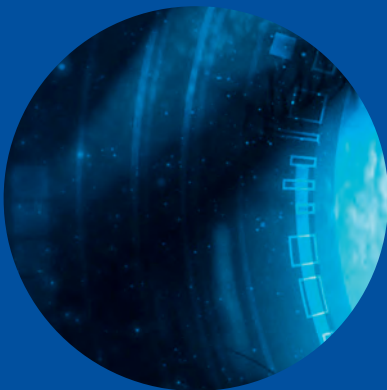






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## foreword

Research and innovation are important drivers in shaping a positive future, a fact that became particularly clear with the advent of the COVID-19 pandemic. Fast findings and reliability are just two of the characteristics here that make research what it is. The current health crisis will hopefully be weathered in the coming year. The climate crisis, however, will certainly be with us for some time to come.

Education, research, technology development and innovation are important tools in combating it. We will also require their prominent role in the future to deal with crisis situations with global challenges, such as climate change, the energy revolution and resource scarcity.

This fact is taken into account by the Austrian Government in the new RTI Strategy 2030 pre-

sented last December. To guarantee sustainable, resource-friendly and socially-just development, the global sustainability goals (SDGs) were also incorporated in compiling the strategy and will therefore have the required systemic effect. Over the past two decades, the Austrian Council, which entered its fifth term of office in autumn 2020, has contributed significantly to Austria's positive development of the RTI area with its thematically diverse, and often also critical recommendations. Particularly in view of the immense challenges our country currently faces, the Government therefore also expects further important stimuli.

With this in mind, we would like to wish the new Council Board the very best with this challenging task, and we very much look forward to actively engaging in the discussions.



Univ.-Prof. Dr. Heinz Faßmann  
Federal Minister of  
Education, Science and Research



Leonore Gewessler, BA  
Federal Minister of  
Climate Action, Environment, Energy,  
Mobility, Innovation and Technology



Mag. Gernot Blümel, MBA  
Federal Minister of  
Finance



Dr. Margarete Schramböck  
Federal Minister of  
Digital and Economic Affairs

Ladies and Gentlemen,  
Dear Readers,

The past year was a special year in so many respects. It brought numerous changes and extraordinary strains for us all – in our jobs, our everyday routine, and in our social interaction. SARS-CoV-2 posed and still poses challenges for us, which we have never known before in this form or to this degree. And the full extent of the problems the COVID-19 pandemic will bring forth in the coming months and years (keywords: company collapses, unemployment, growing social inequality or impacts on environment and sustainability), is still far from foreseeable.

Education, science, research and innovation will play as crucial a role in battling the pandemic and the consequential damages it causes as they also do in the fight against climate change, in shaping digitisation and with what is now known as the “fourth industrial revolution”.

In view of this situation, it was all the more positive that the Austrian Government created a new strategic basis for the research policy in December 2020 with the adoption of its RTI Strategy 2030. The strategic objectives defined in it, which will secure sustainable growth and increased resilience of the overall economic system, also define the three areas of action: (i) to join the international leaders and strengthen RTI location Austria, (ii) focus on excellence and (iii) promote knowledge, talents and skills. The also adopted RTI package equally brings increased planning security, for the 2021-2023 period first of all.

Against this background, in its November 2020 advisory session the Austrian Council defined six work priorities, which address the most important challenges for the Austrian RTI system. Special importance is also added here to the issue of technology sovereignty, however the growing importance of technologies and technology-based infrastructure is al-

so a fundamental challenge for Austria and Europe. System-relevant strategic technologies not only perform key functions such as securing sovereign tasks and meeting social requirements – they also play a key role for a country’s competitiveness. As one of its first tasks, the Austrian Council got to grips with the issue of technology sovereignty, presented it with ten theses and thus underscored the issue’s urgency, which existed before the COVID-19 pandemic, but COVID has made it even more urgent. In the context in particular of an international division of labour to be rethought and reshaped, the Council believes the definition of a clear position is urgently required here, whereby it must be differentiated between what can be done in Austria and what must be done at European level.

Along with the technology sovereignty issue, further topics also entail both current and long-term challenges, and range from “RTI mission orientation”, “education and RTI” and “universities of the future” to the extremely complex “basic research, competitiveness and growth”, through to “internationalisation”.

The issues the Council believes are most important with regard to competitiveness and sustainability, implementation of missions and a continuous improvement of research location Austria, will be addressed with these priorities. Reappointed in autumn 2020, the Council members herewith on one hand connect with topics already followed up on, but at the same time new evaluations are made, which also consider the fast-moving changes in the entire RTI system.

Over the course of its now more than twenty-year existence, the Austrian Council has always considered itself a stimulus provider, critical

editorial



**Klara Sekanina**  
Chairwoman  
of the Austrian Council



**Sabine Herlitschka**  
Deputy Chairwoman  
of the Austrian Council

## editorial

companion and dedicated adviser of the Austrian RTI policy. With this in mind, the Austrian Council will also accompany the new RTI Strategy 2030 and the RTI package in a supporting role.

Finally, we would like to thank the Chairs who left the Austrian Council for Research and Technology Development on expiry of the Council period in autumn 2020, Hannes

Androsch and Markus Hengstschläger, for their indispensable agenda settings and untiring work for research location Austria throughout their full ten years of commitment. The members of the Council Board will continue to define target positions on an evidence-determined basis, and together with the stakeholders will discuss possible and logical ways to achieve them.

The Austrian Council

**Klara Sekanina**



**Sabine Herlitschka**



**Jakob Edler**



**Hermann Hauser**



**Helga Nowotny**



**Sylvia Schwaag-Serger**





## Innovation monitoring and strengths-weaknesses analysis of Austrian RTI performance

### Background

In 2010, the Cabinet commissioned the Austrian Council (AC) with the compilation of an annual report on Austria's scientific and technological capability. In addition to an evaluation of the innovation performance of the domestic RTI system, this should also include the results of monitoring the implementation of the RTI Strategy 2020. The Council has performed this assignment since the strategy was adopted in 2011. When work began on a new strategy for research, technology and innovation, in early 2019 the Austrian Council submitted its last report in this respect, focusing on the RTI Strategy's rate of goal achievement.

With its report of June 2020, the Austrian Council considered the adjusted framework conditions, and with an extensive strengths-weaknesses analysis of the Austrian RTI system, opted for a new method for its innovation monitoring. The RTI Strategy's rate of goal achievement was no longer evaluated here (as it had been in previous years). Instead, the areas in which the Austrian RTI system's performance is better and in which it is worse than those of the leading innovation nations, were analysed on the basis of a comprehensive set of indicators.

### Priorities 2020: Strengths and weaknesses of the Austrian RTI system in the international comparison

The 2020 report on Austria's scientific and technological capability focused on an evaluation of the strengths and weaknesses of the Austrian RTI system's performance in international comparisons. It was considered a descriptive basis to "analyse the status quo and current challenges" named in the government programme, with which the capability of the Austrian RTI system is illustrated on the basis of existing databases. The focus here was on a balanced strengths-weaknesses analysis, whereby two key objectives were pursued:

- To analyse the current situation with the performance of the Austrian RTI system relative to the leading innovation nations and founded on an indicator-based strengths-weaknesses analysis, as well as a qualitative evaluation of relevant developments.
- To draw conclusions, on the basis of which specific policy recommendations for the Austrian Government's strategy development to increase the capability of the Austrian RTI system can be made.

### Overview of key results

The Austrian RTI system exhibits solid performance in the international comparison. While in comparison with the leading innovation nations, Sweden, Finland, Denmark and the Netherlands, Austria's strengths and weaknesses on the whole appear broadly balanced.

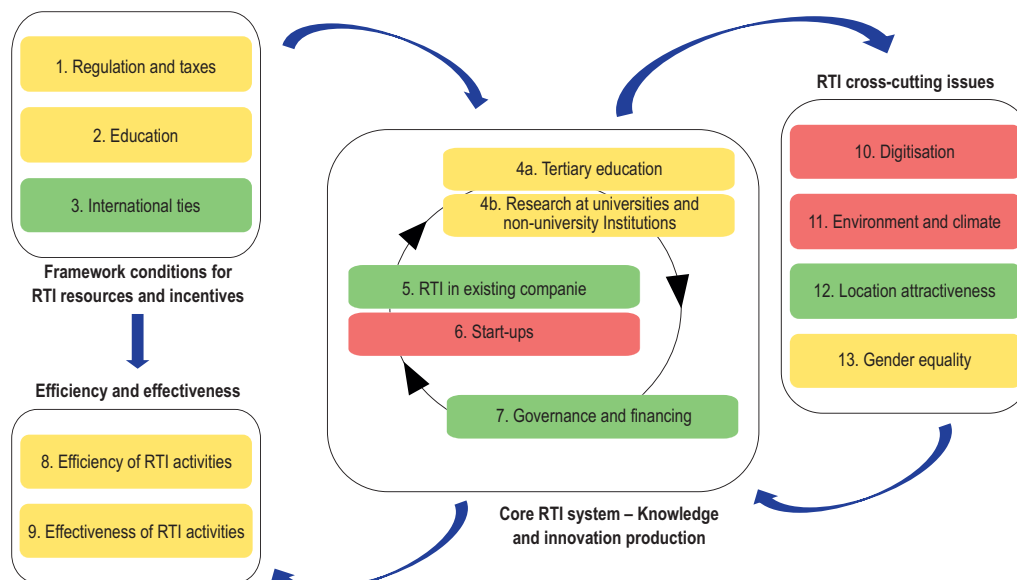
Nevertheless, there are a number of challenges with the framework conditions for RTI, in the core RTI system and with the efficiency and effectiveness of RTI activities. Figure 1 presents the most important results of the underlying strengths-weaknesses analysis at a glance. A

schematic illustration of the RTI system is applied here, consisting of four sub-systems, which are interconnected and influence each other reciprocally.<sup>1\*</sup>

This shows how the Austrian RTI system has both strengths and some key weaknesses compared with the leading innovation nations.

outlook

**Figure 1: Strengths and weaknesses of the Austrian RTI system compared with the innovation leaders**



Source: Janger, J. / Strauss-Kollin, A. (2020): Analysis of the performance of the Austrian RTI system. Study commissioned by the Austrian Council. WIFO, Vienna, Austria  
A traffic light colour system is used as follows: ● Green = Austria better than IL, ● Yellow = Austria as good as IL, ● Red = Austria worse than IL

<sup>1\*</sup> The RTI system consists of the following four sub-systems:

- (1) Specific framework conditions for research, technology and innovation, such as resources (human), incentives and regulations.
- (2) The core RTI system, within which university and non-university research institutions and R&D active companies can generate knowledge and innovations.
- (3) Cross-cutting issues such as climate and environmental protection or digitisation, which have effects on all sub-areas of the RTI system and are influenced by the rest of the RTI system. In the Austrian context, in addition to the major challenges of climate and digitisation, location attractiveness must also be emphasised, as due to the high foreign financing of Austrian R&D expenditure it represents an important component for the RTI system's performance.
- (4) The functioning of the interaction of all sub-areas and players of the RTI system in turn decides on the efficiency and effectiveness of the RTI activities. The latter must be considered potential effectiveness and incorporates overriding economic and social impact indicators, such as economic performance, health or environmental measures. The level of these measures must not be associated causally with innovation performance, but can demonstrate need for action for the RTI policy – if, for example, important environmental KPIs such as the level of greenhouse gas emissions are significantly above the level of any other country, this can serve as motivation for the RTI policy, whose mechanisms must be oriented more on combating climate change, by using technological or social innovations, for instance.

## outlook

### Strengths

The RTI system's strengths include the well-established international network, the high level of RTI support for existing companies and their notable performance, the generally above-average level of R&D financing and the above-average location attractiveness in relation to the comparison countries.

### Weaknesses

The greatest weakness in the core RTI system is clearly the area of innovative start-ups; in the cross-cutting issues area, digitisation and climate and environmental protection in particular are the most problematic.

### Challenges

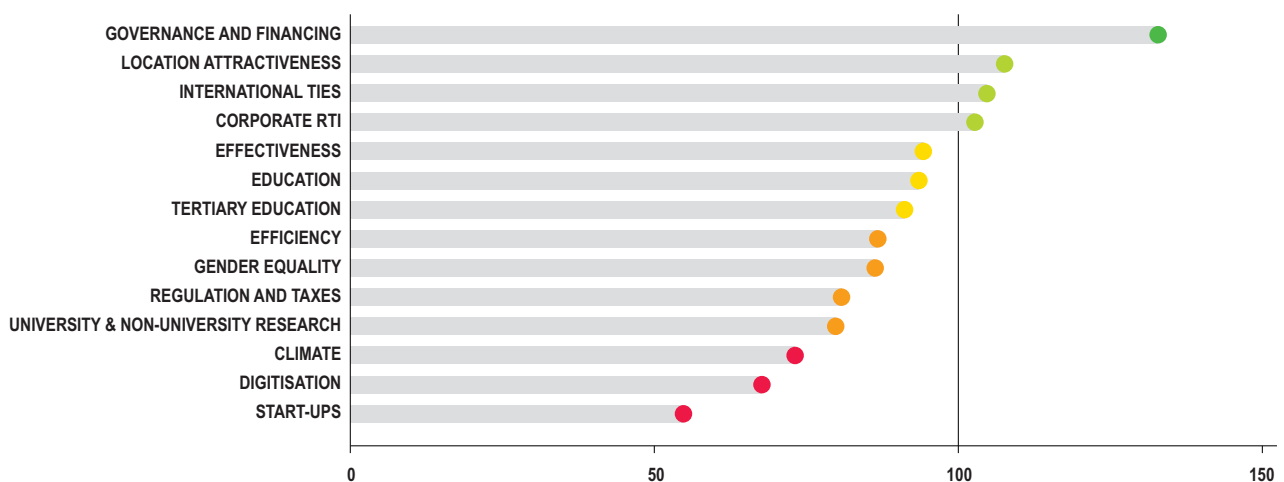
There are specific challenges in all sub-areas, which impede an innovation performance improvement. The problem areas that the Austrian Council has already addressed several times in its previous reports on Austria's scientific and

technological capability must be mentioned here, beginning with parts of the education system, on to the framework conditions at the universities and research funding, and through to gender issues.

An overview of the situation shows that there is still catch-up requirement in many sub-areas of the Austrian RTI system compared with the leading countries. It shows that in four of fourteen areas, the domestic performance is above the level of the innovation leaders (bright and dark green bars). The distance is low in three areas (orange bar).

In seven areas, the Austrian level is, however, clearly below that of the leading innovation nations; in three of these, it is even significantly below (red bar). The picture is somewhat different if we compare Austrian innovation performance with that of the European Union's member states or the respective best performers around the world (see table 1).

Figure 2: Overview of Austria's strengths and weaknesses compared with the innovation leaders



Source: WIFO, 2020

Table 1 shows the aggregated results of the strengths-weaknesses analysis for all sub-areas of the Austrian RTI system relative to the average EU performance (first column), to that of the innovation leaders (second column and figure 3) and to that of the respective top three (third column). Compared with the average EU level Austria scores significantly better, and almost continuously so. Only one area stands out as below average: Start-ups and growth. This area even shows acute weaknesses in relation to the average level of the European member states – from motivation for entrepreneurial activity to start-up regulation, through to risk capital intensity. The Austrian level is indeed below the EU average, but with a smaller distance, in four

sub-areas – regulation and taxes, digitisation, environment and climate, and gender equality. All other sub-areas mostly rank clearly above the levels of the comparison countries.

If we compare Austria with the respective top three in the world, unsurprisingly the picture looks significantly worse. From this perspective, we can see that Austria only manages to join the group of best performers (globally speaking) in two sub-areas, namely the area of corporate research and the area of R&D expenditure.

It is also easy to see that Sweden appears disproportionately often in the global top three group. In the fourteen sub-areas examined, the Scandinavian

**Table 1: Strengths and weaknesses of the Austrian RTI system compared with the EU average, the innovation leaders and the top 3**

|                                                                   | AT compared to. |     |       | Top countries        | Countries for composite-calculation |
|-------------------------------------------------------------------|-----------------|-----|-------|----------------------|-------------------------------------|
|                                                                   | EU              | IL  | Top 3 |                      |                                     |
| <b>Framework conditions for RTI</b>                               |                 |     |       |                      |                                     |
| Regulation and taxes                                              | 92              | 81  | 69    | (1) DK (2) IE (3) SE | 17                                  |
| Education                                                         | 107             | 92  | 70    | (1) FI (2) UK (3) SE | 17                                  |
| International ties                                                | 111             | 106 | 66    | (1) LU (2) BE (3) EE | 24                                  |
| <b>Core RTI system</b>                                            |                 |     |       |                      |                                     |
| Tertiary education                                                | 105             | 91  | 61    | (1) DK (2) PL (3) SE | 21                                  |
| Research at universities and non-university research institutions | 145             | 80  | 67    | (1) CH (2) DK (3) NL | 15                                  |
| RTI in existing companies                                         | 154             | 103 | 76    | (1) SE (2) FI (3) AT | 21                                  |
| Start-ups                                                         | 72              | 55  | 47    | (1) DK (2) SE (3) NL | 21                                  |
| Governance and financing                                          | 165             | 143 | 105   | (1) BE (2) AT (3) FR | 24                                  |
| <b>Efficiency and effectiveness (impact) of RTI</b>               |                 |     |       |                      |                                     |
| Efficiency of RTI activities                                      | 122             | 95  | 68    | (1) SE (2) DK (3) NL | 13                                  |
| Effectiveness of RTI activities                                   | 112             | 94  | 68    | (1) SE (2) DE (3) UK | 22                                  |
| <b>RTI cross-cutting issues</b>                                   |                 |     |       |                      |                                     |
| Digitisation                                                      | 84              | 68  | 50    | (1) SE (2) IE (3) DK | 19                                  |
| Environment and climate                                           | 86              | 73  | 32    | (1) DE (2) SI (3) RO | 31                                  |
| Location attractiveness                                           | 134             | 108 | 74    | (1) IE (2) FI (3) CH | 27                                  |
| Gender equality                                                   | 91              | 86  | 57    | (1) RO (2) PL (3) LT | 26                                  |

Source: WIFO

## outlook

country ranks nine times at a global top position, and even ranks number one five times. Denmark is also in the top three six times and takes first place three times. Fin-

land and Ireland follow with four mentions each among the top three and first place once each. In spite of its above-average high R&D expenditure, Austria is not once placed number one.

## Summary

On the whole, we can say that the Austrian RTI system has both significant strengths and key weaknesses compared with the leading innovation nations. The RTI system's known strengths include the extensive international network, the high level of RTI support and the capability of companies, the generally above-average level of R&D financing and the attractiveness of the business location. The greatest weakness in the core RTI system is clearly the area of innovative start-ups; in the cross-cutting issues area, digitisation and climate and environmental protection are the most problematic.

