

Digitising European Industries - Member States Profile: Austria

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Summary

General Background: The motor of the Austrian economy is a highly innovative and competitive material goods industry. It makes a significant contribution to securing the economic location and the jobs in Austria. The intelligent and future-oriented Industry 4.0 production technologies are expected to strengthen the Austrian goods industry. Concerning digitization, Austria ranked 10th in the 2016 and 2017 DESI index. The country has strengths in public services, basic digital skills of the population and the availability of ICT specialists. Business use of digital technologies for sharing information electronically is above the EU average. The "Digital Roadmap for Austria" [1] (2017) provides a comprehensive overview on current challenges and planned measures. The Austrian strategy focuses on targeted investments in information technologies, the development of RTI infrastructures, intellectual property protection and data protection (also in Open Data, Open Science and Open Innovation).

National Strategies towards "Digitizing European Industries": The association "Industrie 4.0 Austria", which in early 2017 had 39 member organizations, plays a major role for the local adoption of digitization technologies in industry. It facilitates the implementation of digital solutions and unifies the Industry 4.0 community. It aims to secure and create highly innovative industrial production and to boost quality employment, thus strengthening Austria's future competitiveness. The association, which services the platform activities, had been founded in 2015 by the Federal Ministry for Transport, Innovation and Technology (bmvit), the association for the Electrical and Electronics Industries (FEEL), the association of metal technology Industries (FMETI), the Austrian Federal Chamber of Labour (BAK), the Austrian Trade Union for Production Workers and the Federation of Austrian Industries.

In January 2017, Austria has adopted its new government programme for 2017-2018 in which digitisation is identified as one of the key priorities. Austria aims to be a 5G pioneer in the future and has announced to publish a 5G strategy by the end of 2017. The current Broadband Strategy 2020 aims to ensure a well-developed and affordable digital infrastructure and provide a comprehensive availability of ultrafast technology (Fiber-to-the-Home FTTH) by 2020.

Austria will make digitization a priority during its EU presidency in 2018.

Digitising European Industry (DEI) - Pillar 1

Digital industrial Platform actions: The Association "Industrie 4.0 Austria" has published a White Paper [2] on the macroeconomic aspects of industry 4.0 as well as the related aspects of work organisation.

Research, Development and Innovation Actions: bmvit invests 185 mio. € per year in research activities that are directly related to industry 4.0 technology fields (total budget for applied research: 500 mio € / yr.): 100 mio. EUR are directed to Material research (including smart materials and raw materials) and production research (including robotics). Industry 4.0 related ICT topics (applied research in areas such as "intelligent systems for automated driving", "machine learning", "security / interoperability, communication technologies (5G))." are funded with approx. 85 mio. Euro. As part of these funding measures, Furthermore, bmvit has installed a dedicated funding program "Production of the Future", funding national and transnational cooperative R&D projects with particularly high innovation content and with increased development risk. Two calls were currently published: a) national cooperative R&D projects on industry 4.0, biobased industry, plant and raw materials, robotics, photonics and nanotechnology and b) MERA.NET ("ERA-NET for Materials Research and Innovation") with a focus on the promotion of transnational cooperative R&D projects.

International partnerships exist with Brazil, Russia, South Korea, South Africa and Taiwan. A common call with China in selected areas has been launched.

Six endowed chairs working on Industry 4.0 research topics are funded for a period of 5 years. More endowed chairs are funded in the area of automated driving. In addition, bmvit is funding studies concerning the effects of the digitization and automatization of manufacturing and services.

Digitising European Industry (DEI) - Pillar 2

Standardization actions: The Working Group on Standardisation of the Platform Industry 4.0 published the Austrian Standardisation Roadmap Industry 4.0 [4]. Its aim is to raise awareness for standardisation topics and to give concrete guidance to relevant stakeholders. The Roadmap is accompanied by an online tool that provides detailed and up to date information on norms and standards relevant for Industry 4.0.

