



**Rat für Forschung und
Technologieentwicklung**

Annual Report 2021

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The Covid-19 pandemic has dominated practically every aspect of our lives since early 2020. And 2022 won't be any less challenging either, as the age of unpredictability and the resulting insecurity are by no means over yet. The importance of science and research, technology development and innovation, will therefore increase further, because these are the areas that help us overcome challenges and shape both the digital and the green transformation. Science and research also contribute significantly to better combatting pandemics and health crises and strengthening resilience.

In this respect, the economy reflected both this fact and the fact that spending for research and development on the whole remained constant during the crisis. The public sector in turn introduced significant incentives for this, and further increased the overall budget for research and development.

The Austrian Council also ensured important stimuli were properly positioned last year. This Austrian Council Annual Report for 2021 documents the recommendations and statements made by the Council and provides an overview of the topics dealt with. The main focus here once again was the "Report on Austria's Scientific and Technological Capability", which provides a critical overall view of the Austrian RTI system.

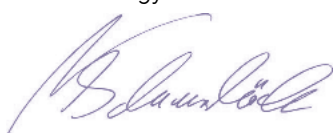
Over the course of its more than twenty-year existence, with its active role as a government advisory body the Austrian Council has consistently proven its value as an important stimulus provider and critical companion of the Austrian RTI policy. In view of the colossal challenges in particular, thrown up not only by both the pandemic, but also and especially by the required digital and green transformation, the Austrian Government looks forward to even more Council impetus to further develop the RTI system. We therefore thank the members of the Austrian Council, who constantly support the Government's RTI policy with their sound and invaluable advisory work.



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**Ladies and Gentlemen,
Dear Readers,**

As in 2020, 2021 was also entirely dominated by the Covid-19 pandemic – with all the restrictions and upheavals it brought with it, but also the new opportunities and possibilities it produced. Digitalisation, for example, accelerated significantly in many areas and many measures that had been called for time and again by both the Research Council and by numerous other experts, could be implemented because of the pandemic. In other words: The virus made possible what our arguments previously had failed to.

However, the need for change will also continue after the pandemic. Whether geopolitical and geo-economic shifts, climate change or the digital transformation – the rate of such deep-rooted upheavals (and therefore also the urgency for action) continues to increase and has now penetrated almost every area of our lives. At the same time, the ongoing fundamental change also requires a strategic smart readjustment of the entire system. Whether education, science or economy, whether society or politics – we are faced with systemic challenges everywhere, which now also require appropriate effective systemic answers. And swiftly above all else. Because numerous solutions are indeed actually already in place for the challenges of the day, but to date have not been implemented, so much valuable time has been lost.

The “circular economy” is an important issue in ensuring the success of the necessary transformation. The Austrian Council will afford even more focus and attention to this area and make it one of its work priorities. Two questions are front and centre here: How will the green transformation play out from a systemic point of view? And what contribution can/should/must research, technology development and innovation (RTI) make here?

We proceed here in the conviction that (i) the transformation towards sustainability will only be possible with a concerted, systemic approach, that (ii) many possible solutions are already in place, especially in the research and technology area, and that (iii) in view of the urgency here it must be about systematically sounding out and broadly applying the already available technologies and methods – and that at various levels in every respect.

These starting propositions make it immediately clear that there is no individual “tuning point” that provides the solution. The circular economy consists of networked sub-systems, which require numerous players with different expertise to bundle their knowledge. The Austrian Council took a first step in this direction with a podium discussion it organised as part of its New Year Reception in January 2022. Hailing the title, “Circular Economy: Research, Technology and Innovation are Key”, proven experts discussed a series of questions here, which provided an initial overview of the breadth and scope of the topic.

Research and technology development take on a key role with the now necessary provision of relevant concepts for the transformation of our economy towards a circular

ecoomy. This transformation is important and urgent, and its necessity has in the meantime also been recognised by broad sections of society. The discussion process to date has been characterised by two extremes: On one hand by very general statements, which are not contradicted because to their simplifying assertions, but do not have any effect either. On the other hand, there are also very specific detail requirements, which, because of their specialisation and concentration on various facets, are far removed from being able to have any relevant effect. Both are unsatisfactory, as the “green” transformation is in particular distinguished by its systemic complexity – and complex systemic challenges require holistic concepts and solutions. At the same time, we are not progressing fast enough with general contributions to the discussion, whereby we return once again to the importance of greater expediency and effectiveness in the implementation of necessary measures.

With the “circular economy” topic, the Austrian Council once again sees itself as a stimulus provider for the Austrian RTI policy. At the same time, the Council also thanks its contact partners for the excellent cooperation, which is underpinned by the shared conviction that the challenges our society faces can be overcome together.



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Chairperson



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Deputy Chairperson

A world in upheaval and the need for technology sovereignty

Technology sovereignty is defined as “[...] the ability of a state or federation of states to either provide and further develop the technologies that it defines as critical for prosperity and welfare, competitiveness and state capacity for action, or to acquire such technologies without developing a one-sided structural dependency on other economic areas”.¹ Critical technologies in particular assume three key functions – performing sovereign tasks, meeting social requirements and securing competitiveness. Technologies are then critical on two levels – when access to them and/or access to their scientific-technological basis are not secured.

Technology sovereignty has long been discussed in Austria and Europe as a maxim of political action, and not just since the socio-economic crisis triggered by the Covid-19 pandemic. The international division of work and the global interconnection of value creation chains and economic areas connected with it has for some time been considered quite critically due to increasing geopolitical insecurity, escalating international trade conflicts and the growing strategic approach to technologies. The pandemic and its effects, however, have both illustrated the importance of discussions about the vulnerability of our social and economic system and pushed them to the fore of social debates. In Austria, therefore, the discussion is also about how sovereign a state (or a federation of states) must and can be with regard to critical technologies and how the most unrestricted access to critical technologies can be ensured.

As a principal player in the Austrian innovation system, the Austrian Council has therefore highlighted the technology sovereignty topic as an analytical work priority and subject matter of its advisory work. In a first step, a thesis paper was developed and published in January 2021.² The Austrian Council consequently initiated a dialogue on necessary and beneficial processes, criteria and priorities to develop an Austrian position on technology sovereignty. The thesis paper was discussed with stakeholders and experts on 18 January 2021 as part of the Council’s pandemic-determined virtual New Year Reception.

A key objective of the Council’s handling of the technology sovereignty topic is to make its own independent contribution to the European debate on this topic and at the same time to develop specific options for action, vis-à-vis how Austria can secure and expand its own technology sovereignty. This also includes the question as to which critical technologies it is possible and beneficial to develop autonomously and to achieve technology leadership with some of them, or at least to become an equal footing partner in a new international division of work. Where this is not beneficial or possible the Council’s work

1 Edler et al. (2020): *Technologiesouveränität. Von der Forderung zum Konzept*, Karlsruhe.

2 Online at rat-fte.at/files/rat-fte-pdf/publikationen/2021/RFTE_Neujahrsempfang_2021_Thesenpapier.pdf

in the years to come will focus on developing analyses and ideas, which target reliable access to critical technologies and optimization of the appropriate framework conditions. The technology sovereignty topic is also closely interwoven with the Council's industrial policy and circular economy activities.

Although only indirectly connected with technology sovereignty, in this context the Austrian Council also addresses the issue of the resilience of the innovation/economic system and society as a whole as well. The work focusses here on the topic of vulnerability and dependency of value creation chains with special focus on knowledge production, technology development and supply chains. This would also require a discussion on possible unintended negative consequences of corresponding measures. As an example here we may point to the burgeoning digitalisation, which brings with it the risk of reducing social participation (increasing the digital divide), and a curtailment of democratic liberties. With regard to the idea of shifting back production capacities there is also the possibility of rising production costs and even a direct weakening of the respective resilience due to lower diversification of supply sources for technologies or raw materials etc.

In 2022, the Austrian Council will in particular continue the discussions on a beneficial operationalisation of technology sovereignty for various players in the RTI policy system. A format that enables a continuous Austrian debate on the question of what technology sovereignty means or can mean should be established for this. The primary objective here would be knowledge transfer, but it would also be to enable feedback, closer cooperation between national, and wherever possible, also international players, as well as connecting the Austrian discourse with international developments. The Council therefore also plans to cojoin its activities in this area with Foresight processes, to ensure the efforts to strengthen technology-related sovereignty will also incorporate those technologies that are currently still in development, but will assume key functions in the future. In 2022, the Council will also address the question as to what sovereignty monitoring tailored as much as possible for decision-makers might look like, and which would collect and prepare information on sovereignty aspects, thereby working out options for action. There is currently no central office that collects and maintains information with regard to the vulnerability of value creation chains or developments that might potentially threaten technological sovereignty and is allocated the appropriate functions and information within departments over a series of sections, units and people.

I

Recommendations & statements

Implementation of the Austrian Micro Data Center and for the further development of a national research data strategy

RECOMMENDATION 31/03/2021

Optimised data usability for experts and interested citizens depends on the data's quality and security. A transparent and controlled access to an extensive data pool is a critical requirement for this. Resulting challenges here must also be addressed at political, legislative and technical level, at the level of people's education and further training, for example. Compared with countries such as Denmark or Sweden, Austria so far has extremely restrictive access to register data, administrative data or data from official statistics. These restrictions impede the scientific research of relevant social developments or the evidence-based evaluation of the effect of political measures.

The topic of improving data access for science was recently added to the Austrian Government's RTI policy agenda with the adoption of the RTI Strategy 2030 at the end of December 2020.

With its recommendation here, the Council on one hand underscores the importance of the "Data" resource for the science and business location. On the other hand, the Austrian Government also calls for the swift implementation of concepts and draft laws that are already being prepared and the creation of the legislative, structural and budgetary framework conditions required for this.

Recommendation

→ **Optimisation of national framework conditions for data-driven science**

The Austrian Council recommends the framework conditions for data-driven science be improved accordingly. The requirement for an own national research data strategy must also be examined here at federal level. Appropriate groundwork must be further developed and implemented under the leadership of the Federal Ministry of Education, Science and Research and with the integration of key departments and relevant stakeholders. It is crucial here that national targets for handling data together with data experts be defined and priority areas of cooperation be identified. An extensive database will therefore be guaranteed, and rapid data streams enabled.

————→ **Improved data accesses for science**

The Austrian Council recommends improved and easier data accesses be enabled for science and research. The legal requirements for using register data and administrative data necessary for this must be met as soon as possible. Appropriate adjustments to the Federal Statistics Law and the ROA for the use of register data have already been identified inter-ministerial and should be immediately sent for appraisal.

The Austrian Council further recommends the European legal framework for using data continue to be actively utilised and shaped with the application of the Austrian research policy. Legal standards for accesses to public sector data, for example, will then be created and the EU Directive on open data and the further use of public sector information (PSI) in Austria will be implemented as broadly as possible. The cooperation within the scope of the European Open Science Cloud (EOSC) and the planned preparation of a policy document on Open Science, Open Access and Open Research Data will also be supported.

————→ **Securing financing and swift implementation of the Austrian Micro Data Center**

The Council recommends the data centre for microdata proposed in the government programme and in the RTI Strategy 2030 be implemented immediately. The appropriate legal basis for this “Austrian Micro Data Center” must be adopted as swiftly as possible. Individual data from public sector registers and the official statistics on secure and simple remote accesses will be provided herewith. Specific authorisations and access solutions for science and research, as well as a transparent usage concept for the interested general public will guarantee data protection-compliant data use.

Created on the basis of international examples, an implementation concept for setting up the required infrastructure and operating a federal server under the auspices of the “Statistik Austria” federal institution is provided. In line with this concept, the Council recommends the approximately EUR 500,000 annually for investments and required funds be provided for the long term, and allowed for in the respective department’s corresponding budget planning. A transparent costs model must be worked out for the service and use of otherwise free of charge public sector data and data collections



Realignment of the Austrian industrial policy

RECOMMENDATION 20/10/2021

Compared with the USA and China in particular, Europe's – and therefore also Austria's – competitive position is increasingly threatened and it must be assumed that this trend will continue unchecked and intensify even further if not responded to correctly. Technological and economic structural changes are characterised more than ever by disruption and strategic reorganisation. These developments, however, also present new opportunities for small, open economies such as Austria in particular, through the expansion of existing industrial strengths, the use of key technologies for more sustainable industry, for example, or the specific building of a strong data/digital industry.

The close interaction of the industrial policy with the ambitious goals of the European Commission's European Green Deal and the twin transition towards sustainability and digitalisation is key for the corresponding sustainable growth strategies. A realigned industrial policy therefore indissolubly connects sustainability, competitiveness, resilience and sovereignty. It does not serve protectionism here, veers away from isolation and must be understood as the proactive realisation of opportunities. The Austrian Council therefore recommends the Austrian industrial policy be realigned on three overriding goals:

- To secure technology sovereignty and state capacity for action.
- To proactively support Austrian industry and the entire innovation system in the development of future competitiveness and in contributing to resilience and supply security.
- Transformation away from a linear economy and towards a circular economy.