There are also specific challenges in all sub-areas of the Austrian RTI system, which have been impeding a significant improvement in innovation performance for some years now. Worthy of mention here are the problem areas the Austrian Council has already addressed several times in its reports on Austria's scientific and technological capability, beginning with parts of the education system, on to the framework conditions for the universities and research funding, through to start-up activity. These are listed again in the following pointation.

## Strengths of the Austrian RTI system

### ● General

- Above-average attractiveness of the RTI location and high level of international ties
- High development dynamic of the R&D quota affords Austria the second highest R&D quota in Europe and the fifth highest worldwide

### ● Education system

- Above-average positive supervision ratios in preschool and primary education
- Significant reduction in the number of early school leavers
- Increased level of university graduates in STEM subjects

### ● Research at universities and non-university research institutions

- Individual universities and non-university research institutes with high scientific reputation and excellent scientific output

- Growth rate of the number of scientific publications in the observation period continuously above that of the innovation leaders

### ● Corporate research and innovation

- Above-average R&D intensity of the Austrian economy
- Continuously increasing number of R&D-intensive companies and innovative SMEs
- Top values with cooperation between science and economy
- Stronger, more knowledge-intensive, export-oriented production sector with global market leaders and innovators in various sectors and niches

## Weaknesses of the Austrian RTI system

### • General

- Scientific and technological output moderate in relation to above average high input
- Catch-up requirement in the digitisation area
- Austria scores poorly with technology-related environment indicators in relation to the leading countries

### • Education system

- Above-average high social selectivity and education inheritance
- Below-average performance level in the secondary education system (lower percentage of pupils with high competences, higher percentage of pupils with lower competences)
- Insufficient coordination and alignment in the tertiary education sector result, among other things, in an imbalance with the steering of student flows
- Poor supervision ratio results in high drop-out rates in the tertiary education sector
- Low share of academics

### • Research at universities and non-university research institutions

- Below-average financing of universities and basic research in particular (competitive funding)
- Research performance that is on the whole too weak, results in scoring that remains significantly behind its potential with international university comparisons
- No attractive country of choice for researchers (brain drain vs brain gain) with

the exception of top research institutions

- The research infrastructure has improvement potential

### • Corporate research and innovation

- Catch-up requirement with innovation performance and inter-sectoral structure change
- Adverse bureaucratic, regulatory and taxation framework conditions increase expense, costs and time taken for innovative start-ups and result in a comparatively weakly developed start-up landscape
- Insufficient risk capital results in a comparatively low number of rapidly growing knowledge-intensive companies and necessary scale-ups
- Low diffusion of digital technologies and deficits with broadband expansion

### • Governance system

- Complex governance structures result in insufficient controlling performance and low RTI policy effectiveness
- Low-level flexibility, coherence and funding system controlling performance
- Insufficiently coordinated internationalisation strategy
- Insufficient dialogue between science and society
- Restrictive access to databases impedes scientific research, data-based innovations and evidence-based political control

## outlook

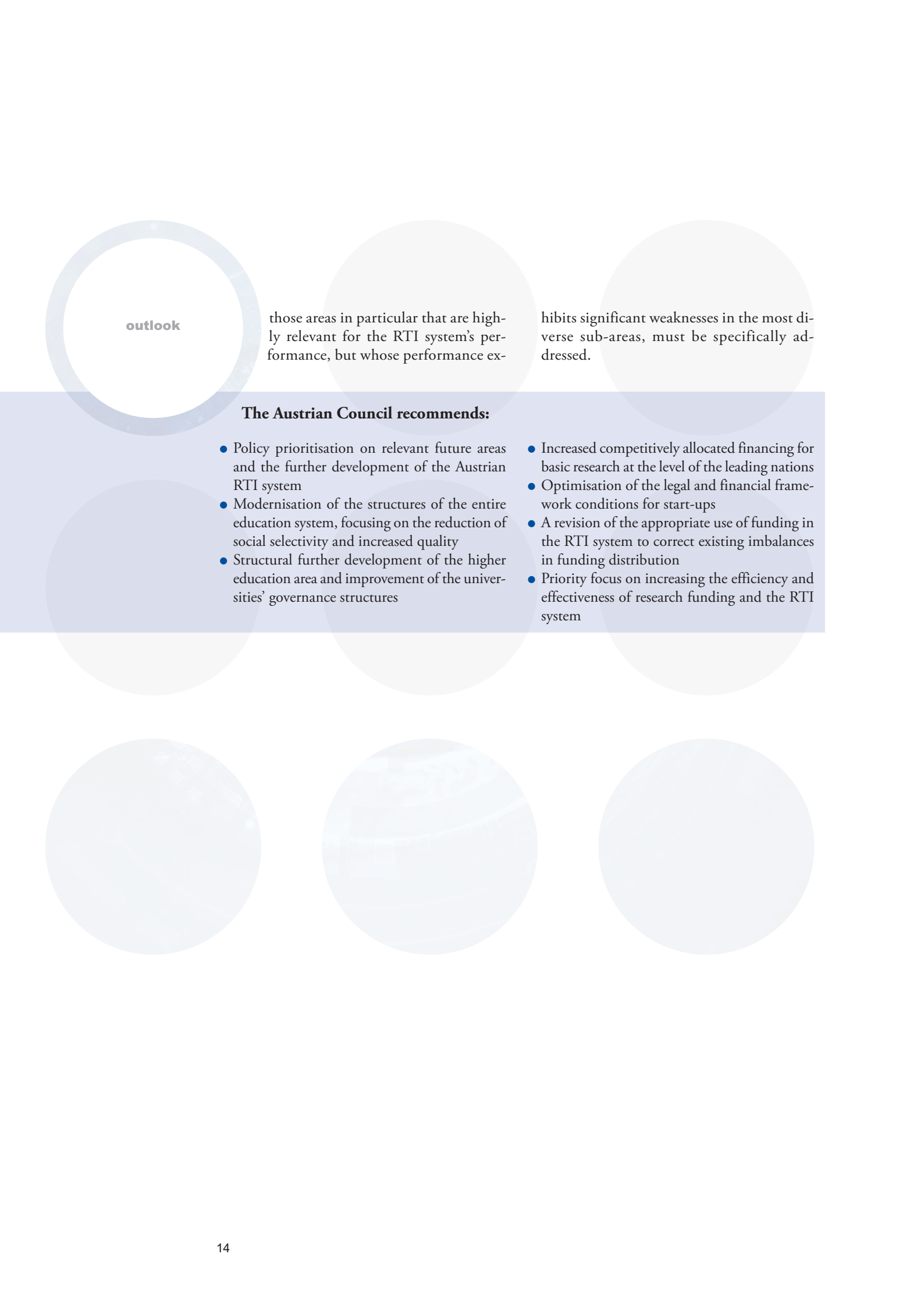
## Seven priority areas of action and recommendations for the RTI Strategy 2030

The Austrian Council drew the following conclusions for the RTI system's performance improvement from the results of the evidence-based analysis:

- The Austrian Government's future RTI policy and in particular the new RTI Strategy

should incorporate the findings of this strengths-weaknesses analysis of the Austrian RTI system.

- While strength areas of the domestic RTI system should continue to be supported to also generate positive results in the future,



## outlook

those areas in particular that are highly relevant for the RTI system's performance, but whose performance ex-

hibits significant weaknesses in the most diverse sub-areas, must be specifically addressed.

### **The Austrian Council recommends:**

- Policy prioritisation on relevant future areas and the further development of the Austrian RTI system
- Modernisation of the structures of the entire education system, focusing on the reduction of social selectivity and increased quality
- Structural further development of the higher education area and improvement of the universities' governance structures
- Increased competitively allocated financing for basic research at the level of the leading nations
- Optimisation of the legal and financial framework conditions for start-ups
- A revision of the appropriate use of funding in the RTI system to correct existing imbalances in funding distribution
- Priority focus on increasing the efficiency and effectiveness of research funding and the RTI system



## Recommendations 2020

### Priorities for awarding the funds of the National Foundation RTD 2021 –

Recommendation of March 9, 2020

The National Foundation RTD (Nationals-tiftung FTE) has a very important role in the Austrian RTI system in financing long-term strategic research initiatives. Since its inception, the National Foundation RTD has funded numerous projects with an average annual volume of some EUR 90 million in the areas of basic research and applied research. The annual funding is provided with funds from the Austrian National Bank (ANB) and interest income of the ERP Fund (European Recovery Programme).<sup>1</sup> Due to the extremely volatile development of international capital markets and the significant fall in interest income it entails (both that of the ERP Fund and the ANB), the National Foundation RTD Act was amended to stabilise funding and the ANB was empowered for the 2018-2020 period to enable funding in accordance with § 4 (5).<sup>2</sup>

In conjunction with the Austria Fund, which was set up with the 2015/16 tax reform, and the funding of EUR 33.7 million provided proportionally in the 2016-2020 period, in the past three years total annual funding amounting to approximately EUR 140 million was provided for allocation via the National Foundation RTD.

The Austrian Council therefore emphasises its recommendation to shape the legislative provisions of the National Foundation Act to ensure sustainable financing and to adjust the period of validity with an amendment of § 4 (5) Z 3 and § 4 (7) and §§ 3 (2) and 4 (6), to guarantee the funds of the National Foundation RTD for the long term and to therefore enable the required planning security for funding strategic priorities.

Following detailed discussion and on the basis of the priority areas of action identified in the 2020-2024 government programme and in the Report on Austria's Scientific and Technological Capability, the Council Board recommends the following content-relevant orientation for awarding funds in descending priority, as in 2020:

Recommendation  
of the Austrian Council,  
March 2020

- Reinforcing of the national human potential basis
- Reinforcing the research infrastructure with initiatives with appropriate critical variables and risk potential
- Activities for the democratisation of technology, knowledge and innovation (Open Innovation, Open Science)
- Reinforcing competitive funding in basic and applied research
- Increased potential of transformative research (Sustainable Entrepreneurship, Social Innovations)
- Coordination and harmonisation of regional and federal RTI activities
- Risk capital reinforcement

<sup>1</sup> FTEG § 4.

<sup>2</sup> BGBl. I No. 81/2017.

The orientation here follows the principle of the National Foundation's long-term planning ability and continuity. The Austrian Council also points out that, in the interests of optimised resource use, an

interinstitutional coordination to counter fragmentation in the programme planning<sup>3</sup> should be implemented.

recommendations

### **Recommendation on the Research Funding Act – Recommendation of June 18, 2020**

The Council welcomes the draft of a research funding act (FoFinaG) adopted by the Cabinet, with which the Austrian Government intends to increase the efficiency of RTI strategic control in Austria, restructure research funding and guarantee long-term budgetary planning security. On the basis of an RTI package, three-year performance and funding agreements will be concluded with the key research institutions and funding agencies respectively. Also to be welcomed are the envisaged growth-oriented funding and the ban on cuts of the agreed budgets within the funding period. The Council is, however, unhappy with the absence of a specific budgetary growth scale in the draft legislation.

#### **Recommendations**

##### **Guaranteed annual 4 percent increase rate in R&D expenditure**

The Council already recommended amending the draft for a research framework act towards the originally intended research funding act in October 2019.<sup>4</sup> The corresponding key points for long-term budgetary planning security are now defined in the current government bill. The RTI package as a mechanism for research

financing will enable the definition of a multi-annual financing agreement based on transparent measures planning, and will guarantee binding funding security. For later budgeting the draft legislation is also oriented on the German package for research and innovation, which projects budget growth of currently three percent per year.<sup>5</sup> The Council welcomes this in its essence.

However, based on its own calculations, it also recommends an annual R&D expenditure increase rate in the public sector (federal and state) of approximately four percent. Up to 2030, this means an average increase of approximately EUR 170 million per year. These increases must be justified on the basis of the data available (for this see also the explanations in the "Background" section). As a starting point, the Council recommends raising the public sector R&D expenditure to EUR 4 billion, as it was for 2020. This would therefore have to increase by 2030 from EUR 4 billion to EUR 5.5 billion.

##### **Further development of agentification**

The Austrian Council has several times recommended that the existing draft of the research framework act or a future research funding act

<sup>3</sup> See Austrian Council recommendation on the use of National Foundation RTD funds for 2020 and the Austria Fund for 2019. Austrian Council, Vienna, Sept. 18, 2019.

<sup>4</sup> Austrian Council (2019): Statement by the Austrian Council on the draft for a research framework act (2019) of Oct. 16, 2019.

<sup>5</sup> <https://www.bmbf.de/de/pakt-fuer-forschung-und-innovation-546.html>.



## recommendations

be expanded with relevant governance elements. Special reference was made in this respect to the white paper on controlling research, technology and innovation in Austria.<sup>6</sup> The introduction of performance and funding agreements is now provided for in the government bill for the research funding act, with which the controlling of research and research funding bodies will be professionalised. The Council welcomes this in its essence.

However, with the specific definition of the goals of the performance agreements and the implementation of the goals of the RTI package, the Council recommends the further development of agentification in the interests of increased autonomy for research and research funding bodies be further considered. The Council believes it is expedient to afford the addressed institutions the greatest level of autonomy within the scope of the strategic projects of the respective departments, in order to achieve the agreed goals.

### **Securing research funding during the COVID-19 crisis**

For a low raw material, high wage country like Austria, an efficient RTI system is an essential basic requirement to also be competitive in the future and when the COVID-19 crisis has been weathered. The Council therefore believes guaranteeing a continuously increasing funding framework for R&D continues to be indispensable in strengthening the capability of the Aus-

trian RTI system. The Council therefore welcomes the growth-oriented RTI funding mentioned in the current government bill.

To guarantee this growth-oriented funding, the Council recommends the absolute securing of the required funding, also and in particular during the COVID-19 crisis, and in the stressed budget situation it has caused. The RTI initiatives set up as a response to the fight against COVID-19 have shown that this is essentially possible.

### **Background**

The Minister of Science Johannes Hahn proposed the introduction of a research funding act as far back as the Alpbach Technology Forum in August 2009. This should become the financial backbone of research and “substantiate and specify the then planned Government’s RTI Strategy [...] where it was about financing and securing new mechanisms”<sup>7</sup>. The RTI Strategy adopted in 2011 consequently includes the objective of establishing a research funding act, in which the principles of the Austrian RTI policy would have been defined, output goals anchored and a long-term budgetary planning security would have been guaranteed.<sup>8</sup> The Austrian Council has since referred several times to the need to pass an appropriate law.<sup>9</sup>

The issue was only addressed again with the 26th legislative period and anchored by the Austrian Government of the day in the 2017-2022 government programme. In accordance

6 Austrian Council (2013): Weißbuch zur Steuerung von Forschung, Technologie und Innovation in Österreich. Vienna.

7 Hahn, J. (2009): “Forschungsfinanzierungsgesetz soll finanzielles Rückgrat der Forschung werden.” OTS 0141 of Nov. 23, 2009.

8 Austrian Government (2011): Der Weg zum Innovation Leader. Strategie der Bundesregierung für Forschung, Technologie und Innovation. Vienna, p. 47.

9 See, inter alia, Austrian Council (2015): Report on Austria’s Scientific and Technological Capability 2015. Vienna, p. 9; idem (2017): Recommendation on the way to the forefront of innovation of Nov. 30, 2017, p. 25.

with the Council of Ministers decision of August 2018, a draft for an appropriate research funding act was finally drafted. In line with the original plans, this was to be presented at the cancelled RTI summit in May 2019, subsequently sent for parliamentary appraisal and adopted by summer 2019. Before the cancelled summit, however, interministerial agreement on the budgetary consequences and the act's content orientation could not be reached, especially towards a stronger agentification recommended by the Austrian Council or a more efficient controlling of the RTI system via appropriate governance structures<sup>10</sup>. Finally, the draft of a research framework act was presented on August 19, 2019.

#### **Proposal on the level of R&D expenditure growth as part of the research funding act (Fo-FinaG)**

With the government bill for a research funding act discussed by the Cabinet on June 16, 2020, a first step towards the implementation of the appropriate project in the Austrian Government's government programme has now been taken (building on the government bill for a research framework act). Determination of the R&D expenditure increase rates is required for its implementation. The initial question here is, what multiannual increase rates at what level will be required to achieve a specific rate target by 2030 (such as, for example, the goal of a 3.76 percent R&D rate already targeted for the last RTI Strategy in 2020).

On the basis of an estimated GDP growth within a bottom and a top corridor, the annual R&D expenditure growth rates up to 2030 on average would have to be between three (conservative assumption) and approximately four percent (average value assumed; see table 2).<sup>11</sup> Due to the significant importance of research, technology and innovation in also combating the COVID-19 crisis, the Council recommends a four percent annual increase rate.

The result of the conservative assumption of the R&D growth corridor corresponds (on average) the agreement in the **German Pact for Research and Innovation, which provides regular budget increase of currently three percent per year.**

The figures given refer to the total R&D rate, that is to public and private sector shares. As the development of private sector R&D expenditure cannot be reliably forecast because of the COVID-19 crisis, the calculated three percent increase rate must be considered the lower limit for public sector R&D expenditure.

The following assumptions are specifically made for GDP growth:

- A **conservative assumption** of minus 6 percent this year, a slight recovery in the coming year and nominal growth of **2.5 percent from 2023 onwards**
- An **assumption based on the average growth rates since 1995**, that is, with a slight recovery in the coming year and nominal growth of **3.5 percent from 2023 onwards**

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<sup>10</sup> Austrian Council (2013): Weißbuch zur Steuerung von Forschung, Technologie und Innovation in Österreich. Vienna, pp. 18 ff.

<sup>11</sup> Note: Due to the currently negative GDP growth, in theory R&D expenditure should also decrease (show negative growth, that is); it therefore makes more sense to assume constant growth over the observation period.

## recommendations

**Table 2: Path to achieving an R&D rate of 3.76 percent**

|                      | Rate path | R&D growth, bottom corridor | R&D growth, top corridor | R&D expenditure, (in € m) | Nominal GDP, (in € m) |
|----------------------|-----------|-----------------------------|--------------------------|---------------------------|-----------------------|
| 2019                 | 3.18%     |                             |                          | 12,689                    | 398.52                |
| 2020                 | 3.24%     | -4.5%                       | -4.5%                    | 12,124                    | 374.61                |
| 2021                 | 3.29%     | 2.1%                        | 2.6%                     | 12,381                    | 376.48                |
| 2022                 | 3.34%     | 3.6%                        | 4.1%                     | 12,830                    | 384.01                |
| 2023                 | 3.39%     | 4.1%                        | 5.1%                     | 13,357                    | 393.61                |
| 2024                 | 3.45%     | 4.1%                        | 5.1%                     | 13,902                    | 403.45                |
| 2025                 | 3.50%     | 4.1%                        | 5.1%                     | 14,466                    | 413.54                |
| 2026                 | 3.55%     | 4.0%                        | 5.0%                     | 15,050                    | 423.88                |
| 2027                 | 3.60%     | 4.0%                        | 5.0%                     | 15,654                    | 434.47                |
| 2028                 | 3.66%     | 4.0%                        | 5.0%                     | 16,278                    | 445.34                |
| 2029                 | 3.71%     | 4.0%                        | 5.0%                     | 16,924                    | 456.47                |
| 2030                 | 3.76%     | 3.9%                        | 5.0%                     | 17,592                    | 467.88                |
| <b>Average value</b> |           | <b>3.0%</b>                 | <b>3.9%</b>              |                           |                       |

Source: Statistik Austria global estimate, own calculations.

