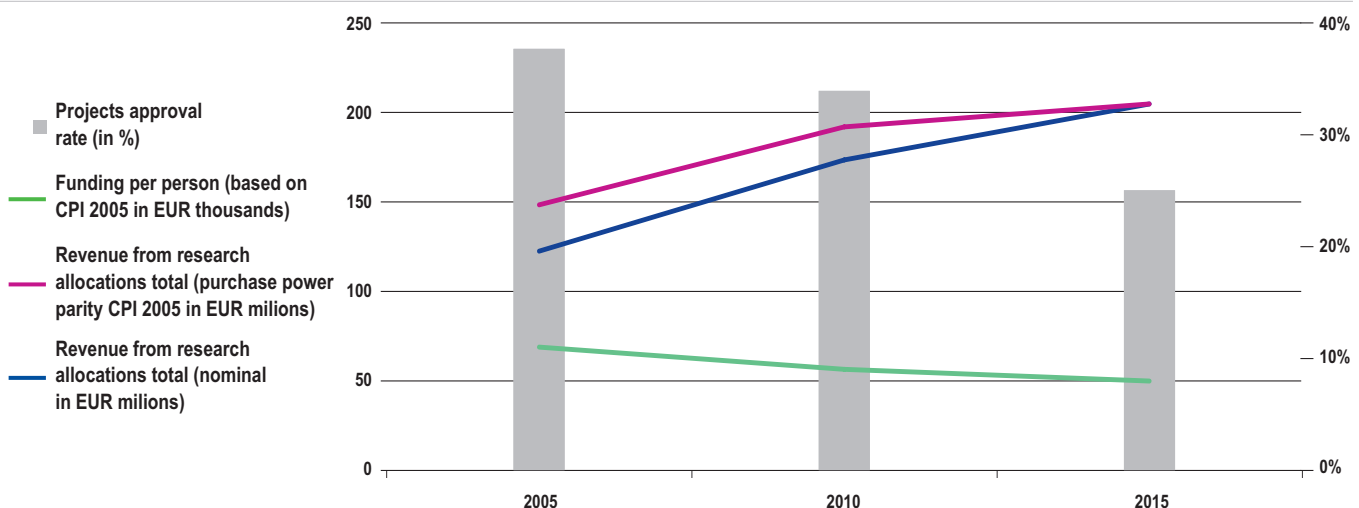
The financial contributions to R&D are already condensed in the most common international indices – and this although their effects can only first be seen in the long term. Austria improved on the previous year by one place to number 10 in the European Innovation Scoreboard (earlier the Innovation Union Score-

board/ IUS).⁵⁷ However, in recent years a rather negative dynamic was evident: In 2009, Austria was number 6 and therefore had a lead position in the follower group. Austria has since fallen back five times in a row by one place each year. The year before, Austria was only number 11 and therefore ranked at the bottom end of the follower group.

This year Austria also fell with the recently released Global Innovation Index (GII) to number 20.⁵⁸ The best place was achieved in 2009 at 15. The top ten here also include the leading innovation nations, Switzerland, Sweden, Finland, Denmark and Germany.

This development runs in the opposite direction as that intended by the Federal Government with its RTI Strategy. The Strategy defines the goal of catching up with the leading inno-

Figure 7: FWF Budget Evolution



Source: FWF annual reports 2015, 2010, 2015; CPI, Statistik Austria, own calculation.

⁵⁷ European Innovation Scoreboard 2016, p. 12 ff.

⁵⁸ <https://www.globalinnovationindex.org/gii-2016-report>

vation nations and joining the group of innovation leaders by 2020. The Austrian Council believes this goal orientation still applies as it did before. On the basis of its monitoring activities in conjunction with its reports on Austria's scientific and technological performance, the Austrian Council believes it is also clear that the current measures to implement the RTI Strategy are insufficient to keep up with the development dynamic of the leading countries.⁵⁹ This means the innovation leaders will move further away if the trend remains as it is. As other countries show a stronger development dynamic, continuing the status quo is not an option. If Austria does not want to fall further in global competition and lose its connection with the lead group, the topics of education, research, technology and innovation must be afforded the highest possible priority – the funding required must be provided and structural adjustments must also be made.

The Austrian Court of Auditors report must also be mentioned in this respect. According to the report, the structures of research funding in Austria are both characterised by complex and unclear cash flows and continue to be inefficient.⁶⁰ The Austrian Council repeatedly refers in this context to its findings and recommendations for this in the White Paper on controlling research, technology and innovation in Austria, which are intended to simplify funding structures.⁶¹ Freed up funds could then be used directly for research.

These and other structural reforms (already defined in the RTI Strategy) are required to improve the output and effectiveness of the Austrian RTI system. However, this would also require an appropriate budgetary basis, sustainable funding security and medium to long-term planning capability.

Recommendation

The Austrian Council therefore recommends once again:

- The funding gap to be closed so the goal of an R&D quota of 3.76 per cent of GDP defined in the Federal Government's RTI Strategy can be achieved by 2020.
- The goal formulated by the Federal Government on the basis of a resolution proposal of the National Council in its Work Programme 2013 to 2018 to raise the university expenditure rate by 2020 to 2 per cent of GDP be vigorously pursued.
- The immediate implementation of the announced and required RTI Strategy measures to achieve funding goals.
- The swift and conclusive formulation of the planned research funding law, to secure sustainable funding security and medium to long-term planning capacity.
- The enforcing of structural reforms to reallocate existing resources from less productive areas into future-oriented areas, such as education, research and innovation

recommendations

⁵⁹ Austrian Council (2016): Report on Austria's Scientific and Technological Capability 2016, p. 54 f.; Austrian Council for Research and Technology Development (2015): Report on Austria's Scientific and Technological Capability 2015, p. 83 f.

⁶⁰ Report by the Court of Auditors: Research Funding in Austria. Vienna 2016/4.

⁶¹ White Paper on controlling research, technology and innovation in Austria, p. 18 ff.

Statement of the Austrian Council for Research and Technology Development on the draft for the “National strategy for the social dimension in higher education” –

Recommendation dated 25 November 2016

Position of the Austrian Council for Research and Technology Development

An extensive process to improve university access was initiated with this draft on the “National strategy for the social dimension in higher education – for more integrated access and broader participation”. The Austrian Council has already voiced its opinion in earlier statements on the implementation of capacity-oriented study place funding with fair access regulations and improved study conditions. With regard to “socially just” access, the Austrian Council emphasizes the importance of performance-oriented study funding. This draft deals with and illustrates these aspects in detail.

The Austrian Council believes it is important that the framework conditions in university access reduce social selection, rather than increase it. This should not contradict performance-oriented selection of suitable students at the beginning or in an early study phase either.

As the Austrian Council has often specified, an

education-minded society must also be created in all development phases, from pre-school development right through to tertiary study age. Family, social and education policies are required here as one to enable socially just access to education. The scholarship system must also be further expanded to increase the percentage of “non-traditional admissions”. A significant increase in income limits would significantly improve the situation for many students. The lines of action illustrated in the document correspond in content with the Austrian Council’s position and for implementation should be equipped with a specific measures plan, which is also reflected accordingly in the budgets. A clear definition of the responsibilities to implement the measures must be defined in the next step. A further burden on the tertiary sector without beefing up the funds to meet the objectives would be counterproductive and would result in restrictions in other areas of higher education operations.

Recommendation regarding the use of funding provided by the National Foundation for RTD for 2017 – Recommendation dated 28 November 2016

Preamble

On the basis of the Foundation Council’s decision of 27 September 2016 with respect to awarding funds for 2017 on 3 October 2016, the Austrian Council for Research and Technology Development was invited in acc. with § 11 para. 1 item 1 of the RTD National Foundation Act to issue a recommendation on the use of the Foundation’s funding for 2017. This is to be made on the basis of the applications submitted.

The total application volume for 2017 is EUR 169,335 million. With regard to the approved EUR 100 million from bank levies the Austri-

an Council structured its recommendation in line with three scenarios for potentially available Foundation funds for 2017:

- 1) EUR 10 million (expected to be funding from the National Foundation)
- 2) EUR 35 million (Foundation funds plus EUR 25 million from bank levies with tranching over four years)
- 3) EUR 60 million (Foundation funds plus EUR 50 million from bank levies with tranching over two years)

In view of the difficult financial situation, the National Foundation becomes especially sig-

nificant, this being manifested in the support of long-term effect interdisciplinary research measures (see § 2 of the RTD National Foundation Act).

The Austrian Council advocates a sufficient and sustainable financing of the National Foundation. The Austrian Council is concerned with the extremely fluctuating allocation of funds. The amount of allocated funds since at least 2008 tends to hover far below the EUR 125 million per year provided for in legal stipulations.

The basis for the decision on awarding funds are the strategic importance and socio-political relevance of the projects submitted and their classification in the overall context of Austrian research funding. The Austrian Council also defines the following priorities for awarding funds for 2017:

- Strengthening the national human potential base
- Strengthening competitive funding in basic and applied research
- Strengthening the research infrastructure with initiatives with appropriate critical variables and risk potential
- Measures to strengthen location Austria for research-active companies
- Strengthening risk capital

- Strengthening innovation potential with “Open Innovation”
- Coordination and harmonisation of regional and federal RTI activities

Recommendation

The applications of the beneficiaries for funding by the National Foundation basically comply with the Council’s recommendation on prioritisation and in principle can therefore be supported.

Should the worst case scenario of EUR 10 million occur, the Austrian Council recommends no allocation be made to the beneficiaries and the funds be held over to 2018 instead.

In the event of a figure above EUR 10 million but below EUR 35 million with the allocation of funds of the National Foundation, the Austrian Council recommends reappraisal.

The Austrian Council for Research and Technology Development favours scenarios 2 and 3 on the basis of an extensive audit and evaluation of the projects submitted for the pending allocation of funds (see table on next page).

Due to the application volume that is also far above the funds to be expected for 2017 a number of projects cannot be covered by the National Foundation. This has been left out in the table for matters of better transparency.

recommendations

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Beneficiary	Title	Amount applied for in EUR m	Recommendation EUR 35 m	Recommendation EUR 60 m
FFG	Bridge building programme / BRIDGE	10.00	9.00	14.00
FFG	Research partnerships – Industry-related dissertations	2.00	2.00	2.00
FFG	2nd R&D tender Infrastructure funding	20.00	0.00	15.00
FWF	Special research areas and PhD	35.260	7.00	12.00
FWF	Matching Funds for supporting young researchers and women	5.23	3.00	3.00
CDG	12 CD labs	10.259	3.00	3.00
LBG	Development, set-up, operation & evaluation of an OIS-enabled research institution	4.00	3.00	3.00
ÖAW	Austrian High Performance Data Analysis Center	8.441	4.00	4.00
aws	aws First – from idea to entrepreneurship	4.21	4.00	4.00
FFG	Frontrunner	5.00	0	0
FFG	Early Stage – early research ideas of innovative companies	5.00	0	0
FFG	21st Century Skills – human resources for digitalization	5.00	0	0
FFG	Better Life – pilot programme for prevention research	5.00	0	0
CDG	Programme Partnership in Research (PIR)	4.00	0	0
LBG	Sustainable establishment of Open Innovation in Science Research and Competence Centre	4.00	0	0
ÖAW	HumanIS – Humanities and Information Science	4.00	0	0
ÖAW	Speaking Truth to Power? For the professionalization of scientific policy and society consulting	1.76	0	0
ÖAW	Multi-photon interferometry for quantum networks (VQN)	2.90	0	0
aws	Venture Capital Initiative (VCI)	10.275	0	0
aws	Translational Life Sciences Austria	10.00	0	0
aws	License.IP: Technology transfer to SMEs through Innovation In Licensing	5.00	0	0
aws / FFG	Expansion of the Global Incubator Network	8.00	0	0
Total		125.91157	35.00	60.00

Reason – comment

Bridge is a long-established programme. The cooperation between science and economy is an attractive option. The highest possible allocation in line with the funds available is recommended, which in the third scenario goes beyond the applied for volume of EUR 10 million. If there is no requirement at the FFG side to use this additional EUR 4 million for Bridge, then it must be allocated in line with the other projects submitted with FFG.

This relatively new programme line promises a boost to human capital in terms of training; the industry shall be integrated in this programme, too.

As the Austrian Council has already specified, an own funding mechanism for setting up research infrastructures of critical dimensions is not provided in Austria. These findings are also reflected in the focus points of the National Foundation recommended for 2017. However a greater financial volume must be applied for a beneficial implementation, which is only possible in the third scenario. Within the scope of the special tranches for the National Foundation 2015 and 2016 the Austrian Council already recommended a total of EUR 20 million for the first tender. In terms of long-term and appropriately dimensioned financing, the Austrian Council believes consideration within the scope of the Research Financing Act is conceivable.

