TIP Working Party
KNOWLEDGE TRIANGLE PROJECT (2015-16)

CASE STUDY: Austria
“Place-based dimension in higher education policy making”
Place-based higher education policies in Austria

Austrian Case Study for the OECD TIP Project on the Knowledge Triangle

Maximilian Unger, Daniel Wagner-Schuster, Wolfgang Polt

Case Study commissioned by the Austrian Federal Ministry of Science, Research and Economy

Graz / Vienna, March 2016

JOANNEUM RESEARCH Forschungsgesellschaft mbH
POLICIES – Institut für Wirtschafts- und Innovationsforschung

Büro Graz
Leonhardstraße 59
A-8010 Graz, Austria
Tel.: +43-316-876 1488
E-Mail: policies@joanneum.at

Büro Wien
Haus der Forschung, Sensengasse 1
A-1090 Wien, Austria
Tel.: +43-1-581 7520
E-Mail: policies@joanneum.at
## Content

1 Place-based higher education policies in Austria 3

1.1 Structure of the case study ................................................................. 3

1.2 Structure of the Austrian tertiary education system .................................. 5

1.3 Finance structure of public universities in Austria .................................. 7

1.3.1 Legal and strategic framework for financing and steering public universities .... 7

1.3.2 Performance agreements .................................................................. 9

1.3.3 Finance structure ............................................................................. 10

1.4 Implementing place-based policies in the performance agreements – the “Lead Institutions Initiative” ................................................................. 11

1.4.1 The role of regions in STI-policy making in Austria ................................ 14

1.4.2 Regional University Conferences ....................................................... 15

1.5 Support mechanisms for science-industry relations .................................. 17

1.5.1 COMET – Competence Centers for Excellent Technologies .................... 17

1.5.2 Christian Doppler Research Association (CDG) .................................. 18

1.5.3 AplusB – Academia plus Business ...................................................... 20

1.5.4 Knowledge Transfer Centres and IPR Utilization ................................. 21

2 References ......................................................................................... 22
<table>
<thead>
<tr>
<th>Figures</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 1</td>
<td>Students enrolled in tertiary education by type of institution</td>
</tr>
<tr>
<td>Figure 2</td>
<td>R&amp;D expenditures in the HEI sector in € million and share of universities of applied sciences (UAS)</td>
</tr>
<tr>
<td>Figure 3</td>
<td>Public instruments for university planning and steering</td>
</tr>
<tr>
<td>Figure 4</td>
<td>Funding structure of public universities in Austria</td>
</tr>
<tr>
<td>Figure 5</td>
<td>Development of public funding for HEIs and university R&amp;D in Austria</td>
</tr>
<tr>
<td>Figure 6</td>
<td>R&amp;D expenditures financed by Austrian regions in %, 2000-2015</td>
</tr>
<tr>
<td>Figure 7</td>
<td>Education in CD Laboratories by thematic cluster 2014</td>
</tr>
<tr>
<td>Figure 8</td>
<td>Sector distribution of AplusB start-up projects</td>
</tr>
</tbody>
</table>
1 PLACE-BASED HIGHER EDUCATION POLICIES IN AUSTRIA

1.1 Structure of the case study

This case study deals with the place-based dimension at different levels of Austrian higher education policy making. At the federal level, the main instruments comprise the respective initiatives embedded in the public financing of universities within the three year performance agreements, and are subsumed under the header of “Lead Institutions Initiative” (Leitinstitutionen-Initiative). Austria is a federal state, made up of nine regions (Länder) that play a decisive role in STI policy and in respective regional knowledge triangles. Their impact is exercised in the provision of relevant funds and programmes as well as in the definition of strategic priorities. The “Lead Institution Initiative” sets out the respective requirements concerning the strategic interaction of universities and their location (region) in order to develop and implement regional STI strategies. The design and implementation of the steps involved in such this initiative are described below.\(^1\)

Top-down empowerment of public universities’ engagement in the regional knowledge triangle is accompanied by bottom-up coordination of higher education institutions. The implementation of regional higher education conferences (regionale Hochschulkonferenzen) was an important step in operationalizing horizontal coordination. Regional higher education conferences are designed to address the needs for coordination of public universities, universities of applied sciences (UAS), university colleges engaged in teacher education, and, in some regions, private universities. The university conference at the national level (UNIKO) mainly acts as a political voice for universities by allowing them to adopt a coordinated position concerning questions relating to social or higher educational matters. In contrast, regional higher education conferences act as hubs concerning the implementation of coordinated projects and initiatives (together with other components of the knowledge triangle), both in terms of research and education.