If the shares of the financing sectors are kept constant until 2030, for the public sector (federal and federated states) this would mean an average **annual increase in R&D expenditure of approximately EUR 170 million**. As a starting

point, the Council recommends raising the public sector R&D expenditure to EUR 4 billion, as it was for 2020. This would therefore have to increase proportionately **from EUR 4 to 5.5 billion by 2030**.

**Table 3: Proportional financing of the R&D sectors**

|                      | GDP expenditure for R&D (in € m) | Of this financed by |                  |                  |                  |              |            |
|----------------------|----------------------------------|---------------------|------------------|------------------|------------------|--------------|------------|
|                      |                                  | Federal             | Research premium | Federated states | Corporate sector | Foreign      | Others     |
| 2019                 | 12,689                           | 3,115               | 758              | 549              | 6,040            | 2,017        | 209        |
| 2020                 | 12,124                           | 2,977               | 724              | 525              | 5,771            | 1,927        | 200        |
| 2021                 | 12,381                           | 3,040               | 740              | 536              | 5,894            | 1,968        | 204        |
| 2022                 | 12,830                           | 3,150               | 766              | 555              | 6,107            | 2,040        | 211        |
| 2023                 | 13,357                           | 3,279               | 798              | 578              | 6,358            | 2,123        | 220        |
| 2024                 | 13,902                           | 3,413               | 830              | 602              | 6,618            | 2,210        | 229        |
| 2025                 | 14,466                           | 3,552               | 864              | 626              | 6,886            | 2,300        | 238        |
| 2026                 | 15,050                           | 3,695               | 899              | 652              | 7,164            | 2,392        | 248        |
| 2027                 | 15,654                           | 3,843               | 935              | 678              | 7,451            | 2,488        | 258        |
| 2028                 | 16,278                           | 3,997               | 972              | 705              | 7,749            | 2,588        | 268        |
| 2029                 | 16,924                           | 4,155               | 1,011            | 733              | 8,056            | 2,690        | 279        |
| 2030                 | 17,592                           | 4,319               | 1,051            | 762              | 8,374            | 2,797        | 290        |
| <b>Average value</b> |                                  | <b>3,545</b>        | <b>862</b>       | <b>625</b>       | <b>6,872</b>     | <b>2,295</b> | <b>238</b> |

Source: Statistik Austria global estimate, own calculations.

## Recommendations for the RTI policy during and after the COVID-19 crisis — Recommendation of June 18, 2020

recommendations

### Introduction

The COVID-19 crisis poses enormous challenges for the community of states and for Austria itself. It is already foreseeable that the protective measures adopted by the Austrian Government and countless other governments all over the world, which in their full scope were appropriate and correct and have contributed to limiting the pandemic's damage, will have massive effects on the global economy and the national RTI systems. The ultimate effects of the pandemic cannot be reliably estimated at the moment. However, it is clear that in their totality these will be one of the greatest splits of recent decades.

The latest available forecasts show, without exception, a sharply negative economic growth dynamic for all states<sup>12</sup>. From today's point of view, the biggest falls in GDP since the Great Depression will be recorded this year. Due to the anticipated budget restrictions, negative implications for R&D investments must also be expected. This affects both companies that will defer R&D investments because to the rising uncertainty and the states themselves, which will have to seriously limit their budgets in the near future because of the social and economic emergency programmes.

To be considered here, however, are both the short-term massively falling growth rates and the

long-term growth potential. If expenditure for R&D is cut sharply now, in view of the long-term applied nature of such investment, this means lower production potential with declining growth rates in the future (distant). Given such a scenario, it could be feared that Austria will fall behind the innovation leaders for the long term, and even behind aspiring industrial nations.

The comparison with the last major economic and financial crisis in 2009 shows how those countries (Austria included) that kept their R&D expenditure constant, came through the crisis better than others.<sup>13</sup> It was also proven quite clearly for the corporate sector that innovative companies were significantly more resistant to the effects of the economic and financial crisis, and therefore had to let considerably less staff go.<sup>14</sup> Also undisputed is the fact that investments in science, research and innovation are key requirements to successfully combat a crisis.

It is no secret that RTI investments are expenditure that only reveal their effectiveness in the long term. Should they be cut, the effect would therefore not be immediately visible, but rather would certainly have an extremely negative long-term impact on the location. And of course human resources are also a country's "gold standard".

12 EU Commission (2020): Spring forecast 2020: Deep and irregular recession, uncertain recovery. Press release of May 6, 2020. Brussels. Online at: [https://ec.europa.eu/commission/presscorner/detail/de/ip\\_20\\_799](https://ec.europa.eu/commission/presscorner/detail/de/ip_20_799).

13 An immediate causality between crisis resilience and R&D expenditure is indeed difficult, nevertheless the empiricism here indicates a clearly positive correlation. For this, see, inter alia, Rammer, C. (2012): Focal point report on the 2010 innovation survey. ZEW Documentation 12-03, Mannheim.

14 Dachs, B. / Hud, M. / Köhler, C. / Peters, B. (2017): Innovation, creative destruction and structural change: firm-level evidence from European countries. In: Industry and Innovation 24, pp. 346–381.



## recommendations

The right investments are therefore extremely important for Austria to be able to maintain its per capita income. Again, also undisputed is the fact that having successfully overcome the crisis, the role of science, research, technology and innovation for the economy and society, and also for the healthcare system, must be re-defined. It is clear here that these were and are of key importance in successfully combating the health crisis, however this also applies even more in overcoming the pending economic, social and environmental effects of the pandemic. With this recommendation, the Austrian Council would like to highlight the key relevance of science, research, technology and innovation in tackling the COVID-19 crisis and its consequences. In addition to the initiatives introduced by the Austrian Government to combat COVID-19 (expressly welcomed by the Council), this firstly also requires the continued securing of stable research funding. The Council also recommends the implementation of key RTI policy measures, which incorporate the increased importance of the RTI system in meeting the challenges during and after the crisis.

### Recommendations

For a low raw material, high wage country like Austria, an efficient RTI system is an essential basic requirement to also be competitive in the future. This applied before the pandemic,

but it also applies all the more so in combating the consequences of the COVID-19 crisis. The Council therefore believes providing a continuous funding framework for R&D continues to be indispensable in strengthening the capability of the Austrian RTI system.

**For this reason, the Council recommends focusing on also keeping the funds for R&D at least constant in the near future, in the face of the reduced overall budget to be expected.**

The Austrian Council therefore advocates a “golden rule for the RTI policy”<sup>15</sup>. Numerous studies in this context show that RTI in particular is a key driver for long-term growth<sup>16</sup> and is therefore also a requirement for an economic recovery after the COVID-19 crisis. In view of the current historically low interest rates, the use of (still) higher debts appears to be justifiable.

The RTI policy during and after the crisis must ensure with proper orientation that scientific institutions and companies continue to (or can) perform their research and innovation activities efficiently and effectively. Direct and indirect financing mechanisms are helpful in this context in overcoming liquidity bottlenecks for innovation projects, especially with small and medium-sized enterprises and in stabilising negative forecasts.

But monetary elements must also be considered to successfully meet the challenges thrown up by the pandemic. The question therefore is: What can the future RTI policy learn from the COVID-19 crisis? The Council believes

<sup>15</sup> Similar to the “Goldene Regel der Finanzpolitik” (see Phelps, E. (1961), The Golden Rule of Accumulation, American Economic Review 51[4], pp. 638–643), which says that new public borrowing amounting to that of public investment is justified, as to some degree it finances itself due to its positive long-term returns and similar GDP effects. This principle applies all the more so for RTI.

<sup>16</sup> See, inter alia, Austrian Council (2015): Designing the Future. Economic, Societal and Political Dimensions of Innovation. Echomedia Verlag, Vienna.

two key points in particular are especially relevant here: Firstly, political decisions in the future should be more evidence-based and oriented on scientific findings. The resilience of our societies can then be strengthened, which could in turn play a still greater role in future crises, because with climate change, compared with the COVID-19 crisis, comes a far more complex and more fundamental challenge for humanity. Secondly, the RTI policy must contribute more to creating framework conditions in Europe to guarantee technological sovereignty. The Austrian Government is called on here to support the corresponding initiatives at EU level.

In addition to the acute measures already implemented to battle COVID-19 and to secure sufficient RTI funding during and after the crisis, the Austrian Council also recommends specifically addressing long-since familiar priority areas of action, which enable an increase in the efficiency and effectiveness of the Austrian RTI system, and therefore substantially contribute to producing answers to the key questions of the future. In addition to the implementation of the recommendations of its Report on Austria's Scientific and Technological Capability 2020<sup>17</sup>, the Austrian Council also believes the following topics in particular must be specifically addressed to also secure economic development, well-being, quality of life and quality of the environment, and the excellent performance of the healthcare system in the future:<sup>18</sup>

- **Incorporation of research, technology and innovation with policy prioritisation to meet the pending challenges caused by the COVID-19 crisis**

As part of policy prioritisation, the Austrian Council recommends special attention be paid to the RTI system, to also (with regard to the above-mentioned development of RTI investments) remain efficient and even join the leading innovation nations. This is no end in itself, but rather a substantial contribution to achieving higher-level objectives at social, economic and environmental level, and therefore to also meeting the challenges thrown up by the COVID-19 crisis. A reduction in the funds for research financing and slowing down RTI activities would be counterproductive and would damage the Austrian economy and society. A series of studies clearly showed that RTI investments also continuously strengthen the resilience of national economies and individual companies in times of crisis.

- **Swift completion and implementation of the RTI Strategy 2030 with special consideration of R&D's contribution to combating the crisis**

In view of the high number of social, economic and environmental challenges (without even including COVID-19), the Austrian Council recommends a swift completion of the new RTI Strategy with special consideration of the COVID-19 crisis. The efficient use of available resources and the stimulating effects of RTI

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<sup>17</sup> See Austrian Council (2020): Report on Austria's Scientific and Technological Capability 2020. Vienna.

<sup>18</sup> This listing is based on earlier recommendations by the Austrian Council; for details, see the Austrian Council for Research and Technology Development (2020): Vorschläge für die Gestaltung der Forschungsdekade 2020–2030. Vienna.

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policy measures on economy, society, health, climate and environment must also be incorporated more intensively than before.

- **Securing sustainable, long-term research funding also and in particular during times of crisis**

In addition to a structural realignment of the RTI system's governance structures and a reduction in the funding system's complexity, the Austrian Council recommends the required research funding also and in particular during the COVID-19 crisis be secured for the long term, and in the stressed budget situation it has caused. The RTI initiatives set up as a response to the fight against COVID-19 have shown that this is essentially possible. For this purpose, firstly the research funding act discussed for years now must at last be implemented. Due to the low innovation efficiency compared with the leading nations, the Austrian Council also recommends a revision of the appropriate use of funding in the Austrian RTI system, while also considering the structural breaks now likely to occur.

- **Optimisation of the entire education system, focusing on the reduction of social selectivity and the establishment of a change process, focusing on digitisation**

The Austrian Council recommends the further optimisation of the education system, whereby the problem of social selectivity and "education inheritance" in particular must be consistently addressed. The COVID-19 crisis has intensified the necessity in this respect – keyword: digitisation in disadvantaged households.

The Austrian Council also recommends introducing a change process in third level education with the goal of enabling a student-centred third level system with efficient study courses. Stronger focus should be made here on utilising the potential of digitisation – especially due to the current experiences connected with the COVID-19 pandemic.

- **Optimisation of the legal and financial framework conditions for business start-ups**

According to Schumpeter, recessions are periods in which the foundations for a new upswing are laid in the form of basic innovations, as many companies are compelled to develop new business models. The current crisis will therefore bring forth innovations in many areas. The Austrian Council thus recommends this development be taken into account and sectors with high (future) growth opportunities be specifically supported with appropriate forms of funding. As part of the measures to combat the COVID-19 crisis, it also recommends to improve the bureaucratic and regulatory framework conditions for funding start-ups.

## Background

Due to the current Coronavirus SARS-CoV-2 outbreak, governments in numerous countries have also introduced RTI initiatives to combat COVID-19, to in turn also support corresponding research and development projects. Two different impact directions of the measures implemented stand out here: Firstly, new research programmes will contribute to producing basic knowledge about the virus and developing both therapeutic approaches and vaccines. Secondly, existing programme processes (assessments, interviews, deadlines for reportings etc.) will be adapted so that, in spite of the framework conditions that have changed drastically in most countries, researchers will be enabled to continue their work as best possible.

The Austrian Council believes it is remarkable in this respect that additional funds for RTI were provided so quickly and unbureaucratically. In addition to a multitude of initiatives at European and international level, RTI policy activities were also initiated by numerous national governments and additional funds were provided for RTI. A brief overview of the initiatives introduced in the EU, Austria and in

the individual European countries is provided on the following pages.

### European Union RTI initiatives against COVID-19

- **EU Commission crisis response – research funding to develop treatments, tests and vaccines:** The EU Commission has provided more than EUR 380 million to develop vaccines, new treatment methods, diagnostic tests and medical systems to prevent the spread of COVID-19: [https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/overview-commissions-response\\_de#forschungsfrderung-zur-entwicklung-von-behandlungen-tests-und-impfstoffen](https://ec.europa.eu/info/live-work-travel-eu/health/coronavirus-response/overview-commissions-response_de#forschungsfrderung-zur-entwicklung-von-behandlungen-tests-und-impfstoffen).
- **International donor conference:** During the course of an international donor conference initiated by the EU Commission, a total of EUR 7.4 billion will be allocated, which will also act as start-up financing for the joint global development and distribution of a vaccine, more effective medicines against COVID-19 and tests: [https://global-response.europa.eu/index\\_de](https://global-response.europa.eu/index_de).
- **European Research Area Corona Platform:** Numerous research and innovation projects and RTI initiatives to combat the spread of COVID-19 and to prepare for further outbreaks in the future will also be supported. Information on Europe-wide COVID-19 research measures and initiatives is compiled on an own website: <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/covid-19>.

### National and selected international RTI initiatives against COVID-19

#### Austria

- **Corona Emergency Call:** The Austrian Government has set up a programme for the short-term financing of projects connected with the Coronavirus Sars-CoV-2 outbreak with an allocation of EUR 26 million. The target group are Austrian companies with

promising, application-oriented projects, which can be implemented rapidly (development period less than/equal to 12 months). The programme is managed by the FFG:

<https://www.ffg.at/corona-support/forschung>

- **Protective clothing production and manufacturing strategies:** The Austrian Federal Chancellery provides an additional EUR 5 million for researching protective clothing production and manufacturing strategies. The goal here is to support companies by converting their production to manufacture necessary auxiliary items, such as protective clothing, masks, ventilators and their parts in Austria. The programme is managed by the FFG: <https://www.ffg.at/news/klimaschutzministerium-fuenf-millionen-euro-zur-erforschung-von-produktion-und>.
- **SARS-CoV-2 acute funding:** The FWF calls on researchers to submit projects to research humanitarian crises such as epidemics and pandemics with direct reference to the current SARS-CoV-2 pandemic in existing FWF programmes, but within the framework of a fast-track procedure. The goal is to initiate further top quality scientific projects at research centres across the whole of Austria and as quickly as possible, and thus expand capacities and structures to deal with current and future humanitarian crises: <https://fwf.ac.at/de/service/kalender/veranstaltung/kid/20200406-2192/>.
- **FWF – COVID-19-specific programme adjustments:** The FWF has adjusted existing programme processes with applications, approvals or project management, so that researchers can continue their work as best as possible, in spite of the crisis: <https://fwf.ac.at/de/forschungsfoerderung/faq/faq-zu-corona/>.
- **COVID package for start-ups:** To support the Austrian economy, as part of the COVID-19 help fund the Austrian Govern-

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ment has initiated several aid measures for companies. In addition to a fixed costs allowance and bridging guarantees, the aws also manages the COVID package for start-ups, with which customised aid measures are provided for new and small companies: <https://www.aws.at/covid-paket-fuer-start-ups/?ref=topnews>.

- **Multilateral call for solutions for COVID-19 Echo Period – Life without a vaccine:** Austria also participates in the multilateral call for proposals at the EUREKA network, with which companies submit market-oriented research projects, which will provide short to medium-term answers to specific COVID-19 requirements: <https://www.eurekanetwork.org/content/multilateral-call-solutions-covid-19-echo-period>.
- **COVID-19 Rapid Response Call:** Hailing the motto, “Vienna Researches Corona”, the WWTF has initiated a COVID-19 Rapid Response Call to be able to swiftly respond to the challenges of the crisis and promptly collect research-relevant data. In addition to focusing on natural science answers to COVID-19, socio-scientific projects to understand society in the crisis will also be funded: <https://www.wwtf.at/covid/>.

### Germany

- **University Rectors Conference – effects of the COVID-19 pandemic on German universities:** Many activities in Germany focused on extending limited contracts, application dates, etc., to mitigate the social inequalities caused by the shutdown, and of course on teaching and learning in the summer semester. The Rectors Conference has also set up a website with information on these topics: <https://www.hrk.de/themen/hochschulsystem/covid-19-pandemie-und-die-hochschulen/>
- **Programme adjustments with DFG & BMBF:** The German Research Foundation (DFG) and Federal Ministry of Education and Research (BMBF) have adopted programme adjust-

ments to address the specific requirements of researchers and students. Various special provisions that enable funding or time extensions, for example, have been introduced for researchers that receive project funding: [https://www.dfg.de/service/presse/berichte/2020/200318\\_corona\\_news/index.html](https://www.dfg.de/service/presse/berichte/2020/200318_corona_news/index.html), <https://www.bmbf.de/de/informationen-fuer-zuwendungsempfaenger-11389.html>

- **Corona-related research funding:** Parliament approved an additional EUR 145 million in mid-March for corona-related research. A large part of this appears to flow into immunology research, especially into the “Coalition for Epidemic Preparedness Innovations” (CEPI), which receives EUR 90 million. The majority of the funding flows via the BMBF, which publishes details in this respect on its website: <https://www.bmbf.de/de/Coronakrise-achtsamkeit-ja-alarmismus-nein-11069.html>
- **Call for Multidisciplinary Research into Epidemics and Pandemics in Response to the Outbreak of SARS-CoV-2:** The effects of the current SARS-CoV-2 outbreak have shown that epidemics and pandemics cannot be combatted at national level alone, but rather must be faced as a global problem. The DFG has therefore introduced a multilateral, multi-disciplinary funding initiative: [https://www.dfg.de/en/research\\_funding/announcements\\_proposals/2020/info\\_wissenschaft\\_20\\_20/index.html](https://www.dfg.de/en/research_funding/announcements_proposals/2020/info_wissenschaft_20_20/index.html).
- **Leopoldina – ad-hoc statements on the COVID-19 pandemic:** At the beginning of March, the German National Academy of Natural Sciences – Leopoldina, published several statements on the COVID-19 pandemic in Germany, in which recommendations for health-relevant measures and intervention possibilities are addressed to the body politic: <https://www.leopoldina.org/publikationen/detailansicht/publication/leopoldina-stellungnahmen-zur-coronavirus-pandemie-2020>.