The special research areas (German abbreviation: "SFB") are a superb funding concept with very high quality and maximum requirement for research and teaching. SFB financing is an essential factor of top-quality interdisciplinary research in Austria. The PhD programme (German abbreviation: "DK") received a very positive evaluation in 2014 with a view to its value for training highly qualified scientists. Although the PhD courses are among the core tasks of the universities, the additional and complementary financing of the structured PhD programme by the FWF seems essential for the universities until further notice. Matching Funds is an innovative governance model that promotes an efficient interconnection of federal and state funding in the RTI area, and it in particular pursues the priorities and recommendations of the RFTE.

The CD labs are a proven mechanism in promoting the cooperation between science and economy and for promoting knowledge transfer.

The application clearly corresponds with the Open Innovation focus set by the Austrian Council for 2017. Setting up an OIS-enabled research institution first in addition to the already existing Competence Centre would be especially welcome here.

The initiative proposed by the ÖAW covers an important infrastructure aspect. The international embedding at one location must be positively emphasized in this respect.

The Austrian Council believes the initiative is extremely innovative and focuses precisely on the point where leverage is the greatest, i.e. young people. This is a programme with which much can be achieved with relatively little funding. The explicit integration of existing projects must also be positively highlighted. Fronrunner is a fusion of the two programmes, "Fronrunner" and "Competence Headquarters".

The application was set quite low at EUR 5 million. As the programme was already covered within the scope of the Austria Fund 2016 with EUR 11 million, due to the scarcity of funds for the National Foundation 2017 a recommendation will not be given. However at this point it should be noted that in conceiving the Austria Fund it was not intended that beneficiaries should submit the same projects to both sources of funds, the National Foundation and the Austria Fund.

"Early Stage" is viewed critically in that on one hand the costs appear very high (70% of funding) and on the other hand the goals of the project are unclear. Furthermore the quality of the application also appears to be in need of improvement.

This involves the FFG's existing funding mechanisms, which focus on digitalisation, without generating corresponding added value.

The delimitation to other programmes in the Life Science area is blurred. It is also more about a consciousness raising initiative than about an R&D-related project.

The Austrian Council does not see any gap to be covered with these support measures. It is much more about duplicating already existing initiatives. Due the scarcity of funds, preference is given to the second application for the LBG's Open Innovation (see above). The Open Innovation Science Research and Competence Center was already covered in 2016 by the National Foundation and therefore put back for 2017.

The application, and its unique position in particular, are viewed critically here. The objectives are broad and insufficiently focused. On the whole the application shows quite a bit of room for improvement.

The initiative is viewed very critically. Learning from international experiences is missing, so that similar initiatives on EU level, for example, are not considered.

An interesting initiative, which unfortunately cannot be funded due to the scarcity of funds.

Basically, the Venture Capital Initiative addresses a weak point of the Austrian RTI landscape. The fund's investments over recent years must now take effect in the system. The percentage of investments outside Austria is still too high. This trend must continue to be observed. Additional funds are therefore not recommended for 2017 either.

The application also features a very high financial requirement, which can only be covered by the National Foundation with great difficulty. On the negative side we should also say that there is no more docking on other programmes either.

Before new initiatives are started in the IP area the presentation of the national IP strategy and the planned new activities of the patent office in particular must first be seen.

The establishment of the Global Incubator Network (GIN) was only recently recommended during the course of the special tranche of the National Foundation 2015 for funding. Before this concept is further expanded the Austrian Council believes the sustainability of the initiative's effect should first be observed.

Recommendation to set up a mechanism to enforce Blue Sky Research – Recommendation dated 2 December 2016

Recommendation

The Austrian Council recommends setting up a mechanism to fund Top End Blue Sky Research. As part of a strategic initiative for excellent researchers and/or research groups from all disciplines this will enable additional freedom for their research work. The Austrian Council also recommends the mechanism be elaborated under the guidance of the FWF science fund with the integration of all relevant stakeholders.

Goal

The core idea of this new mechanism is to promote strategic research initiatives of excellent Austrian players, who have the potential to take on the lead shaping role in international projects, with which radical new and innovative solutions are worked out for current social challenges and global “grand challenges”. The overriding objective here is to develop international research initiatives with an Austrian lead, in order to create strategic benefits for national researchers and/or research groups.

It is also important here that the new mechanism address the potential issues of “safe science” and also support high-risk projects more than before. The research groups will also be guaranteed the greatest possible freedom to act and flexibility here. An appropriate mechanism from the Austrian Council’s point of view could be a new column in the FWF’s portfolio of mechanisms, which would also portray an enhanced self-image within the scope of its strategic realignment.

The idea here also focuses on international

benchmarks such as the National Research Programme of the Swiss National Fund (SNF) for funding scientific research or the Metascans of Policy Horizons Canada. Both methods support science-based contributions to the solution of important present-day problems on the basis of more interdisciplinary and interdisciplinary research.

Elements Of A Conceivable Administrative Tool

- Bottom-up elaboration of proposals by participating project consortia
- Impact evaluation, no requirements for co-financing – purely risk capital for a highly-professional consortium with a brilliant idea
- A new project is financed every 3 years
- No allocation of funds – only the best project is financed

Background

The acceleration of excellent research at international level is an important issue for the Austrian Council. However, excellent international research projects require an appropriate lead time. With most strategic initiatives, Austrian players are at best co-shapers (“followers”), and rarely lead in a shaping role. Essential strategic insights are then lost and participation in follow-up activities is more difficult. Mechanisms that support these kinds of projects in their formation and guarantee the required freedom for research groups do not exist yet.

The Austrian Council already published proposals in 2013 to create new freedom for research in its White Paper on controlling research, technology and innovation in Austria.⁶²

⁶² White Paper on controlling research, technology and innovation in Austria, p. 21.

The funding base required for this could be provided on the basis of freed-up funds from the reform of administration structures in research funding.

In its report on research funding in Austria published on 24 June 2016 the Court of Auditors also argued in the same direction: Accord-

ing to the Austrian Court of Auditors, research funding structures in Austria are both characterised by complex and unclear cash flows and continue to be inefficient.⁶³ Appropriate structural reforms can free up funds, which can then be used directly for research.

recommendations

Statement of the Austrian Council for Research and Technology Development on the Work Group 5 package of measures: Research, technology, start-ups –

Recommendation dated 2 December 2016

Background

The Cabinet adopted an ambitious research package on 8 November 2016. Its objective is to achieve the goal defined by the Research, Technology and Innovation Strategy (RTI Strategy) of joining Europe's most innovative nations by 2020. In addition to structural reform proposals, the adopted package of measures also includes specific budgetary measures. With specific research funding (the Federal Government intends to invest a total of approx. EUR 700 million by 2021), these will create a leverage effect that will stimulate an additional approx. EUR 500 million in private investment in the research sector. On the whole a "research billion" is to be enabled here.

Austrian Council's Appraisal Of/Position On The Adopted Package Of Measures

The Austrian Council essentially welcomes the adopted package of measures for research, technology and start-ups. The Council believes this shows how the Federal Government affords greater importance to the topics of research, innovation and technology as key future-related factors for Austria than it has previously done.

This is highly significant in that the key result of the Council's Mid-Term Review was rather sobering with regard to implementation of the RTI Strategy in 2015: In summary, the overriding goal of the Federal Government to join the leading innovation nations by 2020 was defined as not achievable. The reason for this appraisal was the insufficient implementation intensity of recent years. In its previous reports on scientific and technological capability, the Austria Council has repeatedly pointed out and recommended that the measures of the RTI Strategy be implemented with greater emphasis to achieve the ambitious objectives. It has also urged the qualification of the objectives and specific budgetary provisions for individual measures several times. This was also addressed accordingly in the latest presentation to the Cabinet. All recommendations of the Austrian Council have also been accepted and proposals from its Performance Reports and its White Paper on controlling research, technology and innovation in Austria have also been incorporated. The Council believes this is all entirely positive.

⁶³ Report by the Court of Auditors: Research Funding in Austria. Vienna 2016/4, p. 127.

recommendations

In summary, the Austrian Council believes the adopted package of measures is beneficial and important. It includes the required specification of implementation steps to achieve the innovation leadership targeted by the RTI Strategy. However, it remains to be seen whether or not and when the intended projects will actually follow and whether or not the budgetary coverage required for this will be provided.

The Austrian Council's Position On Individual Proposed Measures

The Austrian Council's position on some measures of the presentation to the Cabinet considered to be especially relevant is as follows:

1 Governance and framework conditions

- RTI Task Force:

The agreed upgrading of the RTI Task Force for implementation of the RTI Strategy is emphatically welcomed by the Austrian Council. The Council had already recommended this measure in 2013 in its White Paper and more recently as part of the Mid-Term Review in its Performance Report 2015. The Council believes a new policy development phase is required to achieve the goal of becoming an innovation leader. A package of reform steps must be pursued in place of the fragmented individual measures seen to date. This package must be harmonised with the entire RTI system. This, however, also requires stronger political commitment and a higher degree of political energy. The Austrian Council therefore believes the planned annual sessions of the Task Force at political level, with which the results of operative activity will be discussed and a work programme for the next year will be defined are an important step in this direction.

- Coordination of preparation work for the RTI Strategy 2030, including OECD "Country Review":

The coordination of preparation work for an RTI Strategy 2030 is to be welcomed, but it

is also recommended that this be performed in close coordination with the Austrian Council. The Austrian Council believes it must be ensured that the planned Country Review of the OECD actually results in findings that can be applied. A look at existing OECD Country Reviews allows us to conclude that primarily existing material is analysed and the findings will correspond with already existing studies and reports (such as the Austrian Council's Performance Report). We would therefore have to consider whether or not a deeper analysis in the form of a system evaluation would be a beneficial addition and enhancement. In this context, the evaluation of research funding in Austria addressed here and the amendment to the Federal Statistics Act are extremely important and therefore also to be welcomed.

- Cost-benefit analysis of a research funding database (in acc. with the Court of Auditors report on research funding in Austria (2016/8):

The Austrian Council already recommended the setting up of an all-Austrian research funding database in 2011. The goal here was extensive and transparently understandable documentation of all research funding by the Federal Government and the states in one standardised, public access database. This should also serve as the basis for meeting special legal reporting obligations (e.g. Report on Austria's Scientific and Technological Capability, Research and Technology Report, facts documentation, reporting obligations within the framework of "Europa 2020", etc.) and evaluations. Corresponding data is already recorded today by the respective funding institutions as part of their standardised data collection with all instances of funding. The Austrian Council therefore explicitly welcomes this proposal and will work intensively on the foundations for setting up a research funding database.

- Activate European subsidies:

The Austrian Council has repeatedly referred to the problems with the EFRD and therefore welcomes all measures that would simplify and in particular increase legal certainty for research institutions.

- **National Foundation for Research, Technology and Innovation:**
As part of its recommendation work, the Austrian Council has continuously called for the long-term securing of the allocation of funds of the National Foundation in past years. This should now be secured immediately to guarantee the allocation of EUR 125 million annually originally intended by the legislators.
- **Improvement in the services of Austria Wirtschaftsservice GmbH (aws) and FFG/reduction in the fragmentation of programs:**
The Austrian Council welcomes the introduction of a transparent search option across all available aws and FFG programs and the planned expansion to funding by regional governments in particular. The targeted reduction in the fragmentation of the Austrian program landscape is especially positive. Coordination with the planned system evaluation appears expedient here, as this should also include conclusions on optimisation options. The continuous evaluation of aws and FFG is also considered positive. The results should in any case be taken seriously, published and rapidly implemented regardless of their critical content.

2 Expedite Innovation Basis

- **Increase in the allocation of the FWF science fund/reinforcing of institutional excellent research/funding human potential:**
The announced increase in funds for competitive funding of basic research by the FWF from currently EUR 184 million p.a. to EUR 290 million by 2021 is expressly welcomed by the Austrian Council, but Austria is indeed far behind the innovation leader average in allocating competitive research funds. A swift increase in funds is one of the most urgent meas-

ures required to support excellent researchers in Austria and to maintain Austria as an attractive research location. This is also supported with the announced funding of non-university excellent research and by the planned measures to fund human potential and the R&D infrastructure available in Austria.

- **Innovation-promoting public sector procurement:**

The Austrian Council has already emphasised the importance of demand-side mechanisms to fund innovation and in particular public sector procurement in its recommendation of September 2016. Of the measures planned by the Federal Government in this area the Austrian Council believes the introduction of a procurement training course and the targeted improvement of the data situation must in particular be singled out. These points were also key stipulations of the Austrian Council's recommendation in this respect.