A new Austrian industrial policy is the core of innovation and technology policy, but above and beyond this it must also be an integrated industrial policy, which is harmonised with sectoral and cross-sector strategies at national and European level. Austria's industrial policy must actively further shape the international/European discussion, and wherever required, must also implement measures at national level. Austria must also and in particular establish and secure access to competencies and technologies, even if various priorities mean these are not currently the main focus across the EU.

Recommendations

The Council recommends the new Austrian industrial policy be built on three pillars:

- o Technology offensive
- o Creation of strategic value creation chains
- o Creation of a level playing field

Industrial policy goals such as the transformation towards digitalisation and sustainability and technological sovereignty will only be achieved with the simultaneous and coordinated implementation of all three pillars.

———> Technology offensive

The swift implementation of the technology offensive anchored in the Austrian Government's RTI Strategy 2030 is key for the first pillar.³ The focus here must be on preventing the perpetuation or even the emergence of unilateral dependencies on non-European countries and companies⁴. All appropriately funded or otherwise supported activities must directly contribute to securing Austria's technology-related decision-making sovereignty, security and competitiveness in the EU. In the long term, the transformation into a tech-economy⁵ must also be advanced.

Essentially, while maintaining optimum technology neutrality, the focus here should be on three major technology areas:

- o Technologies in which there is appropriate potential and which are or will be relevant (that is, critical) for state capacity for action.
- o Technologies that make traditionally well-anchored value creation in Austria fit for the future.
- o Technologies which contribute to the transformation towards sustainability and digitalisation.

The provision of a substantial amount of financial resources is in particular essential for the effectiveness of the technology offensive. It must be possible to allocate these to es-

³ Austrian Government (2020): *RTI Strategy 2030. Strategie der Bundesregierung für Forschung, Technologie und Innovation*, Vienna.

⁴ Edler et al. (2020): *Technologiesouveränität. Von der Forderung zum Konzept*, Karlsruhe.

⁵ The principles of a tech-economy concentrate on the transformation of national economies into circular economies, in which sub-systems sustainably fuse into a global ecosystem. See Bhardwaj (2020): *Principles of Tech-Ökonomie: Future of Economics*, in: Eisenriegler (ed.): *The Circular Economy in the European Union*.

establish competence and technology leadership in strategically important areas, as was also defined in the RTI Strategy 2030. For the required effectiveness, technologies with the highest possible innovation and transformation potential⁶ must be front and centre. Despite already adopted funding increases, this must include establishing a permanent financial growth path.

Innovation-promoting public procurement should play an even greater key role in securing said financial resources. Austria is already well positioned in this respect with its initiatives for innovation-promoting public procurement and sustainable procurement. However, the critical steps to implement effective strategic public sector procurement must be taken now.

In addition to continuing existing measures to support start-ups, the Austrian Council also recommends the development of innovative business models and production-related services etc., whose further development is harmonised with the thematic and strategic priorities of the technology offensive. These must be directly coordinated with and further developed for the goals of the new industrial policy.

In this context, the Austrian Council once again repeats its recommendations⁷ to strengthen the domestic risk capital market. This in particular includes the activation of the Austrian capital market. An umbrella fund, which invests in Austrian investment funds with institutional investors' funds, should be set up for this. Austria must also ensure the framework conditions for holding companies in Austria are competitive. Building new value creation chains in particular can hardly be achieved without the financing of rapid and sustainable growth of new start-ups.

The Austrian Council also recommends the implementation of an education offensive (including continuing education and training courses). The goals of the new industrial policy (especially technology sovereignty) cannot be achieved without the competencies required to master the respective technologies (including development and application). An aggressive expansion of STEM training⁸ on all education levels would have to be implemented along an appropriate roadmap, as is also defined as a goal in the Austrian Government's current RTI Strategy 2030. Furthermore, the digitalisation topic in particular would have to be more intensively integrated⁹ into training and continuing education.

⁶ Refer also to the "deep-tech" term, which (generally from an investor point of view) means those high technologies that provide answers to the big socio-economic challenges and therefore require long-term commitment.

⁷ See Austrian Council (2019): *Recommendation for the mobilisation of risk capital to secure sustainable innovation and growth*, Vienna.

⁸ See IV-INDUSTRIESTRATEGIE Teil III. *Die Österreichische Industrie 2040 – Vision für einen zukunftsfähigen Standort*, Vienna

⁹ See IV-Aktionsplan "Digital.Erfolgreich.Industrie. – Transformation zum digitalen Österreich 2030+", Vienna.

→ Building strategic value creation chains

The Important Projects of Common European Interest (IPCEI) are a key tool in this context and for linking value creation and sustainability. The Austrian Council recommends continuing to actively realise the opportunities generated for Austria through participation¹⁰ in the existing and currently discussed IPCEI. The Austrian Council further recommends providing significantly more resources (including for administration) for the IPCEI than before, and that agile governance also be secured across and beyond departmental boundaries. Austria should also proactively seek out cooperation with other EU member states, to identify further value creation chains, which, from the Austrian industrial policy point of view, should be part of the subject matter of future IPCEI¹¹.

In view of annual total volume of more than EUR 45 billion, to set up and expand strategic value creation chains, the Austrian Council also recommends public procurement be defined as a key instrument and that it be realigned as strategic public procurement, and equipped with appropriate framework conditions. The swift and consistent implementation of recommendations for action already published several times are key in increasing effectiveness with regard to the goals of the new industrial policy¹².

These include:

- o The obligation to provide strategic public procurement by formulating targets (also quantitative).
- o Cushioning the increased risk of the procuring organisations with co-funding programmes.
- o The ability to also implement strategic procurement with innovative procurement methods.¹³

The Austrian Council also recommends an active and extensive analysis of the risks and opportunities of back-shoring/near-shoring activities. This includes consideration of the advantages for resilience and the disadvantages created by reduced international interaction. The development capacities/production capacities that have left Europe and Austria must also be examined here to see if they can be brought back for strategic and welfare/wealth reasons. The respective reasoning must be closely connected with the issue of how key these are for building value creation and/or supply with critical goods, advance services or technologies. Back-shoring must in any case be coordinated at

¹⁰ Austria to date participates in two IPCEI (Microelectronics I and Batteries – EuBatIn) and is preparing for participation in two more (Microelectronics II and Hydrogen). These participations are currently in varying stages.

¹¹ Beginning, for example, with the 31 strategically important value creation chains, which were identified by the “Strategic Forum for Important Projects of Common European Interest” experts in their report: Strategic Forum for Important Projects of Common European Commission (2019): *Strengthening Strategic Value Chains for a future-ready EU industry*, Brussels.

¹² See Ruhland et al. (2018): *Evaluation of the implementation of the guiding concept for innovation-promoting public sector procurement in Austria*, Vienna.

¹³ Pre-competitive dialogue, innovative partnership etc., for example.

European level, so EU-internal funding competition is not triggered and to ensure possible synergies are leveraged¹⁴.

If Austria and Europe intend to secure and expand value creation chains, raw material dependency must be reduced, that is, raw material sovereignty must be defined as access. This would, for example, have to reappear in corresponding bilateral or multilateral agreements and alliances, which would secure access to somewhat rarer earth elements.

As a further building block of a new industrial policy, the Austrian Council recommends setting up a central office for strategic intelligence, whose assignments include active technology scouting and sovereignty monitoring. The former would also serve to secure access to technology development abroad. The latter would also be helpful in increasing the efficiency of existing regulations, such as investment controls, so proactive intervention could be intensified here in the future (see below). This planned office must have direct access to relevant data and information, including information that is only partially available encoded. The Austrian Council therefore recommends this office be provided an advisory board made up of entrepreneurs, researchers and investors, who are ready to share personal accesses to information and their tacit knowledge. To ensure the effectiveness of such an office, there must also be the right governance and respective interfaces to decision-makers in the political system and the relevant departments.

Austria must commit to achieving the objectives¹⁵ called for within the scope of the digital decade, also in the context of the new industrial policy, and must close the gap¹⁶ to the European leaders. The swift and consistent formation of the common single digital market in particular is essential for a new industrial policy. The following elements of an industrial policy that supports the digital economy must be implemented for this:

- o Diversification of supply chains – especially critical components should be deliverable from within Europe.
- o Protection of critical and digital infrastructure (cybersecurity, 5G, power, water, transport infrastructure) – innovation-friendly framework conditions for competitive providers must be created for this.
- o The recovery of data sovereignty – with, among other things, digital encryption to protect private and business data.
- o The consolidation and expansion of the “basis of European values” – also with legal standards and mechanisms for its implementation, GDPR, for example.

14 An appropriate approach will be followed, for example, in the planned European semiconductor alliance. For this see the joint declaration of 22 EU member states on the “European initiative on processors and semiconductor technologies” (digital-strategy.ec.europa.eu/en/library/joint-declaration-processors-and-semiconductor-technologies; called up on 28 May 2021).

15 See ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/europes-digital-decade-digital-targets-2030_en; called up on 7 June 2021.

16 See Digital Economy and Society Index: digital-strategy.ec.europa.eu/en/policies/desi-austria; called up on 7 June 2021.

The Austrian Council also recommends, in addition to the already implemented measures to modernise the use of digital databases and improve the availability of public sector register data for science (in the Federal Statistics Law, the Research Organisation Act and with the adopted setting up of an Austrian Micro Data Center¹⁷), Austrian participation in working out a European¹⁸ data usage strategy or possibly also the development of an appropriate national solution.

→ **Creation of a level playing field**

The third pillar of the new industrial policy includes the creation of a *level playing field*, that is, internationally or globally uniform competitive conditions. The basis here is provided by the modernisation of European competition law. The Austrian Council believes it is especially important that competition law be aligned with the conditions on the global market. Austria must strengthen itself for a corresponding reform and initiate this together with European partners. It is important here to move the point of view away from preventing intra-European market concentrations and towards enabling the creation of global market leaders (keyword: European Champions), that is, to no longer consider the protection of competitive conditions as purely European.

In accordance with this basic realignment, it then applies that the competitive framework must be adjusted to the requirements of the *digital economy*¹⁹. This includes, for example, the introduction of acquisition values in the merger control, which are oriented on the transaction value. Any improperly used refusal for access to data by market-dominating companies must be treated in the future as an anticompetitive violation. Consumers and companies must be enabled to practice their digital or data sovereignty.

With regard to Austria and the EU's ambitious climate goals, the Austrian Council recommends the development and introduction of a Carbon Border Adjustment Mechanism (CBAM). The problems of a potential carbon leakage would then be addressed (that is, the shifting of CO₂ emissions and reduction in innovation incentives in countries with high environmental standards). The departure of domestic industry to prevent competitive disadvantages due to particularly strict sustainability criteria in Europe would consequently be impeded. Austria should actively participate in the conception and establishment of an international arbitration body, and ensure compliance with the WTO's rules, as they are key elements of success. Austria should also further engage with multilateral and bilateral negotiations for a comprehensive balancing of foreign/non-European and European investors.

¹⁷ For this, see Austrian Council (2021): *Austrian Council recommendation on the implementation of the Austrian Micro Data Center and for the further development of a national research data strategy*, Vienna.

¹⁸ In particular in conjunction with the ongoing discussion on the data governance regulation.

¹⁹ See, for example, ACA (2020): *Thesenpapier Digitalisierung und Wettbewerbsrecht*, Vienna.

Further areas of action

In addition to the three pillars of the new industrial policy, further areas of action must be implemented, as the Austrian Council identified them, for example, in its thesis paper on technology sovereignty²⁰. These will be important for the effectiveness of a future Austrian industrial policy, however are to be found far more outside of it.

In the interests of an integrated industrial policy and in view of the criticality and vulnerability of Europe's infrastructure, the security policy aspects that take priority in the industrial context must be examined at both European and member state level. Austria and Europe urgently require a differentiated evaluation of technological supply security, faced with various threat scenarios. Industrial companies and therefore the industrial policy are part of the competition for both economic and strategic (military) predominance and security.

Austria must also commit to an active EU trade policy, and drive forward the conclusion of appropriate trade agreements. Key here will be the resumption or conclusion of currently stalled talks on the US-China investment agreements and about EU-Mercosur. Agreements with the USA and, for example, India, Russia and Turkey, which focus on Europe's strategic interests, must also be targeted for the medium term.

²⁰ RFTE (2021): loc.cit.

“Sense of Urgency in the RTI Policy”

RECOMMENDATION 8/11/2021

The world is undergoing deep-seated change. Whether geopolitical shifts, climate change or the digital transformation – the rate of resulting upheavals increases and incorporates education, science and economy, society and politics. To meet these systematic challenges, we also require systematic answers. It is no longer simply enough to twist and turn on the individual fine tuning points, rather we are all now responsible for making the required systematic change while maintaining the respective European values.

And: We must act swiftly. The deep-seated global structural change, accelerated by the Covid-19 crisis, also lays RTI system weaknesses in Austria bare. We must therefore now implement measures and recommendations to increase the performance of the RTI system already called for several times and develop existing potential, but there is indeed also the danger that the objectives of the RTI Strategy 2030 will not be achieved. If Austria’s competitiveness falls further, the deficit will be unassailable.