In addition to the provision of basic public funds and their respective steering mechanisms, competitive funding is increasingly gaining strategic importance in terms of profile development and engagement in knowledge transfer and cooperation activities with the business sector. Austria has a variety of funding and support programs and instruments in place for the implementation and strengthening of partnerships between universities and business. A special feature of Austria’s support mechanisms for science-industry relations is that they are often based on funding along institutional medium-term and long-term programs, bringing together partners from academia and business in formalized collaborations e.g. in the form of independent legal entities such as laboratories or research centres, rather than providing funding at a project level.\(^2\) Prominent examples in this vein are the Austrian Competence Centre Program, COMET, and the research units Christian Doppler Research Association (CDG). These programs serve to integrate key aspects of the knowledge triangle with the improvement of industry-science linkages by promoting collaborative research and innovation projects and the development of human capital, e.g. via doctoral education and employment mobility. Other funding mechanisms also facilitate knowledge transfer by supporting the commercialisation of academic research. So called AplusB-centres (academia plus business program), located throughout Austria at hosting universities, provide support for the creation of academic spin-offs. The program “Knowledge

---

2 Polt et al. (2015).
Transfer Centres and IPR-utilization” (Wissenstransferzentren, WTZ) was launched in 2014 to support universities’ patenting activities.
1.2 Structure of the Austrian tertiary education system

As a result of structural changes at the beginning of the nineties, the Austrian tertiary education system is now characterized by a great variety of institutions, encompassing a number of diverse objectives, authorities and responsibilities. Structural change was accompanied by fundamental reforms in university governance and financing mechanisms. This is now described below.

The Austrian tertiary sector is characterized by a high number of medium and small institutions, and comprises 22 public universities, 21 universities of applied sciences, 11 private universities and 17 university colleges for teacher education. Looking at the figures on student enrolments and research activities (see Figure 1 and Figure 2), it becomes obvious that the tertiary sector in Austria, both in education and research, is dominated by public universities. Although universities of applied sciences (UAS) are legally obliged to perform research and teaching, their share in total R&D expenditures in the higher education sector, though increasing, is still relatively low compared to public universities.

Figure 1: Students enrolled in tertiary education by type of institution

![Bar chart showing student enrolments by type of institution in Austria.](source: Statistik Austria (2015))

Figure 2: R&D expenditures in the HEI sector in € million and share of universities of applied sciences (UAS)

![Bar chart showing R&D expenditures and share of UAS in the HEI sector in Austria.](source: Statistik Austria (2015))

---

3 Including the University for Continuing Education Krems (DUK) which in terms of its funding mechanism tends to diverge from the other 21 universities in that it is mainly financed by the region of Lower Austria.

4 Of which 3 are private; BMWFW (2014).
The university sector in Austria is characterized by a high degree of institutional specialisation. There are six universities of arts, three technical universities (including the Montanuniversität Leoben), three medical universities, the University of Natural Resources and Life Sciences Vienna, the University of Veterinary Medicine Vienna, and the Vienna University of Economics and Business. Only four out of twenty-two universities, the Universities of Vienna, Graz, Innsbruck and Salzburg, offer a broad range of study programs and scientific disciplines, (apart from medicine). The University of Linz performs research and teaching in the social sciences and economics, law, natural sciences, engineering and technology as well as in the medical sciences. The faculties of the University of Klagenfurt cover the following fields: humanities, technical sciences, management and economics, and interdisciplinary research, the latter mainly dealing with social and ecological problems and public goods. The Danube University for Continuing Education at Krems is unique in the sense that it offers only Master and PhD studies as well as diplomas in selected fields, and focuses on the needs of working professionals. While the Danube University for Continuing Education at Krems is financed by the region of Lower Austria and through tuition fees, the budgetary contribution of the national government is still allocated via the usual performance agreement – as is the case for the other state-funded universities.

The different institutional profiles are crucial to understanding the Austrian university funding mechanism since it is based on negotiations with each individual university concerning specific funding targets and measures.

---

5 BMWFW (2014).
1.3 Finance structure of public universities in Austria

1.3.1 Legal and strategic framework for financing and steering public universities

As a result of the University Act 2002 (“UG 2002”), public universities gained independent legal status in public law (“Vollrechtsfähigkeit”). They are now in a position to autonomously sign contracts (e.g. concerning various forms of cooperation activity) and to hire personnel on a private law basis. The purpose of the increase in autonomy was to improve the efficiency and effectiveness in the provision of university services.\(^7\) Formal independency also increased the power of universities to position themselves in the ‘knowledge triangle’, e.g. by enabling them to define strategic targets and priorities on their own and to engage autonomously in contracted and collaborative research activities.

The establishment of universities as autonomous administrative institutions was accompanied by the introduction of new strategic financing instruments, including development plans, performance agreements and related reporting modes, all these serving to reflect the concept of new public management. Since the restructuring and development of higher education steering and policy measures is an ongoing process, the University Act 2002 is frequently subject to adjustment in order to take account of new developments.

The Austrian government’s RTI strategy of 2011 provides the central strategic development framework for the higher education sector and embodies the following nine strategic objectives. These apply to both tertiary education and to R&D\(^8\):

- Fundamental improvements are to be made in conditions of study at universities. This requires the establishment of new finance models for higher education.
- Reforms to mitigate social selectivity (…), to implement thorough quality improvements (…) in university instruction, to better integrate immigrants and to offset gender discrepancies in research.
- The proportion of 30 to 34 year olds who have completed a university degree or have an equivalent educational certificate is to be increased to 38 percent by 2020.
- Investment in basic research is to be increased by 2020 to the level of leading research nations;
- Basic research is to be improved by implementing further structural reforms in the university system.
- The university financing model is to be reformed. Research financing is to be more competitive and project-based.
- University research financing, in the form of third-party funding from the Austrian Science Fund (FWF) via competitive applications, must be strengthened and given appropriate financing.
- The establishment of individual university profiles is to be supported by creating ‘Clusters of Excellence’.
- The orientation of teaching and research topics at universities, and the collaboration with non-university research institutes, is to be better aligned within an overall strategy.