3 Support Digital Transformation

- **Broadband/5G strategy:**
We are poised at the beginning of the 4th industrial revolution – triggered by the digital revolution and the technological development boost it has initiated. The Cabinet therefore believes that innovation leadership can only be achieved on the basis of appropriate foundations in the area of digitalisation and the Internet. The Austrian Council expressly welcomes measures in this respect, such as the ongoing “digital offensive” for broadband expansion or the 5G strategy currently being prepared, which are announced in the presentation to the Cabinet.
- **Endowed chair for the digitalisation of production systems:**
Basically an increase in the number of professors, especially with research focus on the digitalisation of production systems, is very welcome, but sustainable securing of funding is considered essential. As these are temporary professorships and the term is 5 years, the

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question is – what long-term financial consequences will this have for the universities?

4 Broader Access To Innovations

- Open-theme innovation workshop:

With respect to the planned setting up of “living labs” and open-theme innovation workshops, the Austrian Council welcomes the explicit consideration and support to date of less innovation-active players.

- Impact Innovation Program:

The early consideration of customers and customer requirements in the innovation process, especially in combination with social innovation aspects, must also be positively emphasised.

5 High-Risk Research

- Frontrunners and Early Stage/1000 Ideas Program:

The increased funding of especially risky projects has long been an issue for the Austrian Council and it is also reflected in its various recommendations. While with the Frontrunner Line we can assume fewer high-risk projects, there are definitely more with the new Early Stage Initiative or the planned 1000 Ideas Program of the FWF. The Austrian Council therefore supports the appropriate initiatives and recently referred to their relevance for the domestic RTI system.

6 Boost the science-economy interface & start-ups

- Research investment fund – Uni-Spin-off Fund:

For several years now the Austrian Council has highlighted the insufficient interaction between public sector-funded R&D and private equity capital. It therefore welcomes the planned initiatives in this direction to leverage private early-phase capital for uni spin-offs and start-ups.

- Creation of an Austrian private equity growth fund:

The Austrian Council considers the tender of a “cornerstone investment” to create a private

equity growth fund for scaling and internationalising start-ups to be especially positive. There is still an insufficiently covered funding gap in Austria here in particular. The intention to shape the tender so that the capital actually benefits Austrian companies and in particular is also administered in Austria to create more dynamic for the Austrian financial market in this area is also very welcome.

- Prototype funding for knowledge transfer:

The Austrian Council already referred in its recommendation on knowledge transfer in November 2011 to the lack of appropriate Proof-of-Prototype funding to support the commercialisation of research results. This is also demonstrated in the requirements with PRIZE. The Austrian Council very much welcomes the fact that fresh money will be provided here to continue this initiative.

- Stronger link between economy and science/ COMET competence centres programme:

The Austrian Council believes the intensification of the BRIDGE programme is a beneficial measure. The planned expansion of the funding spectrum to include social innovations is also positive. The Austrian Council also welcomes the realignment of the important COMET programme and the intended additional Call for C1 centres by 2018.

What Is Missing / Criticism

- No secured funding:

The presentation to the Cabinet forecasts that a total of EUR 700 million will be invested by the public sector by 2021. Specific research funding with higher leverage effect will also stimulate an additional EUR 500 million from private funding sources. At first glance this looks very promising. However, on closer consideration the package of measures is revealed to be pure dreams of the future, as the majority of these funds will only be fixed for the years 2018 to 2021 with the next funding framework. Only 16.4 of the EUR 700 million are earmarked for 2017. And the

chosen formulation of the presentation to the Cabinet goes even more drastically to the heart of the funding, because, as stated here: “As part of the work for the Federal Institute for Risk Assessment 2018 to 2021 the financial coverage of the measures mentioned above will be negotiated and checked.”

- No focus on universities:

Approx. 80 per cent of basic research in Austria is done at the universities. International comparisons (with Germany and Switzerland in particular) illustrate that the Austrian universities are dramatically under-funded. As basic research is the foundation for all innovation, neglecting the universities is a massive problem. This factor – which was correctly recognised in Chapter 3 “Facilitate insight, accelerate excellence” – unfortunately is not taken into account with the presentation to the Cabinet. The budget for the 2019-2021 performance agreement period of the universities must already be defined by the end of 2017. The requirement for a first step towards implementing the study place funding

at the universities alone is some EUR 500 million per year. All measures to increase the university budget must therefore also be included in the coming BFRG.

- No attention paid to the science-society dialogue:

Chapter 5 “Provide steering, set framework”, in which the RTI Strategy deals with essential aspects of the structures and priorities at meta level (e.g. Grand Challenges or international positioning). The society-science dialogue, which has an important function with the general public’s attitude to research, is dealt with in this section with specific stipulations. In this respect specific references are missing in the illustration of the measures in the presentation to the Cabinet. References to RRI or Open Access, for example, would have been expedient. This is problematic because the Austrian general public is defined in all international comparisons and surveys as not very science-minded and above-average technology-unfriendly.

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Recommendation on setting budgetary priorities in Austria –

Recommendation dated 19 December 2016.

Recommendation

The Austrian Council for Research and Technology Development emphatically recommends higher budgetary priority on future-oriented areas such as education, research and innovation. Only then can the Federal Government’s strategic objectives to join the leading innovation nations and consequently increase Austria’s competitiveness again be achieved.

The Austrian Council also urgently recommends the National Foundation for Science, Technology and Development be merged with the Austria Fund. This would allow the constant funding problems to be addressed. Synergy effects in the administrative area can also be better utilised.

Background

With increasing concern the Austrian Council for Research and Technology Development also perceives a discrepancy between the strategic objectives of the Austrian RTI policy and its achievement. This is illustrated in the following using some prominent examples.

National Foundation for Research, Technology and Development

The most up-to-date example for this is the development of the funding of the National Foundation for Research, Technology and Development. According to the original intention of the legislators the Foundation was to have been allocated EUR 125 million annually. However,

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this goal was only achieved in the first three years after the Foundation was established in 2004. Since then the allocated funds have fallen continuously and recently dramatically (see figure 8). Not even EUR 10 million are available for 2017!

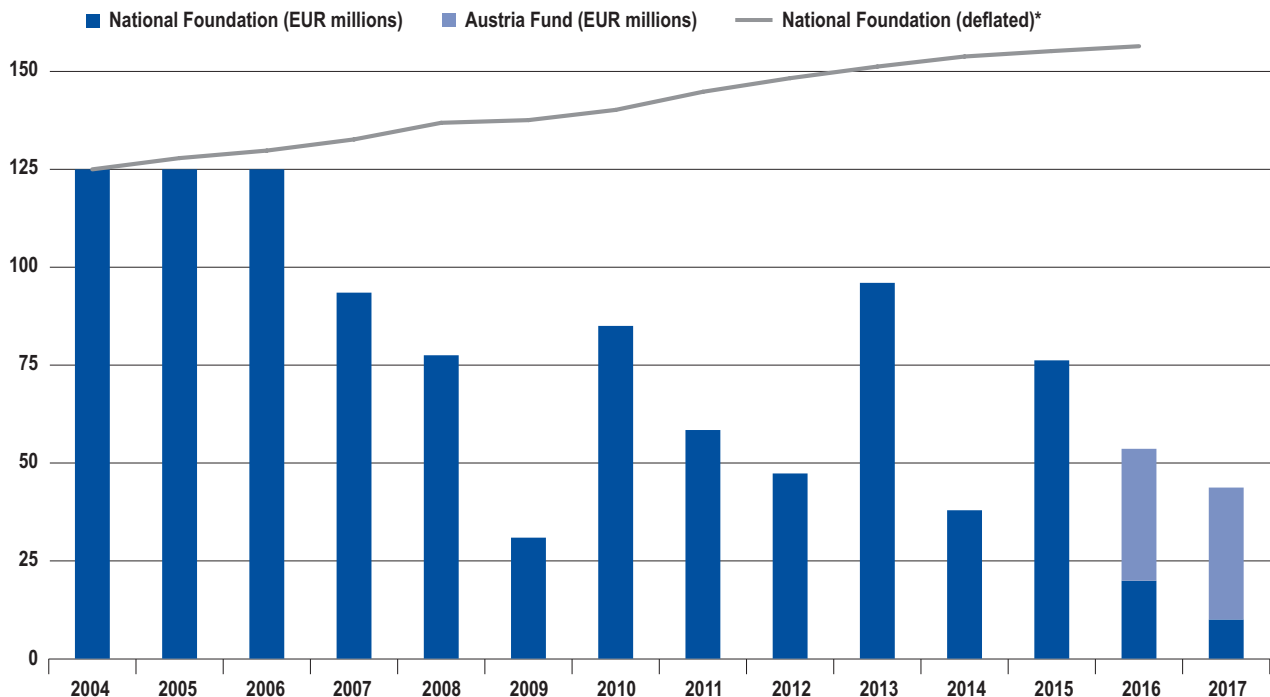
As a consequence an award decision could not be made in the Foundation Council's meeting on 6 December 2016.

Due to the negative interest trend, in 2015 the Minister of Finance provided an additional allocation, which resulted in a total award of EUR 76 million. Because of the continued low allocation by the National Bank and the ERP fund an additional allocation of this kind was also hoped for in 2016. However, this did not hap-

pen – the main argument being that in addition to the allocation of resources of the Austria Fund to the tune of EUR 33.7 million, an additional EUR 50 million should come from the reform of the bank levies adopted by the Cabinet on 12 July 2016. However, the approved funds from bank levies are no longer available for this year, as was seen at the end of 2016. This can only be expected (if at all) in the second half of the coming year, so that these funds will no longer actually be effective in 2017 either.

This means a blatant under-funding of EUR 19.9 million for 2016 and a currently promised EUR 8 million for 2017, whereby the National Bank contributes nothing to this, although its target contribution is EUR 75 million. If this

Figure 8: Evolution of the annual allocation of funds for the Austrian National Foundation for Research, Technology and Development (in EUR millions)



Source: National Foundation RTD, own presentation. *Hypothetical funding flow with constant funding volume.

is not massively countered, 2016 and 2017 will be lost years for the Foundation and the research in Austria that it favours. This is also compounded by the fact that even with the funds from bank levies and the allocations from the Austria Fund, the original amount of the allocations would not be achieved. And the inflation-related depreciation since 2006 hasn't been considered even once here. If we were to balance this the Foundation would have to have an annual award volume of approx. EUR 155 million today. Claim and reality therefore clash dramatically here.

The FWF Science Fund

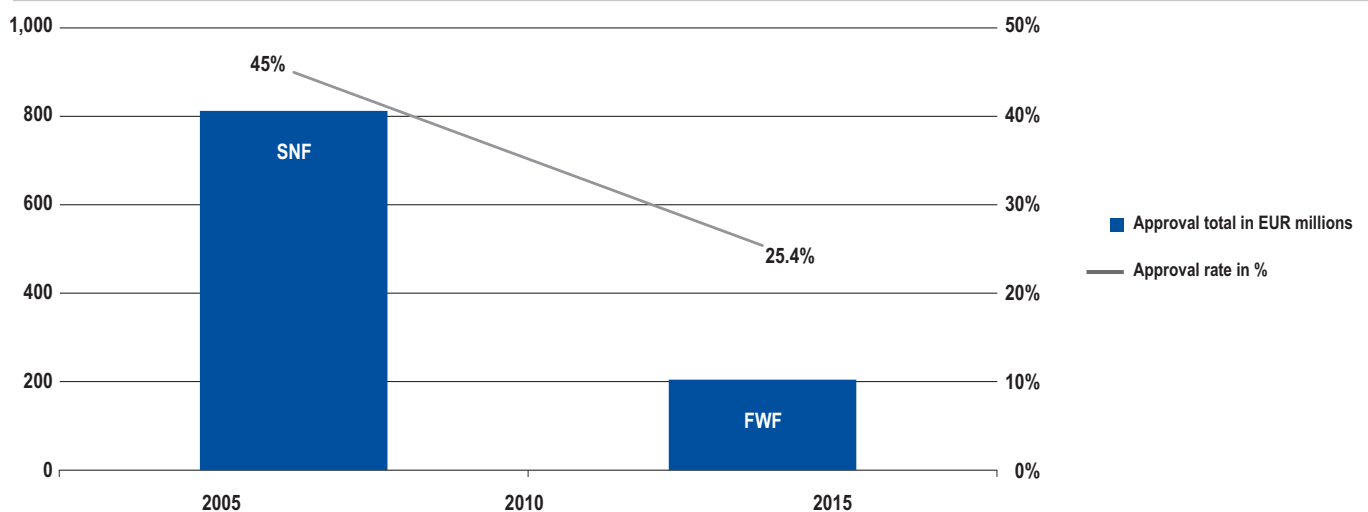
A further example here is the development of the FWF Science Fund's budget. The Federal Government's Research, Innovation and Technology Strategy identifies clear need for action here and focuses on an expansion in the competitively awarded funds for basic research.

However, if we orient ourselves on the leading innovation nations (and this is the approach followed by the RTI Strategy), we can see that Austria is far behind the innovation leaders' average.