Recommendations

→ Establishing a new intervention culture in the RTI policy

The development of a new mode of governance and appropriate attitudes and skills can already be seen with the redefined framework conditions in the research funding act. However, the further increasing urgency of current challenges now also means there will be further institutional and structural consequences, and a new intervention culture will be established. The result: Real strategic control with parallel closer cooperation between departments and agencies while applying the subsidiarity principle, with clear competence and roles allocation, effective inter-ministerial coordination, and swift decision-making processes must also be developed/further developed. An integrated RTI policy, with guiding principle missions, strong strategic visions, clear definitions of goals, content, roles and interfaces, as well as a distinct separation of design, management and evaluation of funding measures, must guide the actions required for this. A critical questioning and permanent realignment of must be performed on the basis of the research funding act, the RTI Strategy 2030 and the RTI Package 2021–2023. As already called for by the Austrian Council in January 2020²¹, an annual RTI summit could be the occasion for such an examination and possibly a content and process-related reorientation.

²¹ See Austrian Council (2020): *WIE GEHT ES WEITER? Vorschläge für die Gestaltung der Forschungsdekade 2020–2030*, Vienna.

→ Promoting an equal opportunities education system

The availability of highly qualified specialists becomes an increasingly more critical competitive factor with knowledge-based value creation. Austria and Europe are under massive pressure here. The highest premise must therefore be to remove opportunity inequalities in the education system and to consistently promote the equal opportunity development of children and young people. Cornerstones in this respect are: The expansion and qualitative strengthening of early childhood education, expansion of interwoven all-day schools and the appreciation of teachers' training and further training. The mediation of 21st century skills and the establishment of competence-oriented lessons, as called for in upcoming curricula, in particular require massive investments in teaching and infrastructure. An appreciation of computing lessons²² (keyword: "fourth cultural technology" and digital competencies), the promotion of linguistic diversity and multilingualism and the mediation of *entrepreneurial skills*²³ also present effective leverage here. A discussion on qualified inflow is also required with the training and recruiting of specialists for the future.

→ Investing in university modernisation

Universities are the spearheads of our educational system and make an enormous contribution to the performance of the research and innovation system. Not least of all because of the speed of the changes, they in particular are especially required to prepare students even better for new challenges in science and research and in the professional world, and to train highly qualified specialists^{24,25,26}. Creativity and willingness to change, in shaping study curricula, for reinforcing transversal competencies or in the use and further development of digital technologies in science and teaching or also to increase research performance²⁷, for example, must be called for here within the scope of performance agreements. The universities and the Federal Ministry of Education, Science and Research must therefore be called upon to jointly implement the transformation of modern, independent universities and their expansion²⁸, by "living" a strategic control of the higher education sector while maintaining the universities' autonomy. This also requires both adequate investments in

22 New concepts for expanding lessons with digital teaching content were to date introduced too slowly in primary and secondary schools and at universities. The educational and teaching tasks of the compulsory teaching of computer science classes in secondary schools was already defined more than 36 years ago with the curriculum amendment of 22 July 1985. This was to be changed to the computer science compulsory subject in 1989, and even then based on the premise of anchoring computer science in lessons as the 4th cultural technology.

23 Austrian Council (2019): *Recommendation for the establishment of entrepreneurship-promoting competences in the Austrian education system*, Vienna.

24 Austrian Council (2018): *„create your UNlverse“ – Handlungsempfehlungen für die künftige Gestaltung der Hochschulen*, Vienna.

25 See Austrian Council (2021): *Report on Austria's Scientific and Technological Capability 2021*, Vienna, p. 46 ff; and Austrian Government (2020): *RTI – Strategy 2030: Austrian Government's strategy for research, technology and innovation*, Vienna.

26 See Bundesregierung (2020): *RTI – Strategy 2030: Austrian Government's strategy for research, technology and innovation*. Goal 3: "Promote knowledge, talents and skills", Vienna.

27 See Austrian Council (2021): *Report on Austria's Scientific and Technological Capability 2021*, figure 13: Strengths and weaknesses in the research at universities and non-university institutions area compared with the innovation leaders. p. 47 ff, Vienna.

28 Special attention is paid here to the STEM subjects; each year in China about the same amount of students finish doctoral studies in a STEM subject as those in the USA and Europe combined.

the tertiary education sector²⁹ and a high level of willingness to reform, as well as the implementation energy of all participating players to push through structural changes.

——→ **Shaping a people-centred digital transformation**

Data is the raw material of the digital world and digital technologies create opportunities to analyse vast data volumes in real time.³⁰ This generates new requirements and possibilities in education, science, research and economic affairs with the networking of people and companies or the automation of production processes. The development and use of artificial intelligence (AI) and quantum physical technologies (quantum optics, mechanics, computing, sensing, etc.) presents the next technology leap.

Artificial intelligence and automation progress also mean massive changes in the world of employment and enormous upheavals³¹ on the labour market. So that these changes are not tantamount to job losses, they must be countered by promoting appropriate local value creation, with upskilling and with the realignment of study courses and job profiles. Nevertheless, not everyone will be able to follow these change processes, so it is crucial that accompanying socio-political measures are also implemented in good time.

——→ **Strengthening Austria and Europe's competitiveness**

The transformation of our world goes hand-in-hand with geopolitical power shifts.³² China's rise to a world power has produced vastly more intensive competition for global supremacy, which is also guided with the aid of science, research and innovation. Austria and Europe are in danger of falling further behind in the competition of the two global super powers, China and the USA. Entire industries, together with the associated key and future technologies, and with these their formation and application conditions, such as raw materials, advance services, international top researchers, foreign direct investments, risk capital etc., will be geopolitically instrumentalised. With regard to almost all technologies, which are connected with the aptly-named *twin transition*, Europe therefore depends on raw material imports and advance services, which are either subject to state controls or are sourced in potentially crisis-prone regions. Catch-up investments in the billions, which, for example, will now be activated to build European production facilities and secure European sustainability, among other things towards the Cloud, quantum technologies and batteries, must therefore also be promoted at national level.³³

²⁹ The goal of 2% of GDP public and private spending for the tertiary education sector already set in the 2008–2013 government programme continues to be a benchmark in this respect.

³⁰ Austrian Council (2021): *Austrian Council recommendation on the implementation of the Austrian Micro Data Center and for the further development of a national research data strategy*, Vienna.

³¹ According to a recent study by the Institute for Employment Research (Ger. abbr: IAB), the percentage of people in professions with high substitution potential in Germany is 34 percent, or 11.3 million jobs. For this, see *IAB brief report 13/2021* (doku.iab.de/kurzber/2021/kb2021-13.pdf).

³² Austrian Council (2019): *Recommendation for Austria's efficient integration into the European industry policy*, Vienna.

³³ Austrian Council (2021): *Recommendation for Austrian industrial policy realignment*, Vienna.



This all plays out against the backdrop of the effects of anthropogenic climate change, which are already visible and measurable. The warnings of the consequences of an unchecked growth policy and of excessive natural resources consumption have long been flagged since the publication of “The Limits to Growth”, the famous report of the Club of Rome on the predicament of humanity in 1972, and now for the 50th time already. With the “Green Deal”³⁴ Europe sets clear goals to facilitate the transition to a modern resource-efficient and competitive economy. Finding solutions for the careful and sustainable use of resources and to overcome an unchecked growth policy will be one of the greatest challenges – perhaps the most crucial for our future.

All these challenges outlined by way of example increase the requirement for swifter and more efficient intervention on all levels. This urgency cannot be overemphasised and a corresponding “sense of urgency” must serve to guide us in small, open and globally networked economies in particular, such as Austria for example. The Austrian Council sees significant development potential here, however many of the challenges and reform building blocks have been known for some years now, without any swift or even notable reforms or improvements appearing here. The goals of the RTI Strategy 2030 just adopted last year will be unattainable without an appropriate reorientation in the entire RTI policy. This ambition must therefore and in particular be applied to the urgency for implementation, not least of all because the Covid-19 pandemic has accelerated many developments even further.

The Austrian Council in particular sees the highest priority for swift action in the following areas:

Artificial intelligence

To achieve the critical dimensions of AI competence and to develop internationally visible technology clusters, Austria requires a research, education and innovation offensive for artificial intelligence, whereby the majority of the required implementation should be performed with joint, application-oriented activities by research organisations and companies or industries.

Quantum technology

The existing competencies from research and development in the quantum technologies environment should be bundled to drive forward the commercialisation and development of business models. Austria must invest in the set-up and networking of quantum technology centres significantly more than the EUR 107 million awarded in the Recovery and Resilience Facility.

34 For this, see eur-lex.europa.eu/resource.html?uri=cellar:b828d165-1c22-11ea-8c1f-01aa75ed71a1.0021.02/DOC_1&format=PDF.

Technology sovereignty

Activities for technology sovereignty highlighted at European level will be established with higher priority and must, if required, be complementarily extended by the Austrian RTI and economic policy. Research and economy-promoting measures should be harmonised with optimum technology neutrality to achieve this goal. Strategic intelligence for technology scouting and sovereignty monitoring must continue to be urgently increased and decision-makers must be provided.

Specialists

Important cornerstones must be urgently implemented for competence-oriented lessons and the mediation of 21st century skills and an equal opportunity development of children and young people – qualitative strengthening of early childhood education, massive expansion of interwoven all-day schools and the appreciation of teachers' training and further training. Universities' curricula must increasingly reflect the scientific-technological transformation, and as quickly as possible. A discussion on qualified inflow must begin.

Entrepreneurship

To establish further domestic champions and global market leaders, especially in recently emerging technology areas and value creation chains, while considering existing initiatives, Austria requires a generously remunerated umbrella fund³⁵ for the scaling of domestic innovation-based start-ups and spin-offs, as well as an education offensive for entrepreneurship-supporting measures at all education levels.

35 See Austrian Council (2019): *Recommendation for the mobilization of risk capital to secure sustainable innovation and growth financing*. Vienna.

Drafting of a federal law to amend the University Act (UG; 2002), the University Quality Assurance Act (HS-QSG) and the Higher Education Act (HG; 2005)

STATEMENT 15/01/2021

General position of the Austrian Council

The Austrian Council sees important steps towards creating more efficient structures at the universities in this draft for the University Act 2002. The proposed changes and measures in the draft law will optimise the law with regard to studies, personnel and organization, to enable a better ability to study, more stringent organisation and more transparent career opportunities and structures. The framework conditions proposed in the draft will, among other factors, ensure increased commitment with students, but it will also call on the universities to actively and professionally support students. Curricula will be evaluated more intensively and an equivalent assessment of the ECTS credits will be guaranteed. In the interaction of management bodies a clarification of management's responsibilities and more efficient process sequences, among other things, will be enabled. Accessibility to the universities will also be increased through changes with the recognition of examinations and other qualifications.

The Austrian Council welcomes the draft law as an important basis for meeting the current and future challenges that universities will be confronted with. To overcome these challenges, however, additional further measures must also be implemented and continued. The following topics are addressed for this by way of example:

“E-learning”: The pandemic has massively increased the requirement for e-learning. The Covid-19 crisis compelled the universities to face up to the long-standing challenges in third level education. Topics such as digital access to academic knowledge or the digitalisation of teaching content have been discussed for some years now.^{36,37} The announced closing of teaching activities has drastically increased the trend towards online teaching. However, there continues to be considerable optimisation potential and qualitative improvements are possible.

“New forms of teacher/student collaboration”: Better ability to study is essentially linked with that on offer and the quality of courses, and is therefore an important fac-

³⁶ See Austrian Council (2017): *Zukunft und Aufgaben der Hochschulen: Digitalisierung, Internationalisierung, Differenzierung*. LIT Verlag, Vienna.

³⁷ Bratengeyer et al. (2016): *Die österreichische Hochschul-E-Learning-Landschaft*, fnma.at/content/download/1431/4895.

tor for study periods and study success. A more systematic expansion of national and international collaborations with other universities in education, science and research, evaluation and ensuring the quality of courses, professional support for researchers and teachers with the implementation and application of digital teaching formats are named here by way of example.³⁸

Integration of “transversal competencies” into curricula: To satisfy students’ growing requirements and the labour market’s demand for transversal competencies, these must be anchored in the qualification goals. More intensive focus in this respect in shaping the curricula structure at universities essentially contributes to equipping graduates better for the challenges of the professional world.³⁹

Increasing “digital competence”: The Austrian Council believes it is generally necessary to further pursue the strengthening of digital competencies in all areas of teaching and research with even higher priority.⁴⁰ Important areas of action here include data competence in research institutions, data accesses for science, training and career models for the data management area, and a swifter expansion of the digital infrastructure.

International visibility: If we measure the quality of universities, it is people, the researchers, the teachers and the managers, that represent this quality. The competition for the best minds is therefore one of the universities’ most important tasks. The career development of young researchers in particular should be afforded high priority here, not least of all because Austria’s participation within the scope of a pilot action by the new European Research Area, active participation, for example, in developing the “ERA Talent Platform”, would be very much welcomed. Increased and therefore improved availability of competitive funding is also still an urgent requirement to increase the international visibility of universities and their researchers.