The Austrian University Plan (Hochschulplan) of 2011 and the Austrian University Development Plan 2016-21 of the Federal Ministry of Science, Research and Economy (BMWFW) are designed to translate these long-term strategic objectives into step-wise targets which are then to be operationalized in the form of university development plans and performance agreements with the ministry.

\(^7\) Strehl et al. (2006).
\(^8\) Austrian Federal government (2011).
The Austrian University Plan of 2011 initiated the intensification of priority setting and coordination among universities both in research and teaching, “...to further develop higher education in Austria, to increase international visibility, and to ensure the highest quality in teaching and research under the given circumstances and the efficient completion of achievements according to international standards”. Furthermore, the active role of universities as scientific lead institutions in the regional knowledge triangle was emphasized by formulating the necessity of university participation in regional STI and/or “Smart Specialisation” strategic processes. Initial steps towards these targets were undertaken by the implementation of the so-called “Lead Institution Initiative” in the performance agreement period 2013-15. This initiative is continued in the targets formulated in Austrian University Development Plan 2016-21. As can be seen in Figure 3, this is also related to the strategic framework for the performance agreement periods of 2016-18 and 2019-21.

Figure 3: Public instruments for university planning and steering

Source: Austrian University Development Plan 2016-21
1.3.2 Performance agreements

University budgeting is still evolving in Austria. At the moment, the allocation of basic public funding via the so-called global budget (“Globalbudget”) is based on two distribution mechanisms. These are performance agreements (“Leistungsvereinbarungen”), which account for the largest share of funding (about 95% of allocated global budgets in the period 2013-2015), and, second, indicator-based higher education structural funds (“Hochschulraumstrukturmittel”). The structure of university funding is displayed in Figure 4.

Figure 4: Funding structure of public universities in Austria

The performance agreements are negotiated between each individual university and the Federal Ministry of Science, Research and Economy (BMWFW) for a planning period of three years. In contrast to more backward-oriented approaches, performance agreements are related to strategic targets and respective measures for a future period of three years. The structure of the performance agreements is the same for all universities, covering aspects of strategic and profile development, research and teaching, as well as other areas of university activities reflecting the so-called “third mission” of universities, i.e. activities designed to foster the societal engagement of universities, or those serving to promote knowledge transfer and cooperation (i.e. between higher education and research institutions, the business sector and political and societal stakeholders). Furthermore, plans regarding buildings and research infrastructure, and targets concerning human resource development and internationalisation activities are also included. Strategic targets and measures implemented in the performance agreements are related to the specific development plans (Entwicklungspläne) drawn up by every university. Development plans serve as medium-term strategic documents, and provide an overview of a university’s profile and medium-term development goals. The most important operational targets and themes to be implemented in the 2013-2015 performance agreement period were: i) continuation of

---

topic and priority setting, ii) intensification of cooperation, iii) expanding internationalisation, iv) strategic development of research infrastructure and v) further development of third-party funding acquisition.\textsuperscript{10} Although the universities commit themselves to concrete targets and measures in the performance agreements, their global budget is allocated to them as a lump sum. This means that in practice they have a free hand in how funds are distributed internally.

The achievement of the targets is monitored in ‘performance dialogues’ (Begleitgespräche) between the ministry and each individual university. These take place frequently throughout the funding period. The procedures and steps that need to be undertaken in cases where targets are not met are also laid down in the performance agreements. Furthermore, universities report their activities in the form of annually updated indicators (Wissensbilanzen). The financial situation of universities is also monitored in the annual financial accounts.

The higher education structural funds supplement the performance agreements by tying a certain amount of the total global budget to a predetermined set of indicators linked to the quantity, quality and performance targets in the performance agreements.\textsuperscript{11} In the performance agreement period 2013-15, about 5% (€ 450 million) of the global budget was distributed in this way. Of the indicator-based budgets, 60% was distributed based on the number of regular students in tertiary courses (“prüfungsaltiv”), 14% was distributed based on the amount of third-party funding acquired for R&D projects, 10% was allocated, based on the number of graduates, 14% served as public start-up financing for proposed cooperation projects (and is requested by universities on a competitive basis) and finally, 2% was distributed based on the amount of private donations acquired by universities. As is the case with the performance agreements, the higher education structural funds-mechanism is also adjusted for every new period. For the period 2016-18, the amount dedicated to higher education structural funds is to be increased by 66%, i.e. to € 750 million.