The FWF is allocated approximately EUR 200 million annually. With EUR 812 million, the Swiss National Fund has more than 4 times this at its disposal. A comparison of the competitive research funding per inhabitant with the leading nations produces a similar picture: In Austria about EUR 25 is spent per inhabitant. In Switzerland it is EUR 85, in Finland EUR 58 and in Germany about EUR 35. The ability to attract competitive research funding at national level is therefore restricted in Austria. Among other factors, this has a negative effect on the average FWF approval rate, which with individual projects is at approximately 25 per cent, while with the Swiss National Fund it is 45 per cent (see figure 9).

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Figure 9: Approval Rates FWF – SNF



Source: FWF, SNF, own presentation.



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The increase in funds for the competitive funding of basic research by the FWF to EUR 290 million p.a. by 2021 adopted on 8 November 2016 as part of the Cabinet's Research Package is indeed an important signal. But there is a wide gap here between claim and reality, because the announced funds have not been budgeted even once and therefore depend on the negotiations for the Federal funding framework 2018 to 2021.

Universities

A further aspect of the basic research topic: Approx. 80 per cent of basic research in Austria is done at the universities. International comparisons (with Germany and Switzerland in particular) illustrate that the Austrian universities are dramatically under-funded. The expenditure for the entire university sector, especially for the universities, measured on GDP has stagnated for years now. The Federal Government has committed in its Work Programme for 2013 to 2018 to developing an overall strategy for the universities to improve its positioning in the international comparison. Budgetary measures, among others, should be implemented here to achieve a university expenditure quota by 2020 of 2 per cent of GDP, which takes into account a resolution of the National Council. However, if we consider the expenditure path to achieving this goal, approximately EUR 3 billion more would be required with the funding dynamic remaining as it is (see figure 10). But even if these funds were provided by 2020, which is rather unlikely on the basis of the current funding dynamic, the Austrian university sector would still only have about 75 per cent of the resources available to the Swiss university sector as things stand today. As basic research is the foundation for many innovations, neglecting tertiary education and the universities first and foremost is a massive problem. Added to this is the fact that the budget of domestic universities also includes the rents that

they must pay to the federal real estate company (BIG). Among other factors, this means that rental payments must also be included in the research quota. If we also considered the delta from the missing EUR 3 billion to achieve the 2 per cent goal and the research-relevant percentage of the university budget (46 per cent), then research will require another approx. EUR 1.38 billion in 2020. Claim and reality also differ very sharply from one another in this area as well.

Research Quota

The same pattern can also be seen with respect to the research quota. The Federal Government defined the goal of increasing the research quota to 3.76 per cent of GDP by 2020 to catch up with the quotas of the innovation leaders both in the RTI Strategy and in its Work Programme. This objective was also communicated to the EU. An additional EUR 1.6 to EUR 3.1 billion are required to actually achieve it (see figure 11). Even with the funds now hoped for from the reform of bank levies or the research package, it will not be possible to close this considerable gap to the goal of an R&D quota of 3.76 per cent of GDP by 2020. The discrepancy between objective and goal achievement is evident.

International Rankings For Innovation And Competitiveness

The overriding goal of the RTI Strategy is to become an innovation leader by 2020. But there is also a gap here between claim and reality, because instead of reducing the distance to the leading nations, Austria has lost innovation dynamic. This is reflected in Austrian performance in international rankings on innovation and competitiveness.

In the European Innovation Scoreboard Austria only ranks at the bottom end of the group of followers. Austria has indeed improved by one place compared to the previous year up to number 10 in the ranking. However, a very negative

dynamic was registered in recent years: In 2009, Austria was number 6 and therefore had a lead position in the follower group. Austria has since fallen back five times in a row by one place each year.

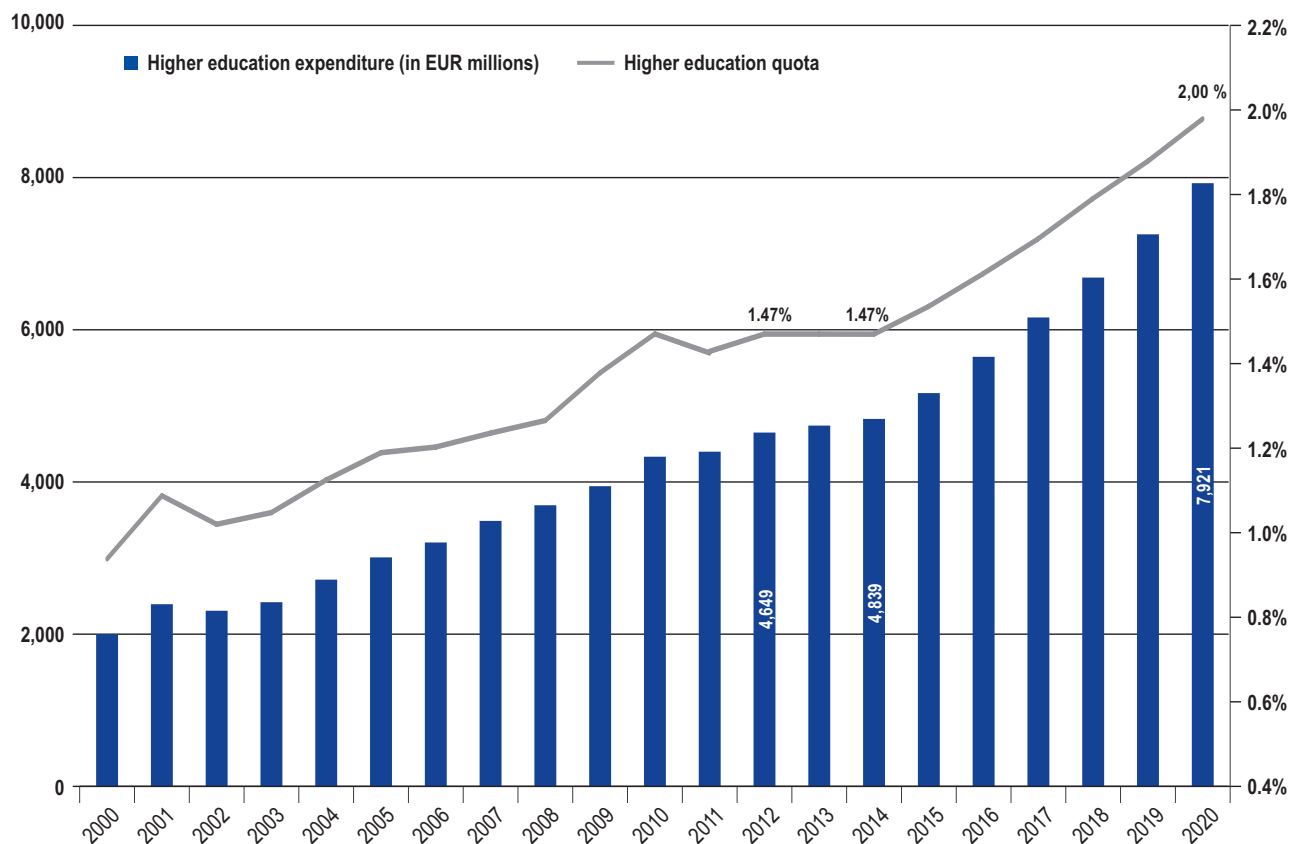
Austria also falls back this year to place 20 with the Global Innovation Index (GII). The best result was achieved in 2009 with place 15. The top ten here also include the leading innovation

nations, Switzerland, Sweden, Finland, Denmark and Germany. Figure 11 provides an overview of the Austrian placing in some of the most relevant rankings on innovation and competitiveness.

Figure 11 shows that Austria has fallen back successively in most rankings since 2007. Even if individual rankings show positive trends in some cases, the tendency is indeed clearly neg-

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Figure 10: Evolution of higher education expenditure until 2016 and required expenditure path for the higher education quota goal, in EUR millions



Source: WIFO research quota targets 2020, update 2015.

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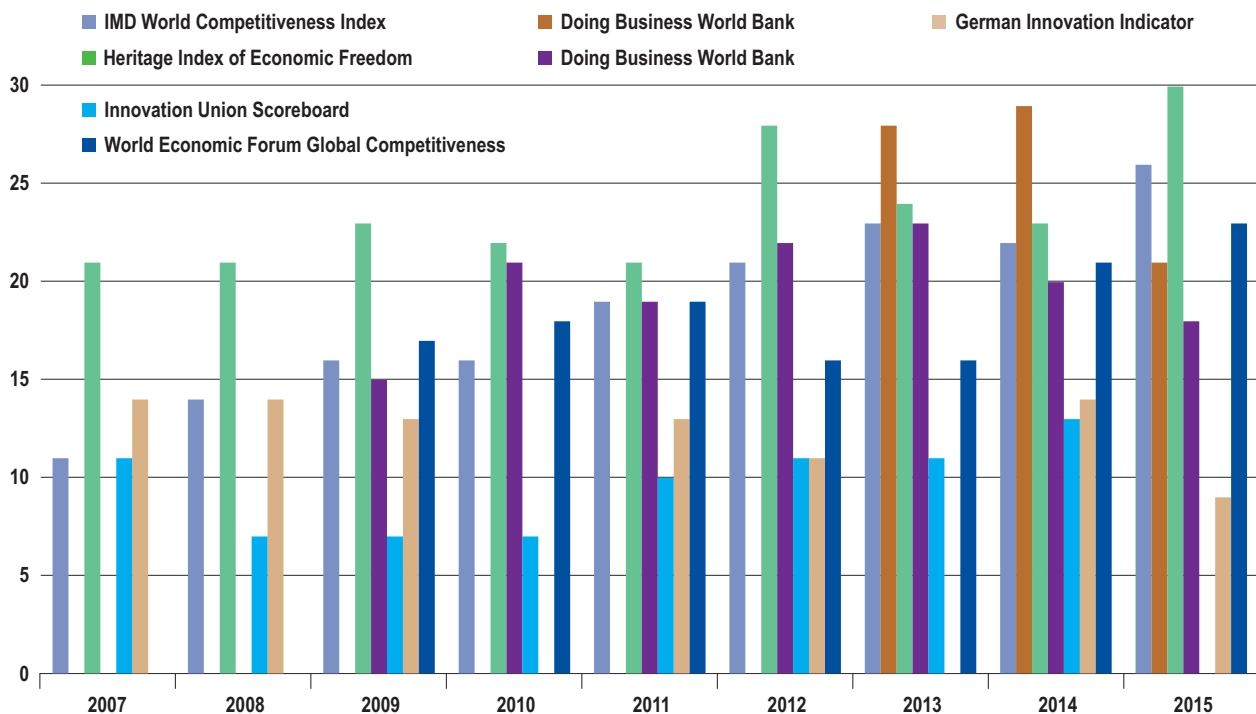
ative. The Austrian Council believes this is a significant contributing cause for the stagnating economic dynamic, the levelling off of exports and further increasing unemployment, which, according to current forecasts by the Austrian National Bank, will reach a record level of 6.3 per cent in the coming year.

This development runs in the opposite direction as that intended by the Federal Government with its RTI Strategy. This expresses the claim of “further developing the potential of science, research, technology and innovation in

Austria to make our nation one of the most innovative in the EU by 2020, and to consequently strengthen the competitiveness of our economy and increase the prosperity of our society.” The Austrian Council believes it is clear that the current measures to implement the RTI Strategy are insufficient to stay abreast of the development dynamic of the leading nations. The innovation leaders will pull further away ahead with the trend remaining as it is.

The fact therefore is that the strategy goals cannot be achieved. Despite some individual positive signals (research package, bank levies),

Figure 11: Austria's Performance in the context of international rankings



Source: IMD World Competitiveness Index, World Bank Doing Business, Heritage Index of Economic Freedom, INSEAD Global Innovation Index, Innovation Union Scoreboard, German Innovation Indicator, WEF Global Competitiveness Report, own presentation.