## The Netherlands

- **Research Programme COVID-19:** The Dutch Cabinet has approved a total of EUR 42 million for urgent coronavirus-related research. The country's national research council (NWO) started the tender on 3 April. Interest in it was so great that the budget was exhausted after just a few days. For details and information on further activities announced by the NWO, see: <https://www.nwo.nl/en/common/about-nwo/corona-virus/corona-virus>.
- **Research Programme COVID-19 ("second wave"):** Due to the high demand for research funding from the first programme, a broader COVID-19 research programme ("second wave") was tendered on 17 April. The aim is to develop medical and social solutions and answers, due to the effects of the COVID-19 crisis: <https://www.nwo.nl/en/news-and-events/news/2020/04/details-covid-19-research-programme-second-wave-now-online.html>.

## Switzerland

- **Swiss National COVID-19 Science Task Force:** The Federal Council in Switzerland has deployed the Swiss National COVID-19 Science Task Force to combat the COVID-19 crisis. Its mandate comes from various federal offices and it performs the function of a national scientific advisory committee in the context of the COVID-19 pandemic. Focusing on the pandemic, it will perform

continuous or to be addressed scientific work, which will be financed unbureaucratically via the regular budget of the participating funding organisations and universities: <https://ncs-tf.ch/de/>.

- **Special tender on coronaviruses:** With this special tender the SNF supports research projects concerning coronaviruses – both relating to the current and possible future epidemics: <http://www.snf.ch/de/foerderung/programme/coronaviren/Seiten/default.aspx>.
- **"COVID-19" national research programme:** Commissioned by the Swiss Federal Council, the SNF tendered the "COVID-19" national research programme (NFP 78) with CHF 20 million for two years. The programme's goal is better understand the transmission, effects and treatment of the virus (diagnostic and therapeutic measures) and combat it with specific measures: <http://www.snf.ch/de/foerderung/programme/nfp78-covid19/Seiten/default.aspx>.

**SNF updates:** The SNF posts regular updates on research-relevant topics connected with COVID-19 and the pandemic. Issues here include, for example, suspending career promotion-related interviews or extending times to make it easier to meet the challenges connected with the pandemic: <http://www.snf.ch/de/foerderung/direkteinstieg/coronavirus-snf-update/Seiten/default.aspx>.

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## **Recommendation on the implementation of a “Future Fund Austria for Research, Development and Innovation” — Recommendation of August 26, 2020**

The 2020-2024 government programme provides for the improvement of the Austrian RTI system's performance. A key measure in this respect is defined in the chapter “Research: Innovation and knowledge transfer for the global challenges of our age”. “The National Foundation will be further developed into a ‘Future Fund Austria’ for research, technology and innovation.”<sup>19</sup> Due to the limited period of validity of the statutory provisions for the funding of the National Foundation RTD and the Austria Fund, the project is extremely urgent. For awarding funds for the rest of 2020, only the Austria Fund is available. The funds of the Austrian National Bank for the National Foundation RTD, EUR 100 million at the last count, will therefore not be provided here for the preferred funding institutions.

To establish sustainable funding security of the Foundation funds, the Austrian Council recommends a series of key points, required to successfully install this.

### **Recommendations**

The Austrian Council recommends the planned “Future Austria Fund” foundation be set up as swiftly as possible and the required legislative requirements for a long-term secured allocation of funds be met.

The Council recommends the funding amount be valorised in accordance with the rising requirement for research and development and raised to at least EUR 250 million per year.

It also recommends a restructuring of the administration and the evaluation procedures and criteria, which must be applied to the preferred

funding bodies, in accordance with the proposed volume.

To set up the “Future Austria Fund” foundation, the Council recommends the tried and tested strategic cooperation for defining funding priorities and working out a funding recommendation be organised similar to the National Foundation RTD's previous process. The Council is very much aware that with the strategic orientation of the Foundation, questions on the programme length and cycles as well as programme content and scope must be addressed more intensively and, depending on meaningful evaluation results, an appropriate evaluation of awarding criteria must also be made.

The Council recommends allocations of the National Bank's Jubilee Fund be integrated into a “Future Austria Fund” and therefore, as with applications to the National Foundation RTD and the Austria Fund, the quality assurance be guaranteed with a joint evaluation process in accordance with the awarding guidelines.

The Council recommends the task and role of preferred funding organisations (new) be defined and re-evaluated in accordance with the foundation goal of a “Future Fund Austria” (new). Whether or not further preferred parties from the Austrian RTI system must be identified must also be reviewed here.

### **Background**

The National Foundation RTD plays a very important role in the Austrian RTI system of research funding to finance long-term strategic research initiatives. Since the National Foundation

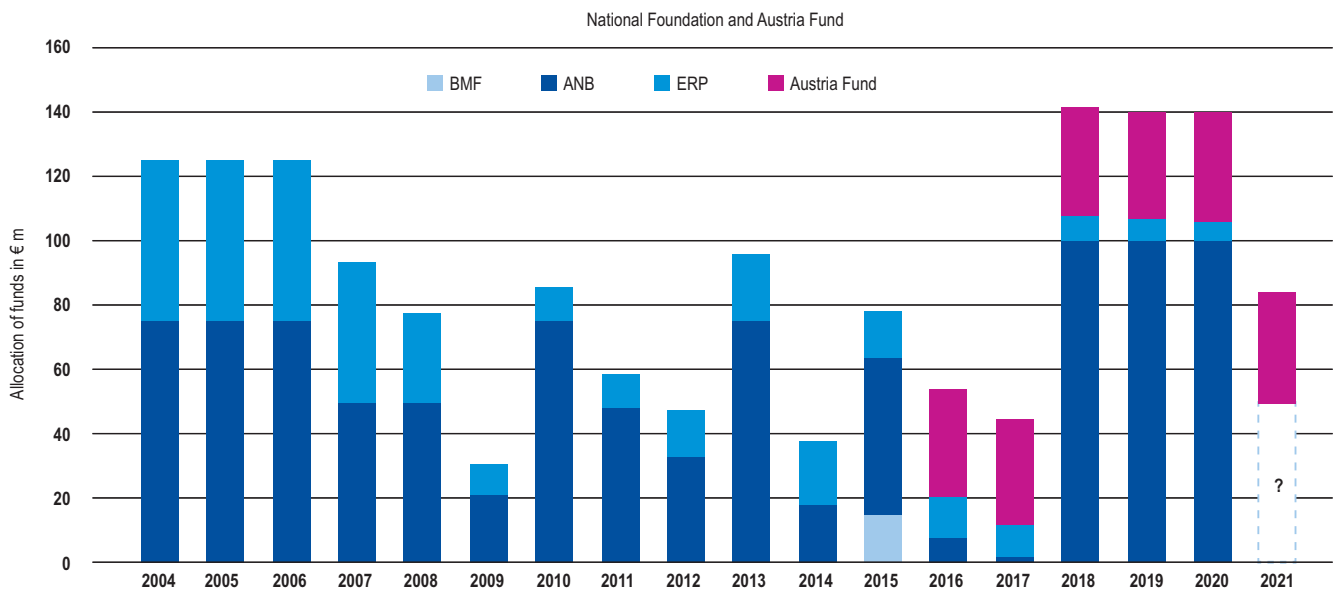
<sup>19</sup> Austrian Government (2020): Aus Verantwortung für Österreich. Regierungsprogramm 2020–2024. Vienna, p. 311.

RTD was set up in 2004, numerous projects have been funded with an average annual volume of some EUR 90 million in the areas of basic research and applied research. A total of more than EUR 1 billion has since been provided for research funding measures. The fund's financing is legislatively anchored and is the result of contributions by the Austrian National Bank (ANB) and interest income of the ERP Fund (European Recovery Program).<sup>20</sup> The annual funding in 2004 was assessed at EUR 125 million. The estimated funding volume was, however, only allocated entirely in the first three years. The funding was then reduced and reached its lowest point with

EUR 11.3 million for 2017 (see figure 1). Due to the extremely volatile development of the funds allocation, both of the ERP fund and the ANB, the Austrian Council again recommended installing financing that would enable long-term secured funding allocation. With the decision to grant limited special funding and the creation of a new legislative basis<sup>21</sup> for the annual funding of the National Foundation RTD of EUR 100 million per annum for the 2018-2020 period and the setting up of the Austria Fund<sup>22</sup>, a stable financing situation was guaranteed for a limited funding period.

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**Figure 3: Development of the National Foundation RTD funding and the Austria Fund since 2004**



Sources: National Foundation, Council's own research and representation

<sup>20</sup> Federal law on the National Foundation for Research, Technology and Development (National Foundation RTD Act).

<sup>21</sup> Amendment to the National Foundation RTD Act – BGBl. I No. 81/2017.

<sup>22</sup> Ibid. § 4.



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A valorisation of the originally intended EUR 125 million, however, was never made. But after expiry of the temporary regulation, there is now an urgent need for action to boost this essential funding for research and development.

For the funds of the Austria Fund, which was set up with the 2015/16 tax reform and is also managed via the Foundation Board of the National Foundation RTD, the Austrian Council suggested a harmonisation in the funds awarding of the two, whereby in the last three years an annual funding total of approximately EUR 140 million was provided for allocating funds.

With the further development of the National Foundation RTD towards a “Future Fund Austria”, the importance of the Foundation for funding innovative, strategically relevant and higher risk programmes receives increased attention, which should also be reflected in securing increased and long-term funding. This, however, also requires a restructuring, among other things, of the targeted goals, the awarding method including evaluation, and considerations of the criteria which must be applied to the preferred funding bodies and their expansion. Parallel with strategic orientation and long-term planning, questions about the effect of programmes, their length and tender cycles as well as funding scope (infrastructure for example), and so on, must be considered more intensively and decisions must be made on the basis of programme evaluation results.

The National Foundation RTD’s funding is currently allocated according to the funding criteria at funding bodies provided by the Government, for selected programmes with defined priority. A characteristic of the Foundation here is that it serves as a financing instrument and no new administration and management structures are to be created. A further process simplification was achieved with the harmonisation in the management

and quality assurance of the National Foundation RTD and the Austria Fund. Following this principle, the Austrian Council proposes the same path be taken with the funds of the Jubilee Fund awarded via the National Bank and that these be integrated into a “Future Fund Austria” foundation, and the quality assurance therefore be made more effective and more efficient.

The annual allocation of the Jubilee Fund is approximately EUR 15 million on average, with which the knowledge areas applied economics, medical sciences, social sciences and humanities were previously funded. With a new strategy and funding structure from 2020, in the future scientific research in specific topic clusters, which now exclusively include economic issues, will be funded with the Jubilee Fund. Basically, this decision on the National Bank’s prioritisation is understandable because it does lead to a reduction of administration costs, especially those associated with specialist assessments. With the proposed integration of the Jubilee Fund into a “Future Fund Austria” foundation, this lean administration was made even more efficient and existing structures were used for its management. The thematic clusters would have to be organised analogously to a thematic programme funding.

The setting up of a “Future Fund Austria” foundation for funding excellent basic research and applied research as a further development of the National Foundation RTD and the Austria Fund and the integration of the Jubilee Fund of the National Bank provide the potential to boost the set goals of a budget-independent, long-term and strategic financing of Austrian research initiatives in relation to the National Foundation RTD, and should therefore be allocated funding in accordance with the existing challenges in research and development. The Austrian Council proposes funding of the “Future Fund Austria” foundation of at least EUR 250 million per year for this.

The proposed funding volume is the result of a valorisation of the original proposed funds of the National Foundation RTD<sup>23</sup> of EUR 125 million amounting to 40 percent, the to-date gained funds of EUR 33.7 million from

the top tax rate of 55 percent for the Austria Fund<sup>24</sup> and the average funding of the Jubilee Fund of the National Bank<sup>25</sup>.

recommendations

## Use of the Austrian Fund Resources in 2020 – Recommendation of November 20, 2020

### Preamble

Based on the decision of the 74th meeting of September 22, on September 24, 2020, the Foundation Board of the National Foundation RTD Council invited the Austrian Council in accordance with § 11 para. 1 item 1 of the RTD National Foundation Act to submit a recommendation on the use of the Austria Fund's funding for 2020.

The Austrian Council regrets for this allocation recommendation that the legislators have been not able to create the required legislative basis to secure the fund inflows for the National Foundation RTD.<sup>26,27</sup> In 2020, only approximately one quarter of the total of recent years is therefore available for the allocation via the Foundation Board RTD.

For the current allocation of the Foundation funds, the funding based on the expiry of the limited special funding of the National Foundation for the 2018-2020 period is formed solely from the contributions for the Austria Fund. An allocation of the Austrian National Bank in favour of the National Foundation RTD was not made.<sup>28</sup>

Therefor the Austrian RTI system Use of the Austria Fund Resources in 2020 lacks some EUR 100 million this year, whereby once again the financing security of long-term strategic research initiatives originally intended with the setting up of the National Foundation RTD in 2004 cannot be guaranteed.

23 The National Foundation RTD was set up in 2004 and funded with EUR 125 million. A valorisation of this amount would therefore show a nominal total of approx. EUR 175 million (according to Statistik Austria, the inflation in the period in question was close to 40 percent). Compared to GDP, the R&D expenditure in Austria has even more than doubled in the same period.

24 The Austria Fund was allocated for the first time in 2016, financed with the Government's share of income with income tax. From 2017 to 2020, the Austria Fund was allocated the amount of the Government's share from the limited tax rate of 55 percent of estimated increased revenue volume, which according to the Fiscal Equalization Act 2017, equalled funding of EUR 33.7 million respectively. The temporary regulation was extended for five years in 2020.

25 The Austrian National Bank acted as a research funder for the first time in 1966 (150 years of the Austrian National Bank). Since then a total of some EUR 820 million has been allocated for research projects. The average annual budget volume was therefore approx. EUR 15 million.

26 See Bundesregierung (2020): Aus Verantwortung für Österreich. Regierungsprogramm 2020–2024. Vienna, p. 311.

27 See recommendation on the implementation of a "Future Fund Austria for Research, Development and Innovation". Austrian Council for Research and Technology Development on August 26, 2020.

28 § 4 of the Federal law on the National Foundation for Research, Technology and Development (National Foundation RTD Act).

## recommendations

Numerous initiatives of the preferred funding bodies can therefore not be funded or their funding will be low this year. If the challenges for research and development were already great before the current crisis, the massive cuts in funding in particular affect strategic initiatives that focus on the digital transformation. In recent years, programmes especially for expanding digital technologies and for supporting specialists, who are urgently required to meet the challenges of digitisation, were financed with the funds provided by the National Foundation RTD.

The Austrian Council recommendations on the 16 applications filed are based on the guiding principles and set priorities for awarding funds, the strategic importance and socio-political relevance of the submitted projects and their classification in the overall context of Austrian research funding. Even if only the funds of the Austria Fund are available for allocation, both the priorities of the National Foundation RTD and the Austria Fund were included in the evaluation.

The application volume for both funds together is EUR 93,893,000. The funds of the Austria Fund, whose allocation is still only legislatively anchored for 2020, amount to EUR 33.7 million. According to current estimates and with the crediting of reserves of the Foundation RTD, the allocation total for 2020 amounts to EUR 34.7 million.

## Priorities

### National Foundation RTD

The Austrian Council also defined the following priorities for awarding funds from the National Foundation RTD for 2020 (in descending priority):

- Reinforcing of the national human potential basis
- Reinforcing the research infrastructure with initiatives with appropriate critical variables and risk potential

- Activities for the democratisation of technology, knowledge and innovation (Open Innovation, Open Science)
- Reinforcing competitive funding in basic and applied research
- Increasing the potential of transformative research (Sustainable Entrepreneurship, Social Innovations)
- Coordination and harmonisation of regional and federal RTI activities
- Risk capital reinforcement

### Austria Fund

In accordance with § 3, para. 2, of the National Foundation RTD Act, the funds from the Austria Fund for 2019 are used for funding in the area of basic research and for funding applied research and the development of technology and innovation.

The specific priorities according to the explanatory comments on the Tax Reform Act 2015/2016 (Article 13) are:

- Funding young talent researchers in basic research
- Increased knowledge transfer
- Cooperation between science and business
- Increased Industry 4.0
- Increased Life Sciences
- Industrial technologies (from the areas of productivity, mobility, energy, ICT, Industry 4.0)
- Promoting young talent
- Promoting frontrunner companies

### Recommendation

Against this background, the Austrian Council focused in its recommendation on funding the implementation of innovative ideas and people's training and further training. The focus here is on the application and translation of digital technologies in companies, science and economy in particular, which is also reflected in the diversity of the programmes submitted. To prevent a future content overlapping of the funding programmes, the Austri-

an Council once again recommends improved coordination between the agencies, to already prevent the negative effects of a micromanagement of fragmented programmes with the planning and design of the submitted programme applications.

Based on the EUR 34.7 million that was expected from the Austria Fund for 2020, the Austrian Council proposes the following recommendation on allocating funds.

recommendations

#### Distribution of funds 2020

| Beneficiaries                                                       | Programme                                                           | Applied for (millions) | Recommended (millions) |
|---------------------------------------------------------------------|---------------------------------------------------------------------|------------------------|------------------------|
| <b>National Foundation for Research, Technology and Development</b> |                                                                     |                        |                        |
| aws                                                                 | Production transitions of environmental technologies with start-ups | 3.200                  | 3.200                  |
| aws                                                                 | First Inkubator                                                     | 3.000                  | 2.050                  |
| aws                                                                 | Digital.IP                                                          | 4.482                  | 0                      |
| aws                                                                 | Knowledge transfer in STEM / Life Sciences                          | 7.054                  | 2.300                  |
| CDG                                                                 | CDL modelling and digitisation for innovative materials             | 7.957                  | 2.000                  |
| FFG                                                                 | Bridge Programme                                                    | 5.000                  | 3.250                  |
| FFG                                                                 | Digital pro Bootcamps                                               | 3.500                  | 0                      |
| FFG                                                                 | Digital Innovation Hubs                                             | 6.000                  | 2.000                  |
| FFG                                                                 | Ideen Lab – digital health                                          | 4.000                  | 0                      |
| FFG                                                                 | Big Data in Production                                              | 3.000                  | 3.000                  |
| FFG                                                                 | Early Stage                                                         | 3.000                  | 0                      |
| FFG                                                                 | Research partnerships                                               | 3.000                  | 2.900                  |
| FWF                                                                 | doc.funds Programme                                                 | 11.600                 | 4.000                  |
| FWF                                                                 | SRAs and DCs                                                        | 18.100                 | 6.000                  |
| LBG                                                                 | Transforming Careers                                                | 5.000                  | 2.000                  |
| ÖAW                                                                 | Go!Digital!                                                         | 6.000                  | 2.000                  |
| <b>Total</b>                                                        |                                                                     | <b>93.893</b>          | <b>34.700</b>          |

#### Programmes recommended for funding

##### Production transitions of environmental technologies with start-ups (aws)

The programme supports the goal of an increased spread of innovative Austrian technologies by supporting the financial transition of research results through to the set-up and expansion of the production of start-ups and new companies in the areas of energy efficiency and saving, renewable energies, smart networks, storage and electro-mobility. The companies will be enabled with this funding

programme to take the important step towards transitioning into series production.