1.3.3 Finance structure

Figure 5 displays the development of total government funding of higher education institutions (HEI) of all types as well as of total public university revenues, general university funds and third party funds of public universities. The largest part of government funding for tertiary education institutions (“Hochschulbudget”) goes to universities (about 84%, 2013). This represents 4.2% of total government spending and 1.2% of GDP in 2013. Since 2003, nominal public funding for universities has increased by 58.4%. Regarding universities’ budgets in the performance period 2010-2012, 73% of total revenues came from institutional funding by the government, and 16% was acquired via competitive revenues for third-party-financed R&D projects (“F&E-Drittmittel”). Revenues from tuition fees account for just 2% of total university revenues.\textsuperscript{12}

Total university revenues comprise – among other things – competitive revenues from R&D projects (“Third party funding”). Though these revenues significantly increased in absolute volumes by 47.1% between 2007 and 2013, from € 402.6 to € 597.5 million, their share in total university revenues remained relatively constant over time at around 16%. Furthermore, the largest part of competitive funding is acquired via public sources, i.e. the two national public research funding agencies, the Austrian Research Promotion Agency FFG and the Austrian Science Fund FWF, via national authorities (government, regions, communities), and other public funds (Jubiläumsfonds, Austrian Academy of Sciences). This amounted to 43.2%, in 2013, with the FWF alone being responsible for a share of 25%. 13.9% was acquired from EU funding schemes. The share of competitive funding by the business sector

\textsuperscript{10} BMWF, BMVIT (2013).
\textsuperscript{11} Claes-Kulik, Estermann (2015).
\textsuperscript{12} BMWFW (2014a).
increased only slightly from 25.7% in 2007 to 26% in 2013. This followed a sharp decline in 2008 which was probably attributable to the global economic crisis. Only 4% of competitive funding comes from private foundations.\textsuperscript{13} A major aim of both the Austrian RTI strategy, and of the recently published “action-plan for research” by the Austrian Federal Ministry of Science, Research and Economy (BMWFFW), is to increase the share of private funding at universities\textsuperscript{14}

**Figure 5:** Development of public funding for HEIs and university R&D in Austria

The highest share of federal government funding for HEIs is dedicated to the 22 public universities via general university funds. This is largely a result of the more diverse nature of funding employed in universities of applied sciences which is based on a variety of sources (depending on their ownership structure) and comprises tuition fees, global funding from regional governments and municipalities, student-based funding from the national and regional governments, and public and private research funds.\textsuperscript{16}

1.4 Implementing place-based policies in the performance agreements – the “Lead Institutions Initiative”

The “Lead Institutions Initiative” of the Austrian Federal Ministry of Science, Research and Economy (BMWF FW) provides an umbrella for combining two strategic targets that have gained importance since the performance agreement period 2010-12. The first is the ongoing process of priority setting among universities. This entails the definition of strategic research priorities and longer-term objectives, as well as the associated strategic planning of resource allocation. Existing strengths and capacities are to be targeted such as to create “critical mass” in strong research fields at internationally competitive universities.\textsuperscript{17} Second, universities are increasingly obliged to intensify and display their engagement in “third mission activities”, meaning their contribution to innovation, economic development and the solution of overarching social issues. This reflects an active interpretation of their role as regional lead

\textsuperscript{13} BMWFW, BMVIT (2015).
\textsuperscript{14} BMWFW (2015).
\textsuperscript{15} Statistik Austria (2015)
\textsuperscript{16} Österreicherischer Wissenschaftsrat (2012).
\textsuperscript{17} BMWFW, BMVIT (2015).
institutions in the knowledge triangle, in accordance with the related conceptual work undertaken by both the OECD and the European Commission. The integration of different partners’ competences in regional innovative eco-systems is seen to be a key asset in increasing the international visibility of universities. The “Lead Institutions Initiative” is embedded in the European concept of Smart Specialisation, and provides universities and research institutions with an explicit mandate to actively participate in policy development relating to regional innovations strategies for smart specialisation (RIS3).

Regional transmission mechanisms facilitating university knowledge transfer take many forms in Austria. For example:

- knowledge transfer that occurs through the provision of highly qualified graduates, the attraction of highly qualified personnel and informal knowledge mobility via local networking activities,
- cooperative ventures, such as those of the COMET programme for competence centres or the Christian Doppler laboratories (see respective section below), as well as contract research services at universities,
- publication and commercialisation activities of the universities, as well as university spin-offs, supported by programs like AplusB, or the recently established Knowledge Transfer Centres (see below),
- direct economic stimulus as an employer, generation of value added, as well as via student and employee spending.

At the same time, university development potential is influenced by local circumstances. Universities profit from their proximity to research and business enterprise partners, clusters and networks, as well as to other institutions of higher education, and may also benefit from the specific conditions in a locality. Examples of this in Austria include the “Centre on the Mountain” at the University of Leoben in Styria’s Erzberg mine, or the hydraulic engineering laboratory DREAM of the University of Natural Resources and Life Sciences Vienna on the river Danube.

The central purpose of the “Lead Institution Initiative” is to channel the several strands of universities’ regional engagement into a strategic vision for each individual university, and to increase the related areas of university cooperation and coordination. The initial steps towards the implementation of specific measures were undertaken in the performance agreements period 2013-15.

Two specific milestones were developed for implementation in the performance agreements. For the first, universities were obliged to create a so-called ’location concept’ (“Standortkonzept”) in which each individual university presents its strategic cooperation and network arrangements with other research institutions, firms, and society with respect to a self-defined vicinity. These location concepts are then to be integrated into development plans in order to document each university’s impact on its location and to create a basis for the attraction of international partners and the strategic alignment of research priorities. Furthermore, the universities were encouraged to participate actively in RTI and development strategies in their respective regions. RTI priorities developed on the basis of regional

---

18 OECD (2007).
19 EC (2014).
potential are in turn an important foundation for the efficient and transparent allocation of public resources, e.g. for the implementation of large-scale infrastructures.