Pilot factories and testbeds: A pilot factory for science and industry at technical university of Vienna has been installed as a key component of the strategic focus of Industrie 4.0. The pilot factory combines basic research, application-oriented research in cooperation with industry, research-oriented teaching and continuing education. The pilot factory is a new instrument for strengthening Austria as a location for innovation (Investments in R&D infrastructure; transfer of R&D results into the economy). Two other pilot factories will be established in Graz and Linz, respectively. Here, industry and science are supposed to jointly develop new processes and test production processes in a realistic environment. The intention is that SME have the chance to test new technologies and production processes without affecting production in their own facilities. Next to industry 4.0 testbeds, Austria also establishes testbeds in the area of automated driving.

Digitising European Industry (DEI) - Pillar 3

Digital Innovation Hubs actions: In Austria, several Innovation hubs are active. They are grouped around well-known research units, such as for example Salzburg Research (Maintenance Competence Center) or KnowCenter Graz. Artificial Intelligence Research Center Linz is a cooperation between the University of Linz with Audi. A number of Innovation Hubs are funded by the COMET program which is co-funded by federal budgets (bmvit plus the Federal Ministry of Science, Research and Economy) as well as regional budgets. In July 2016, bmvit announced the funding of 2 new centers with a total budget of 60 mio. Euro. In the meantime, the Center for Digital Production (CDP; University of Technology Vienna) and the Center "Products and Production of the Future" (Pro2Future; Universities of Linz and Graz) have been selected as new Competence Centers under the COMET scheme. Another DIH initiative is currently planned by the Federal Ministry of Science, Research and the Economy (BMWFV) as part of their initiative "KMU digital" ("SME digital; see "specific national measures").

Digitising European Industry (DEI) - Pillar 4

Skills development: There is an active Working Group on Skills and Qualification as part of the platform activities; the relevant actors, including the Federal ministry of education (BMB) and the Federal Ministry of Labour, Social Affairs and Consumer Protection (BMASK) are actively engaged. Bmvit has initiated a study on qualification measures in connection with Industrie 4.0 [5]. The study concludes that digital competencies are becoming more and more important in production, while simple routines are the most affected. The province of Carinthia together with Infineon have announced the setup of the first "learning factory" for Industry 4.0 at the Technical Academy St. Andrä.

Specific national measures

Innovation promotion: In 2016, the Austrian government has attributed around 100 million euros to an increase in the tax incentive on R&D from 10 percent to 12 percent. Overall, the Federal Government is expected to invest EUR 627.7 million in these tax incentives for companies. From 2018 onwards they will be raised to 14%. Austria's corporate sector remains the most important financing sector for Industrie 4.0 related R&D, with an estimated share of 48.2 per cent of the corresponding total expenditures. The financial contribution from abroad is estimated at 1.7 billion euros (15.4%)

The Federal Ministry of Science, Research and the Economy (BMWFW) and the Austrian Economic Chambers (WKÖ), have jointly faced the task of supporting SMEs in the area of digital change. The program "SME DIGITAL" encompasses several support measures, starting from online analysis tools and free personal consulting services up to certification and training programs and informative events / webinars. Furthermore, the establishment of Digital Innovation Hubs in Austria is planned. Austria will use a comparably small sum of 34.5 mio. Euro of ESIF funds, targeted at promoting ICT in rural areas (27 mio. EUR) and intelligent transport systems (6 mio. EUR)

I. General Background

Overall economic situation of the country

The motor of the Austrian economy is the highly innovative and competitive material goods industry. It makes a significant contribution to securing the economic location and the jobs in Austria. At the beginning of the year 2017 the Austrian economy has had its highest growth in six years, mainly due to external factors [WiFO Prognosis, June 2017]¹. It is expected that the economy will strongly expand also in 2018 due to a robust domestic demand.

The Austrian production is realized by about 30.000 businesses (2014) with approximately 677.000 employees. Production in Austria has a share of the GDP of about 22%. Links between industry and science are sound; and a high share of public research is funded by industry.