In summary, the Austrian Council believes the key cornerstones, which enable progress towards the shaping of more efficient structures in many areas, are defined in the planned amendment to the University Act. Irrespective of this, the development of modern universities for the 21st century requires a comprehensive change process, as well as a high level of readiness to reform and corresponding implementation energy of all players.

The Austrian Council’s statement here addresses what it believes to be important legislative proposals.

³⁸ See Austrian Council (2018): *‘create your UNiverse’ – Handlungsempfehlungen für die künftige Gestaltung der Hochschulen*, Vienna.

³⁹ OECD (2017): *In-Depth Analysis of the Labour Market Relevance and Outcomes of Higher Education Systems: Analytical Framework and Country Practices Report, Enhancing Higher Education System Performance*, Paris.

⁴⁰ Winnovation (2020): *Big Data, Algorithms and AI: Data-driven research in science 2030. What new challenges are universities and non-university research institutions in Austria confronted with when it comes to data-driven research?* Study commissioned by the Austrian Council, Vienna.

Statement on detailed aspects of the draft law

→ Minimum academic performance (§59a and b)

In the legislative regulation, the Austrian Council believes a minimum of 24 ECTS credits must be provided in the first four semesters; essentially a legitimate measure to increase students' commitment to their studies. This is in particular boosted because studies-supporting measures will also be implemented by the universities. Meeting this minimum requirement also appears to be possible for students that are in gainful employment (part-time). Additionally, with §67(2)Z3 with unforeseen submission of a reason for leave of absence, the option for a leave of absence outside of approval processing periods was also created, without the risk of any loss in already provided performance. Exclusion from studying for 10 academic years where minimum academic performance is not provided, nevertheless appears excessive.

In the interests of promoting interdisciplinary education the Austrian Council suggests §59(1)⁴¹ not be formulated as "compulsory", but rather as an "incentive". The Austrian Council also suggests that it should then also be possible for students to access or extend another study course, if 48 ECTS credits have been successfully achieved within the first two study years in at least one (main) study course.⁴²

→ Evaluation and quality assurance (§14)

The Austrian Council believes essential accompanying measures in the interests of a quality-oriented appropriate awarding of ECTS credits for the evaluation and quality assurance formulated in §14(2a) and §58(12) are priority measures to be implemented by the universities, and in particular by the Senate. A rectorate right of initiative to enact and change or to structurally shape curricula proposed in §22(1)12/12a emphasises the priority importance of this measure and is supported by the Austrian Council.

Within the scope of the evaluation of curricula, the Austrian Council also recommends the qualification profiles and qualification goals [§51(2)Z29.] be anchored in the curriculum, to supplement required qualification goals for digital competence and transversal competencies for society and the economy in general, as well as for students, if this has not yet happened.

41 §59a (1) In bachelor and degree studies students are obliged, in each study course, for which approval is required, to deliver an academic performance amounting in total to at least 24 ECTS credits in the first four semesters.

42 See Project Report by Thaler / Unger (2014): *Dropouts ≠ Dropouts, Wege nach dem Abgang von der Universität*. EQUI-IHS, as commissioned by Universities Austria, Vienna. Of all first registered in the first two semesters, 60 % are examination-active (therefore at least 16 ECTS or 8 semester hours in the first two semesters), 16 % are examination-inactive, however acquire at least one ECTS point and one successfully graduated semester hour and 24 % do not conclude a single course (successfully), and therefore are studies-inactive.



→ **Rector selection / selection committee / rector reappointment**

Successful cooperation of the management committees – rectorate, Senate and university council – requires a clearly structured allocation of tasks and competencies. The essential remits of the three committees here are the performance, appraisal and approval of the university management's tasks.

The legislative regulation covering selection of the rector is anchored in the current version of the University Act in §21(1)Z2-4. In accordance herewith the university council is responsible for (i) tendering the appointment of the rector, (ii) adoption of the provisions for selection and (iii) selecting the rector.

In accordance with §21(6), the university council will be formed in equal part by members of the Senate, and by persons nominated by the Austrian Government. Two, three or four people will be nominated in each case. One more person will also be nominated as agreed accordingly. The Senate will determine the number of people represented on the university council.

The selection committee [§23a] – to be set up after the appointment is tendered – will now have five people, after the amendment comes into force [§23a(1)]. These will be the chairperson of the university council and of the Senate and another person from both committees, and a person nominated in agreement with both committees. The selection committee examines the submitted applications, actively seeks out candidates and submits a shortlist of three candidates, which is passed on to the Senate.

Having considered the selection committee's shortlist of three candidates (this is not binding), the Senate itself draws up a shortlist of three candidates [§25(1)Z5a], which is sent to the university council as a selection proposal.

The Austrian Council welcomes the extension of the selection committee, however further proposed people will have to be added in the interests of a transparent selection process.

The Austrian Council proposes an amended process for this. With the (first) selection of the rector, all university members, represented by the Senate, should be integrated at the beginning of the selection process. The Senate would then be the first committee with the right of nomination to name the person they believe to be most suitable for selection.

This shortlist of three candidates will be addressed to an extended selection committee (7 people). The Austrian Council proposes the Senate chairperson, the university council chairperson, a person nominated by the chairperson of the Austrian Science Council and a person nominated by the Austrian Council's chairperson be used to staff the selection committee. A broad disciplinary and institutional spectrum would be opened up with the consolidation of both councils, or a body that would result from the merger of the two

councils. The Austrian Council also proposes this four-person team be extended with three further people, who with international experience are proven experts (i) in research (basic), (ii) in teaching (especially with new didactic concepts) and (iii) in knowledge transfer (Third Mission). A right of nomination to name one person in each case should be allocated to organisations that have recognised international expertise in the areas addressed.

The selection committee continues the selection process, examines applications and actively moves up further possible candidates. At the end of the selection process there will be an equal-ranking shortlist of three candidates with the best candidates, which includes at least one person from the Senate's proposal, and will be submitted to the universities as a selection proposal decided by simple majority. The selection or rejection of candidates must be justified.

With the inclusion of all university members, the management bodies and international experts, the Austrian Council believes a high level of acceptance of all candidates proposed for selection can be expected and a transparent, successively shaped decision-making process is guaranteed.⁴³

In this context, the Austrian Council would note that the addition in §23(2), "... for rector only a person with ..., knowledge and experience of the Austrian university system ... can be selected", should not be applied so strictly for candidates for the position of rector from abroad, and those with proven leadership experience and appropriate CVs should also be considered.

For the re-election of the rector for a second term of office and the amendment made in §23b(1), which now grants the Senate a right to be heard, the Austrian Council ensures the committees that this right to be heard will be sufficient to rule out any re-election with a well-founded counter argument by the Senate. The Senate's opinion/reasoning with this hearing must be made public, so this argument is given sufficient consideration with the decision-making on the university council.

————→ **Appointment proceedings (§98)**

One of the greatest challenges at universities to guarantee excellent research and first-class teaching is the appointment of the best minds. The search for, selection and appointment of professors is therefore one of the most important tasks for the university's management, and therefore of the rectorates and Senates. The recruiting and selection process essentially incorporates a public, international tender process for professorship positions performed by the rectorate, the appointment of appraisers and an appointment

⁴³ In the Austrian Council's "Management and governance at universities" recommendation (2015) it was recommended that the Senate's role in its advisory function be more intensively emphasized. To perform this advisory function as effectively as possible, as part of interviews held in a parallel study it was emphasized that, "a comprehensive integration in good time of the participants (Senate members) could positively influence the development process, on an informal level in particular".

committee set up by the Senate. A shortlist is submitted to the rectorate on the basis of these committees' decision. The rector makes the selection decision.

The Austrian Council believes the proposed changes in §98 enable both a more efficient administration of the process with the introduction of deadlines in the processing of the appointment process and more transparency or a more direct integration of the rectorates into the procedure. The Austrian Council believes it is also important to emphasise that the much-discussed regulation in §98(4a), "Use of an appointments officer by the rector", is not an interference of any kind in the Senate's competencies, but rather – in line with international examples – the ability to improve the cooperation between Senate and rectorate in an optimised appointment process is endeavoured.

The Austrian Council supports this possibility for cooperation and schedule tightening of the process, in particular because the efficient performance of the selection process and the appointment procedure could be important for successful recruiting.

————→ **Recognition of examinations, other academic performances, activities and qualifications (§78)**

The proposed extended possibilities for recognising qualifications are an essential building block to better connect the concept of "lifelong learning" with university education. This can contribute to improving permeability, access for non-traditional students and the combination of academic and professional training. However the initiative also requires a more in-depth discussion at institutional level, on how colleges in general and universities in particular, but ultimately also the entire educational system can accompany, support and strategically anchor this reform process.

————→ **Personnel law – duration of the working relationship (§109)**

This draft law essentially limits the duration of limited period working relationships in §109, paragraph 1 to six years, in paragraph 2 for employees according to §94(2) to maximum eight years, with the option of two extensions (so three limited periods in total). Paragraphs 3 to 8 list exceptions.

For clarification as to whether or not the proposed regulation complies with the legislative framework conditions, especially at EU legislation level, we recommend closer examination of the respective topic. The Austrian Council therefore does not have a conclusive opinion on the matter at this point.

Amendment to the Federal Statistics Law 2000 and the Research Organisation Act

STATEMENT 27/07/2021

General

The Austrian Council expressly welcomes the draft of the federal law which will amend both the Federal Statistics Law 2000 and the Research Organisation Act (ROA). Pioneering steps are thus taken, which will enable the long called for modernisation for the use of digital databases.

With the installation of the Austrian Micro Data Center (AMDC), a digital data infrastructure will be established, which enables digital data exchange between the public sector and scientific institutions with clear registration, access and supervisory rules⁴⁴. The AMDC also improves the conditions for Austria's integration into international research.

Statement on detailed aspects of the draft law

→ Improved availability of public sector statistical and register data

With the proposed amendments to the Federal Statistics Law 2000 and the ROA, an improvement in the availability of public sector statistical and register data for science will be achieved, and data security with data exchanges will equally be secured with transparent and clearly defined regulations for data sharing. Legislators thus react to the increased requirement for digital infrastructures brought about by the digital transformation and burgeoning networking, which guarantee secure and regulated data transfers.

→ Ensuring data quality, data protection, data security and transparent access possibilities

Data quality, data security and transparent possibilities to access digitally stored data are decisive criteria for its efficient use. The federal law attributes particular importance to this criteria and regulates these in accordance with the amended framework conditions. The Federal Statistical Office is also assigned the key task cited in the Federal Statistics Act of

⁴⁴ See Austrian Council (2021): *Austrian Council recommendation on the implementation of the Austrian Micro Data Center and for the further development of a national research data strategy*, Vienna.

guaranteeing appropriate data sovereignty. With the implementation of the access criteria, the Austrian Council believes special focus should be afforded to flawless data protection processing appropriate for the access requirements, to prevent and detect data misuse and essentially avert data protection violations. At the same time, however, much emphasis must also be placed on unbureaucratic processing, so that data queries do not generate excessive expense for researchers and research institutions. The calculation of the costs for access to and use of data records should also be chosen so that financial obstacles for access-authorised science and research institutions are ruled out.