To date, 14 out of 22 universities have implemented such targets and 11 of them have already reported on concrete implementation results for the period 2013-15. The University of Klagenfurt, for example, subjected their cooperation structures to an internal analysis that resulted in the definition of three “cooperation orbits”, i.e. the ‘orbits’ of Carinthia, the Alpine-Adriatic region, and global partnerships. In Upper Austria, the Technology Management and Regional Development Agency, together with the University of Linz jointly developed the concept of so-called fields of dual-strengths (“Doppelstärkefelder”) in order to highlight scientific and economic growth potential in the region of Upper Austria.21

According to the Austrian University Development Plan 2016-21, the “Lead Institutions Initiative” will be further developed in the subsequent two periods of performance agreements. Central objectives in the performance agreement period 2013-15 were the introduction of the initiative as well as the creation of location concept. In future, emphasis will be put on designing instruments to increase the cooperation between universities in terms of enhancing strategic alignment. In the medium run (up to 2021) location concepts and the priorities embedded therein are to serve as a key guide in public investment and in the extended application of higher education structural funds.

21 Ibid.
1.4.1 The role of regions in STI-policy making in Austria

In order to fully appreciate the centrality of the “Lead Institutions Initiative” in the multi-level governance of STI policies in Austria one has to understand something of the Austrian federal structure and its highly autonomous regions (Länder). Although the Austrian federal government is the main financier of public universities (with the exception of the University of Continuing Education Krems, which receives 24% of its global budget from the region of Lower Austria), regions still play vital a role in STI policy making and financing. The share of total intramural R&D financed by the Austrian regions lies at around a more or less constant 4 %, which represents about 12 % of total public R&D expenditures, since the middle of 2000 (see Figure 6). Most of the Austrian regions provide a variety of funding and support mechanisms for R&D and innovation, comprising regional foundations and funding agencies, incubators, cluster programs and networking initiatives.

Figure 6: R&D expenditures financed by Austrian regions in %, 2000-2015

Priority setting procedures and the development of university ‘location concepts’ are embedded in regional STI strategies and prioritisation at the regional government level. Existing priorities and areas of strength at universities are essential factors for the STI regional profiles. Vice versa the development of university profiles and priorities is also expected to take account of local demand and expertise, and of future political and social priorities. Public universities are located in seven of the nine regions – Vorarlberg and Burgenland are the two exceptions – and universities of applied sciences (FH) are located in all nine regions. This makes the regional nature of the Austrian higher education system quite clear. In Austria’s largest region, Lower Austria, the institutional setting mirrors the region’s unique position as a result of its proximity to Vienna. While 17 HEI of all types are located in the capital, Lower Austria decided not to compete directly, but to cater for complementary niches. We thus have

---

22 University for Continuing Education Krems (2015).
23 E.g. Stahlecker, T. (2012); Schnabl et al. (2014).
for example: (1) the Danube University (for Continuing Education) at Krems with a graduate and post-graduate focus, (2) the Institute of Science and Technology Austria (IST Austria) at Klosterneuburg, a young centre of excellence for basic research with only doctoral and post-doc training, and (3) an invitation to Viennese universities to establish research (and education) co-locations in Lower Austria that fit into the region’s desire to establish multi-institutional thematic hubs (technopoles).

Current and ongoing STI strategic processes at the regional level are related in varying degrees to the concept of “Smart Specialisation”. Most importantly, however, they reflect the concept of profile formation through thematic priority setting. These strategic priorities are typically based on an analysis of the strengths of a region’s economy and the research specialisations in higher education institutions. For example, priorities in Upper Austria’s STI strategy comprise manufacturing, energy, health and ageing, food and diet, as well as questions relating to issues of mobility and logistics. This simply reflects Upper Austria’s position as Austria’s leading manufacturing and exporting region. In contrast, Lower Austria places strategic emphasis on agro-technology and veterinary medicine, culture, health and medicine, natural science and engineering, and on issues relating to the environment, energy and resources. Styria has developed separate STI and economic strategies, but both reflect the prominent position of the automotive sector in Styria, and the issue of mobility is a clear strategic priority. Other so-called “thematic corridors” of the STI strategy comprise energy and resources, materials, health and biotechnology, and the ‘information society’. In Tyrol, STI strategy focuses on creative industries, material sciences and technologies and on research concerning the alpine area. Burgenland focuses on three broad future areas: sustainable technology (e.g. building, renewable energies), sustainable quality of life (e.g. ambient assisted living, optimization of health care products and services) and intelligent processes, technologies and products (e.g. optoelectronics, mechatronics). Carinthia’s STI strategy emphasizes the development of human resources, ICT, production technologies and sustainability as core objectives for future STI activities. Furthermore, it explicitly addresses targets for the two higher education institutions located in Carinthia, the University of Klagenfurt and the Carinthia University of Applied Sciences. Both of these are to emphasize education in the fields of engineering and technical disciplines in their current and future activity. Vienna’s STI strategy, recently launched in September 2015, has selected social sciences and humanities, life sciences, ICT, creative industries and mathematics and physics as being the strongholds of the Viennese STI landscape. This reflects the prevailing variety in the research and higher education environment. Specific emphasis is being put on the concept of “Smart City”, an attempt to provide innovative solutions to specific challenges in urban areas, for example, concerning questions of public transport or governance.