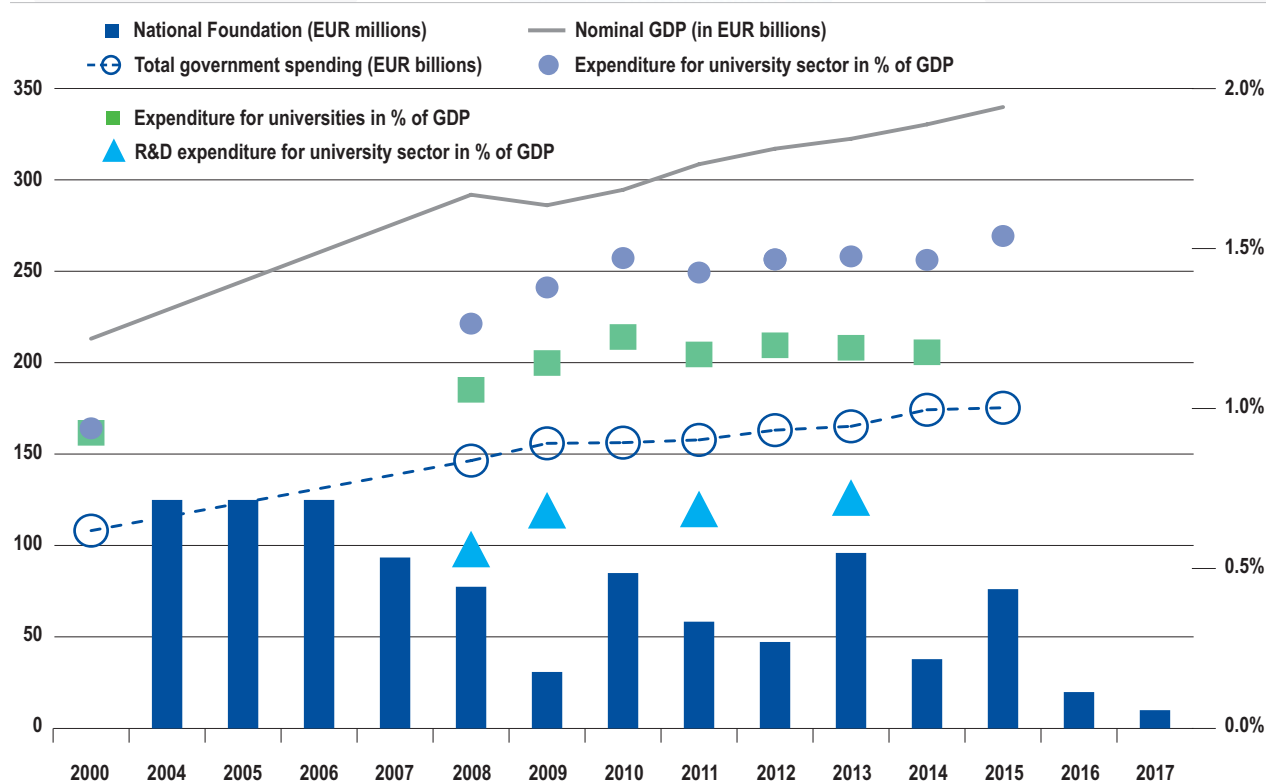
the Austrian Council believes a systematic setting of priorities is absent, and therefore also the investments this would bring. A comparison of the funding developments of the areas addressed above illustrates their stagnation and regressive development compared with the rising trend in government spending and the GDP (see figure 12).

Renewed Budgetary Prioritisation Required

The Austrian Council believes budgetary prioritisation in Austria is currently imbalanced. While there are additional funds for consuming

areas such as healthcare or pensions, the budgets for future-oriented sectors such as education, science, research and innovation are stagnating. According to the Federal funding framework the budget for pensions alone (ASVG and civil servants) will rise by 2020 from 25.7 to 29 per cent. An increase in the budget for education, science, research and innovation on the other hand is not foreseen. On the contrary: The corresponding percentage of the budget will fall from the current 17.9 per cent to 17.1 per cent in 2020.

Figure 12: Evolution of Various Financing Factors



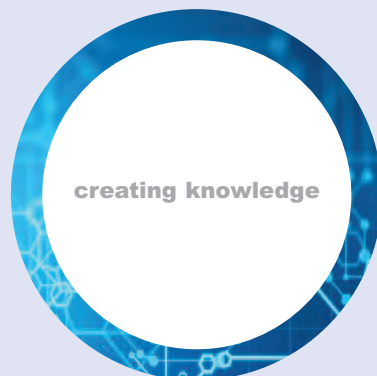
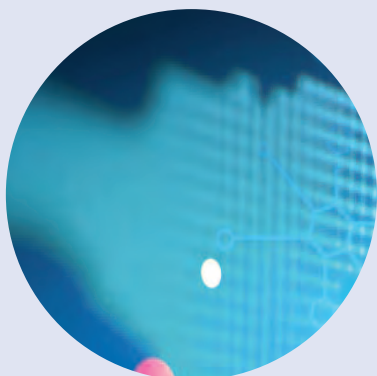
Source: Statistik Austria, surveys on research and experimental development (R&D) in Austria; National Foundation data; WIFO, research quota targets 2020, update 2015; own calculations, Austrian Council.



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There is therefore an urgent requirement for an increase in funding for education, research and innovation. This is especially necessary because investments in these areas require more time to be able to fully develop their macroeconomic impact. It is therefore imperative that greater parts of the budget be freed up for the future areas of education, research and innovation.

As other countries show a stronger development dynamic, continuing the status quo is not an option. If Austria does not want to fall further in global competition and lose its connection with the lead group, the topics of education, research, technology and innovation must be afforded the highest possible priority – the funding required must be provided and structural adjustments must also be made.



Update: Accomplishments

Setting up a nationwide database to illustrate research input and output

Feasibility Study

In its meeting of 2 December 2016 the Austrian Council for Research and Technology Development decided to perform a feasibility study together with cost-benefit analysis for setting up an Austria-wide research database. The goal of the study is to check the required framework conditions for setting up a nationwide research database. The database will enable statistically-based statements on the effect of research funding on regional, national and international level and the research input and output in Austria will be illustrated on the basis of appropriate KPIs. The feasibility study will work out the heuristic, technical, legal and commercial principles to identify relevant stakeholders in the Austrian RTI system and outline necessary implementation steps.

Court of Auditors Criticism As Stimulus

In its report on research funding in Austria published on 24 June 2016, the Court of Auditors also criticised the complexity of the funding system. The key point of criticism is the multitude of players: 216 organizational units and 24 agencies are responsible for research funding. Also criticised is a “jungle of programmes” with 136 research programmes by Federal Government and the states. According to the Court of Auditors the Federal Government and the states had a total of EUR 3.1 billion at their disposal in 2014 for research funding. However, there is still no clear overview for the actual cash flows. The multitude of databases for research funding with Federal Government, the states, funding institutions and research organisations do not provide a clear overview either. In its report the Court of Auditors therefore suggests setting up a standardised database to ensure full and complete recording of research funding in Austria.

Court of Auditors and Austrian Council Pull Together

The Austrian Council for Research and Technology Development welcomes the suggestion by the Court of Auditors, as it already recommended setting up a standardised research funding database itself in 2011. The recommendation focuses on the extensive and comprehensible documentation of research funding by the Federal Government and the states in a standardised and publicly accessible database. This should also serve as the basis for meeting special legal reporting obligations (e.g. Report on Austria’s Scientific and Technological Capability, Research and Technology Report, facts documentation, reporting obligations in the framework of “Europa 2020”, etc.) and evaluations. Corresponding data is already collected today by the respective research institutions as standard for funding cases.

But all-Austrian research documentation is missing, which, in addition to the research input (third party resources, funding, etc.), also illustrates the research output (publications, patents, etc.) Existing data must be merged for this anyway and integrated into an Austria-wide database.

With reference to the Court of Auditors report and the corresponding recommendation of the Austrian Council, the BMVIT and the BMWFW approached the Council’s Chairman in writing on 12 October 2016 with a request to perform a feasibility study complete with cost-benefit analysis. The Austrian Council has defined an appropriate project in its Work Programme. The study will be commissioned in 2017 and performed by mid-year.

Second RTI Module In The Global Entrepreneurship Monitor 2016

Improvement of the data situation is an urgent requirement to be able to specify an envisaged three-per cent annual increase in RTI-relevant start-ups in the RTI Strategy.

For this reason, the Austrian Council for Research and Technology Development already initiated a pilot project to collect RTI-relevant start-up data in 2014 within the scope of the “Global Entrepreneurship Monitor 2014 (GEM)”. An RTI module was added to the conventional GEM basis module, a global study on business activity.

The Global Entrepreneurship Monitor is based on a survey in a representative group of the general public, and therefore delivers an initial usable indicator for the number of RTI-relevant start-ups. In Austria, these surveys are performed by Joanneum UAS. The GEM’s RTI module must be repeated at regular intervals for continuous monitoring and forecasts. In 2016 a repeat RTI survey was therefore started as part of the Monitor, which will be completed in 2017.

Social Business

Social entrepreneurship (Social Business) is growing in importance as a supplement to, but not a replacement for government action. Social businesses contribute to de-stressing an increasingly challenged social system in individual areas. Typical social business models provide support in the education sector, on the labour market, promoting integration, in the health and social sectors, etc.

The difference with public benefit organisations is in the entrepreneurial activity. Social businesses act market-based, so therefore want to generate profit. The purpose of the business is clearly the social contribution, while the profit is predominantly reserved for this purpose.

Due to their special nature, social businesses are often very innovative in finding new methods to achieve their goals. They therefore make a contribution to the national innovation system that should not be underestimated. The fact that social businesses are predominantly SMEs is also noteworthy.

For this reason the Austrian Council for Research and Technology Development has already monitored national social business activities since 2014 within the scope of a self-organised multi-stakeholder group. In addition

to social business representatives, this also includes Austria Wirtschaftsservice GesmbH (aws), the Vienna Business Agency, the Federation of Austrian Industry and the BMWWF. In 2015 the Austrian Council gave its first recommendation on the required funding framework conditions for social businesses.

In 2016 the multi-stakeholder group and the Austrian Council got to grips with a suitable legal form for heterogeneous businesses. Social businesses do not have a suitable legal structure in both worlds at the interface between profit orientation and non-profit status. Help comes here in the form of hybrid solutions and duplicate structures. But these do not provide the desired legal certainty in a legally grey area. This affects both the social business itself and potential investors, who have special value in this business area. In addition to legal certainty, these also require more visibility for their investments. An own “social business” legal form could offer this signal effect outwardly.

The discussion is not trivial, as in addition to the industrial code, the fiscal code, the principle of equal treatment, etc., and a multitude of legal, economic and political factors must also be weighed up. The process is on-going and is

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expected to be completed in 2017. The Austrian Council will support the result with a recommendation, provided it is met with broad approval. The Austrian Council, namely Prof.

Markus Hengstschläger, took part in the press conference for the opening of aws's Social Business Calls and thereby expressed the Austrian Council's support for this initiative in the general public.

Higher risk in research funding

A work group of the Austrian Council for Research and Technology Development conferred with the BMWFW and the funding agencies (FWF, FFG and aws) for an entire year. The focus of this intensive cooperation was the question

as to how scope for ground-breaking innovations can be created in the Austrian RTI funding system. This is because disruptive or radical innovations conceal more risks, while also requiring more freedom. Parallel to this an accompanying



study was commissioned with Technopolis, which sounded out the international best practice examples for their suitability for Austria. It appeared in October 2016.

During the course of the work group processes and investigations it was demonstrated that Austria already has a series of established mechanisms for funding excellent, high-risk research projects in the area of basic research – in particular the Wittgenstein Award of the FWF Science Fund, but also the Innovation Fund for Research, Science and Society of the Austrian Academy of Sciences. Private initiatives such as the Freigeist-Fellowships of the Volkswagen Foundation in Germany, for example, on the other hand are still lacking in form and scope. There is a gap with the funding of application-oriented research and innovation when it comes to genuinely new, disruptive solutions. Their benefit is often still not known at all or cannot be documented at the beginning of the funding application.

Funding Invention Instead Of Innovation

The Austrian system primarily and consciously funds innovations. The emphasis here is on proving implementability on the market. The funding of inventions – inventive ideas without any specific market orientation – is insufficient. History tells us that the specific application or the benefit of an invention ultimately was not the originally intended one. If the application had been already specified in advance for a specific area, in many cases radical innovations probably wouldn't have materialised.

Innovation processes require sufficient room to manoeuvre at the beginning in particular. Clever brains must experiment, reject, start again and reject again, run through new combinations and think through scenarios – without constant proof of success and applicability. Many creative minds are not in a position to convey their ideas in writing in the restrictive categories of a grant application. Their strength is in oral presentation, which is not provided for as an option in the Austrian funding system (yet).

However, if the economic benefit of innovation projects is not a beneficial selection criterion, how then can we differentiate good ideas from bad ones?

Look around in the international sphere and you'll find a whole series of alternative selection procedures. The "Pitch to Peer" workshops of the British ESRC (Economic and Social Research Council) funding institution, for example, where applicants present their projects orally for ten minutes. The audience consists of experts and co-applicants. The "Sandpits" of the British EPSRC (Engineering and Physical Sciences Research Council) are also exemplary in this respect. Active researchers and users, mentors and independent stakeholders are brought together in multi-day interactive workshops. This composition is designed to promote cross-thinking and radical approaches. The "Idea Labs" of the Norway Research Council also present an exciting approach. Applications are not submitted here – initial ideas are put forward instead. These are processed by the participants in a multi-day workshop.