With the recommendation to finance the funding programme in full with EUR 3.2 million, the Austrian Council underscores the importance of the implementation of research results in successful innovative products and in particular supports new companies.

##### First Inkubator (aws)

The First Inkubator programme provides coaching from idea finding to implementation, through to company start-up.



## recommendations

Programme participants are supported in developing their business model for a full year with monthly grants, project budget, intensive training and workshops on start-up-relevant topics, access to co-working spaces, networking and individual mentoring by successful company founders.

With the recommendation of funding of EUR 2.05 million, the programme will support participants on the way to successful self-employment.

### **Knowledge Transfer in STEM/Life Sciences (aws)**

The Knowledge Transfer in STEM/Life Sciences programme builds on several successful programme lines and on the basis of four modules enables comprehensive knowledge building and transfer.

Module A, “Knowledge transfer centres (KTC)”, addresses the further development of KTCs towards internationalization and the expansion of non-university research institutions (as also in all other modules). Module B, “Intellectual property”, aims to accelerate the utilisation of research results, to make more knowledge accessible to the economy, in particular from STEM/Life Sciences. Continuous and consistent utilisation strategies with the inclusion of companies are key here (IP strategies, IP portfolio and cooperation management). Module C, “Prototype funding”, supports the verification of the functionality and technical feasibility of R&D results in the form of a prototype. Module D, “STEM regions”, supports the formation of regional networks (STEM regions) for strengthening scientific-technical education and securing the required offering of specialists for STEM/Life Sciences. Important players work closely together here (from kindergartens, secondary schools and universities through to companies, associations and administrators) and harmonise their offerings with one another. These

results flow into the STEM regions module. The programme’s EUR 2.3 million funding promotes synergies, especially in the STEM disciplines and Life Sciences, and better transition of innovative ideas is therefore enabled.

### **CDL Life Sciences/Ind. Technologies (CDG)**

The Christian Doppler Lab’s priority setting is oriented on current scientific issues, which are dealt with in cooperation with one or more companies with scientific facilities. The CD model is a many times positively evaluated funding mechanism, which presents an instrument for funding application-oriented basic research in the form of a public private partnership. It therefore performs an important bridging function between science and economy, which in this format has a unique selling point in the Austrian RTI system.

On the basis of the available funds, the application for funding CD Labs is supported with EUR 2 million.

### **BRIDGE – FFG programme**

BRIDGE is an established programme and is highly attractive for initiating collaborations between science and economy. The BRIDGE programme was developed in 2005 at the recommendation of the National Foundation and has since developed into an internationally respected and very positively evaluated programme. The goals here are the initialisation and deepening of research cooperation between economy and science, and the utilisation of the potential in the area of human resources for industrial research. The programme focuses in particular on SMEs. Funding of EUR 3.25 million is recommended in the context of the necessity to increase implementation of research results in applications and innovations.

### **Digital Innovation Hubs (FFG)**

Digital Innovation Hubs consist of institutions with research priorities in digitisation

areas that offer SMEs direct access to digitisation know-how. The bundling of the service offerings and the expansion of the existing hubs across Austria will therefore be continued. The Austrian Council believes this presents an operative asset. Funding of EUR 2 million is recommended to perform further calls.

#### **Big Data in Production (FFG)**

Handling big data volumes is an increasing challenge for both research institutions and companies for secure data infrastructures and to implement corresponding big data technologies throughout the production processes and the entire value creation chain.

The continuance of the RTD offensive, Big Data in Production, is supported with the renewal application and expanded by strengthening the existing potential and with technological and socio-political goals. This includes the partners' networking in the value creation networks (Europa+), knowledge transfer and access to new technologies and methods, as well as cooperation in European initiatives. The application for funding project tenders is recommended at EUR 3 million.

#### **Research partnerships (FFG)**

In the context of a private public partnership, the programme supports direct knowledge transfers between universities and companies. The research issue raised and the common interests of companies and universities are pivotal for the successful initiation and performance of these dissertations.

Approximately 25 further projects will be enabled with the recommendation of funding of EUR 2.9 million to continue this mechanism and therefore expand structured cooperation between industry and science.

#### **doc.funds (FWF)**

doc.funds is an "on-top" funding of already existing doctoral programmes. This additional fi-

nancing of excellent ongoing doctoral programmes (at least two years) with an existing training and research infrastructure, enables the integration of new research groups and therefore the expansion of an existing network. The expansion of the research basis and funding of young talent is therefore a key added value here.

On the basis of the available funds, funding of EUR 4 million is recommended to support further highly qualified young talented scientists in a highly competitive environment within the scope of structured doctoral programmes.

#### **FWF Special Research Area (SRA) and Doctoral Colleges (DC)**

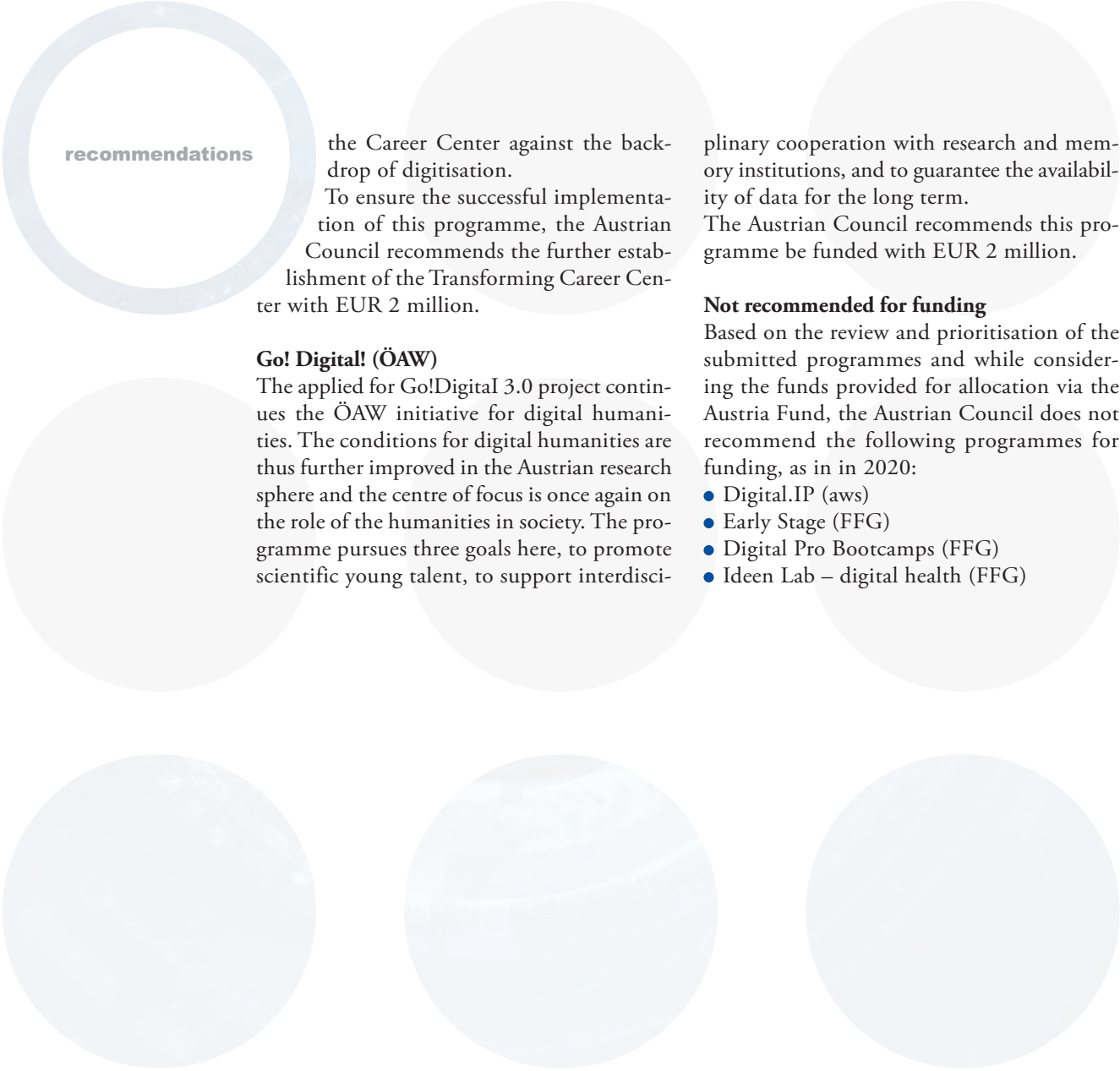
The Special Research Areas are an excellent funding programme for reinforcing interinstitutional and interdisciplinary top research in Austria and represent medium-sized scientific consortia at the highest possible quality level. Combined with this, there is also the key goal of the doctoral colleges of funding talented young researchers in this excellent research environment.

In line with the respective grants, funding of EUR 6 million by the Foundation is recommended to continue the special research areas and doctoral colleges.

#### **Transforming Careers (LBG)**

The LBG Career Center was set up in 2016 with the goal of improving the career prospects of LBG researchers (existing and talented newcomers) and in particular outside the realm of science, and to promote the permeability and knowledge transfer between different sectors and society. This initiative now enters its third phase with the applied-for Transforming Careers programme. The focus here is also on both LBG-internal and external researchers and managers, as well as and in particular on the continuation and professionalization of

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the Career Center against the backdrop of digitisation.

To ensure the successful implementation of this programme, the Austrian Council recommends the further establishment of the Transforming Career Center with EUR 2 million.

### **Go! Digital! (ÖAW)**

The applied for Go!Digital 3.0 project continues the ÖAW initiative for digital humanities. The conditions for digital humanities are thus further improved in the Austrian research sphere and the centre of focus is once again on the role of the humanities in society. The programme pursues three goals here, to promote scientific young talent, to support interdisci-

plinary cooperation with research and memory institutions, and to guarantee the availability of data for the long term.

The Austrian Council recommends this programme be funded with EUR 2 million.

### **Not recommended for funding**

Based on the review and prioritisation of the submitted programmes and while considering the funds provided for allocation via the Austria Fund, the Austrian Council does not recommend the following programmes for funding, as in in 2020:

- Digital.IP (aws)
- Early Stage (FFG)
- Digital Pro Bootcamps (FFG)
- Ideen Lab – digital health (FFG)

## Statements 2020

### Statement on the European Commission concept paper on “Tackling Foreign Interference in Higher Education Institutions and Research Organisations” — Statement of March 20, 2020

Due to the increasing influence of the European RTI systems by non-EU countries (China in particular), the European Commission presented a concept paper on the issue of, “tackling foreign interference in higher education institutions and research organisations”. The concept paper immediately refers correctly at the outset to the globally successful development of science and research, which would not be possible without opening up the scientific community and more intensive international cooperation. The advances in the area of digital technologies and their consistent use, especially the communication and cooperation possibilities this entails, have massively increased the performance of science and research across the globe and accelerated their development cycles. As stated in this concept paper, these successes can, however, be seriously impaired by negative influences on common interests of the EU member states or on sovereignty, and by the activities of non-EU states that are harmful to European values.

The Austrian Council therefore welcomes the Commission’s initiative to specifically counter the increasing influencing of European RTI systems by non-EU countries. Nevertheless, the Austrian Council also believes this initiative ensures that the openness of the RTI systems and the global scientific cooperation required for scientific success will not be endangered. The Austrian Council gives its view on the measures and guidelines proposed in the concept paper with regard to the issues addressed by the Federal Ministry of Education, Science and Research in the following points:

- **Are the target groups (item 2.3) of the planned guidelines defined clearly enough and do they cover the area sufficiently (companies are inten-**

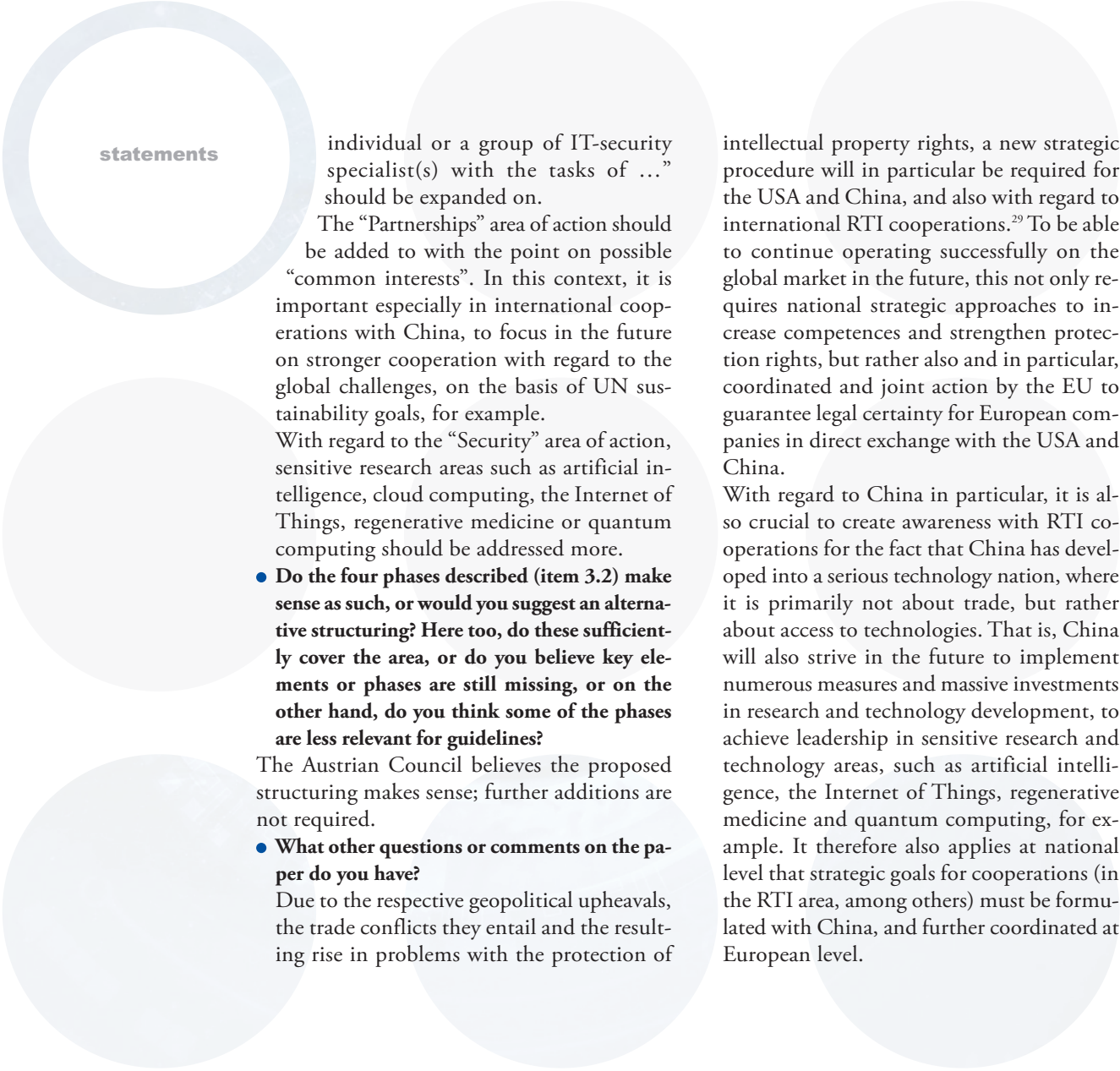
**tionally not included here, as these are worked for on other levels and in other work groups)?**

A joint procedure coordinated at European level, especially with regard to RTI cooperations with China, requires the increased attention of the addressees referred to. The Austrian Council proposes the following addition under item 2.3.b to clearly define the institutions: “... national and European research institutions, in particular public and private HEIs and research organisations ...” The Austrian Council also suggests explicitly adding “PhD students” to item “c”: “... researchers, PhD students and other staff”. The Austrian Council believes this is required to already sensitise academics at the beginning of their careers with regard to possible risks with international RTI cooperations. The Austrian Council also proposes generally ensuring in Europe that the required increase in comprehensive competencies for international RTI cooperations with non-EU states be accelerated as early as possible, for example, with the appropriate support with stays abroad for students and researchers in non-EU countries, especially China.

- **Are the four areas of action, governance, partnerships, security and values (areas of action, item 3.1) described clearly enough? Do these sufficiently cover the area, or do you believe key elements or areas of action are still missing, or on the other hand, do you think some of the areas of action are less relevant for guidelines?**

The Austrian Council believes the areas of action referred to here are described clearly enough. It does, however, propose the following three items be added to: In the “Governance” area of action the paragraph, “For example, the ... could decide to entrust and

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individual or a group of IT-security specialist(s) with the tasks of ...” should be expanded on.

The “Partnerships” area of action should be added to with the point on possible “common interests”. In this context, it is important especially in international cooperations with China, to focus in the future on stronger cooperation with regard to the global challenges, on the basis of UN sustainability goals, for example.

With regard to the “Security” area of action, sensitive research areas such as artificial intelligence, cloud computing, the Internet of Things, regenerative medicine or quantum computing should be addressed more.

- **Do the four phases described (item 3.2) make sense as such, or would you suggest an alternative structuring? Here too, do these sufficiently cover the area, or do you believe key elements or phases are still missing, or on the other hand, do you think some of the phases are less relevant for guidelines?**

The Austrian Council believes the proposed structuring makes sense; further additions are not required.

- **What other questions or comments on the paper do you have?**

Due to the respective geopolitical upheavals, the trade conflicts they entail and the resulting rise in problems with the protection of

intellectual property rights, a new strategic procedure will in particular be required for the USA and China, and also with regard to international RTI cooperations.<sup>29</sup> To be able to continue operating successfully on the global market in the future, this not only requires national strategic approaches to increase competences and strengthen protection rights, but rather also and in particular, coordinated and joint action by the EU to guarantee legal certainty for European companies in direct exchange with the USA and China.

With regard to China in particular, it is also crucial to create awareness with RTI cooperations for the fact that China has developed into a serious technology nation, where it is primarily not about trade, but rather about access to technologies. That is, China will also strive in the future to implement numerous measures and massive investments in research and technology development, to achieve leadership in sensitive research and technology areas, such as artificial intelligence, the Internet of Things, regenerative medicine and quantum computing, for example. It therefore also applies at national level that strategic goals for cooperations (in the RTI area, among others) must be formulated with China, and further coordinated at European level.