1.4.2 Regional University Conferences

Regional higher education conferences serve as a bottom-up instrument in the coordination of higher education institutions within one location. Related activities in this respect may comprise research cooperation in terms of jointly set objectives, the development of regional knowledge hubs, promotion of clusters or incubator programs, and cooperation in teaching programs. Another important issue is joint agenda setting in regional innovation strategies. This is supposed to serve as a central contact point

25 The region of Upper Austria (2013).
27 The region of Lower Austria (2015).
28 The region of Styria (2013).
29 The region of Tyrol (2013).
30 The region of Burgenland (2014).
31 The region of Carinthia (2009).
32 The region of Vienna (2015).
for regional policy makers. The creation of synergies between regional lead institutions in knowledge production is seen as an important step towards the creation of internationally visible knowledge locations. This contrasts with the concept of simply enforcing ‘excellence’ solely on the basis of individual flagship institutions.

So far, collaboration in the form of regional higher education conferences has been established in Salzburg, Styria, Tyrol, Carinthia and Burgenland. In the following, the Styrian higher education conference will be described, as it is believed to be typical of such forms of cooperation.

The Styrian higher education conference, formed in 2012, includes the University of Graz, the University of Technology Graz, the University of Music and Performing Arts Graz, the Montanuniversität Leoben, the Medical University Graz as well as two university colleges for teacher education and two universities of applied sciences. Together, these nine institutions form the so-called “Science Space Styria”. With the exception of Vienna, it represents the largest cluster of higher education institutions in Austria and comprises approximately 55,000 students, a total of 12,000 employees (second largest employer in Styria), and has an annual total budget of approximately € 700 million. The mission statement of the Science Space Styria includes the following objectives:

- Creation of a Styrian higher education area and the generation of activities to raise related awareness.
- Development of a common position regarding strategic questions.
- Shared public relations regarding policy, economy and society.
- Shared marketing and awareness raising with respect to students and student matters (to direct the student flow)
- Coordination of profile formation and cooperation with a focus on:
  - Projects of concern for universities,
  - “Lighthouse projects”, i.e. those of high visibility and appeal in the area of Styrian higher education,
  - General projects aimed at the removal of hurdles and obstacles and which serve to promote co-operation.

One flagship initiative is the so-called NAWI Graz in which the University of Graz and the University of Technology Graz bundle activities in research and teaching in the natural sciences. Currently, 18 NAWI Graz bachelor's and master's programmes with a total of 4,750 students are on offer. Other initiatives, currently in place, also emphasize joint activities in teaching, for example, the Inter-university Initiative for New Media Graz, iUNIg, the joint course of electrical engineering and audio engineering, or the joint provision of guidance for the selection of courses and study programs. The Health Perception Lab (HPL) for applied sensory research was established in 2013, with funding of € 1.2 million from the Austrian Research Promotion Agency FFG for a period of five years. It is located at the University of Applied Sciences JOANNEUM, and manages to bundle interdisciplinary expertise in the field with the University of Technology Graz and Medical University Graz. The aim is to provide pioneering work in the German-speaking area.

One on-going process concerns the formulation of a joint location concept for the Styrian higher education area. This should reflect the principles of the “Lead Institutions Initiative” which serves as a

---

34 http://www.steirischerhochschulraum.at/die-steirische-hochschulkonferenz/
35 http://www.nawigratz.at/
baseline for Styrian policy making and decisions on the planning and use of research infrastructures for the future.\textsuperscript{37}

1.5 Support mechanisms for science-industry relations

The relations between science and industry have always been an important part of innovation systems. Effective linkages between research organizations and industry have finally been recognized as necessary drivers in technological breakthroughs. Awareness of the importance of strong science-industry linkages, and the simultaneous realization of respective weaknesses has led to numerous discussions concerning the gaps between scientific output and its translation into innovation. As a result, various policy measures have emerged in many countries over the past two decades which attempt to strengthen science-industry relations.

Austria has a variety of support programs and instruments aiming at the implementation and strengthening of partnerships between universities and business. A special feature of Austria’s support mechanisms for knowledge transfer between science and industry is that the system is very much based on funding along institutional and long-term lines, bringing together partners from academia and business in formalized forms of collaboration and/or in the form of independent legal entities such as laboratories or research centres.

This following section provides an overview of four central programmes. These are:

- COMET – Competence Centers for Excellent Technologies,
- The Christian-Doppler-Research Labs, and
- AplusB – Academia plus Business.
- Knowledge Transfer Centres

1.5.1 COMET – Competence Centers for Excellent Technologies

The COMET programme was launched in 2006 as successor to the programmes Kplus, K_ind and K_net. Although the programme was implemented at the federal level, it also has a strong regional aspect as the Austrian regions provide additional funding in order to support their own regional objectives as formulated in their STI policy. The COMET programme attempts to close the gap between science and industry by supporting close cooperation between business and research. Additionally it enables and encourages educational and training possibilities for doctoral students. In terms of annual budgets, the COMET programme is the largest funding scheme for knowledge and technology transfer in Austria. Its current structure was established in 2008 and manages to bundle several successful funding schemes. Between 2008 and 2013, the total volume for funded COMET centers and projects was approximately € 1.3 billion, with about € 405.3 million being financed by the Austrian Federal Ministry of Science and Research, as well as by the Austrian Federal Ministry for Transport, Innovation and Technology. Additional public funding comes from the Austrian regions. Currently, 5 K2-Centres, 18 K1-Centres and 21 K-Projects are active. The 6\textsuperscript{th} Call for K-Projects and the 4\textsuperscript{th} Call for K1-Centres is now in progress.\textsuperscript{38,39,40,41}