An experimental space for domestic inventions

Innovation funding in Austria requires experimental spaces free of application reference and financial intention. This then allows inventive curiosity and creativity to develop. In best case scenarios the innovation funding is provided without written applications. It then offers maximum flexibility in evaluation and nonetheless prevents misuse and copycatting. This kind of funding generally does not involve large sums, but rather freely available experiment money for inventions without any specific market orientation. A difficult balancing act – but it can be done! And it is also required to avoid obstructing promising inventions, just because their benefits are not immediately visible at the beginning. An appropriate proposal will be formulated as part of an Austrian Council recommendation.

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Basic Expertise: Reports And Studies 2016

Report On Austria's Scientific And Technological Capability

Obligation To Report Annually To The National Council

The Austrian Council for Research and Technology Development compiled the fifth Report on Austria's Scientific and Technological Capability in 2016. The Performance Report is presented to the National Council together with the Federal Government's Research and Technology Report since 2012. The Cabinet issued the basic assignment for it on 9 September 2010. An important frame of reference for this regular monitoring is the Research, Technology and Innovation Strategy (RTI Strategy), which was also adopted in 2010. The Austrian Council believes the Strategy is an important milestone in the development of Austria's RTI policy and very much reaffirms this process with the Performance Reports.

Objective Of The Annual Performance Report

The Performance Report surveys the status of the Austrian research and technology landscape, compares the performance of the Austrian system Europe-wide and evaluates the implementation of the Federal Government's RTI Strategy using the respective measures and the goals set. The following questions are answered in the Report on Austria's Scientific and Technological Capability: How is implementation of the RTI Strategy progressing? Where does the Austrian RTI system stand today? Will the goals set out in the RTI Strategy be achieved? Will Austria be an innovation leader in 2020? An estimation of how much energy and resources are required to achieve the 2020 goal is also critical. The Austrian Council is concerned with both pointing out positive developments and addressing difficulties with equal clarity.

The Council accompanies the Federal Government in the specification and quantification of the objectives of the RTI Strategy in its implementation. The Report on Austria's Scientific and Technological Capability reinforces the innovation policy agenda each year.

News

The fifth Report on Austria's Scientific and Technological Capability presented in 2016 is the first following the major Mid-Term Review in 2015. For the first time not all sub-areas and objectives were dealt with completely by the RTI Strategy adopted by the Federal Government in 2011. Instead the Austrian Council focussed on the five priority areas of action from the Mid-Term Review:

- (1) Education system performance that fails to meet expectations.
 - (2) Basic research funding (competitive) that is not competitive in the international comparison.
 - (3) Insufficient start-up dynamic and insufficient growth dynamic of start-ups with parallel absence of corresponding investment capital.
 - (4) Private funding share in R&D is basically too low.
 - (5) Governance weak points in the RTI system.
- The current status of the Austrian RTI system was analysed in these five areas on the basis of developments since 2010; strengths and weaknesses were demonstrated and proposals for action were worked out in the form of recommendations.

Study Knowledge Transfer Offers For Young People

The study addresses the issue of the conditions that could help children and young people develop their interest and capabilities with regard to science and research. Workshops for children and young people by the “Science Pool – Plunge into Worlds of Knowledge” association in Vienna, Lower Austria and Burgenland were studied as case examples (“Qualitative examination of the offers for knowledge transfer for children and young people as part of the Initiative Science Pool”). Children and young people perform experiments themselves in the Science Pool Workshops. The research pursued three goals: (1) To study the transfer formats with regard to the effect on how children and young people view science, (2) to estimate the range of the offers, and (3) to illustrate scope for action.

Key Results

It was demonstrated that the didactic methods of the workshops depend heavily of the use of materials. These allow participants to experience

phenomena and perform experiments themselves. The children use results from the workshops as resources to communicate their view of science and describe the work of scientists. They get to see the workshop leaders as people who are experienced and confident with science, who can equip them with the skills relevant for research.

The study showed that the workshops that were studied reach children and young people from kindergarten age to school-leaving age in Austria. Event venues close to Vienna are preferred here over further distant locations. In addition to regional differences, social aspects were also ascertained. The offers for knowledge transfer on science basically reach children and young people from different social backgrounds. However, practical experiences allow us to assume that participation fees prevent some children and young people from participating.

The study is available as a download on the website of the Austrian Council.

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Effects of the Trans-Atlantic Trade and Investment Partnership (TTIP) on Austria As An Education And Research Location – An Appraisal

The United States of America (USA) and the European Union (EU) have been negotiating since 2013 on a free trade agreement within the scope of the Trans-Atlantic Trade and Investment Partnership (TTIP). Sharply differing positions between the negotiating partners since 2015 increasingly complicate an objective evaluation of the content of the planned agreement. The negotiations were put on ice during the US presidential election campaign in 2016. It is still not clear when they will continue. To better appraise possible positive or negative consequences of the TTIP for Austria as an ed-

ucation and research location, the Austrian Council for Research and Technology Development assigned a study at the end of 2015, which was completed in March 2016. The study focused on education and research in general, research policy decisions, the offering of education institutions, legal requirements for research and development, scientifically-based approval methods and future standards or regulations. In addition to the analysis of official documents, interviews were also held with experts from public sector and civic institutions. The study is structured in two parts⁶⁴. The first

⁶⁴ W. Raza / B. Ecker / H. Gassler (2016): Effects of the Trans-Atlantic Trade and Investment Partnership (TTIP) on Austria as an education and research location – an appraisal.



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illustrates the research and technology-relevant interactions between Austria and the USA and the trade and investment interconnections between the two economic regions. The second part deals on this basis with the status of the negotiations up to the end of January 2016 and is structured in chapters for service and investment liberalisation, mobility of natural persons, intellectual property protection and regulatory cooperation. The results of the study are singled out here merely by way of example. The entire study is available at <http://www.rat-fte.at/publikationen.html>.

Important Results

The USA and the EU have by far the highest R&D spending worldwide. In 2013 the USA invested USD 424 billion in the production of new knowledge. The USA is therefore responsible for approximately 28 per cent of global R&D spending. In the EU the share is 22 per cent (or USD 334 billion in absolute figures). China follows in third place with USD 220 billion. In global R&D expenditure it has already overhauled Japan with USD 162 billion per year.

The USA is traditionally an attractive scientific location and central hub within the global “Brain Circulation”. A temporary or permanent stay in the US is considered a springboard for an academic career for students and young scientists, and even for already established scientists. The mobility of scientists and exchanges between Austria and the USA are supported with several grant and funding programmes⁶⁵.

The interaction in knowledge production and technological interactions are manifested in joint patents.

The areas of educational services, research and development services, mobility of scientists and researchers, intellectual property protection and regulatory cooperation projects were studied more precisely and recommendations were worked out to appraise the current status of negotiations. However, due to ongoing, non-public sector negotiations, only preliminary consequences can be drawn.

Educational Services: The current information situation is based on documents and statements of Austrian government offices that deal with the material. The analysis did not show any significant changes in the status quo of liberalisation obligations in the EU or Austria to be expected with the TTIP. An uncertainty factor is here the traditionally offensive US negotiation position on tertiary and other education services. Demands by the USA in this respect when the negotiations continue cannot be completely ruled out. The planned dispute settlement procedure (ISDS) with regard to an autonomous education and funding policy is a further unpredictability factor here. If there are more international education providers in Austria in the future, the focus will be on the design leeway of the education policy. Preference should be given here to public interests before the profit expectations of individual providers. It is therefore recommended that education services be clearly removed from investment arbitration.

Research Services: Research and development services have already been largely liberalised

⁶⁵ The two most important are the Schrödinger Programme, which was initiated in 1985, and the Lise-Meitner Programme (since 1997), which supports “incoming mobility”

with regard to market access and national treatment for international providers. The planned definition of certain protection provisions in the EU offering of services is essentially beneficial. Increased cooperation relations in research policy, with new bilateral research programmes, for example, would on the other hand be welcome. Nothing is known of this to date. A chapter on research cooperation projects that is only limited to declarations of intention would be a lost research policy opportunity.

Mobility Of Scientists And Researchers From today's point of view a significant change in the status quo of the liberalisation situation in the European Union is not foreseeable either. The mobility of scientists and researchers is determined by applicable EU regulations, as well as the national rights of foreigners, rights of residence and employment of foreigners law. The liberalisation obligations of the EU Trade Agreement in the area of Mode 4⁶⁶ reflect the applicable legal provisions grosso modo. On the USA side we cannot expect further-reaching concessions for domestic policy reasons. In view of the political sensitivity of the topic of "mobility of natural persons" it does not appear very beneficial either to make demands as part of the trade policy to make things easier for scientists and researchers. Relevant attempts have so far failed regularly (see the proposal of the European Services Forum for an own visa category for people posted according to Mode 5 with the GATS negotiations of the WTO-Doha round). Bilateral agreements on research

cooperation would therefore be recommended to make the trans-Atlantic mobility of scientists and researchers easier.

Protection of Intellectual Property Rights (IPR) The TRIPS-plus method (agreement on trade-related aspects of intellectual property rights) applied undifferentiated in the EU and US trade policies will be retained within the scope of the TTIP. In principle this means that the level of protection of intellectual property rights will be raised above that of the TRIPS agreement. Intellectual property rights (IPR) will be protected more in patent and copyright law, as well as with geographical designations of origin in particular. In the economical expert discussion doubts are increasingly expressed as to how much further increases in IPR protection would promote innovation. Within the scope of the TTIP negotiations protection provisions should therefore be checked precisely.

Regulatory Cooperation This negotiation chapter has long-term, far-reaching implications and an indirect effect on the (corporate) research and innovation landscape. TTIP can contribute regulatory harmonisation, among other factors, if new standards are created or existing ones are harmonised, without reducing the public protection level. However, the text of the negotiation chapter does not allow us to conclude that extensive consultation processes with regulatory authorities and integrated stakeholders will require more capacities. The costs of the regulatory policy will therefore increase.

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66 The General Agreement of Trade in Services (GATS) defines four types of provision:

Mode 1 – Cross-border supply: The service is handled across borders (e.g. E-Commerce).

Mode 2 – Consumption abroad: The service is "consumed" abroad (e.g. tourism sector service).

Mode 3 – Commercial presence: Branch/office set-up in host country.

Mode 4 – Presence of natural persons: Temporary movement of natural person across borders for the purpose of service provision.



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There is also a risk that regulatory plans and the legislative processes connected with them will be slowed down by consultations with a multitude of players.

In successful cases administration savings and reduced inspection costs for companies (e.g. with mutual recognition of equivalent procedures) are foreseeable. It is therefore recommended, as part of regulatory cooperation projects, that areas in which underlying regulatory approaches and methods are similar be concentrated on (e.g. in the automotive industry). An alternate recognition can be achieved in the short and medium-term in these areas.

A further recommendation addresses the scope of the legal areas incorporated by regulatory cooperation. Unless something changes, incorporating national laws of EU member states will be of no benefit either. On one hand EU legislation can already be applied in many places, and on the other hand national laws are combined with the provisions of EU Law anyway (internal market legislation, for example).

Ultimately it should be noted that the increased requirements with regard to the evaluations of the effects of regulatory measures result in numerous methodical questions, which are handled differently within the scope of existing effect analyses in the USA and the EU. The preliminary TTIP contract text suggests using more scientific methods in effect analysis. However, this recommendation ignores the fact that there is no consensual methodology. There are different methodologies (e.g. cost-benefit analysis, multi-criteria analyses, etc.), which are specific and partially incompatible. It should also be noted that in addition to the costs factor the social benefits of regulation must also be evaluated from case to case. Cooperation and exchanges on effect analysis questions must be favoured. However, regulatory effect analyses are limited in their methodology and cannot replace an extensive policy evaluation of regulatory plans with democratically legitimised institutions.

Study on “Strategies Of Active Market Cultivation In Research”

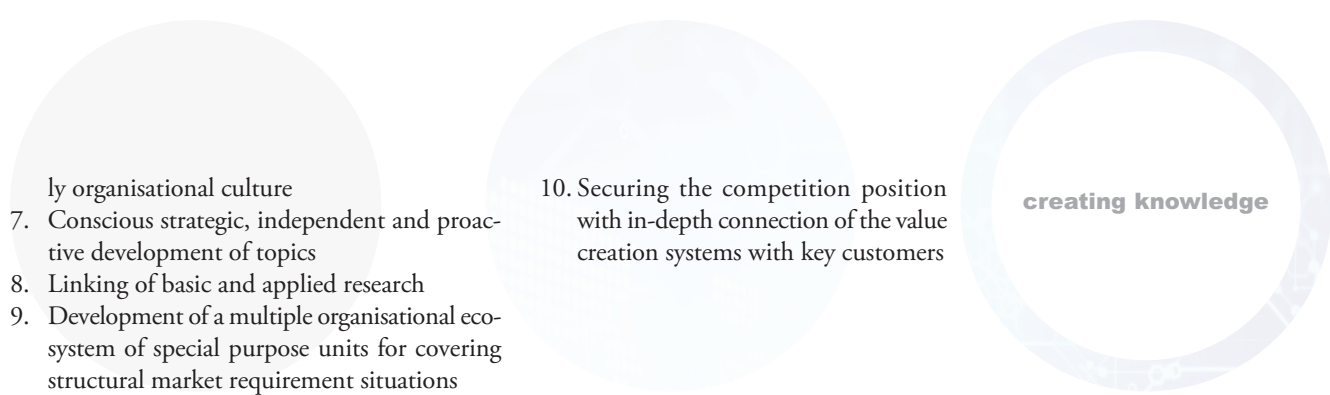
To remain internationally accessible, universities and non-university research institutions acquire increasingly more third party funding in the international comparison. Austria still has catch-up requirements here. In basic research in particular, in many cases there no or only limited strategies for active market cultivation. These findings have prompted the Austrian Council to define an appropriate project in its Work Programme and to commission a study. The contractor was Wolfgang Filz from spe-consulting.