<sup>29</sup> See Austrian Council (2019): Recommendation for increasing the protection and exploitation of intellectual property rights. Available online at: [https://www.rat-fte.at/files/rat-fte-pdf/einzelempfehlungen/2019/191016\\_Empfehlung\\_zur\\_Steigerung\\_von\\_Schutz\\_und\\_Verwertung\\_geistiger\\_Eigentumsrechte.pdf](https://www.rat-fte.at/files/rat-fte-pdf/einzelempfehlungen/2019/191016_Empfehlung_zur_Steigerung_von_Schutz_und_Verwertung_geistiger_Eigentumsrechte.pdf).

**Statement on a federal law, which would amend the university quality assurance act, enact a federal law on private universities, and the Technical Colleges Studies Act and the Higher Education Act 2005 would also be amended** — Statement of May 28, 2020

statements

The quality-oriented further development of the Austrian higher education area is of key importance for education, science and research location Austria, and is crucial for the country's successful social and economic development. Measures for quality assurance and further differentiation in the higher education sector, which strengthen the educational institutions in their training and further training, research and development and third mission tasks, are therefore continuously required to be able to respond appropriately to changing conditions.

The Austrian Council accompanies and supports this process in its role as a government advisory body by working out relevant recommendations and statements<sup>30</sup> and by monitoring the developments in the tertiary education system and the research at universities and non-university research institutions within the scope of the annual report on Austria's scientific and technological capability.<sup>31</sup>

The regulations on the further development of quality assurance in the higher education area, on increasing planning security in the technical colleges sector and on the further development of the private higher education area provided for in the representational draft legislation, affect essential elements of a quality-oriented development of the tertiary education sector. This is essentially to be welcomed. The Austrian Council believes, however, with re-

gard to the opening or inner differentiation of the privately financed education area in particular, a careful revision of the offered quality in teaching and possibly research is required, without hereby hindering the potentially positive influence of new educational institutions in the development of the overall higher education area.

**Position of the Austrian Council**

The following is the Austrian Council's detailed statement on any federal law which would amend the university quality assurance act, enact a federal law on private universities, and with which the Technical Colleges Studies Act and the Higher Education Act 2005 would also be amended.

**On amending the university quality assurance act (HS-QAG)**

The education system is currently attracting much attention due to the crisis and the general public is scrutinizing it more than usual. Successfully combating the crisis with dedicated teachers and school administrators is confronted with a number of difficulties. This affects the partially insufficient digital equipping of schools, the access to digital infrastructures or the availability of terminal equipment, just as it does the different digital competencies of both students and teachers.

<sup>30</sup> See <https://www.rat-fte.at/empfehlungen.html>.

<sup>31</sup> See Reports on Austria's Scientific and Technological Capability (2012 to 2020); <https://www.rat-fte.at/leistungsberichte.html>.



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Teacher training colleges take on a crucial role here. The need for changes is documented by continuous reform processes such as “NEW teacher training” or the teacher training colleges development plan 2021-2026, among others. The integration of the public and private teacher training colleges into the HS-QSG’s area of application is therefore a correct step and should contribute to a transparent further development of the teacher training colleges. AQ Austria is therefore responsible for the entire higher education sector as the national quality assurance agency and can be used by universities and technical colleges to perform an audit. Restricting the right of teacher training colleges in selecting the auditing quality assurance agency regulated in § 19 (1) HS-QSG therefore presents an inequality here. The incompatibility provisions on staffing and appointing the board of AQ Austria regulated anew in § 6 (2) HS-QSG are to be welcomed. The reduction of the general assembly to 14 members and its parity occupancy in line with the groups represented must also be endorsed.

### On private universities

As already mentioned at the beginning, a sensitive mechanism for the auditing process and for accreditation must be found and applied for the new area of private universities. The opening or inner differentiation of the privately financed education area allows new opportunities for education providers with the option of establishing private universities. A higher-level emergence of smaller educational institutions should always be prevented here. An option for the Government in

university controlling is incorporated in § 6 (3), whereby with monetary value services of a regional authority at a private university, a voting procedure with the responsible federal minister is provided for.

The legislative provisions in the PHG were largely taken over from the PUG. A change to be approved affects the Government’s ban on financing. Compensatory measures from contracts on the provision of specific research services of a private university, which the Government concludes with a private university where required, are still possible. Monetary value services of the Government as part of publicly tendered research, technology, development and innovation programmes are also still possible. A lacuna in the Government’s ban on financing will also be correctly closed with regard to the “Specific teaching services” passage.<sup>32</sup>

### On the Technical Colleges Act

The legislative anchoring of a technical college development and financing plan contributes positively to the technical colleges sector’s planning security and long-term further development and is supported by the Austrian Council.<sup>33</sup> As addressed in § 2a (1) item 2, it is crucial for the further development of the technical colleges sector and the entire higher education area that the principles for new study courses at technical colleges be followed to ensure the further development of the higher education portfolio. As part of the “Zukunft Hochschule” (Future University) project, development areas (STEM and digitisation, applied health sciences, applied economics, translation and interpretation, and thematic

<sup>32</sup> See PHG § 6 (1) and § 15 (4).

<sup>33</sup> See the Austrian Council’s statement on drafting the technical colleges’ development and funding plan 2018/19 – 2022/23 Austrian Council for Research and Technology Development, Vienna, December 21, 2018.

combination studies such as economics/law, health/law, engineering/management) were worked out for this and added to the current development plan. Not defined, however, were quantitative expansion plans and targets, which should be controlled in the current period by management at the technical colleges and should be the basis for increasing the Government-financed technical college study places.

Along with the offered range of subjects, the further development of the technical colleges is, however, also significantly dependent on the quality of the research, which has increased sharply in relevance since the emergence of this higher education sector. With regard to vocational training at higher education level, research is also an essential component of the practical vocational training of many study courses at technical colleges. The technical colleges are also an important partner in knowledge and technology transfer with the economy in the regions. At suitable locations, the further development and funding of research in the interest of improved planning security, should therefore also be established within the scope of the technical colleges development plan. The Austria Council proposes in this respect that the programme funding be increased and research funding be provided at suitable locations.<sup>34</sup> For training purposes, the technical colleges should also examine more options to set up cooperations with research institutes for using labs.

The further development of the technical colleges also depends to a large degree on the availability of qualified teaching and research staff. At Austrian technical colleges, this is very much provided by part-time teachers – up

to a maximum of six semester periods per week. Altogether approximately 80 percent of teaching staff have a main profession in a company, a different post-secondary educational facility, in the public sector etc., and therefore incorporate their external professional expertise. With regard to a further expansion of the technical colleges sector, a higher share in permanent staff would, however, be favourable, to continue guaranteeing the intensive supervision requirements in teaching and in research in particular at a high level. The Austrian Council therefore expressly welcomes the addendum in § 8 (1) item 1 FHG, wherein the staff planning is set within the scope of a technical colleges development and funding plan. A consistent building up of full-time teaching and research staff should produce a better balance between full-time and part-time employees and therefore make a significant contribution to quality assurance.<sup>35</sup>

The definition of a planning period of at least three years for the technical college development and funding plan is understandable in line with the universities' performance agreement periods. An extended planning horizon of four years could be submitted to ensure improved coordination with the Government's planning horizon. This option should also be created for performance agreement periods in the university sector (similar to AQ Austria's change to the finance plan).

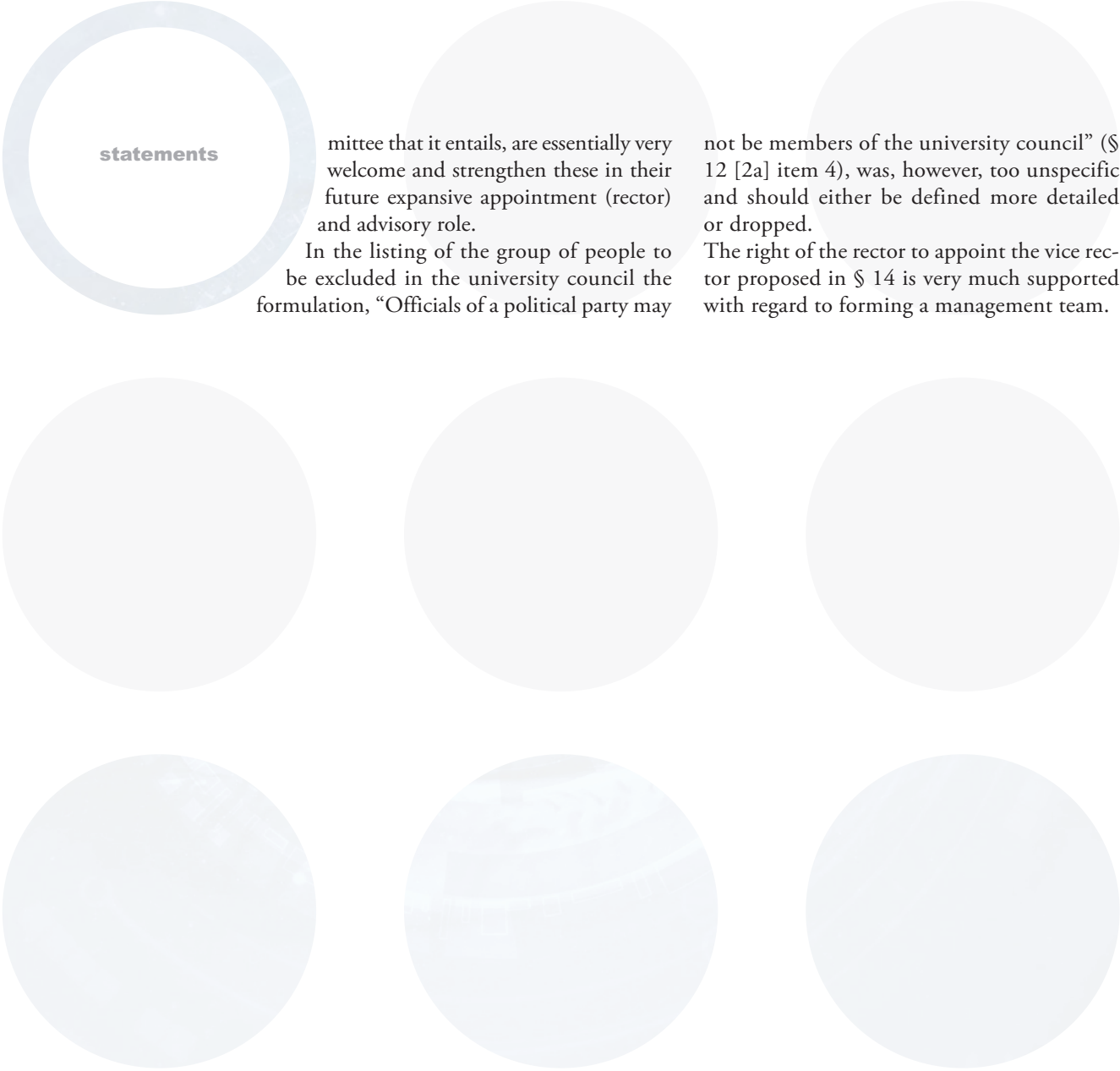
### **On changes to the Higher Education Act**

The revision for membership on a university council (§ 12 [1 to 2a]) and the depoliticising of the appointment of the members of this com-

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<sup>34</sup> See the Austrian Council's recommendation for the further development of the technical colleges sector in the Austrian education and science system. Austrian Council for Research and Technology Development, Vienna, May 30, 2017.

<sup>35</sup> Ibid.



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mittee that it entails, are essentially very welcome and strengthen these in their future expansive appointment (rector) and advisory role.

In the listing of the group of people to be excluded in the university council the formulation, "Officials of a political party may

not be members of the university council" (§ 12 [2a] item 4), was, however, too unspecific and should either be defined more detailed or dropped.

The right of the rector to appoint the vice rector proposed in § 14 is very much supported with regard to forming a management team.



creating knowledge

## Work areas, reports and studies 2020

### Make the benefits of digitisation accessible for all – “Digital transformation and ethics” brochure

Many effects of the COVID-19 pandemic may still not be foreseeable. However, one trend that has been promoted is obvious: digital transformation. Digitisation has long been moving into and changing more and more life and work areas, from our education, shopping, leisure and communication behaviour to shaping our cities (keyword: smart cities), through to the reorganisation of work processes in the age of robotics and Industry 4.0. Accelerated by the COVID-19 crisis, almost every aspect of our life now has a digital component. We expect to outsource laborious, monotonous or risky work to machines, critical processes to run faster and more efficiently and also to provide “more objective” results

and our life on the whole to become smarter. Sometimes we ourselves use the data generated by and about us, to improve our knowledge and consequently also control our behaviour, but it is mostly companies, public institutions and increasingly also governments that are interested in data about us. The definition of a suitable strategy against the COVID-19 pandemic, which has gripped the world since early 2020, was made on the basis of data and calculations concerning the virus’s spreading speed, infection risks, etc. We actually now live less in a knowledge society and far more in a data society.

But what does a digitally controlled world mean? As with most new technologies, discussions in this respect currently fluctuate at best between hope and scepticism, at worst between uncritical belief in progress and alarmist “end of the world” scenarios. What is required therefore, is an objective discussion based on specific questions: Which challenges are already posed today, what might be headed our way, and which measures help us to overcome them? How can we ensure that the digital transformation will be used to benefit humanity, without violating the rights and dignity of the individual? What moral rules are required for this in dealing with the digital transformation?

The Austrian Council already published the “Digital transformation and ethics” brochure, which initiated the urgently required discussion on these issues, in August 2019 as part of the Alpbach Technology Forum. Experts from diverse areas, including IT, economics, sociology and philosophy, were then invited to illuminate the challenges, risks and opportunities of digitisation for each individual and for society as a whole from various perspectives.

Markus Hengstschläger /  
Austrian Council  
**Digitaler Wandel  
und Ethik**  
(Digital transformation  
and ethics)  
Ecowin Verlag at  
Benevento Publishing,  
Salzburg – Munich, 2020



The resulting book, “Digital transformation and ethics”, was presented at the beginning of September 2020 and includes 17 articles by 27 renowned authors, including Sabine Köszegi (Vienna University of Technology), Julian Nida-Rümelin (University of Munich), Barbara Prainsack (University of Vienna), Sarah Spiekermann (Vienna University of Economics and Business), Harald Welzer (Europa University Flensburg) and Katharina

Zweig (UAS Kaiserslautern). The articles provide a concise insight into the multitude of social challenges brought forth by the digital transformation. We are therefore at the beginning of a broad societal discussion to make the opportunities of the digital transformation accessible for all and to violate neither the rights nor dignity of the individual.

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### **Success factors of the China innovation ecosystem**

The goal of this descriptive short study by Techmeter was to identify and make successful innovation ecosystems easier to explain. To do this, the patent application behaviour of Chinese inventors was examined over the 1980-2019 period, to be able to identify the most important success factors. These are: (i) thematic prioritisation of the research strategy, (ii) specifically sending inventors abroad and (iii) promotion of the reintegration of returning expat inventors into highly productive networks with local innovators.

This provides some recommendations to optimise the Austrian innovation ecosystem, which range from a clear thematic prioritisation of the research strategy to an increase in the percentage of researchers with foreign experience, through to promotion of expat networking and patent productivity together with local inventors.

The project-based promotion of inventor expats and their local networking were in particular recommended. There should also be a matching of competent target regions in individual technology areas as an upstream step, beginning with the question as to which regions are scientific leaders in specific topics. A matching of this kind could, for example, be made via the analysis of the respective density of topic-specific inventors in specific regions. A project-related funding programme is proposed for the prioritised technology areas and their specific target regions, which, in a first step accelerates the sending of inventors to the target regions, and in a second step accelerates the reintegration of these expat inventors by connecting them with local innovators. The number of local co-inventors and expat inventors could, for example, act as a success parameter for possible funding.

### **Background report**

#### **“Analysis of the Austrian innovation system’s performance”**

The Austrian Council’s innovation monitoring, which is the essential basis for compiling the Report on Austria’s Scientific and Technological Capability, is performed with the underlying data research of the Austrian Institute of Economic Research (WIFO). In compiling

the 2020 annual report, the Austrian Council commissioned WIFO with a comprehensive strengths-weaknesses analysis of the Austrian RTI system.

The “Analysis of the Austrian innovation system’s performance” produced a background re-

port for the 2020 annual report, in which the available data and indicators on the performance of the Austrian innovation system were presented as comprehensively and as detailed as possible.

The goal of the background report is to present a systematic data basis to evaluate strengths and weaknesses of the domestic innovation system. The data and indicators will contribute to supporting a status quo diagnosis of the innovation system and to the ability

to base the resulting Austrian Council recommendations and possible RTI policy measures on evidence. Data-supported status quo analyses are an important starting point for strategy processes, such as an RTI strategy, for example. The study itself does not provide any innovation policy recommendations. Nor does it explain in detail why individual indicators are used to illustrate innovation performance, but it refers in this respect to the respective existing literature.

### **Big Data, Algorithms and AI: Data-driven research in science 2030**

Algorithms and artificial intelligence (AI) will penetrate more and more life areas as time goes by. This has drastic effects both on everyday life and on the manner and method of how scientific research is operated. Disciplines, research processes and the research institutions themselves are at the beginning or are already in the middle of an enormous transformation process, which will accelerate even further. Several European strategies, such as the planned EU research framework programme, Horizon Europe, the “European Strategy for Data”, the “European Green Deal” and at national level the “Austrian ERA Roadmap”, for example, as well as the 2020-2024 government programme, already address this transformation in science and research. Two key issues were defined for the study<sup>36</sup> commissioned by the Council:

- 1. What challenges do the fast-moving technological, organisational and content developments ongoing in the area of data-driven science bring for the Austrian research institutions?

- 2. What should be done so the science system, primarily universities and non-university research institutions, is not only prepared but rather also remains internationally competitive with regard to the changes the digital data revolution brings with it?

By applying open innovation methods, which enabled the participation of experts and specific affected parties from various science areas, the winnovation project team identified seven major international trends and requirements of data-driven research (see figure 4). Current international developments were identified and their resulting requirements specified for every topic covered – data accesses, data competencies, interdisciplinary activities, data standards, data infrastructures, legal framework conditions and artificial intelligence. The status quo was also analysed at national level for every area. The experts interviewed believe Austria is in the midfield when it comes to framework conditions and requirements for data-driven science. The study participants believe there is a catch-up require-

<sup>36</sup> “Big Data, Algorithmen und AI: Datengetriebene Forschung in der Wissenschaft 2030” (2020), winnovation consulting gmbh; commissioned by the Austrian Council. <https://www.rat-fte.at/publikationen.html>.