The strategic focus of the COMET programme is the collaborative development of new competences and the initiation and support of top-level long-term strategic research agendas for science and industry, as well as a desire to establish and secure technological leadership in Austrian companies. The programme is intended to make Austria more attractive as a research location in the long run. The following objectives are to be pursued:

\textsuperscript{37} EC (2014).
\textsuperscript{38} FFG (2013).
\textsuperscript{39} FFG (2016).
\textsuperscript{40} FFG (2015).
\textsuperscript{41} Dinges et al. (2015).
- Strengthening the culture of cooperation between science and industry in order to attain top-level research.
- Aligning strategic interests between science and industry.
- Preparing national institutions for increasing international competition by bundling players according to thematic synergies.
- Establishing centres with international visibility through top-level research and thus strengthening Austria as a research location.
- Strengthening human resources by attracting outstanding researchers and supporting the transfer of expertise between science and industry.
- Establishing an appropriate gender balance in research activities.

The COMET Programme includes three different programme lines, which are characterized by high research expertise and the implementation of this expertise within companies. The different programme lines differ in terms of their degree of internationality, project volume, duration and infrastructure:

**K2-Centres** have a stronger focus on long-term bundling of existing national competencies and cooperation with outstanding international partners in science and industry in order to achieve top-level research and increase the attractiveness of Austria as a research location.

- **Duration:** 10 years.
- **Public funding:** 40-55%, max of € 5 million per year.
- **Minimum funding of partners:** scientific partners 5%, industry partners 40%.

**K1-Centres** focus on strategic science-industry research agendas with a medium to long-term perspective. These centres conduct high-level research and place additional focus on technological developments for future-relevant markets.

- **Duration:** 8 years.
- **Public funding:** 40-55%, max of € 1.7 million per year.
- **Minimum funding of partners:** scientific partners 5%, industry partners 40%.

**K-Projects** initiate high-quality research through interaction of science and industry and adopt a medium-term perspective. These projects are clearly delimited in terms of the research topic, and offer high development potential. K-Projects have to be multi-firm projects (minimum number of 3 companies) which are carried out by science and industry. These types of project can also be set up as preparation for subsequent K1-Centre applications.

- **Duration:** 3-5 years.
- **Public funding:** 35-45%, max of € 0.45 million per year.
- **Minimum funding of partners:** scientific partners 5%, industry partners 50%.

The high international visibility enjoyed by the COMET programme is corroborated by the fact that COMET is considered to be one of the most successful technology policy initiatives in Austria and is named as an example of good practice in the Regional Innovation Monitor.

1.5.2 **Christian Doppler Research Association (CDG)**

The Christian Doppler Research Association addresses the improvement of science-industry linkages and the promotion of relevant human capital. The main objectives of CDG are

- the strengthening of basic, application-oriented research,
- the support of knowledge and technology transfer between science and industry,
- the strengthening of universities, universities of applied sciences and other research institutions,
- the improvement of the structure of the national innovation system, and
- the strengthening of Austria as a competitive and innovative research and industry location for private companies, universities and researchers.

---

42 FFG (2014).
43 Walendowski et al. (2014).
In terms of the above, CDG’s general features and characteristics have remained relatively constant since 1995. Adaptations, when deemed necessary, have nevertheless been made, with the result that CDG now appears to have become a widely accepted and stable element in promoting research and innovation in Austria. It has also managed to gain a significant role in the promotion and training of young scientists (see Figure 7).

The CDG exhibits two main funding models. These are the Christian Doppler Laboratories (73 active CD Labs in 2015) and the Josef Ressel Centres (7 active JR Centres in 2015). While CD Labs are hosted at universities or non-university research institutions, and focus on application-oriented basic research, JR Centres are hosted at universities of applied sciences and focus on applied research. Both models are established as public-private partnerships which are normally financed 50% by the public purse and 50% by commercial partners. If SMEs are involved, a share of 60% for public funding is possible. The models include the option of internationalization by allowing for a mix of national and foreign partners (one of the partners – either the commercial or the academic partner – has to be Austrian). This may entail for example, establishing an international CD-Laboratory at a foreign institution, cooperating with international commercial partners or internationalizing certain modules of work. Some basic characteristics of the two models are:

**CD Labs:** maximum duration of 7 years (involving a sequence of 2 year, 3 year and 2 year periods, whereby progress to a subsequent period is subject to a process of evaluation), annual budget of minimum € 110 thousand and maximum € 700 thousand, size of research group: 5-15 persons.

**JR Centres:** maximum duration of 5 years (a 2 year introductory phase, followed by a 3 year extension phase), annual budget of minimum € 80 thousand and maximum € 400 thousand, size of research group: 3-10 persons.

**Figure 7: Education in CD Laboratories by thematic cluster 2014**

![Education in CD Laboratories by thematic cluster 2014](image)

Source: CDG (2014).