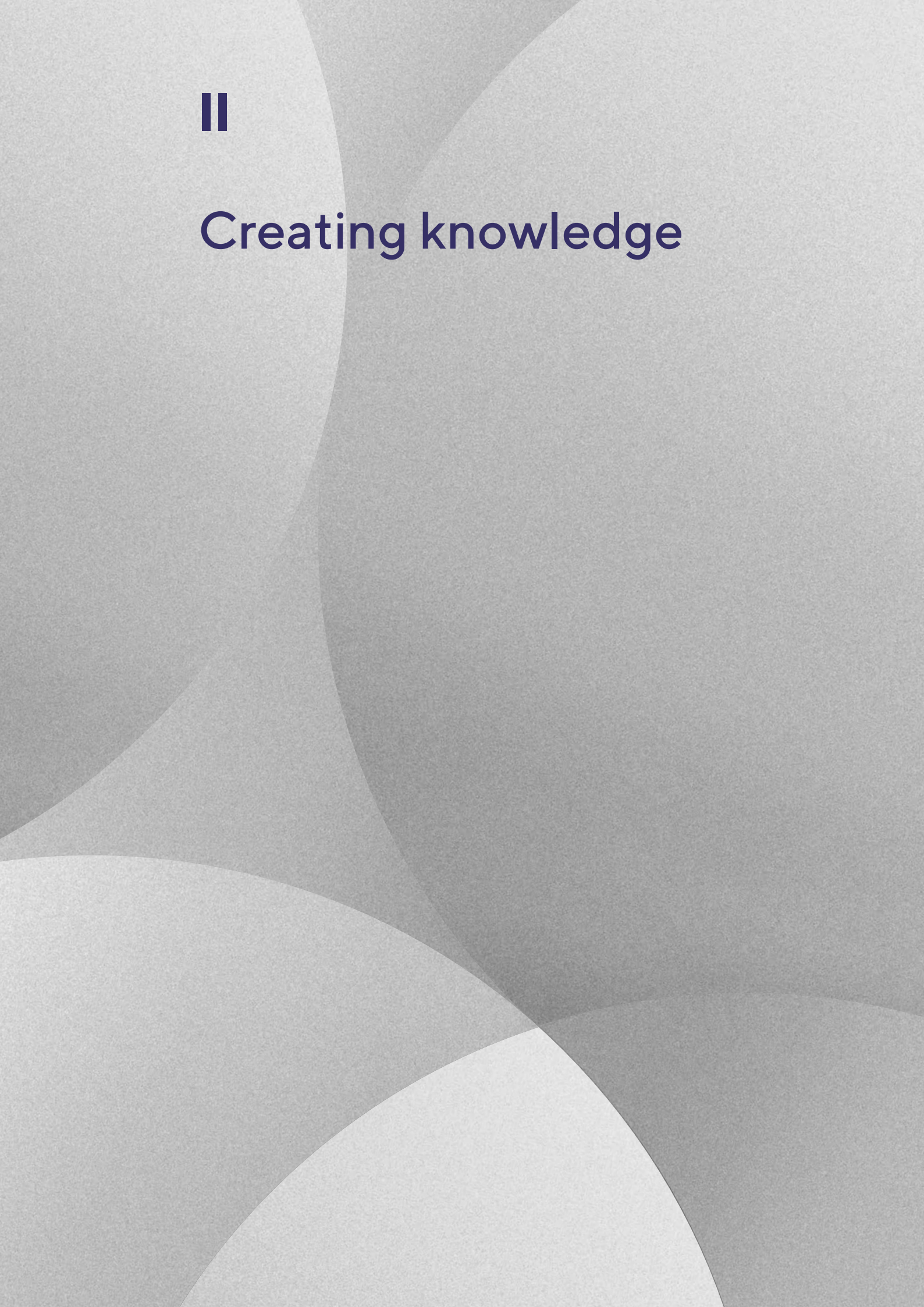
———→ **More efficient data use to combat the effects of the Covid-19 crisis**

With regard to the legislatively mandated public sector access to register data, regulated in the ROA (§ 38b), the Council also calls for swift measures to open up the individual registers by issuing statutory ordinances. The responsible Federal Ministers in particular should promptly issue such ordinances for those registers that contain the relevant data to combat the effects of the Covid-19 crisis.

The Council believes these versions of the Federal Statistics Law and the Research Organisation Act are an important step towards providing secure and simple remote access to register data and to public sector data for science, and thus to provide digital data as important raw material for science, research and innovation. Added value for science and research is then generated, and the entire of society also benefits here. As became so obvious for so many with the COVID-19 pandemic, scientific analyses of epidemiological developments are therefore possible and sound advice can be provided. The general public, for example, can consequently be informed quicker and more efficiently about existing health risks or the prevalence of specific viral loads in different age cohorts.

———→ **Accompanying awareness measures required**

New opportunities are not only presented in relation to the COVID-19 pandemic – they also appear in other areas, such as better investigation of climate-relevant, demographic or economic developments. The Council therefore believes it is particularly relevant in terms of the implementation of the AMDC that a wide-ranging awareness campaign be launched with the goal of creating new mindfulness among all those involved and in particular among the broader general public that data must be considered a public domain asset and activities in this respect in Austria must be harmonised with the respective efforts at European level. Firstly the added value for society and the individual must be emphasised here. But secondly, the fact that on the basis of the General Data Protection Regulation Europe cultivates a common path for securely handling data and therefore differs in such from the USA's or China's data policy, must also be positively underscored here.



II

Creating knowledge

Work areas

Report on Austria's Scientific and Technological Capability 2021

According to the Research and Technology Promotion Act, the Austrian Council is assigned the task of establishing innovation monitoring and examining the step-by-step implementation of an Austrian RTI strategy. In 2010, the Cabinet commissioned the Austrian Council with the compilation of an annual report on Austria's scientific and technological capability. The Council has also complied with this remit with what is now its tenth report.

This report records the results of the analysis of the objectives of the RTI Strategy 2030 and the analysis of the current strengths and weaknesses of the Austrian RTI system in the international comparison.

Key results

——> **The RTI system's weaknesses outweigh its strength areas**

The essential results of the strengths-weaknesses analysis are provided in figure I. It illustrates how the Austrian RTI system has remained stable for some years in the international comparison, however it also shows patchy performance with some strengths and significant weaknesses. The RTI policy therefore still faces major challenges. In equal measure they affect the framework conditions for research, technology and innovation, the core RTI system, the cross-cutting issues (especially digitalisation, followed closely, however, by climate and environment), as well as the efficiency and effectiveness of RTI activities.

While three clear strength areas can be identified compared with the leading innovation nations, Denmark, Finland, Luxembourg, the Netherlands and Sweden, those areas in which Austria now even shows a significant distance to the innovation leaders predominate.

——> **However, strength areas also face challenges.**

The RTI system's strengths include the generally above-average level of R&D funding, high RTI support and performance of existing companies and the attractiveness of the business location. Austria also performs well in the area of international networking – the distance to the leading nations is minimal here.

It should be noted, though, that in many cases these positive findings are accompanied by deteriorations. The corporate innovation area, for example, shows considerably better performance in the inputs area. In terms of relevant outputs, however, Austria continues behind the innovation leaders. This is particularly problematic with regard to the quality and quantity of technological inventions, as demonstrated especially by the weaker patent activities relative to the leading nations – they are of course a basis for future economic success. In the internationalisation area, we see that the scientific ties in particular exhibit downward trends in all analysed categories. And the high level of RTI funding conceals the problem of low innovation efficiency.

————→ **The RTI system's weaknesses impede increases in innovation performance**

The greatest weakness in the core RTI system is the area of innovative start-ups. This is problematic because in particular in times of socio-economic crises, new, innovative and knowledge-intensive companies with given growth potential and appropriate growth plans are essential for structural change, technological transition and on the whole the dynamic development of modern national economies. Despite numerous initiatives in recent years, there are hardly any changes here. The corresponding objectives of the RTI Strategy to optimise start-up activity are therefore to be welcomed.

In the area of cross-cutting issues the two global megatrends, digitalisation and environmental and climate protection, in particular are the greatest challenges. Digitalisation and digital infrastructures are the key pillars of all digital business models and therefore extremely important for the further development of modern national economies. Weaknesses in this respect must therefore be addressed specifically, as essentially intended by the RTI Strategy. Climate change is one of the key grand challenges of the near future, so there is also a need for a clear prioritisation here.

There is also improvement potential in all sub-areas of the Austrian RTI system, which must be exploited to increase innovation performance. Especially worth mentioning is the educational system in all its variety, the framework conditions for the universities and research performance, as well as the areas of regulation and taxes.

On the whole, the strengths-/ weaknesses analysis illustrates the need for optimisation in many areas of the RTI system. It is also evident that the development dynamic has not been sufficient in recent years to actually achieve the level of the leading nations in the majority of the examined sub-areas of the RTI system – especially in the core RTI system. On the whole, there is still a distance to the leading European innovation nations, Denmark, Finland, Luxembourg, the Netherlands and Sweden, but also Switzerland. This has even increased further in some areas.

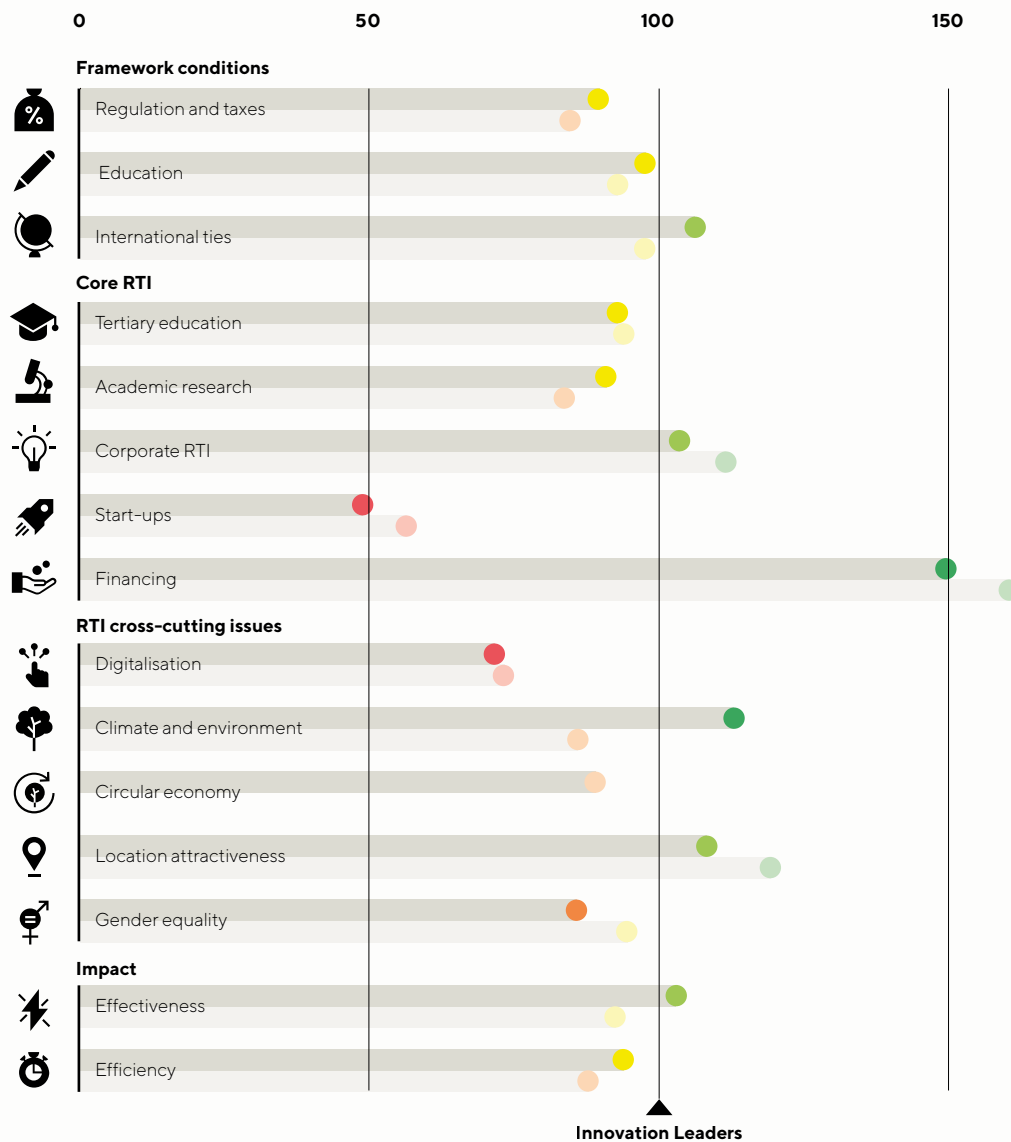


Figure I: Overview of Austria's strengths and weaknesses compared with the innovation leaders, 2022 versus 2021

● Value $\geq 109,5$ ● $99,5 \leq \text{Value} < 109,5$ ● $89,5 \leq \text{Value} < 99,5$ ● $74,5 \leq \text{Value} < 89,5$ ● Value $< 74,5$



Data at:
fti-monitor.rfte.at/

→ **The RTI strategy addresses key challenges and sets relevant priorities**

The Austrian Government's RTI Strategy 2030 adopted on 23 December 2020 largely refers directly to these challenges and specifically addresses some of the key weaknesses of the RTI system. The majority of the strategic objectives also have an equivalent in the recommendations of the OECD and the Austrian Council. The Council believes the right priorities for further developing the Austrian RTI system are set with the overriding objectives of the RTI Strategy. The specific focus on effectiveness and excellence and on the key function of education (tertiary) for research, technology and innovation must in particular be emphasised here.

→ **The RTI Strategy does not address further relevant topics**

It should be noted that the RTI Strategy does not cover some relevant topics. The RTI Package also only addresses these on the periphery or with little substance, if it does at all. To be named here in particular are the areas of "Education (without tertiary education)", "Governance at universities", "RTI for climate and environmental protection" and "Protection and exploitation of intellectual property rights", which the Council believes are significantly important for the further development of the Austrian RTI system intended by the Austrian Government.

The area of school education was almost completely factored out by the RTI Strategy 2030, which must be evaluated critically in view of its fundamental importance for the RTI system. The issue of governance and management structures at the universities was actually addressed within the scope of the amended University Act; however, the Council believes it should be emphasised even more intensively in accordance with its actual importance. The situation is similar in optimising the protection and exploitation of intellectual property rights, whose key dimension for the Austrian RTI system is not illustrated in the strategy. The fact that there is no individual RTI policy goal in relation to climate and environmental protection should be compensated for in other ways. However, the OECD refers explicitly to Austria's corresponding catch-up requirement; the Council believes at least one input goal and a budgetary prioritisation (based on systematic reallocations) to increase R&D expenditure for energy and environmental research would have been appropriate.