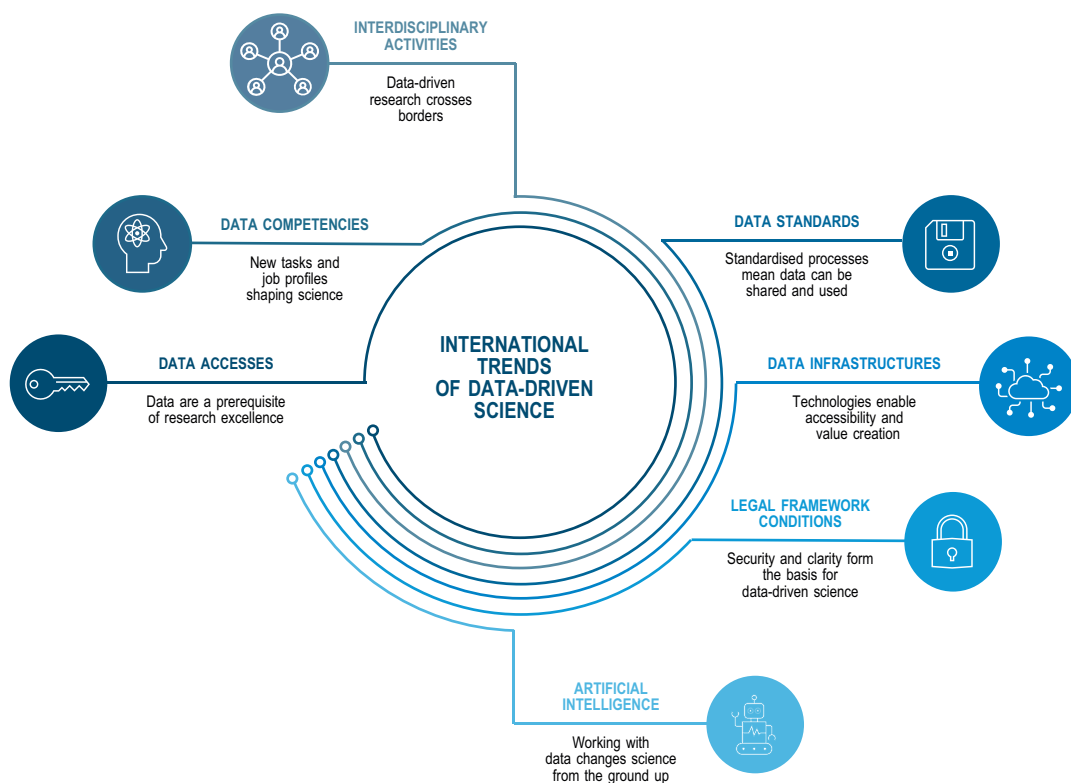
ment in specific areas to join the leading nations and to guarantee long-term excellent quality in data-driven research in Austria. On the basis of an analysis performed for this, six areas of action were identified, twenty recommendations for action were proposed and goals, effect and measures were described (figure 5).

- **Area of action 1: National framework conditions for data-driven research**
  - **Recommendation for action 1.1:** Development and implementation of a national research data strategy

- **Recommendation for action 1.2:** Setting up a commission for data ethics and foresight on data-driven research
- **Area of action 2: Incentivizing professional data handling**
  - **Recommendation for action 2.1:** Development and implementation of a national research data strategy
  - **Recommendation for action 2.2:** Setting up a commission for data ethics and foresight on data-driven research

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Figure 4: The seven international trends of data-driven science



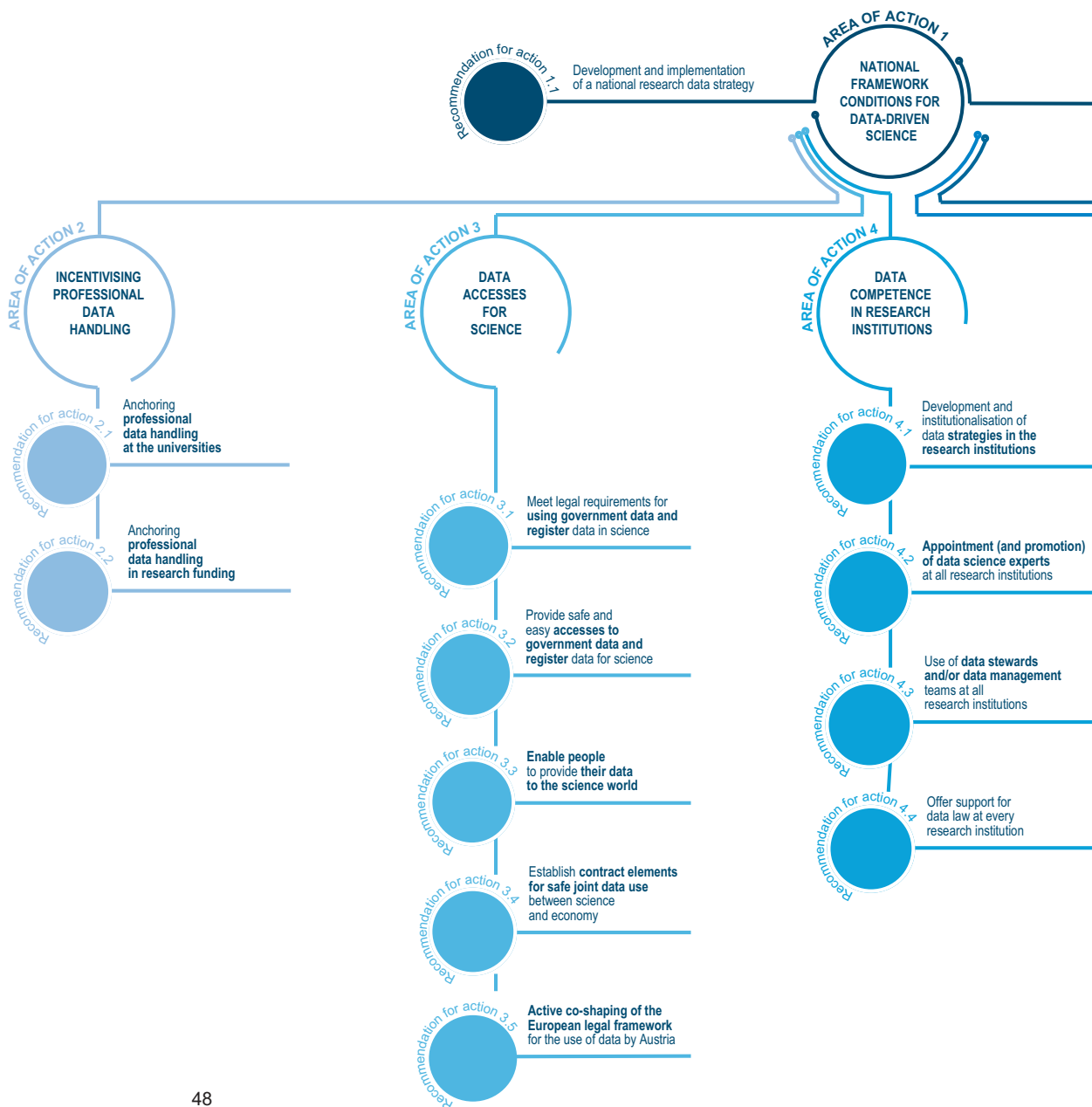
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● **Area of action 3: Data accesses for research**

- **Recommendation for action 3.1:** Remove legal barriers for the science world to accesses to databases created by federal agencies
- **Recommendation for action 3.2:** Make access for the science world to government data and register data easier

- **Recommendation for action 3.3:** Enable people to provide their data to the science world
- **Recommendation for action 3.4:** Support the development and implementation of ownership and license models for handling data at EU level
- **Recommendation for action 3.5:** Establish “smart contracts” for secure data exchanges between science and economy

Figure 5: Areas of action and recommendations for data-driven science



- **Area of action 4: Data competence in research institutions**

- **Recommendation for action 4.1:** Development and institutionalisation of data strategies in the research institutions
- **Recommendation for action 4.2:** Appointment (and promotion) of data science experts at all research institutions

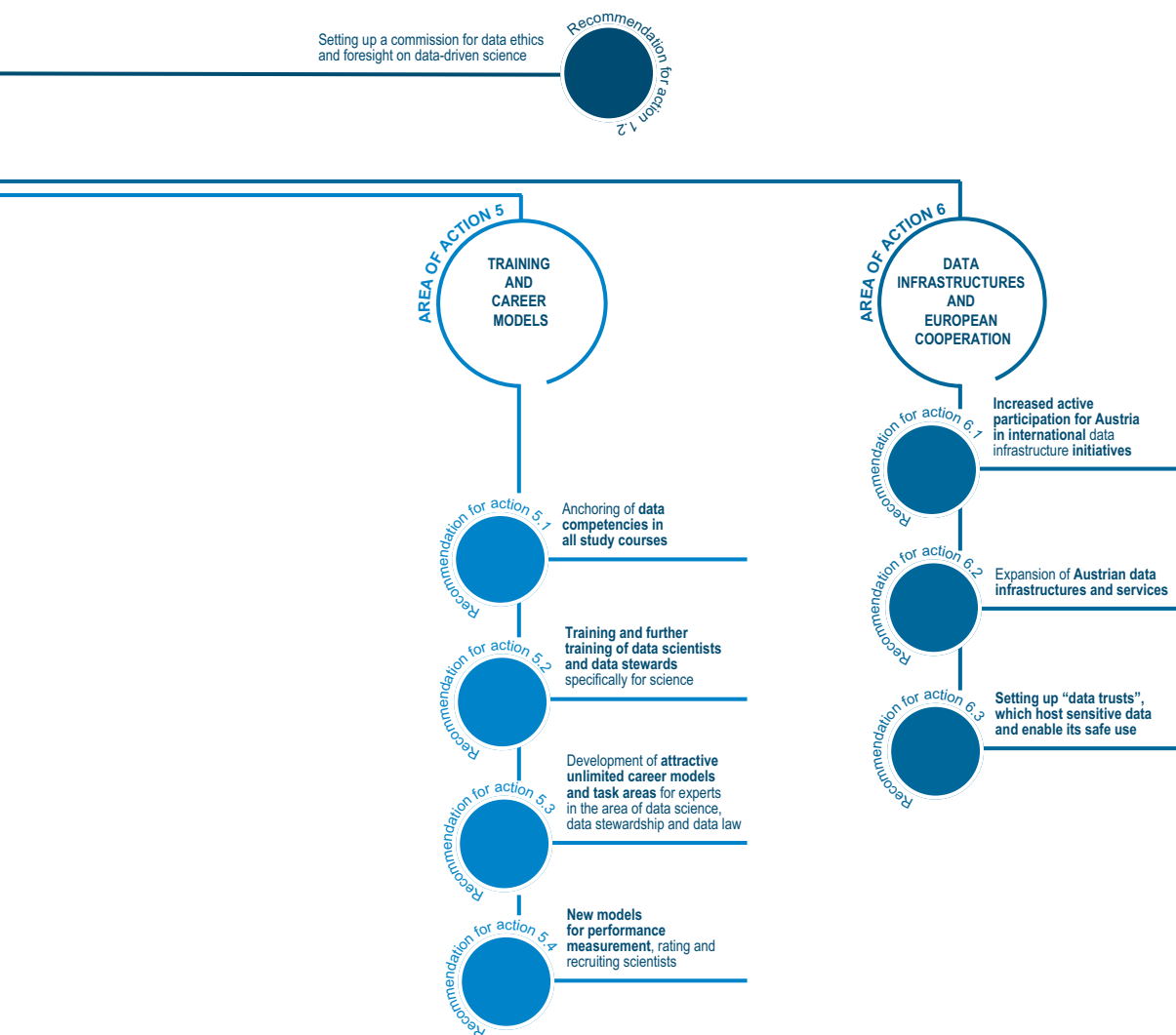
- **Recommendation for action 4.3:**

Use of data stewards and/or data management teams at all research institutions

- **Recommendation for action 4.4:** Offer support for data law at every research institution

- **Recommendation for action 4.5:** Establish “smart contracts” for secure data exchanges between science and economy

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- **Area of action 5: Training and career models**
  - **Recommendation for action 5.1:** Data skills anchoring in all study courses
  - **Recommendation for action 5.2:** Training and further training of data scientists and data stewards specifically for research
  - **Recommendation for action 5.3:** Development of attractive unlimited career models and task areas for experts in the area of data science, data stewardship and data law
  - **Recommendation for action 5.4:** New models for performance measurement, rating and recruiting researchers
- **Area of action 6: Data infrastructures and European cooperation**
  - **Recommendation for action 6.1:** Increased active participation for Austria in international data infrastructure initiatives
  - **Recommendation for action 6.2:** Expansion of Austrian data infrastructures and services
  - **Recommendation for action 6.3:** Setting up “safe data hubs”, which host sensitive data and enable its secure use



## Potential and dynamics of private offers and participations in the Austrian education system with special focus on private universities

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The universities develop in line with social requirements and challenges. Examples for drivers of these changes are the Bologna declaration (1999), among others, as the basis for a common European higher education area, a diversification within the higher education area (foundation of the technical colleges in Austria in 1994, foundation of the private universities in Austria in 1999) or also the further development of the Higher Education Act (University

Act, 2002). Profile and priority setting at the higher education institutions, for example, also put diversification processes in motion. Triggered by these and other factors, a both vertical and horizontal diversification occurs, which requires a permanent discussion on shaping the higher education area and calls for it on various levels.

The Austrian Council commissioned a study at the Institute for Higher Studies (IHS) to pro-



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vide an overview of the status of research on privatization in the education area, prepare data on private higher education in Austria and obtain estimates from experts, which show the developments that stand out for private higher education in Austria and what should be considered here.<sup>37</sup>

## The study's main results

On the basis of the comparing literature reviews and international databases, a general trend with regard to privatisation tendencies cannot be seen, but far more to the point, a great deal of heterogeneity between the states can be seen across all education areas – pri-



<sup>37</sup> "Potential and dynamics of private offers and investments in the Austrian education system" (2020), Institute for Higher Studies (IHS), commissioned by the AC. <https://www.rat-fte.at/publikationen.html>

mary, secondary and tertiary. From a global perspective, the level of privatisation according to education system sub-areas is highest in tertiary education and lowest in formal education, and compulsory education in particular; early education sits in the middle here.

At state level, we see individual “highly privatised” and many “not or not very privatised”. A clear privatisation trend is not seen in the overall education system, especially in the EU and OECD countries.

The study’s results for Austria show that an exogenous privatisation (private education providers offering, which is also financed privately) happened late and the level of privatisation in the international comparison on the whole is seen to be low or even very low. The endogenous level of privatisation (all forms of private economy organisation, occurring within the public education system – New Public Management, for example) must be classified higher and is high in the Austrian higher education system and low in the schooling system in general (despite reform initiatives). Early education differs here with a higher level of privatisation and an increasing trend. The areas are partially characterised by blurring, which goes in two directions – private financing from public provision (with contributions/fees in the higher education system in particular) on one side, and public financing from private provision on the other (with coupons/vouchers).

Private universities have existed in Austria since 2000. As of spring 2020, sixteen private universities are accredited, and three of these only began in that academic year. Despite steady growth in the past twenty years, however, only some 3.3 percent of all regular students in Austria are at a private university. Approximately one third of these study health sciences, 28 percent study social sciences, 16

percent study humanities or the arts, and 12 percent study economics. The financing of private universities prototypically almost reflects the blurring in the literature review of the areas, especially with attendance at public universities. Apart from the statutory basis, this increasingly makes a differentiation of the sectors according to defined and international standard criteria more difficult (financing, for example). On the whole, high matching is found with the trends seen in the international literature review in both the Austrian empiricism and in the interviews:

- Differentiation between **exogenous and endogenous privatisation**, whereby endogenous forms are essentially more important
- **Blending** of public and private structures through to hybrid constructions
- Concentration of private providers on offers that are heavily selective in the public sector (“**interaction between public and exogenous private provision**”), on small niches and on solvent students, predominantly from abroad
- Added to this are **low research activities** and a limited offering of doctoral studies at private universities.
- **For-profit universities** are an insignificant small exception in Austria.
- In the future, Austria is expected to have **more intensive forms of network organisation**, as can already be seen in joint cross-sector education offers.
- In this respect, the Austrian private universities are **very typical in the international comparison** and fundamentally differ from the private US elite universities (whereby the CEU comes closest as a philanthropically funded university).

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## Austrian Startup Monitor 2020

A detailed database on the formation and development of start-ups in Austria was created with the Austrian Startup Monitor (ASM) published annually since 2018. The Austrian Startup Monitor is based on information from the database on Austrian start-ups (ASM database currently with information on more than 3,000 start-ups) and an annually run survey of the start-ups covered

in this database (ASM Survey). Start-ups from different sectors, which are characterised by high innovation content and desire to grow, are recorded here.

All start-ups included as part of the ASM were therefore also invited to the survey again in late summer 2020. With participation of more than 450 companies, approximately the same amount of start-ups as in the previous year



took part, which, given the pandemic-determined socio-economic situation, was unexpectedly high. The ASM was financially supported once again by a series of institutions: Along with the Federal Ministry for Digitization and Business Location, the Federal Ministry of Education, Science and Research, the Austrian Federal Economic Chamber and the Austrian Council, several other key institutions were also brought on board from the states as financing partners.

The development dynamic and corresponding expectations were also examined in 2020 and questions on the company founders, business models, internationalisation efforts, financing structure and use of funds were posed. Special focus this time was placed on the analysis of green start-ups. The reappraisal of the consequences of the COVID-19 pandemic for start-ups was also analysed. It became clear here that there have been exceedingly high heterogeneous effects on start-ups, which

means, while some had to accept high sales slumps, others, especially in the area of digital technologies and corresponding applications, were able to generate highly positive effects from the ongoing crisis. Comparative analyses were also performed at state level by continuing the ASM 2019.

Start-ups were also surveyed in 2020 for their estimation of the importance of different technology and innovation trends. Artificial intelligence is still the technology trend that is especially relevant for start-ups, and by far (although falling slightly), followed by big data, renewable energies and automation. Due to the adapted issue, however, for the first time in 2020, right away technology areas such as energy storage and recycling and waste treatment were found to be significantly important for about one fifth of those surveyed, and therefore among the five most important trends.