Overall strategy / situation concerning the digitization of manufacturing / production

Industry 4.0 is regarded as more than just the application of technology to production - it is a conceptual model of new developments based on available and future technologies. Companies need to integrate this model in their strategies to remain competitive. It is expected that intelligent and future-oriented production technologies will strengthen the goods industry in Austria.

Digitization level of the country

According to the [Digital Economy and Society Index \(DESI\) \[3\]](#), Austria ranks 10th in 2017, unchanged from the year before. It has made progress in line with the EU average in most dimensions. In digital public services, where Austria scores particularly well, it is now among Europe's top 5. Austria also scores very well in terms of human capital with a broad coverage of basic digital skills in the population and high ranks in the availability of ICT specialists and STEM graduates. Austrian SMEs seem somewhat reluctant to use eCommerce, but business use of digital technologies for sharing information electronically remains well above the EU average. Austria has further improved its already well developed offer of online provision of public services. Nevertheless, the use of eGovernment services remains only just above EU average.

Overall national strategies towards digitization (economy, society)

The Austrian strategy focuses on targeted investment in information technologies, the development of RTI infrastructures, intellectual property protection and data protection (also in Open Data, Open Science and Open Innovation).

On 19 January 2017 Austria published the "Digital Roadmap for Austria" [1], a national digital strategy including a comprehensive overview over current challenges and as well as existing and planned measures to address these challenges. About 150 measures of all Ministries, are presented for the first time in a bundled form. The Austrian government also aims at creating framework conditions so that the broad society can benefit from the digitization. New innovative business

¹ <https://www.wko.at/service/zahlen-daten-fakten/daten-oesterreich.html>

paradigms, such as Open Innovation are promoted in the course of digitization. User-driven innovation and crowdsourcing are another focus in the 2017 research and technology report.

In January 2017, Austria has also adopted its new government programme for 2017-2018 in which digitisation is identified as one of the key priorities.

- Austria aims to be a 5G pioneer in the future. A 5G strategy for a new telecommunication infrastructure was announced to be published by the end of 2017.
- With its Broadband Strategy 2020², the Federal Government is committed to ensuring a well-developed and affordable digital infrastructure and provide a comprehensive availability of ultrafast technology (Fiber-to-the-Home FTTH) by 2020. Austria will have to invest around 5 bn Euro. Currently only about 13 % of households use internet connections with at least 30 Mbit/s and only 2% of households have connections with at least 100 Mbit/s.
- In terms of an innovative and future-oriented school system Austria is committed to a common digitization strategy for schools ("Schule 4.0").
- Austria will make digitization a priority during its EU presidency in 2018.

The Federal Government is expected to invest EUR 3.4 billion in R&D in 2017, of which a total of EUR 627.7 million is part of tax incentives for R&D for companies. The Austrian company sector remains the most important financing sector, with an estimated share of 48.2 per cent of total expenditures, with an estimated € 5.5 billion of R&D expenditures. The financial contribution from abroad (primarily international companies) is estimated at 1.7 billion euros and a share of 15.4 percent.

Overall expenditure on research and development in Austria for the year 2017 is expected to amount to 11.3 billion euros. This corresponds to an R&D rate of 3.14 percent of GDP. According to the "research moratorium" adopted in the Council of Ministers of 8.11.2016, Austria aims at increasing its research expenditures up to 3.76 per cent of GDP. It is envisaged that a third of the increase will come from the public hand and two thirds can be leveraged by the private side. Around 100 million euros are invested to increase the tax incentives for R&D from 10 percent to 12 percent in 2016 and up to 14% in 2018.