CD Laboratories and JR Centres are based on a strict bottom-up principle. This means that grant applications from various fields are acceptable on the condition that the commercial partner demands high quality research and that progress is evaluated in accordance with clear scientific criteria. Currently the CDG portfolio comprises eight thematic clusters. These are:

- Chemistry,
- Life Science and Environment,
- Engineering and Instrumentation,
- Mathematics, Computer Science, Electronics,
- Medicine,
- Economics, Law and Social Sciences.

---

44 CDG (2016).
45 Unger (2014).
- Metals and Alloys,
- Non-Metallic Materials, and
- Social Sciences, Economics and Law.

1.5.3 AplusB – Academia plus Business

There is high awareness today that academic spin-offs are essential in facilitating effective knowledge and technology transfer across the fields of science and business. This was the impulse for the AplusB programme, with its AplusB-Centres, started in 2002 by the Federal Ministry of Transport, Innovation and Technology (BMVIT). The aim was to support business start-ups coming from the academic sector. The AplusB programme focusses on innovative start-up projects. These are typically technology-oriented, relatively complex or demanding in terms of the level of supervision and support needed, and of considerable significance in view of the expected impact of structural change and economic growth on the economy. These projects require a high level of continued development and supervisory support right from the beginning, something that cannot usually be provided by the scientific community or private incubators at the necessary level of intensity. The programme targets students and graduates from higher education institutions, as well as university and non-university research staff, and tries to increase the chances of commercial success of innovative and technologically oriented academic start-ups. AplusB is promoted by the Austrian Research Promotion Agency (FFG) and funded by public federal and regional bodies and private sources. The programme is quite significant since while commercial usage of research results is becoming more and more important for higher education institutions, the latter are unlikely to have access to sufficient resources. Within the AplusB programme, start-ups receive support in the form of specialised knowledge concerning business creation and public relations, they become integrated into the relevant existing networks, and they are supported with business financing and necessary infrastructure, and are advised in patent issues. The importance of a programme such as AplusB has also been emphasized by Ploder et al. (2015), which shows that AplusB businesses are characterized by a higher survival rate, a greater impact on employment, more dynamic revenue growth, higher export rates, and more intensive research and development compared to a control group of start-ups. These results were observed to be constant across regions. Currently, there are eight AplusB Centres with a total of 62 employees. These helped to launch 512 businesses from 2002 to the end of 2014. 86% of these start-ups are still operating. Start-ups supported by the AplusB programme were responsible for the creation of more than 3,400 jobs in this period. A look at the distribution of AplusB start-up projects by sector shows that nearly half of all projects are from electronics, IT, software and telecommunications (47%). Together with life sciences (17%) and environment, energy and transport technology (12%), these accounts for 76% of all projects (see Figure 8).

Figure 8: Sector distribution of AplusB start-up projects

---

46 Ploder et al. (2015).
47 AplusB (2016a).
1.5.4 Knowledge Transfer Centres and IPR Utilization

In terms of patenting activity, Austrian universities had to make up considerable ground between the beginning of 2000 and 2013. In this period, university patent applications as a share of total national patent applications increased from 0.5% to 3%. This was mainly due to the measures introduced in the university law UG 2002, whereby all inventions by university researchers have to be reported to university management. The related uni:invent program, administered by the Austrian Business Agency, and financed by the Federal Ministry for Science and Research, was a funding mechanism run from 2004 to 2009. It was designed to enforce university patenting activity, first, by providing coaching for universities and researchers in the patenting process, and second, by providing financing for university patents.\(^\text{48}\) The program for knowledge transfer centres and IPR-utilization (WTZ) was launched in 2014 by the BMWFW as a successor to the uni:invent program. It was intended to help improve the relatively weak commercialisation performance of Austrian universities. The program promotes the establishment of regional knowledge transfer centres. These support knowledge and technology transfer by accelerating the commercial and social exploitation of research output and as well as the close coordination of related activities among universities, universities of applied sciences and public research institutions. The support and funding instruments of the knowledge transfer centres are intended to aid the professionalization of commercialization activities and to facilitate the further development of patents towards market maturity and prototype development. Currently, three knowledge transfer centres have been established at the University of Innsbruck, University of Technology Graz, and the Medical University Vienna. As of mid 2015, 20 Austrian universities were involved in 16 joint projects coordinated by knowledge transfer centres.\(^\text{49}\) The knowledge transfer centre covering the area of life sciences comprises 17 partner institutions, and the University of Vienna is responsible for coordination. The aim of this specific centre is the implementation of a virtual infrastructure in this field in order to improve medical and diagnostic development.\(^\text{50}\) The total public budget for the establishment of these centres is provided by the BMWFW up to 2018 and amounts to €11.25 million.

\(^{48}\) Polt et al. (2015).
\(^{49}\) BMWFW, BMVIT (2015).
\(^{50}\) BMWFW (2016).
2 REFERENCES


BMWF (2015): Aktionsplan für einen Wettbewerbsfähigen Forschungsraum


EC (2014): University-Regional Partnerships: Case Studies - Mobilising Universities For Smart Specialisation; JRC-IP TS, Seville.


Statistik Austria (2015) based on Annex T of the Auxiliary Document for the Federal Finances Act