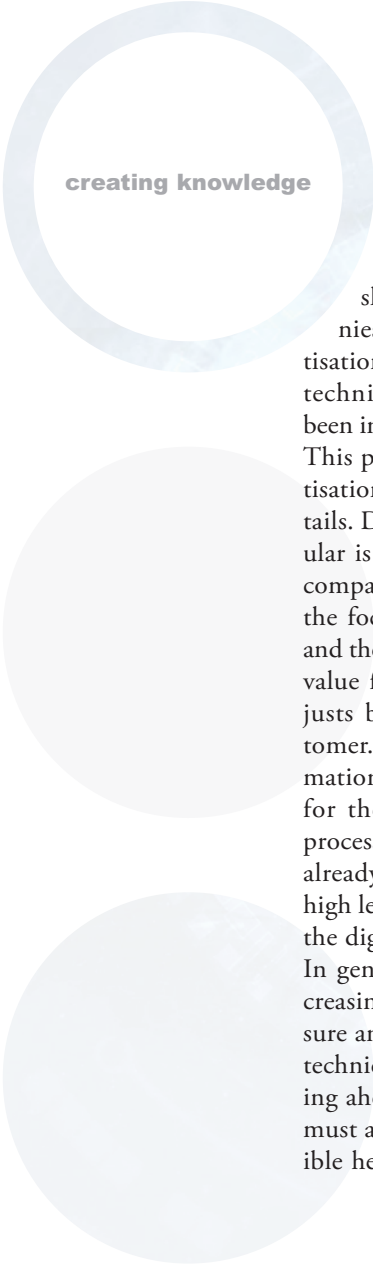
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## Digital transformation in Austrian value creation networks

According to the current OECD report, digitisation has a direct influence on a country's innovation policy. To evaluate this influence on leading Austrian companies and SMEs, the Austrian Council commissioned a study that examines the digital transformation in Austrian value creation networks on the basis of leading companies and SMEs. Among other factors, the Institute for Industrial Research (IIR) analyses the degree to which the digital transformation can make the two essential production factors in value creation processes (labour and capital) more effective/more productive. In addition to the development of methods and lines of argumentation, the issue was examined on the basis of three or four selected case studies. The possibilities of analysis as part of macroeconomic models were also considered. Technology providers and recip-

ients, for example, should be identified and analysed via a macroeconomic technology flow analysis.

Based on explorative methods, the study completed in 2020 illustrates the digital transformation in Austria against the background of real structures and the economic performance connected with them. Internal and external digital technology providers and recipients are determined on the basis of network views. The study's working hypothesis is: "Digital transformation takes place with joint efforts, across and beyond both employee and company boundaries". The more dynamic the underlying substance, the greater the overall competitiveness. It will also be shown how much the digital transformation gets quantifiable developments going in the domestic national economy, not just within company boundaries, but



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outside of companies as well – especially in the associated macroeconomic value creation capabilities.

The preliminary intermediate results show that all examined leading companies are proactive in dealing with the digitisation issue. Many change processes (both technical and organisational) have already been introduced in the past (evolving process). This process is massively accelerated by digitisation and the use of new technologies it entails. Digitisation's enabler function in particular is therefore especially important for the companies considered. The study shows that the focus is on the benefit for the company and the business processes, as well as the added value for competitiveness, which ideally adjusts both with the company and the customer. It also shows that the digital transformation must be worked on continuously and for the long run, in terms of an evolving process. This means that companies that are already highly digitised, will also still see a high level of efficiency and future potential in the digital transformation.

In general terms it is illustrated that the increasing dynamic progress of the change pressure and the high speed of the economic and technical developments require constant forging ahead and prompt adjusting. Companies must act increasingly faster and must be flexible here, especially in sectors with high cost

and competition pressure. During the course of the digital transformation, competitiveness must be equated with a company's future viability. Similar to the readiness to invest in innovation (R&D), the readiness to invest in the digital transformation is also above-average high in the companies considered. Companies see future challenges in mapping market and customer requirements in processes, to be able to react to changes as quickly as possible.

The acquisition of new customers and customer segments applies as a factor of highly networked value creation structures, as well as a new approach in the product development and marketing process. As expected, during the course of the digitisation in recent years, the sector structure has shifted increasingly towards IT companies. The leading companies act here within the scope of the digital transformation as a stimulus provider for their environment, especially for cooperation partners. The cooperation here means that these gain in digitisation competence and competitiveness. In conclusion, we can say that the value creation network continuously becomes more digital, stronger, more resilient and consequently future fitter. New technological developments (digital twin engineering, for example), will once again stimulate the possibilities of cooperation and joint learning in value creation networks here.

## International activities

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### Austrian Research and Innovation Talk 2020 – virtual for the first time –

December 19, 2020

Hailing the motto, “Austrian Scientific Excellence in North America”, the Austrian Research and Innovation Talk (ARIT) was held on September 17, 2020. Due to the COVID-19 pandemic that broke out in early 2020 and the global travel restrictions it brought with it, the event could not be held as the conference it usually is, but rather had to become an on-line event.

Despite the short-notice planning changes and the challenges they entailed, the Office of Science and Technology Austria in Washington/DC (OSTA) was able to organise the ARIT as a live YouTube event. More than 130 people participated in this premiere. The event could then be viewed via on-demand video on the OSTA-Washington YouTube channel, and many people did indeed do so: More than 2,000 individual accesses were registered in the first 24 hours after the ARIT.

The digital processing of the poster session in the run-up to the ARIT also registered a record number of 1,180 individual votes for the Poster Awards. The number of votes compared with last year was therefore approximately ten times higher.

The presentation of the ASciNA Awards rounded off the Austrian Research and Innovation Talk in the usual way. The winners were Dr. Lukas Fischer (PostDoc at MIT), Jennifer Simonjan (Research Scholar at Georgia Institute of Technology) and Dennis Svatunek (PostDoc at UCLA).

The ARIT, held for the 17th time already, provides contact maintenance and information exchanges between Austrian scientists, researchers and entrepreneurs that live and work in North America (USA, Canada, Mexico) and the Austrian stakeholders. The net-

work meeting is organised annually by the Office of Science and Technology (OSTA). The Austrian Council became an ARIT cooperation partner in 2020 and sees the event as an important platform for networking the activities of Austrian scientists in North America, but also between North America and Austria, and for promoting the domestic science location and its services. The mix of participants here, from students to researchers through to entrepreneurs, is what really makes the Austrian Research and Innovation Talk so exceptional. Furthermore, the continuous networking between the Austrian scientific community abroad and the Austrian stakeholders can also support the development of a future-oriented RTI policy.





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### European Councils Meeting – November 10, 2020

The meeting of the European Council formations was held on a virtual level for the first time on November 10, 2020. The meeting moderated by the German Council of Science and Humanities gathered a total of fourteen European councils, which

in their individual states advise their governments on topics relating to science, research and innovation policy. The discussion of the council formations was successfully concluded with the adoption of a declaration on European research policy.

## European Councils for Science, Technology and Innovation Policy

### Conclusions

On 10 November 2020, we, chairs and executives from European Councils for Science, Technology and Innovation Policy, met virtually to discuss the future of the European Research Area. The signatories agreed that the current COVID-19 pandemic, which brings so much suffering, challenges us in unprecedented ways to strengthen our knowledge base in order to better understand, cure, and prevent the disease, to innovate for a speedy recovery, and to increase the resilience of Europe. These challenges can only be met if our countries invest in strong science, technology and innovation ecosystems, and if cooperation across borders is stimulated and supported both in Europe and on a global scale. We therefore came to the following conclusions:

**We welcome** the Bonn Declaration on Freedom of Scientific Research as adopted by the Ministerial Conference on the European Research Area on 20 October 2020 in Bonn. We share the view that research and the freedom to conduct research are indispensable prerequisites for our social, cultural, political and economic resilience and progress. We applaud the ministers' commitment to supporting and strengthening the freedom of research, both in Europe and around the globe.

**We support** the agreement reached between the Council Presidency and the European Parliament's group of negotiators for a substantial improvement on the extraordinary European Council's July conclusions concerning the EU multiannual financial framework (MFF), and we urge the Member States to endorse that agreement. We consider cuts in the Horizon Europe budget as highly detrimental to Europe's research and innovation capacity. They would signal a lack of political will, and thereby diminish the ERA's attractiveness for highly-skilled research and innovation personnel.



## List of signatories

### **Austria**

Dr **Klara Sekanina**

Austrian Council for Research and Technology Development, chair

### **Austria**

Professor Dr **Antonio Loprieno**

Austrian Science Board, president

### **Belgium**

**Lieven Danneels**

Flemish Advisory Council for Innovation and Entrepreneurship (VARIO), chair

### **Croatia**

Professor Dr **Mirjana Polić Bobić**

National Council for Science, Higher Education and Technological Development, president

### **Denmark**

Professor **Frede Blaabjerg**

Danish Council for Research and Innovation Policy, chair

### **Germany**

Professor Dr **Dorothea Wagner**

Council for Sciences and Humanities, chair



#### **Latvia**

Professor Dr **Gita Rēvalde**

Latvian Council of Science, director

#### **Lithuania**

Professor Dr **Romas Baronas**

Research Council of Lithuania, chair

#### **Malta**

Dr **Jeffrey Pullicino Orlando**

Malta Council for Science and Technology, executive chairman

#### **Poland**

Professor **Maciej Duszczyk**

Science Policy Committee, chairman

#### **Spain**

Professor Dr **Rosa Menéndez**

Spanish National Research Council, president

#### **Turkey**

Professor Dr **Hasan Mandal**

The Scientific and Technological Research Council of Turkey (TÜBİTAK), president



## events

### New Year Reception 2020

Left to right:  
**Hannes Androsch,**  
**Federal Minister**  
**Leonore Gewessler,**  
**Federal Minister**  
**Margarete Schramböck,**  
**Federal Minister**  
**Heinz Faßmann,**  
**Markus Hengstschläger**



### “Ethical challenges in the digital age” events – Vienna, January 21, 2020 – Graz, February 11, 2020

Left to right:  
**Markus Hengstschläger**  
**Sarah Spiekermann-Hoff**  
**Hannes Werthner**  
**Christiane Wendehorst**  
**Erich Prem**

Linking up with the “Digital transformation and ethics” brochure presented as part of the Alpbach Technology Forum in August 2019



and within the scope of the companion process on working out the eponymous omnibus publication, in Q1 2020 the Austrian Council organised two events on the topic of “ethical challenges in the digital age”.

The goal of the podium discussions in Vienna and Graz was to drive forward the urgently required social and ethical discourse, in order to illustrate possible solutions to shape the future. Additionally there was also the co-operation with media partners and relevant stakeholders in situ, so that the topic could receive the appropriate attention with the general public.

With the kick-off event on January 21, 2020 in Vienna’s Hotel Urania, at the podium Dr. Erich Prem (eutema GmbH Managing Director), Univ. Prof. Dr. Sarah Spiekermann-Hoff

(Chairwoman of the Institute for Information Systems and Society at the Vienna University of Economics and Business), Univ. Prof. Dr. Christiane Wendehorst (Deputy Chairwoman of the Institute for Innovation and Digitisation in Law at the University of Vienna), and Univ. Prof. Dr. Hannes Werthner (Professor of the IT Faculty at the University of Vienna) discussed the “digital humanism in research and technology development mission” topic. The event and the subsequent one in Graz were moderated by Deputy Council Chairman Markus Hengstschläger. The second event was held on February 11, 2020 at UAS Graz entitled “Requirements in the higher education sector and the economy”.

MBA Claudia von der Linden (Vice Rector for Digitisation and Change Management at UAS Graz), Mag. Martin Mössler, MSc (Managing Director of the Science Park Graz), Univ. Prof. Dr. Petra Schaper-Rinkel (Vice Rector for Digitisation at the University of Graz) and Mag. Dr. Roswitha Wiedenhofer (Research Organisation & Services Department Head at Joanneum UAS) discussed as podium participants.

Left to right:

**Prof. Dr. Markus Hengstschläger, Prof. Mag. Dr. Roswitha Wiedenhofer, DI (FH) Claudia von der Linden, Univ.-Prof. Dr. Petra Schaper-Rinkel, Mag. Martin Mössler, MSc**



## Co-creation WS “Big Data, Algorithms and AI: Data-driven research 2030 (online)” – April 21, 2020

As technological progress and high investments cause a change in disciplines and research activities per se with data-driven scientific research across the globe, the challenges concerning research processes, staffing, infrastructures and governance must be met in good time. Handling data is an indispensable part of a future-oriented RTI policy, so that research and innovation location Austria remains internationally competitive and can develop further in good time.

As part of the “Big Data, Algorithms – AI” study, an expert workshop on the topic was organised as an online event, due to the pandemic-determined general travel restrictions.

The online workshop participants were integrated and prepared for the topic in several phases. Based on literature research and expert interviews, hypotheses were already developed and communicated in the run-up phase, which were then discussed in several groups within the scope of the workshop. The focus here was on developing a vision for 2030 and discussing necessary measures to prepare and implement the digital transformation.

The key points of the three topical areas and issues are summarized in brief in the following:

### Organisation and governance

Data ownership and license models are important bases to create broad access to data and therefore advance data-driven research. For ideal data further processing, data licenses will have to be standardised to an extent that they can be broadly used and read in and further processed by machines (by corresponding meta data, for example).

### Skills and human resources

To be able to expediently use artificial intelligence in the future, the training and deploy-

ment of people who have sufficient knowledge of data science and algorithms are directly required in research institutions, to be able to act as interfaces between artificial intelligence and researchers. Many people are not sufficiently familiar with operating modes, methodologies or the necessary data principles for artificial intelligence. The danger therefore exists of AI not being used for the desired ends, and consequently having a lasting unintentional influence on decisions. Expertise is therefore required directly in the research institutions, which can both understand the backgrounds of AI and identify the correlations in the results. When this is a given, algorithms can deliver new findings in many disciplines.

### Infrastructure and resources

Clear specifications on the infrastructures to be set up locally, nationally and at European level (EOSC) are required. Key here is the strategic planning of the joint use of infrastructures and services. Not all research institutions must set up all infrastructures and offer services themselves. There should be a clear distribution of tasks and specialisation. Under certain circumstances, existing smaller infrastructures could be integrated here into bigger ones. A certain redundancy should also be considered here, in order to guarantee the required downtime security and resilience.

Nine external experts attended the workshop together with the winnovation study team and the Austrian Council's organisers. The results of this expert workshop were applied to develop the measures for action within the scope of the study.

## **Presentation of the 2020 Report on Austria's Scientific and Technological Capability – June 8, 2020**

events

The Austrian Council presented its to-date ninth Report on Austria's Scientific and Technological Capability on June 8, 2020. Within it, the Austrian Council performed a comprehensive strengths-weaknesses analysis of the domestic research, technology and innovation system based on numerous indicators (for this see the "Outlook" chapter).

The summarising conclusion of the two Council Chairs in presenting the report was that Austria is essentially well positioned, but still has much to do, because along with some successful developments, above all the discrepancy between the aim to become one of the leading innovation nations and the reality of Austria's de facto unchanging distance to the group of leaders remain quite evident here. The report was presented in the Presseclub Concordia by the two Council Chairs, Hannes

Androsch and Markus Hengstschläger, and Austrian Council Managing Director Ludovit Garzik and Content Project Manager Johannes Gadner.



## **European Technology Forum Alpbach – August 27, 2020**

As part of the European Technology Forum Alpbach, the Austrian Council organised a podium discussion on the topic of a "new technology, innovation and industry policy" on August 27, 2020. Due to the COVID-19 regulations it was held as a hybrid event, that is, while the majority of the podium came together in the APA press centre in Vienna, interested listeners could follow the discussion and ask questions and provide feedback via live stream.

Head of the Austrian Council's secretariat, Ludovit Garzik was the moderator, while Kerstin Jorna (Director General for Internal Market, Industry, Entrepreneurship and SMEs), Sabine Herlitschka (CEO of Infineon Technologies Austria and member of the Austrian

Council), Eva Stejskalová (Managing Director at MicroStep, spol. s r.o., and member of the Horizon 2020 High-level Strategy Group, "Industrial Technologies") and Hannes Androsch (Chairman of the Austrian Council) discussed issues relating to the possibilities and limits of a renewed industry policy, which concentrates on technology and innovation. It was also about how Europe and European industry can assert themselves in global competition that is becoming increasingly tougher, and at the same time meet the major challenges of our age. The experts illustrated what an appropriate industry policy might look like, and which already existing or not yet existing elements should highlight such a policy at national and European level.

**Digital Long Night of Research 2020— October 9, 2020**

Due to the COVID-19 pandemic, the biggest domestic research event, the Long Night of Research, could not be held as usual in 2020, but rather was a digital event for the first time. After the organisers had decided at the beginning of March to move the LNR to October, the event hailing the motto “Digital Transformation”, finally had to be transferred to the Internet and the programme was offered virtually.

The conversion to a digital event meant the entire LNR had to be reorganised. Anyone interested in research could, however, follow some 50 live streams and 616 video items at [www.langenachtderforschung.at](http://www.langenachtderforschung.at) on October 9 from 2 pm to 10 pm. The offering ranged from education topics to digitisation, energy, health, art and technology through to economic sciences. From the most diverse perspectives, a good deal of the items dealt with the current coronavirus crisis and the impacts

of the COVID-19 pandemic. The videos were also available to view until the end of the year. A total of more than 12,000 people took part in the virtual event.

The LNR is the most important format in the field of science communication. The nationwide measures are financed by the BMBWF, BMDW and BMK. The Austrian Council also actively participated in advertising the event as part of the virtual LNR on various social media channels. More than 200 postings were consequently made on Facebook, Instagram and Twitter from July 1 to December 30, 2020.

An impact analysis commissioned by the Austrian Council also showed that visitors thought the event was extremely positive, however the vast majority (more than 70 percent of respondents) would like to see a hybrid event, so a mixture of “visits on site” and digital elements.



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## Look back at 2020 and forward to 2021

This is a premiere. A look back and a look forward have always been discussed separately in the annual reports of the past 15 years. This time, and for the first time, there will be no separation, and the reason for doing so is clear to see. The year now behind us is difficult to differentiate from the year ahead of us. Everything becomes blurred in the fog of the pandemic. We try to keep the last little flames of economy alive so the spark can ignite when a recovery begins. The aspiration to rally efforts in the research policy gives way to a pragmatism to at least not lose anything.

And yet, still the strategic plans simmer away behind the digital façades. There is a new strategy. Up to 2030. The appropriate decision in the Cabinet was placed for the community under the Christmas tree on

December 23, 2020. The media support, which would normally have taken place to the tune of the deafening Alpbach drum rolls, was only noticed by very attentive scene observers. The strategy would certainly have deserved plenty of attention, clear statements and demanding goals. The Austrian Council has already picked out the most interesting topics here and tied together a work programme that addresses the most important issues of our ecosystem from an RTI Strategy perspective. From technology sovereignty to human capital through to mission orientation – with united thrust power, over the course of 2021 the community will rise from the fog of the pandemic and call for the required investments in future issues, so the necessary competitiveness can also be secured for our future generations.



**Ludovit Garzik**  
Head of the Secretariat



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## The Secretariat

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 Austrian Council are financed by the Ministry of Transport, Innovation and Technology.

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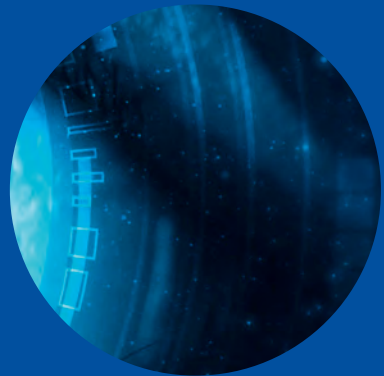
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