→ **The RTI Strategy objectives are very ambitious for the most part**

The detailed analysis of the RTI Strategy 2030 objectives produces a heterogeneous picture. Whereas individual goal values have already been achieved, other objectives show a distance between targeted and actual value, which is so high that goal achievement is rather unlikely. Figure 2 provides an overview of the respective distance to the goal values. It shows that the number of ambitious objectives with a high goal distance outweighs

GOALS OF THE RTI STRATEGY 2030		Current value	RTI goal	Goal achievement
1	Become an international innovation leader and strengthen Austria as an RTI location			
1.1.1	Rank improvement in international indices: European Innovation Scoreboard (EIS)	10	5	50
1.1.2	Rank improvement in international indices: Digital Economy and Society Index (DESI)	10	5	50
1.1.3	Rank improvement in international indices: Global Innovation Index (GII)	18	10	56
1.2	Increase number of R&D-active companies by 20 %	3872	4187	92
1.3	Participating in at least 3 additional IPCEI	4	5	80
1.4	Drive forward digital transformation	composite indicator		70
2	Focus on efficiency and excellence			
2.1	OECD top 5 in R&D rate	7	5	71
2.2	Expansion of the venture capital pool to 0.1% compared to GDP	0.07%	0.1%	72
2.3	100% more economically successful academic spin-offs			
2.4	Top 10 placing with European Research Council (ERC) grants	4	10	100
2.5.1	Strengthen participation in Horizon Europe	2.9%	> 2.9%	na
2.5.2	Top 3 ranking in Horizon Europe (or Horizon 2020) success rate	3	3	100
2.6	Increase the corporate sector's success rate with Horizon Europe	17.3	20	86
3	Promote knowledge, talents and skills			
3.1.1	Increase STEM graduates by 20 %	23.4	28.1	83
3.1.2	Increase the percentage of women with graduates in technical subjects by 5 %	49.8	52.3	95
3.2	Top three place in the IMD-World Talent Ranking	6	2	33
3.3	2 Austrian universities among the top 100 (THE World University Ranking)	0	2	4
3.4	Universities: Foreign share in new recruitments 45 %	46 %	45 %	100

Fig. 2: Overview of the distance to the RTI Strategy 2030 goal values

the others. Of the 17 objectives allocated to a defined target value, 12 can be classified as very ambitious; achievement of the targeted value only appears realistic with dedicated implementation activities. From today's perspective, the intended expansion of venture capital investments to 0.1 percent of GDP in particular and the objective of placing two Austrian universities in the top 100 appear to be over-ambitious. By contrast, the goal values in relation to a top ten placing with the ERC Grants were already achieved, as was the top three placing with the Horizon Europe success rate.

Conclusions

The essential conclusions delivered by the results of the analysis of the current strengths and weaknesses of the Austrian RTI system in the international comparison and the objectives of the RTI Strategy 2030 are as follows:

- o The RTI Strategy 2030 objectives address the correct topic areas to improve the RTI system's performance. To achieve the goals, however, key areas require ambitious steps to implement the measures defined in the RTI Package.
- o As part of the implementation activities, the two greatest weaknesses of the RTI system in particular (start-up activity and digitalisation) and the area with the third worst performance, namely environment and climate protection, must be afforded the highest priority, to ensure the connection with international trends is not lost.
- o Two areas that are especially important for the RTI system's performance (the education system from primary to tertiary level and the higher education area), whose performance shows significant weaknesses in the most diverse sections, must also be specifically addressed to improve the overall performance.
- o At the same time, the existing strength areas of the RTI system must be further supported to also generate positive results in the future.
- o Efficiency and effectiveness must also be increased further in all RTI system sub-areas (as indeed intended by the RTI Strategy).

Education – Digitalisation – Equal Opportunity

The Covid-19 pandemic and the need for home schooling and *distance learning* connected with it have shifted the focus to the “education in the context of digitalisation” topic. The Austrian Council therefore developed a project idea, which will not (as was often the case in previous discussions on digitalisation and education) focus purely on the important, however insufficient point of availability and usability of terminal devices and bandwidth. It is far more about questions concerning *digital literacy* and – highly evident in the school area in particular – the *digital divide* topic. With *digital literacy*, the focus is on the question as to which competencies require a “society digitalisation” at all, and which teaching content and forms, paired with the right didactics, should determine educational activity. Competencies for information procurement, for example, digitally-supported cooperation, the critical reflection of sources and *data literacy* appear at the point where knowledge is reproduced. Didactically this means a swing away from unidirectional mediation towards practical testing and collaboration. The *digital divide* in turn poses questions concerning social inequality with regard to digitalisation, whereby the difference can be made between *first-order* (access to hardware) and *second-order* (usage competencies) social differences. The challenge in implementing digitalisation lies in developing strategies and concepts, which, by introducing digitalisation, will not increase the already immense social inequality in the education system.

In preparation for the project, the Council staged four discussion groups, attended by fifteen experts from the most diverse areas. The main topics here were “Equal Opportunity” and “Digitalisation”. A project entitled, “Future of education in the context of digitalisation and equal opportunity” was developed on the basis of findings produced here, and will be implemented in 2022.

Evaluation – the “Evaluation Talent Award”

The monitoring and evaluation topics are anchored in the Austrian Council’s legally stipulated range of tasks. To perform these the Council therefore also committed from day one to the “Platform for research and technology policy evaluation” (fteval). To support this topic with its due significance, together with fteval the Council has initiated the “Evaluation Talent Award”, the goal of which is to promote evaluation talent and therefore contribute to the further development of the evaluation landscape and to optimising the evaluation culture in Austria. The importance of evaluations for evidence-based policy-making in the RTI community and the general public will also become more visible.

The award winners were decided by a jury of experienced players from the research policy area and its evaluation, chaired by the Austrian Council. Johannes Gadner was the foreperson with the first jury session on 30 August 2021. The nominations of seven eval-



uators with impressive CVs and interesting evaluation experiences were duly discussed. Because the jury was so impressed by the quality of the submitted nominations, the decision was made to present two awards this year: One went to María del Carmen Calatrava Moreno from Technopolis, and the other to Magdalena Wicher from the Institute for Higher Studies (IHS).

Both award winners are researchers with different priorities in their approach to evaluation. Carmen Calatrava Moreno has an academic background in computer sciences and introduces the more intensive use of data to the field of research policy evaluation, with which she explores much uncharted territory. For Magdalena Wicher, research and innovation's contribution to society is key; she understands evaluation and monitoring as part of a comprehensive programme to strengthen more responsible research and innovation.

The award will be presented by Austrian Council member Jakob Edler in May 2022 as part of the "REvaluation Conference – European Research and Innovation Policy Evaluation Conference" with an official ceremony.

Reports and Studies 2021

New European industry, innovation and technology policy (NIIT)

Against the backdrop of an extremely intensive debate in recent years on a new industry, innovation and technology policy, at the beginning of 2020 the Austrian Council had already commissioned Joanneum Research-POLICIES and WIFO to perform a review of the current state of discussion and knowledge with regard to this topic area. Subsequently key elements of these debates were prepared in a discussion process with Austrian stakeholders and transformed into options for action for a new Austrian industrial policy. This process was also supported by eutema.⁴⁵

The focus topics were selected interactively and included:

- o General development lines and alignment of the European industrial policy, including the latest versions of the relevant Commission statements.
- o Changes in European state aid law (especially in the context of the “Important Projects of Common European Interest, IPCEI” mechanism).
- o The discussions on CO₂ border adjustment mechanisms and their appraisal from an industrial policy point of view.
- o The issue of sovereignty (digital/technological), which has recently once again pushed very much to the fore.

These topics were discussed in own expert workshops, for which the assignees had created their own input papers, which formed the basis of the discussions. The possible implications of these European developments and options for action were then finally discussed in an own workshop.

Key results

The high social relevance and the urgency and abundance of current challenges, to which the industrial policy can actively contribute much to overcoming, make it clear that the recent industrial policy renaissance is no temporary phenomenon, but rather will remain a constant essential component of European economic policy. Whether or not Austria is sufficiently prepared for this, however, must also be answered, as an industrial policy that is defined by its goals and not by an existing, tightly limited instrument, is inevitably an

⁴⁵ Online at rat-fte.at/files/rat-fte-pdf/publikationen/2021/2106_Endbericht%20NIIT.pdf.

interdisciplinary matter, which is based on the cooperation and mutual harmonisation of a multitude of different policy areas. This includes the research, innovation and technology policy and the trade policy, the competition policy, education policy, infrastructure policy or numerous sector-specific regulations, to name but a few examples. These policy areas with their specific tasks and mechanisms have grown historically and in Austria are extremely diverse, differentiated according to various tasks and well-institutionalised – in the sense that they are performed by established institutions (ministries, agencies, etc.), which are each equipped with experienced staff and specific responsibilities and tools. By contrast, in the industrial policy it is difficult to draw institutional boundaries at all and determine which institutions are responsible on the whole for defining goals, the development of strategies and the coordination of measures and mechanisms.

The history of European industrial policy illustrates the challenges and possibilities. A new industrial policy can only permanently establish itself as an independent, modern and logical policy area, if its players remain vigilant to an ever-changing environment and prevent any return to old mistakes, such as the interpretation of strategic autonomy as the dominance of national vested interests, which then results in the policy ultimately being caught up in escalating trade conflicts and subsidy races. It is also key, however, to develop sustainable and generally accepted mission statements and to translate such into sound, realistically implementable measures that are immediately tangible for both companies and the general public. A new industrial policy therefore first and foremost defines itself via its contribution to meeting the big economic and social challenges.⁴⁶ Against the backdrop of these numerous challenges, the industrial policy is actually undergoing a renaissance, both internationally and in the European Union. To address these challenges the EU Commission also sees the need to further develop industrial policy mechanisms, such as state aid law or a foreign trade regime. Generally speaking, the impact direction of the EU industrial policy is currently heavily focussed on the mitigation of unequal conditions on international markets (creation of a level playing field). Austria can and must actively participate in these discussions at European level and both drive forward the European discussion and draw conclusions from the European developments for its own positioning.

With the Important Projects of Common European Interest (IPCEI) the EU has “revived”⁴⁷ a mechanism that can promote major industrial and infrastructure projects of European importance. The background here is awareness of restrictions on possible actions and mechanisms, which the EU possesses to respond to global competition and major economic and social challenges. IPCEI can and will be defined here in all policy areas that pursue common European goals. So while economic and industrial policy motivation is at the fore of the current debate,⁴⁸ IPCEI are also an important tool explicitly provided for

⁴⁶ See Peneder M. et al. (2020): *WIFO radar of the Austrian economy's competitiveness*, WIFO monthly reports (12), 887-898, Vienna.

⁴⁷ See Deffains et al. (2020). The basic idea of funding important projects of common European interest is historically already laid out in the constituent documents of the European Community.

⁴⁸ See European Commission (2020): *A new industry strategy for Europe*, COM (2020) 102, Brussels.

in pursuing other objectives (in the environment, energy, transport policy, for example).⁴⁹ Various criteria must suffice as IPCEI-defined plans to ensure there is no competition-distorting effect and must therefore address serious cases of market or system failure, show major positive external effects, incorporate several member states, target fundamental product or process innovation and be able to make significant contributions to overriding European policy goals (to the “Green Deal” or to the digital strategy, for example).

From the current (also Austrian) discussions we can formulate a series of options for action, both for the national industrial policy and for Austrian positions on the further development of the European industrial policy. These include, for example:

- o Clear accelerations and simplifications in approval processes.
- o The ability to improve the participation of SMEs, by reducing entry barriers, for example.
- o Greater expansion of IPCEI to achieve the level of economically viable production.
- o Greater “Europeanisation” of the IPCEI (with co-financing at European level via the RRF, among other things) – with simultaneous maintenance of the intensity of competition and the range of opportunities to participate.

For the industrial policy in Austria there is therefore the task, against the backdrop of own specialisation patterns, of actively participating in the European discussions on the definition of value creation chains, to secure participation in IPCEI and to support participants in the best possible way. This in particular also requires appropriate resourcing.

Industrial policy and Green Deal

The goal of climate neutrality by 2050 defined in the Green Deal is an essential component of the European Commission’s new industrial policy strategy. This requires a user-based pricing of climate-damaging emissions, among other things. The absence of a globally uniform solution at the respective source of the origin of these emissions, however, results in unequal competition conditions in international trade and therefore in the danger of carbon leakage. Only with the interaction of climate policy with trade and industry policy can countries that play a pioneering role with CO₂ pricing mitigate the problem with compensating CO₂ border adjustment mechanisms (CBAM).

In its current industrial policy strategy the European Commission affirms its intention to introduce such a CBAM for selected sectors. The restriction to a certain few emissions-intensive sectors (cement/concrete or steel, for example) will keep the administrative hurdles manageable, while a relatively large part of the direct emissions would be covered at the same time. An important factor for the successful implementation of the mechanism

⁴⁹ See European Commission (2014): *Criteria for the analysis of the compatibility with the internal market of State aid to promote the execution of important projects of common European interest* 2014/C 188/02, Brussels.



here will be compliance with the World Trade Organisation's (WTO) set of rules. Austria should actively participate in this European discussion and support the development of an implementable and at the same time effective European CBAM.