² <https://www.bmvit.gv.at/telekommunikation/publikationen/bbs2020.html>

II. National Strategies towards “Digitizing European Industries”

First Platform activities in Austria related to “Industrie 4.0” started in spring 2014; in 2015 an association “Industrie 4.0 Österreich” was established. Founding members were the Federal Ministry for Transport, Innovation and Technology (bmvit), the association for the Electrical and Electronics Industries (FEEL), the association of metal technology Industries (FMTI), the Austrian Federal Chamber of Labour (Bundesarbeitskammer BAK), the Austrian Trade Union for Production Workers (Produktionsgewerkschaft PRO-GE) and the Federation of Austrian Industries (Industriellenvereinigung IV). In early 2017, the association had 39 member organisations and participated at the 1st “Digitising European Industry” Stakeholder Forum

Fact Sheet “National Strategies in Austria”	
Ministry in Charge	Ministry for Transport, Innovation and Technology (bmvit) [Website]; Federal minister: Mag. Jörg Leichtfried
Contact Person	Dr. Ingo Hegny, Federal Ministry of Transport, Innovation and Technology Radetzkystraße 2. A-1010 Vienna Phone: +43 1 71162-652011 Mail: ingo.hegny@bmvit.gv.at
Main Strategy Documents	"Digital Roadmap for Austria" (2017) [1]

The responsible ministry as well as the Platform “Industrie 4.0 Österreich”³ consider the digitization of production a societal challenge that can only be addressed by collaboration of industry, science, regional and national policy makers, associations, trade unions and NGOs. It had been a targeted strategy of the Austrian government to involve this broad variety of interest groups right from the beginning. The Austrian Federal Chamber of Labor focuses on the areas of work organization and working conditions. They seek to maintain social protection at a high level, even in new forms of work in the digital environment. Qualification, vocational training and new forms of participation are regarded as important factors to find the best way to optimally implement the possibilities of digitization and to distribute them fairly.

³ <http://www.plattformindustrie40.at/?lang=en>

III. Digitising European Industry (DEI) Pillar 1 - Digital Industrial Platforms actions & Research, Development and Innovation actions

Digital Industrial Platforms actions

The Platform facilitates the implementation of digital transformation in Austria and unifies the Industry 4.0 community. It aims to secure and create highly innovative industrial production and to boost quality employment, thus strengthening Austria's future competitiveness.

Fact Sheet "Association Industry 4.0 Austria"	
Founding Members	Federal Ministry for Transport, Innovation and Technology (bmvit), Austrian Federal Chamber of Labour (BAK) Association for the Electrical and Electronics Industries (FEEL), Association of metal technology Industries (FMTI), Federation of Austrian Industries (IV), Austrian Trade Union for Production Workers (PRO-GE)
Working Groups	<ul style="list-style-type: none"> • Smart Logistics • Pilot factories • Norms and Standards • Research, Development and Innovation • The Human in the Factory • Qualification and Skills • Regional Strategies
Contact Persons	Dr. Kurt Hofstädter; Chairman Head of Siemens Digital Factory Central Eastern Europe DI Roland Sommer, MBA; Managing Director T +43 1 588 39 – 74; M +43 664 619 25 70 roland.sommer@plattformindustrie40.at
Platform Office	Association Industry 4.0 Austria – the Platform for Smart Production Mariahilfer Strasse 37-39, 1060 Vienna, Austria Tel. +43 1 588 39 75 office@plattformindustrie40.at http://plattformindustrie40.at/?lang=en

Key targets of the platform policy are:

- to leverage interests between industry, science, policy makers, employers and employees associations
- to accompany the processes of change driven by digitization
- to provide knowledge and services on Industry 4.0 to companies, academia, RTOs and to the general public
- to define fields of action and to advise policy makers

- to develop joint strategies with high leverage on Industry 4.0
- to launch initiatives to steer regional, national and international activities

to enable the exchange of experience, best practices, data and studies

Recently, the platform has worked out a White Paper [2] that stresses the macroeconomic aspects of industry 4.0 as well as the related aspects of work organisation.