The study provides an overview of the strategies for acquiring third party funding of national universities and non-university research institutions, illustrates this in the comparison with international best-practice models and derives development potential for the future from it. The focus is on strategies of active market cultivation of re-

searchers in the areas of technology and the natural sciences focusing on “Science to Business”.

The final report provided identifies essential success strategies and addresses possible areas of action for the body politic, university management and researchers. The sequence of the strategies named reflects the frequency of their application:

1. Thematic concentration – building unique expertise in a clearly defined, industry-relevant field of competence
2. Concentration on key customers
3. Prevention of fragmentation of the scope of the project
4. More specific deployment of personnel according to personal strengths
5. Customer relationship approach – long-term consideration of business relations
6. Set-up and maintenance of an industry-friend-

- 
- ly organisational culture
 - 7. Conscious strategic, independent and proactive development of topics
 - 8. Linking of basic and applied research
 - 9. Development of a multiple organisational ecosystem of special purpose units for covering structural market requirement situations

- 10. Securing the competition position with in-depth connection of the value creation systems with key customers

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Study On Innovation-Promoting Public Sector Procurement

In recent years, more attention has been paid at European and international level on the demand-side to innovation-promoting measures. These are used to boost the innovation landscape together with additional funds and further supply-side mechanisms. Innovation-promoting public sector procurement is a demand-side innovation policy tool.

In Austria it is estimated some EUR 40 billion flow every year into public sector procurement. Spending even just a small part of this volume on innovative products and services would mean an enormous increase in R&D funding. Increased demand for innovative products and services in particular strengthens domestic SMEs. On the other hand innovation funding also makes public sector procurement itself more innovative. The general public benefits from the offering of improved products and services.

Innovation-promoting public sector procurement incorporates two areas: pre-commercial procurement of research and development performance

(Pre-Commercial Procurement) and the public sector procurement of innovations (Public Procurement of Innovation Solutions).

Even if the positive effect has been proven many times, the implementation of a broad demand-side innovation policy often still causes significant difficulties.

The Austrian Council for Research and Technology Development has therefore had important principles worked out in a study. An ex-

ploratory study was commissioned at spe-consulting, which provides an overview of the demand-side innovation policy with focus on innovation-promoting public sector procurement and illustrates the current situation in Austria in more detail.

The following questions guided the analysis process:

- What positive effects can innovation-promoting public sector procurement have on a country's innovation policy?
- What role will the state play here?
- What is the general situation in Austria in this respect?
- What activities will be implemented?
- What structural barriers are there in Austria, which would hinder the best-possible implementation of innovation-promoting public sector procurement?
- How is Austria positioned in the area of innovation-promoting public sector procurement in the international comparison?

In addition to a broadly coordinated Austrian innovation-promoting public sector procurement guideline concept, national and regional activities in Austria were also illustrated. International good practice models were also analysed to define further action possibilities. The identification of structural obstacles that hinder a demand-side innovation policy was an essential aspect.

The following barriers for innovation-promoting public sector procurement were identified in the study.

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Structural Obstacles:

- Political backing
- Responsibilities and fragmentation of (innovation-promoting) public sector procurement
- Legal framework conditions
- Data situation for (innovation-promoting) public sector procurement

Operative Obstacles:

- Financial and staffing resources
- Know-how and expertise of operative procurement personnel
- Motivation and incentives with innovation-promoting public sector procurement

Stakeholders were then interviewed about how structural and operative barriers could be over-

come and five primary areas of action were derived from international examples. The priority areas of action

- Financing
- Political control
- Training and qualification
- Data situation for (innovation-promoting) public sector procurement
- Fragmentation of responsibilities

were once again the subject matter of a Council recommendation on innovation-promoting public sector procurement in Austria dated 1 September 2016.

Details can be read in the study. You'll find it here www.rat-fte.at/publikationen.

Pocketbook: “(Fast) Alles über Wissenschaft und Forschung / ((Almost) Everything About Science And Research)”



This pocketbook was published in April 2016 by the Holzhausen publishing house to make young people curious about science and research. It was distributed for free to interested people, and also during the Long Night of Research on 22 April. Partners in its production included several ministries, funding agencies and research institutions.

The book was hammered out together with the science journalists Stefan Müller and Verena Ahne and a graphics team, issued by the Austrian Council and printed with the support of

several partners. The publication can be downloaded as an e-book on various platforms. The book is intended to make young people aged 17 and over aware of scientific topics and scientific working methods. The research topic is explained on the basis of successful people and institutions. In easy to read, jokey illustrated chapters, young people are conveyed an image of scientific work and possible research areas with examples from Austria. The idea here is to highlight the “researcher” job description and careers in science.

International Activities

Meeting with the Czech Council for Research and Technology – Prague, 14 and 15 March 2016

In March 2016 a delegation of the Austrian Council accepted an invitation by Pavel Bělobrádek, the Chairman of the Czech Council for Research and Technology and Vice Prime Minister for Science, Research and Innovation. Chairman of the Austrian Council Dr. Hannes Androsch visited Prague for two days accompanied by selected journalists. Along with Dr. Androsch, members of the Austrian delegation included Deputy Managing Director Dr. Constanze Stockhammer, Mag. Michael Hlava, Head of Corporate and Marketing Communications of the AIT, Dr. Elvira Welzig, Strategic HR and Science Networks of the AIT, and Ingrid Sauer, Dr. Androsch's Personal Assistant.

The media were represented by Claudia Zettel, Editor-in-Chief of futurezone and Kurier, Tanja Traxler of Standard and Harald Hornacek, Editor-in-Chief of Austria Innovativ. The first day began with a meeting of the Chairman of the Austrian Council with the Czech-Austrian group of experts for energy (www.energy-europe.org). Jiřina Jílková, Vice Rector for Research at Jan Evangelista Purkyně University, and Jaroslav Knápek, Executive Board of the Department for Economy, Management and Human Sciences of Prague UAS, gave an exciting insight into the activities of the group of experts, followed by a discussion of further joint activities.

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Press statement by Dr. Androsch:

"Austria has had a longer relationship with Bohemia and Moravia than with any of its other neighbours. With the fall of the Iron Curtain and entry to the EU, the Czech Republic now finally has the opportunity to re-establish its 'old' contacts. This in particular also applies to research and innovation policy. Joint research projects, student exchanges, teachers and researchers, cross-border innovation cooperation projects between companies – they can all contribute to positioning and strengthening a Central European innovation hub. The Austrian Council also recommends such activities. The next stop will be Bratislava."



From left to right:

Dr. Hannes Androsch,
Chairman of the Austrian Council for
Research and Technology Development

Pavel Bělobrádek,
Czech Vice Prime Minister for
Science, Research and Innovation

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In the evening the Chairman of the Czech Council, Deputy Prime Minister Pavel Bělobrádek invited all involved to a mutual exchange. Discussions included long-term national research, technology and innovation strategies and the need for thematic focus points in applied research.

The next day was dedicated to a joint council meeting under the direction of the Deputy Chairman of the Czech Council, Arnošt Marks. Following two-way presentations on the national innovation system, possible cooperation projects were discussed, and the following steps of closer cooperation between Austria and the Czech Republic were defined:

- More in-depth cooperation of technical and medical universities at rector level
- More exchange and mobility of students
- Increased cooperation between research agencies
- Invitation to a Czech delegation to the technology fora in Alpbach

The visit to Alpbach took place in summer 2016 and offered greater scope for constructive cooperation talks of both research councils on intensifying cooperation.

The result of this discussion was presented in a joint press conference to the media representatives of both Council Chairmen, Deputy Prime Minister Pavel Bělobrádek and Hannes Androsch.

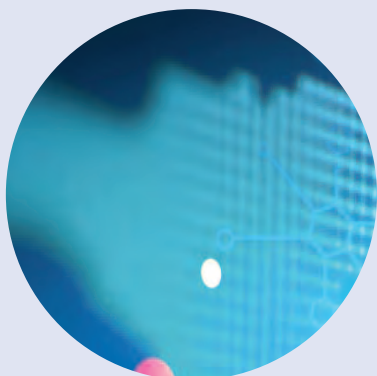
Youth Summit At “European Horizons” On The Topic Of The “Trans-Atlantic Digital Economy” – 20 to 22 November 2016

The first youth summit of the “European Horizons” think tank on the topic of the “Trans-Atlantic Digital Economy” was held at the Collège d’Europe in Bruges (Belgium) from 20 to 22 November 2016.

Data protection challenges also grow continuously with the digital economy and the rapid introduction of new technologies. Trans-Atlantic dialogue and discussions are required here because the legal position and legislation in the USA and continental Europe differ greatly. The European summit of the US-based “European Horizons” think tank therefore brought together representatives of the EU, other think tanks, the technology industry and students from the USA and Europe.

The participants agreed that digitalisation offers numerous opportunities, which can be considered benefits (in the education area, for example). The discussion then turned to how existing knowledge can be transformed into specific actions in the European economy. It should always be noted that the digital economy also

brings numerous challenges with it. The question of data security was intensively discussed, as was the danger posed by algorithms, which are still only confronted with one-sided search results. If they were to remain the only news source all other aspects would remain hidden. The leitmotif of all discussions was the term “would”, which can and must serve as a guide in the age of digitalisation with the dramatic changes in the way we live and work that it brings with it. Where, for example, data protection until recently was presented as a hindrance to the economy, this view now changes increasingly all the time. One challenge was consistently identified in the discussions: Typical misunderstandings, which result from the complexity of the digital economy, must be cleared away. When confidence between businesses, citizens and governments is established, the change connected with the digital economy will be easier to deal with, and to everyone’s benefit.



events


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council

events

Stakeholder workshop as part of the Open Innovation Strategy – 18 January 2016

The Austrian Parliament commissioned the Federal Government in June 2015 with the development of an Open Innovation Strategy for Austria by summer 2016. The Federal Minister for Transport, Innovation and Technology at the time, Alois Stöger, and the State Secretary at the Federal Ministry of Science, Research and Economic Affairs, Dr. Harald Mahrer, were entrusted with its implementation.

An own website on the Federal Government's Open Innovation Strategy invited participation in this development process. The community was asked to contribute own ideas, proposals and suggestions. Participation was supported, condensed and intensified by the Austrian Council for Research and Technology Development with a stakeholder workshop. Invited were specialists from the areas of science, economy

and social innovations. The Workshop offered the opportunity to discuss paradigm changes and incorporate specific concerns and issues. Welcome and opening were performed by the President of the Austrian Federal Economic Chamber, Dr. Christoph Leitl, Chairman of the Austrian Council, Dr. Hannes Androsch, and State Secretary Dr. Harald Mahrer. Federal Minister Alois Stöger was represented with a video message.

The keynote on the "Open Innovation" topic was provided by Dr. Gertraud Leimüller, Managing Director of the consultancy agency, winnovation, which specialises in open innovation. The breakout sessions that followed were moderated by a team from the consultancy firm. The results of the workshop served as important input for the continued strategy process.



Dr. Hannes Androsch,
Chairman of the
Austrian Council for Research
and Technology Development

“Austrian Global Academy” – 25 January 2016

The “Austrian Global Academy” set up by the Austrian Council for Research and Technology Development in 2014 focuses on Austrian innovation and university managers and political decision-makers. It is implemented in cooperation with Bank Austria and the Vienna Institute of Strategy & Competitiveness (VISCO) as a series of workshops and events. The objective of the Global Academy is the knowledge transfer of international innovation expertise in the Austrian RTI landscape. Current global aspects serve in the format as stimuli for the discourse on the innovation system in Austria.

An entire day was dedicated to the Austrian Global Academy on 25 January in Vienna. While the specialist conference during the day was oriented on a restricted group of participants of 15 to 25 people, the event in the evening was open to the public. The theme this

time was Asia and its role in international competition.

In the workshop, Annie Koh from the Singapore Management University and Christopher Kummer from VISCO presented current papers on questions relating to Asia’s competitiveness compared with Austria and discussed these with the participants.