Digital sovereignty in the face of geopolitical and geo-economic upheavals

The ongoing turbulence in geopolitical order, combined with the high-level internationalised value creation chains (but not only) of digital technologies, is a driver of the requirement to strengthen our digital sovereignty. Added to this is a new form of "digital geopolitics", which also includes the use of digitally-based powers to pressure or manipulate, with cyberattacks or political opinion formation in social media, for example. States and companies' ability to act is an important sovereignty goal of the new industrial policy. For a European sovereignty policy that targets digital and technological sovereignty, clear synergies emerge with both the European industrial and economic policy and with the cohesion policies. The swift and consistent formation of the European single digital market, for example, is important for a sovereign European industrial policy. Such a market can help to create sufficient demand and successfully establish European technology alternatives and also achieve export successes where required. An active industrial policy in this context can be shaped, for example, with:

- o Diversification of supply chains, that is, some critical components should be deliverable in Europe.⁵⁰
- o The protection of critical infrastructure (5G, power, water, transport infrastructure).
- o The recovery of data sovereignty with, among other things, digital encryption to protect private and business data.
- o The consolidation and expansion of the "basis of European values", with legal standards and tools for its implementation, GDPR, for example.

Measures in the area of digital sovereignty range from the required precise analysis of the problem to specific countermeasures. A digital dependency analysis and feasibility study for the critical infrastructure (communication, 5G, power, water, transport infrastructure, for example) should therefore be performed. A next step might be the completion of a feasibility study on exchanging components, changing technology bundles and the introduction of modular architectures, etc.

In the industrial area possible measures range from improving the data infrastructure's reliability to stronger encryption of the communication with and between public sector institutions through to the contractual strengthening of the communication and data availability with private providers (Internet service providers, for example). This, however,

⁵⁰ Scheuer (2020): *Digitale Souveränität ist ein Irrweg*, handelsblatt.com/meinung/kommentare/kommentar-digitale-souveraenitaet-ist-ein-irrweg/26002692.html?ticket=ST-2256067-OzDTNbyJQ6dq5YzdFheg-ap2 (10/2/2021).

also includes sharing best practices, the development of modules and tools for easier implementation of existing standards and the active discussion of sovereignty-maintaining strategies in the industrial environment (automotive industry, energy sector, communication, for example).

Strengthening knowledge and development sovereignty

Sovereignty goals can also be achieved by improving training and further training with appropriate content. This includes, for example, the improvement in STEM training, often called for anyway, in all study programmes and the mediation of basic ICT skills for all study programmes. Strategic sovereignty topics should be included more in teaching and research. Training and further training also play an important role in the private sector, with offers in the cyber security, supply chain security, data protection, protection against industrial espionage topics, for example.

The public sector can increase incentives by considering digital sovereignty as part of public tenders, with requirements for alternative sources, for example (2nd source). Sovereignty aspects should be a legitimate component of the evaluation criteria with public procurement contracts. In the private sector, incentives can be created with information campaigns with medium-sized and large companies and with companies with critical services and infrastructure.

Knowledge and development sovereignty can also be increased by strengthening European publication and research databases. Existing RTI programmes (in the ICT environment, for example) can be used to address the sovereignty topic. Both national and European legislators are assigned the task here of defining requirements (in the cyber security area, for example) as well as regulating civil liberties and self-determination rights (data protection law, for example) and securing their implementation. Transparency in these processes and the public discourse are extremely important in the technology area of computer sciences in particular, which is difficult to navigate anyway. The possible measures in the governance area also include the strengthening and initiation of diplomatic initiatives to outlaw cyber criminality and improve cooperation in the area of critical raw materials with the goal of improved supply security.

Contribution of COVID-19 fiscal stimuli to resilience and transformation

The Austrian Council participated in an international project on the analysis of the “Recovery and Resilience Facility” (RRF) and its effects on transformative processes and innovation. The RRF was created by the European Commission in response to the economic crisis caused by the pandemic. The project entitled “National recovery packages, innovation and transformation” is pursued by some Nordic states and the OECD. The Council also awarded a study contract to the AIT – Austrian Institute of Technology.⁵¹

The motivation to participate in the project was to examine Austria’s reactions and those of the other participating countries to the various effects of the crisis and the national “Recovery and Resilience Plan” (RRP) established by the governments under the auspices of the RRF, to identify the contributions of the measures determined for the green and digital transformation and to increase the resilience of the economy and society in general.

It especially scrutinised the question as to if and how the stimulus packages have helped or can still help make contributions to greater sustainability and digitalisation. This was therefore also particularly interesting, as available data from Statistik Austria indicated that the R&D funding of companies fell by 12 percent from 2019 to 2020, so even more than during the 2008/2009 crisis. Whether or not the measures implemented were agile enough to support new start-ups or spin-offs and new business models as potential activators for the required structural change and transformation was also examined.

A key result of the study is that the transformative character of the Austrian RRP in the international comparison looks rather promising. This also corresponds with the results of an analysis by the Wuppertal Institute (see figure) on the sustainability goals of some national stimulus packages in the comparison. This shows that approximately half of the measures implemented as part of the Austrian RRP are rated positive with regard to the sustainability goals. The biggest individual items in the Austrian RRP are investments in broadband expansion and rail transport. R&D and innovation therefore play a comparatively minor role. Only RTI activities in the area of microelectronics and hydrogen must be emphasised in this respect.

It should also be noted that the measures implemented by the Austrian Government are well complemented by the steps taken by the EU. Their volume also exceeds that from the European budget coffers. The investment premium alone brings EUR 3.5 billion in additional national funds for the areas of digitalisation and sustainability. It must therefore be expected that a substantial contribution to transformative processes can therefore be made.

⁵¹ Online at rat-fte.at/files/rat-fte-pdf/publikationen/2022/RFTE-2022-National-recovery%20packages-innovation-and%20transformation.pdf

Strategic Foresight processes – overview and options for action

More and more governments use systematic and future-oriented research to make sound political decisions. “Strategic Foresight” as a method for supporting decision-making here denotes the ability to collect, process and integrate information on the future of your own operating environment as an essential basis in decision-making processes. The Foresight topic is therefore increasingly more important for policy consultation and think tanks.

The Austrian Council has thus commissioned a pre-study of strategic Foresight processes to provide an overview of the current status of Foresight in Europe and to record international and ongoing activities in Austria and the available expertise. It was performed by EBP Schweiz AG. The objective of the study was to develop possible options for a Foresight process in Austria and for the Council on the basis of the results.⁵²

Essential factors for successful Foresight processes were identified on the basis of a broad analysis of existing Foresight processes and diverse “forward looking activities” in Europe and in Austria, as well as a detailed examination of processes at the European Commission, the Federal Ministry of Education and Research in Germany, the Government Office for Science in England and the Future Generations Commissioner in Wales. These, among other elements, include broad stakeholder participation, sufficient capacities, international networking and clear coordination with the client (the government, for example). A support framework is also helpful, such as proactive public relations work, good process design, and the long-term promotion of “Futures Literacy”, so the skill that enables people to better understand and proactively apply the importance of the future in their current actions.

Building on these findings the study outlines various recommendations for action. As the study showed that in Austria, despite numerous smaller initiatives, there are currently no overriding, institutionally anchored and regularly performed Foresight processes that deal comprehensively with the most important trends and developments, which Austria is faced with in the medium and long term, the conceptualisation of such a project is recommended. A strategic Foresight project should be initiated to generate appropriate findings or to derive such for Austria from existing international processes and to allow these to flow into current policy-making. The goal here should be to integrate Foresight as an established tool into the policy strategy development and long-term planning. The results would have to be made accessible and applicable for the body politic, administration, economy, science and the public sector. Last but not least, comprehensive Foresight competencies and Futures Literacy should also be built up in ministries and administration.

52 Online at rat-fte.at/files/rat-fte-pdf/publikationen/2021/211115_EBP_Foresight_Schlussbericht_anFTE.pdf

Global Entrepreneurship Monitor Austria 2020

JOANNEUM UAS and the Institute for International Management have been performing the Austrian part of the largest international comparison study on entrepreneurship, the Global Entrepreneurship Monitor (GEM), since 2005. The GEM analyses the structure and dynamic of the corporate landscape, as well as essential starting point and framework conditions. The GEM's authors formulate recommendations for action on the basis of the findings produced here.

The GEM 2020 published in 2021 was entirely dominated by the effects of the Covid-19 pandemic. There was also focus on research, technology and innovation, as well as the digital transformation. Furthermore, expert interviews to collect information on the framework conditions of entrepreneurial activity and a population survey (Adult Population Survey, APS) were also held once again with the GEM Austria 2020. As part of more than 4,500 telephone interviews this representative survey determined numerous relevant indicators for policy planning and evaluation. The significantly higher sample variable compared with GEM 2018 enabled comparisons between the Austrian states, among others.

Key results

The effects of the Covid-19 crisis have seriously unsettled Austrian entrepreneurs, and significantly subdued the start-up dynamic, optimism and growth expectations. Austria has to some degree been harder hit by the negative effects than other European countries. At the same time, the crisis also accelerated the structural change, also because the digital transformation and the sustainability transformation have increasingly also become the driving forces of entrepreneurial activity. These must now be supported accordingly, to set the right pointers for the future. In other words: Innovation and economic policy incentives must be introduced to overcome the numerous existing challenges.

The percentage of young entrepreneurs during the course of the Covid-19 pandemic fell to 6.2% and therefore significantly so, whereby Austria dropped from rank 3 to rank 12. Generally speaking during the pandemic fewer start-up opportunities were exploited, but at the same time about one third of young entrepreneurs recognised and used the new business opportunities resulting from the Covid-19 pandemic. The start-up competencies required for this were once again positively appraised in the previous survey period, however with entrepreneurial training and further training in Austria, once again even more catch-up requirement was seen, and the offering even fell further in the European comparison. The dominant socio-cultural standards in particular are perceived as start-up-inhibiting, especially in the international comparison. Securing a livelihood was seen during the pandemic as the most important start-up motive, but on the whole

a start-up was seen as a less worthwhile career option. Along with economic goals, 45 % of young entrepreneurs also focussed on social and/or ecological objectives.

The percentage of established entrepreneurs on the other hand remained relatively stable at 7.8 %. The Covid-19 aid measures meant the rate of “dropouts” was kept relatively low. The Covid-19 crisis, however, had different effects on the respective entrepreneurial phases. And the individual economic sectors and the different Austrian states were also affected differently. On the whole, there were frequently also delays and difficulties in starting a business, while core activities of established business owners were not affected as much. Across the board the employment and growth expectations of Austria’s companies were clearly subdued by the crisis.

The average age of Austrian young entrepreneurs remained constant at 37. The percentage of women rose significantly by 7 percentage points to 43 % and the percentage of academics among Austrian entrepreneurs also increased further.

The restrictions caused by the Covid-19 crisis in particular impeded Austrian companies’ internationalisation activities. Austria also deteriorated here in the European comparison and has now fallen to rank 11. The entrepreneurial activity within established companies on the other hand fell all over Europe; Austria at least maintained a relative position here.

During the study period the crisis also resulted in the postponement of investment and innovation decisions and therefore in a greater fall in the level of innovation and research intensity at Austrian companies, whereby this in particular disproportionately affected the established RTI-based companies. The percentage of RTI-based established companies fell by 23 percentage points to 65 %. The RTI-intensive companies were less affected by the effects of the Covid-19 pandemic and 44 % of these even saw new business opportunities presented by Covid-19.

The possibilities of the digital transformation were, however, only partially still recognised. Fewer than half of Austrian companies appear to be able to monetise the benefits of the digital transformation, whereby young entrepreneurs position themselves clearly ahead of established entrepreneurs here. Catch-up requirement is in particular seen with digital customer interaction and the mediation of necessary skills for the digital transformation.

With the evaluation of the entrepreneurial environment, on the whole in 2020 Austria was placed in the European and international midfield. The entrepreneurial ecosystem was shown to be relatively crisis-resistant, and at the same time resistant to change and continues to suffer from already well-documented weaknesses. While the physical infrastructure and the funding offer were positively evaluated and internal market hurdles (such as market entry difficulties and costs, for example) estimated to be low, on average there were negative evaluations for market dynamics, standards and entrepreneurial training and further training. Other indicators were only evaluated as average, such as the financial framework conditions, the economic policy and the economic and services infrastructure, for example.



The appraisal of the effectiveness of government measures to cushion the economic effects of the Covid-19 pandemic differed greatly in Austria. Among those surveyed, there was both approval and disapproval, with significant differences between established companies and new start-ups. While 11% of young entrepreneurs rated the measures as effective, this percentage with established entrepreneurs fell to 9%; however, the percentage of young entrepreneurs that believe the measure is ineffective is also higher. In the European comparison, Austria managed only a lower ranking among new companies with the appraisal of the aid packages; with established companies it is somewhat better in the midfield.