Research, Development and Innovation actions

Between 2011 and 2016, the ministry for infrastructure bmvit has funded over 1.500 R & D projects with a production volume of more than 500 million euros. In 11/2016, bmvit has put together an even larger package of measures for industry in order to support the transition of the domestic economy to the digitized and automated production. The package includes, among other things, annual research grants of 185 million euros, 3 pilot factories, endowed professorships, the association "Plattform Industrie 4.0" and accompanying studies (e.g. effects of industry 4.0 on education and the labor market in Austria). In addition, the Ministry is working on a 5G strategy to make Austria fit for the new mobile radio standard.

Industry 4.0 related R&D

bmvit invests 185 mio. € per year in research activities that are directly related to industry 4.0 technology fields (total budget for applied research: 500 mio € / yr.);

- Material research (including smart materials and raw materials) and production research (including robotics) are funded with approx. 100 mio. Euro / year
- Industry 4.0 related ICT topics (applied research in areas such as "intelligent systems for automated driving", "machine learning", "security / interoperability, communication technologies (5G))." Are funded with approx. 85 mio. Euro

Bmvit has installed an independent funding program "Production of the Future" (in German: "Produktion der Zukunft")⁴ that primarily promotes national and transnational cooperative research and development projects with particularly high innovation content and with increased development risk. Through regular research or critical research, new insights are gained that contribute to the development of new skills and new products. This initiative has a yearly budget of 20-25 Mio. Euro (personal communication). Starting in 2014, a lighthouse project in generative manufacturing was started; and in 2016 a lighthouse project on human-machine-cooperation.

The current calls in "Production of the Future" were presented in a two-day information event (31.5./01.06.2017) at Tech Gate Vienna⁵. The topics funded in "Production of the Future" have a close relation to the thematic spectrum of "Digitizing European Industries".

Currently, two calls have been launched:

- The 23rd Call for is held within the framework of the European Research Area Network, MERA.NET ("ERA-NET for Materials Research and Innovation") with a focus on the promotion of

⁴ <https://www.ffg.at/produktionderzukunft>

⁵ <https://www.ffg.at/forumproduktion2017>

transnational cooperative R & D projects through more than 40 European and international funding organizations. International partnerships exist with Brazil, Russia, South Korea, South Africa and Taiwan.

- Within the 24th call for tender (19 May-13 September 2017), national cooperative R & D projects on industry 4.0, biobased industry, plant and raw materials, robotics, photonics and nanotechnology could be submitted. The proposals are currently under evaluation.

Other research programs address related areas such as new energy and mobility. Next to “top down” agenda setting, the ministry also funds a number of “bottom up” initiatives, such as the General Programme and COMET excellence centers. The COMET program fosters the establishment of centers of excellence. The COMET center run among other a research program that is jointly defined by industry and science at a high level.

Austria has a long tradition of research cooperation with China.⁶ Common research programs are initiated under the EU Horizon 2020 program, but partnerships are as well built up within the COMET program or as part of the research budget of the Austrian research agency FFG. Under specific circumstances, FFG can fund foreign partners within a program with up to 20 per cent.

Six endowed chairs working on Industry 4.0 research topics are funded for a period of 5 years. Each professorship is funded with 50% of cost by the government (2.0 mio. EUR for the first two endowed chairs; 1.5 mio. Euro for the following chairs; total investment is 9 mio. €). Three endowed chairs („Advanced Manufacturing“, „Design of Steels“, „manufacturing for SME“ were kicked of 2014; three other chairs („Industrie 4.0“, „Logistik 4.0“, „Data Science“) started in 2015. More Endowed Chairs are funded in the area of Automated Driving as part of an action plan on automated driving (bmvit) [4].

bmvit is funding studies concerning the effects of the digitization and automatization of manufacturing and services⁷. These studies are performed by Joanneum Research, Salzburg Research, AIT, IWI, Fraunhofer Austria and other organizations. The studies stress the future of the labor market, the changing qualification requirements for workers and new business models⁸. So far (2016), 400.000 Euro have been invested in studies. As an example, the study IND4LOG4 (2016) examined the effects of Industry 4.0 on transport and logistics.