Klara Sekanina from the Austrian Council for Research and Technology Development and Vietnamese Ambassador Viet Anh Vu welcomed the guests in the evening. The audience was tuned in with a keynote by Annie Koh on the topic of “Asian Competitiveness: Opportunity or Threat for Austria?”. Johann Hipfl from Hoerbiger Kompressortechnik Holding GmbH was also a guest on the podium with the subsequent discussion.

events

“fteval inside : fteval insight”: Metastudy presentation of Austrian RTI evaluations – 18 February 2016

Austria is a European leader in terms of the number of evaluations of the RTI policy. Following approximately 15 years experience with this control instrument the effectiveness of various players is now increasingly questioned. This is not a purely Austrian phenomenon. The question of the reflection potential of evaluations in the RTI area is also increasingly posed at international level as well. The Austrian Council therefore commissioned a meta-study to provide evidence-based estimates on the usefulness of Austrian programme evaluations and improvement methods. The survey over a period of twelve years is based on the generally recognised international body of knowledge of

a “good evaluation” and aspects of the usability of such studies. The meta-study analyses strengths and weaknesses of evaluation practice against the background of international evaluation research.

Study author MMag. Landsteiner presented the results as part of the “fteval inside : fteval insight” series of events of the fteval platform (Austrian research and technology development platform) and the Austrian Council as host. Invited were all colleagues of the fteval member organisations, who appeared in great numbers and discussed lively.



events

Café ImmiCo – (Six Dates In 2016)

People with migrant backgrounds are frequently above-average in business. The current research provides the following explanation for this: People that emigrate and start a new life are more prepared to take risks (business).

Immigrants in particular should therefore be asked about their experiences to promote innovations and start-ups in Austria in general. For this reason the Austrian Council for Research and Technology Development supports the Café ImmiCo series of events, which is organised by Immipreneurs of Austria and was held for the sixth time in 2016.

Immipreneurs of Austria supports immigrant businesspeople with financing, coaching, administration, sales and networking in the local eco system. With Café ImmiCo the initiative offers Bootstrapper breakfasts. In an informal setting 15 businesspeople exchanged ideas and experiences with mentors and experts. Searches are made together for strategic partners and/or support structures. Six selected businesspeople also got the opportunity to participate in the ImmiAccelerate micro-acceleration programme.

Zukunftsgespräche (Discussions About The Future)

The Austrian Council's "Zukunftsgespräche" were continued in 2016 due to the enormous success of previous years with three dates in Vienna, Linz and Graz. The event will promote public discussion of innovation, research and

technology topics. Specific solution methods for improving Austria's position will also be worked out. The series of events were held as part of a cooperation agreement together with Bank Austria.

Zukunftsgespräch Linz: "Innovation Location Upper Austria" – 14 March 2016

Keynote speaker of the evening was Prof. Dr. Julian Nida-Rümelin, Minister of State and Professor for Philosophy at Ludwig-Maximilians University in Munich. State Secretary Dr. Michael Strugl, President of Industriellenvereinigung Oberösterreich, Dr. Axel Greiner, President of the Upper Austrian Economic Chamber, Dr. Rudolf Trauner, Rector Prof. Meinhard Lukas of Johannes Kepler University Linz and Dr. Ludovit Garzik from the Austrian Council's offices then discussed innovation location Upper Austria with him.

Zukunftsgespräch Graz: "Industry 4.0" – 5 April 2016

With its publications "Austria 2050" and "Vision Austria 2050", the Austrian Council has initiated a discussion with a view to general struc-

tural changes and possible future scenarios for research and innovation. The Industry 4.0 topic and its significance for innovation was illustrated on 5 April 2016 in Graz within the scope of the "Zukunftsgespräche".

The evening was opened by Robert Zadrazil, Chairman of Bank Austria, and Dr. Christian Buchmann from the Styrian State Government. A brief introduction to the idea and objective behind the event was given by Dr. Sabine Herlitschka from the Austrian Council for Research and Technology Development, and CEO of Infineon Technologies. Prof. Christian Ramsauer from the Institute for Industrial Management and Innovation Research of the University of Technology in Graz set the framework for the subsequent podium discussion with his eagerly-awaited keynote "Industry 4.0 and Makerspaces – How to win the Innovation Race". The current

situation with Industry 4.0 and other milestones were discussed on the podium. Along with Sabine Herlitschka, Dr. Ronald Henzinger, Executive Director Research & Development at Anton Paar GmbH, the Rector of the Technical University in Graz, Prof. Harald Kainz and DI Georg List, Vice President of Corporate Strategy at AVL List also took part here. The successful evening wound down with informal chats at the buffet.

Zukunftsgespräch Vienna: “What framework conditions do international researchers need in Austria?” – 6 April 2016

Not just scientific networking in the European research area is on the increase – the knowledge in the heads of international researchers is also travelling around the world. The competition for the best brains is becoming tougher. Universities, research institutions and companies are supported with focus on research & development in keeping their staff and making their location attractive for foreign researchers. Together attempts are

made to stem the “brain drain”, or emigration of Austrian scientists abroad.

On 6 April 2016 the Austrian Council organised a discussion on the future together with Bank Austria and the Swiss Embassy. The focus was the right framework conditions for Austria to ensure the best brains are not lost in European and global competition. Host Robert Zadrazil, Bank Austria Chairman, welcomed participants together with Prof. Helga Nowotny. The evening was introduced with a wide-ranging keynote by Dr. Wolfram Schmidt, General Manager from Roche Austria, who spoke about education, research and innovation as “mitochondria of our economy”. Representing the Austrian Council Prof. Helga Nowotny took part in the subsequent podium discussion, along with Rector Dr. Sonja Hammerschmidt, Chair of the Universities’ Conference, and Deputy General Secretary of the Federation of Austrian Industry, Mag. Peter Koren.

events

From left to right:

Mag. Peter Koren,
Deputy General Secretary of the
Federation of Austrian Industry

**em. Univ. Prof. Dr.
Helga Nowotny,**
Austrian Council for Research and
Technology Development

Dr. Wolfram Schmidt,
General Manager, Roche Austria,



events

Long Night of Research – 22 April 2016

Once again in 2016 the Austrian Council actively participated in the nationwide coordination of content with the Long Night of Research. Together with Akzent-PR the Austrian Council acted in its proven role as an interface between advisory board (with representatives from the departments) and operative administration in the regions (with representatives of the federal states). The Long Night of Research has established itself as the biggest domestic research event. In

**LANGE NACHT
der
FORSCHUNG**
22.04.2016



Long Night of Research at Heldenplatz, Vienna.

From left to right:

Walter Schneider,
Barbara Weitgruber,
Reinhold Mitterlehner,
Hannes Androsch.

High Potential Day Cooperation Event With “profil” – 27 June 2016

The News publishing group organised the “High Potential Day” for students for the ninth time on 27 June 2016. The information day focuses on university and technical college graduates with above-average success and practical experience, who want to take control of their further career planning. Due to the high visibility and attractiveness of the event for the graduates target group, the Austrian Council imple-

mented a podium discussion in cooperation with the “profil” magazine especially for young researchers. Hailing the title “How do researchers live in Austria?” career models in science, human capital and requirements in training are addressed to make research more attractive as a career opportunity.

2016 it once again inspired even more people. Around 180,000 visitors were counted at more than 2,150 stations across Austria. A new visitor record! The Austrian Council for Research and Technology Development believes the dialogue between science and society is extremely important. As a visitor magnet the Long Night of Research makes a significant contribution to presenting the services of the domestic research and innovation community to a broad public. Parallel to this the Austrian Council has developed the “Everything (almost) about science and research” book for the target group of young people and study beginners, which, among other material, was distributed for free with the Long Night of Research 2016.

The next Long Night of Research will be on 13 April 2018.

Fishbowl Discussion As Part Of The Alpbach Technology Forum – 24 August 2016

The Alpbach Technology Forum set itself the goal of encouraging the dialogue between young researchers and established personalities. The Austrian Council welcomes the intensification of discussion formats and focused on a new format in 2016 with the “fishbowl”. In a fishbowl discussion, a small group in the inner circle discusses the topic, while the other participants observe the discussion in an outer circle. In the inner circle is an empty guest chair, on which anyone from the outer circle can sit at

any time and join in the discussion. The seat is occupied until the guest has said everything or another guest from the outer circle wants to take the seat.

The event with the title “Ivory tower vs. shanty? Enlightenment in the Fishbowl!” was held on 24 August 2016 in the Hotel Böglerhof with the enthusiastic participation of the audience. This allowed numerous aspects and experiences from the research everyday to be incorporated into the discussion.



Fishbowl discussion in the Hotel Böglerhof. From left to right: Participants from the audience, **Klemens Wassermann**, **Barbara Weitgruber**, **Walter Schneider**

Presentation: Innovation-promoting public sector procurement – 14 September 2016

In addition to supply-side mechanisms (i.e. funding, etc.), in recent years increasingly more attention has also been paid at European and international level to demand-side innovation-promoting measures.

The topic of “demand-side innovation policy” is emphatically defined in the Austrian Council’s Work Programme. An important milestone was

reached in September 2016 with the “Recommendation on innovation-promoting public sector procurement”.

This recommendation by the Austrian Council was presented as part of the event on 14 September 2016 and future challenges of the demand-side innovation policy for Austria were discussed with experts. Along with the responsible mentor



events

in the Austrian Council, Prof. Jakob Edler, the head of the national service office for innovative public sector procurement, MMag. Stefan Wurm, and the responsible departmental representative, Section Head Andreas Reichhardt (BMVIT) and Mag. Josef Mandl (BMWWF) also took part. The speaker of the regional experts conference “Public sector procurement of the federal states”,

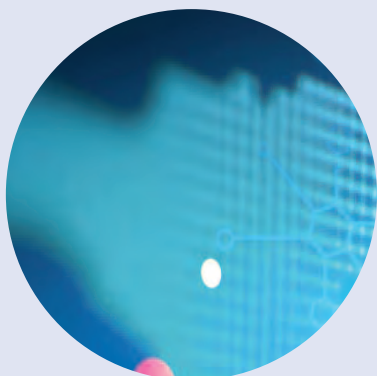
Hannes Pöcklhofer, and Stefan Kollarits, Prisma-Solutions Managing Director as SME representative also joined in on the podium.

Prof. Edler briefly listed the essential key points of the Council’s recommendation, which were very well received by the community present. This was followed by a lively discussion on the Council’s recommendation and the topic on the whole.

“Singaporean-Austrian Science and Business Day” – 30 September 2016

The “Singaporean-Austrian Science and Business Day” was held in Vienna for the second time already in 2016. This initiative started by the BMWWF and administered by the FFG will push existing RTI cooperation projects between Singapore and Austria into the limelight, increase Austria’s visibility in the Singaporean research community and illustrate opportunities for boosted RTI cooperation between the states.

This year the BMWWF invited the Austrian Council to take part as host. Prof. Helga Nowotny opened the evening reception of the “Singaporean-Austrian Science and Business Day” in the presence of the Singaporean Ambassador Soo Kok Leng and the Minister of State for Foreign Affairs and Transport, Josephine Teo. The participants enjoyed an interesting evening above the rooftops of Vienna in “TUtheSky”.



Review 2016

2016 can be described as the year of disappointed hopes and surprising successes. The greatest success was certainly the fact that the topic of start-ups received broad political attention with the Start-up Package and further measures. Some are even already speaking about an inflationary use of “start-ups” in areas that do not have much in common with technology. The end justifies the means – the topic is important: especially in a country in which knowledge potential is great, but its actual implementation in the economy shows sig-

nificant room for improvement.

But the disappointment is also written on the faces of many players and stakeholders when they think back on 2016. Absolutely everything was going to be financed! The bank levies were going to provide the majority of the fresh money. “Unfortunately not” then appeared in the letters that the community so enthusiastically tore open. Notices have not yet produced any scientific breakthroughs, and the research generations will only see the bill for this in a few years.



Ludovit Garzik
Head of the Secretariat

Outlook for 2017

Hope springs eternal. Because it returns – with the announcement of stable funding, such as the National Foundation with EUR 100 million per year in the next three years. The Cabinet was to adopt this decision in April already. Should the National Bank pick up the bill for this? The memory of the last “special tranche” in 2015 is still too fresh, where we had to struggle in various boards and committees for half a year for EUR 18 million. And now EUR 300

million are to flow with no problems? Once burnt it’s hard to believe, but all will work hard on making it happen, however long it takes.

In 2017 the Austrian Council will publish a series of studies and recommendations, led by the Performance Report on 1 June and the “Universities of the Future” book in August in Alpbach. Only in the rearview mirror will we then be able to see if the calls for funding and reforms were loud enough.



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The Secretariat supports the Austrian Council both in terms of organization and content, in particular with regard to preparing and organising the meetings of the Austrian Council and work groups, and in respect of communication both within the Council and externally. The operations of the

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