Austrian Startup Monitor 2021

Since 2018, the Austrian Startup Monitor (ASM)⁵³ has been collecting comprehensive data on founding and developing start-ups in Austria. The ASM database set up for this has information on more than 3,000 new companies and is expanded with an annual survey of the start-ups included in it. The start-ups come from various industries and sectors, however are similar in terms of their innovative content and their growth intentions. Along with numerous organisations and companies, among others the Federal Ministry for Digitalisation and Business Location and the Federal Ministry of Climate Protection, Environment, Energy, Mobility, Innovation and Technology, as well as the Austrian Federal Economic Chamber, the Austrian Council also supports the creation of the ASM.

More than 460 companies took part in the survey performed in autumn 2021, which was a slight increase over 2020. Once again, the focus here was on questions relating to the development dynamic and expectations with regard to corporate growth and for the company founders, business models, internationalisation efforts, financing structures and the use of funds. Special focus in 2021 was placed on analysing green start-ups. The re-appraisal 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, that is, while some companies had to accept high sales slumps, others, especially in the area of digital technologies and applications connected with them, were able to generate highly positive effects from the ongoing crisis. Comparative analyses were also performed at state level by continuing the ASM 2019.

As in previous years, start-ups were also surveyed in 2021 for their estimation of the importance of different technology and innovation trends. Artificial intelligence is consequently 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.

⁵³ Online at rat-fte.at/files/rat-fte-pdf/publikationen/2021/Austrian%20Startup%20Monitor%202020.pdf

Spin-off Dashboard Austria 2021

Knowledge production in universities and research institutions and the corresponding knowledge transfer in companies are essential for increasing productivity and innovativeness and therefore are key factors for an economy's competitiveness. Spin-offs which both channel and strengthen the knowledge and technology transfer from the universities and research institutions into the economy and society, and in particular also support economic growth, especially the creation of attractive jobs, are assigned a key function and special importance here. Spin-offs, especially exploitation spin-offs, often have close collaborations with their organisations of origin (that is, universities or research institutions), which can result in numerous positive effects, direct monetary returns, knowledge transfers or proposals for new interesting research questions, for example. Spin-offs to some degree also offer the only opportunities to further develop research results with a view to their commercialisation. Spin-offs are important cooperation partners at the university/research institution location and a possible source of third-party funds or private capital.

The Spin-off Austria Initiative supports entrepreneurship at universities and research institutions and targets the goal of improving the long-term framework conditions for spin-offs and creating greater awareness among researchers that the foundation of a spin-off can be a suitable way to provide society with pioneering research results. The Spin-off Austria Dashboard, which will map a regular quantitative and qualitative recording of Austria's spin-off landscape, was presented as part of the Spin-off Conference 2021. The monitoring of spin-off activities is an important building block of evidence-based policy-making for the following reasons:

- o It is currently not possible to fully trace the number of spin-offs from universities and research institutions.
- o The urgently required attitude change and possible imitation effects are essentially determined so that successes and strategies that result in such successes, are made visible for students, graduates, employees and organisations.
- o There is a whole series of state support measures for spin-offs, whose effect can only be understood following medium-term analyses with regard to the development of the number of spin-offs and if a corresponding cultural and structural change at universities and research institutions is intensified and documented.

The Spin-off Austria Dashboard is therefore the first step of a comprehensive survey of spin-off activities in Austria. The required data will be provided by the universities, technical colleges and other institutions on the basis of a questionnaire, with the goal of creating a database of spin-offs, which can be expanded and completed every year. This will both create a long-term reference basis for monitoring and further developing the entrepreneurial ecosystem and also make clear statements on the progress of spin-offs possible.

The Austrian Council has conceptually advised and accompanied the initiators and responsible people of the Spin-off Dashboard Austria. In addition to co-shaping the actual survey tool, the Secretariat also and in particular developed a formal and content evaluation and weighting concept for the collected data and information, and provided such to the Spin-off Austria Initiative and the Spin-off Dashboard 2021 expert jury.

International activities

Austrian Research and Innovation Talk

■ WASHINGTON 18/09/2021

For some years now the Austrian Research and Innovation Talk (ARIT) has provided contact maintenance and information exchanges between students, scientists, researchers and entrepreneurs that work in North America (USA, Canada, Mexico) and the Austrian stakeholders. The annual event is organised by the Office of Science and Technology (OSTA) based at the Austrian Embassy in Washington DC. The Austrian Council has been an OSTA cooperation partner at the ARIT since 2020.

The Austrian Research and Innovation Talk 2021 was held on 18 September 2021 in Washington DC with the general topic of, “Energizing Knowledge Transfer Ecosystems”. Against the backdrop that emerging technologies are based both on basic research and on applied research, and partnerships and collaborations are therefore the key to success, new approaches were presented on how discoveries in the labs can be introduced into society. Leading experts provided information on the topics of financing, commercialisation, entrepreneurship and intellectual property, to convert ideas into opportunities. The speakers were unanimous that this can ultimately only be achieved with sustainable and joint efforts by universities, research centres, industry and governments.



ARIT discussion panel with (left to right) Federal Minister Faßmann (BMBWF), Sonja Schmer-Galunder (Smart Information Flow Technologies), Dieter Pfoser (George Mason University), Andrea Feigl (Health Finance Institute) and Section Head Barbara Weitgruber (BMBWF)



International Councils Meeting

■ 26/11/2021

Once a year the European Research Councils meet to exchange content information and experiences. In 2021, the Austrian Council organised the International Councils Meeting and it should have been held in Vienna, but unfortunately could only be virtual due to the lockdown caused by the pandemic at the time (and was therefore also a shortened version).

Despite the more difficult conditions, there was nevertheless an interesting exchange, on the basis, among other things, of the keynotes by Prof. Martin Wörter (ETH Zurich) and Prof. Christian Keuschnigg (University of St. Gallen). Christian Keuschnigg spoke on the “From Basic Research to Private Innovation” topic and, among other elements, referenced the study results produced for the Austrian Council by the *Wirtschaftspolitische Zentrum* (WPZ). Martin Wörter presented on the “How important is international knowledge sourcing for productivity?” topic, and with his presentation informed on the international knowledge flows that emerge when patents are awarded. The respective national councils then informed about current developments in their countries.

In 2022 there will be the usual two meetings – the first in May in Denmark and the Second in Switzerland in the autumn.

Events

Press conference on the presentation of the Report on Austria's Scientific and Technological Capability 2021

■ 10/06/2021

The Austrian Council presented its now tenth Report on Austria's Scientific and Technological Capability on 10 June 2021. The pandemic meant the report was presented by Deputy Council Chairperson Sabine Herlitschka and Council Member Jakob Edler as part of a virtual press meeting. An extensive strengths-weaknesses analysis of the domestic research, technology and innovation system was once again performed on the basis of a comprehensive set of indicators.

The summarising conclusion of the two council members in presenting the report was that Austria continues to be well positioned, despite the turbulences caused by the Covid-19 pandemic. During the crisis, the Austrian Government also focused intensively on research, technology and innovation and introduced the right measures by adopting the RTI Strategy 2030 and the RTI package. This is all the more important, as the development dynamic of the Austrian RTI system in recent years has actually been insufficient to join the leading nations. As a result, the considerable distance to the leading European innovation nations, Denmark, Finland, the Netherlands, Sweden and Switzerland, remains unchanged. Ambitious implementation activities are therefore now essential. The measures planned in the RTI Strategy and the RTI package would have to be swiftly implemented, so Austria will not run the risk of losing any measure of competitiveness.

IV

The Council

Look back and look forward: 2021 and 2022

Review 2021

What lessons does the pandemic year 2021 teach us? What can we learn from the upheavals connected with it? And how can we prepare ourselves for the next crisis?

The pandemic mercilessly held a mirror up to us. Society is split into vaccine believers and vaccine non-believers. Each wants to have as little to do as possible with the other. For a factually and technically oriented hypothesis, the issue is easy to resolve. The risk assessment between infection and vaccination speaks a clear language. Conspiracy theories on the other hand are more or less just that – theories, or claims. And everything we don't know, we have to believe. But beware: "Be careful what you think – you might just believe it." Science and research have the important role here of providing and clarifying information. In the German-speaking area, this is currently only marginally perceived, as massive scepticism towards science considerably restricts the desired effect. Much of this is homespun. Communication formats such as the "Long Night of Research" could not unfurl their full effect, because scientific institutions (many of them universities) didn't want to take part in them. The body politic has also used this topic more as a plaything than rather to actually recognise it as a communication task. This was avenged in the crisis. Result: Only about half the Austrian population trusts statements made by science. Austria therefore occupies a rather low position internationally.

Outlook for 2022

We have the opportunity to learn from the experiences of 2021 and directly implement what we learn – let's prepare ourselves for possible crises on a solid basis of social values. The next crisis will be different to the one before it. Perhaps it will be a natural disaster, a war, a new virus, perhaps this time from the MERS strains and not SARS. Research has the task of preparing the tools and the mindset for coming crises in the dialogue with society. This is not only necessary to close the social divisions again. The functionality of the innovation ecosystem also depends directly on the success of this process – on tolerance. There can be no knowledge implementation without social tolerance for accepting personal risks or the test phases of new products and services. Idea bringers go with their ideas where the chances for their successful implementation are the best. Austria must score significantly better here in the future.

Members of the Council

Council Board with voting rights

The Council Board has six members with voting rights, which were determined in equal parts by the Federal Ministry of Education, Science and Research and the Federal Ministry of Climate Protection, Environment, Energy, Mobility, Innovation and Technology. The Council's members with voting rights are appointed for five years, and one reappointment is possible.



Klara Sekanina, Dr.ⁱⁿ
Austrian Council Chairperson
Director of the Swiss Study Foundation
(Photo credits: Swiss Study Foundation)



Sabine Herlitschka, DIⁱⁿ Dr.ⁱⁿ MBA
Deputy Chairperson
CEO of Infineon Technologies Austria AG
(Photo credits: Infineon)



Hermann Hauser, Dr.
Company founder, computer and risk
capital entrepreneur in the UK, co-founder
of Silicon Fen („British Silicon Valley“)



Jakob Edler, Univ.-Prof. Dr.
Managing Director of the Fraunhofer Institute
for System and Innovation Research ISI



Helga Nowotny, em. Univ.-Prof. in Dr. in
Former President of the
European Research Council



**Sylvia Schwaag-Serger,
Univ.-Prof. in Dr. in**
Professor of the University of Lund

The advisory members of the Council Board (in alphabetical order):

The extended Council Board (without voting rights) includes the highest level representatives of the Federal Ministry of Climate Protection, Environment, Energy, Mobility, Innovation and Technology, the Federal Ministry of Education, Science and Research, the Federal Ministry for Digitalisation and Business Location and the Federal Ministry of Finance.

Leonore Gewessler, BA

Federal Ministry of Climate Protection,
Environment, Energy, Mobility, Innovation
and Technology

Dr. Magnus Brunner, LL.M.

Minister of Finance

Ao. Univ.-Prof. Mag. Dr. Martin Polaschek

Federal Minister of Education, Science and
Research

Dr.ⁱⁿ Margarete Schramböck

Federal Minister of Digitalisation and
Business Location

Secretariat



**Dipl.-Ing. Dr. Ludovit Garzik,
MBA DWT**

Secretariat Head



**Dipl.-Ing.ⁱⁿ Mag.^a Dr.in techn.
Alexandra Mazak-Huemer**

Deputy Head

Project manager for the "Report on Austria's
Scientific and Technological Capability",
coordination of strategic processes
(Government RTI Strategy, Strategy 2030),
speaker for the circular economy and
tech-economy, energy and sustainability
research



Dr. Anton Grashopf

Speaker for higher education policy,
international affairs, data policy, Open Science,
basic research, RTI funding and research
infrastructure



Mag.ª Maria Husinsky, MA

Office Manager (currently on leave)
Management Assistant, Office Management



Mireille Holfeld

Office Manager (leave cover)
Management Assistant, Office Management



Mag.ª Bettina Poller

Speaker for education, science/RTI and society, human resources, humanities, social and cultural sciences, promotion of women and gender mainstreaming, ethics in research, security research and public relations



Priv.-Doz. Dr. Gerhard Reitschuler

Speaker for impact analysis, macroeconomic development and trends as well as macro-economic monitoring, modelling and simulation, R&D data recording and analysis, output/impact (indicators), technology flow analysis, innovative procurement



Sascha Ruhland, M.A.

Speaker for industrial policy, technology policy, key technologies, start-ups, SMEs, governance in the RTI policy



Karin Schögg

Office Manager, responsible for accounting, HR and reporting



Mag. Martin Wagner

Communications manager, responsible for public relations, internal and stakeholder communication, editing



Dr. Bernhard Wally, MSc

Speaker for RTI mission orientation, Foresight, robotics and artificial intelligence, STEM education

At the end of 2021, with Dr. Johannes Gadner and Margarete Rohrhofer, two long-standing and deserving colleagues, have left the office. We wish both of them all the best for the future.

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