⁶ https://issuu.com/oead.worldwide/docs/screen_wtz_20151027

⁷ <https://www.bmvit.gv.at/innovation/publikationen/produktion/index.html>

⁸ <https://i40transform.salzburgresearch.at>

IV. Digitising European Industry (DEI) Pillar 2 - Standardization actions, regulation and testbeds

Standardization actions

The Working Group of the Platform Industry 4.0 published the Österreichische Normungs-Kompass „Industrie 4.0“ (Austrian Standardisation Roadmap Industry 4.0). [5]

The aim of the Roadmap is to raise awareness for the topic of standardisation and to give concrete guidance to relevant stakeholders. The Roadmap is accompanied by an online tool that provides detailed and up to date information on norms and standards that are highly relevant for Industry 4.0 (“Online-Normenkatalog Industrie 4.0”)⁹.

The Austrian standards Institute (ASI) and The Austrian Association for Electrical engineering (OVE) are the Austrian organizations that drive these activities in the field of standardization. OVE is the official representative at IEC and CENELEC as well as at the National Standards Organisation of ETSI.

The organizations work in the following technical fields with relation to Industry 4.0

- Diagnostics of performance and faults
- Maintenance
- Life cycle management
- System migration
- Interoperability between systems
- Development and Engineering (synthesis processes in digital factories)
- Industrial Communication Systems
- Optimization (e.g. of unstructured data sets)
- Security Management
- Human-Machine Interaction
- Modeling Languages (e.g. RAMI 4.0; IoT Reference Architecture)

Pilot Factories and Testbeds

A pilot factory for science and industry at technical university (TU) of Vienna has been installed as a key component of the strategic focus of Industrie 4.0. The pilot factory combines basic research, application-oriented research in cooperation with industry, research-oriented teaching and continuing education. The pilot factory is a new instrument for strengthening Austria as a location for innovation (Investments in R & D infrastructure; transfer of R & D results into the economy). It has high relevance for SMEs (that are lacking an own R & D infrastructure). Next to a promotion instrument, it is also an experimental field at the interface between research and business with realistic hardware and software that can be used for cooperative development projects. The pilot fabric is financed as PPP (50% financing by private funds). An economic use of the facilities is possible and the fabric offers education and training (at universities, but also for companies).

⁹ <http://plattformindustrie40.at/normen/>

The pilot fabric in Vienna focuses on new concepts and solutions for multi-variant serial production (low badges, high mix) in the area of discrete production which is typical for many Austrian businesses. Vienna-Aspern is a demonstration plant for smart production and cyber-physical production systems, addressing several specific applications (Machining processes in robot-supported flexible manufacturing cells; robotic laser processing procedures for joining / separating and for additive / hybrid manufacturing; internal logistics with focus on lean methods and autonomous systems; lean assembly and worker assistance systems for assembly processes). The ministry of Infrastructure is investing a total of 4 mio € in this first pilot factory in Vienna-Aspern¹⁰. There are additional Investments from TU Vienna and 20 participating companies, including Siemens Austria, GGW Gruber and EMCO. The premises are provided by the city of Vienna.

In 11/2016 two other pilot factories have been announced¹¹. After the evaluation of the competitive call these will be established in Graz and Linz, respectively. Here, industry and science are supposed to jointly develop new processes and test production processes in a realistic environment. The intention is that SME have the chance to test new technologies and production processes without affecting production in their own facilities.

The Ministry of Infrastructure will pay half of the costs - up to two million euros for three years. At the two locations, new approaches to process engineering and assembly line production ("Discrete Production") are to be explored and new methods for the use of innovative materials or for producing in small batch sizes are to be researched.

Testbeds in Automated Driving

In addition, Austria has started substantial investments in Automated driving in 2016 (bmvit: 20 mio. Euros by 2019). On the highways around Graz, test runs begin with cars that independently steer, brake and accelerate. The Alp-Lab project¹² is a merger of several companies, including Magna, AVL-List, Virtual Vehicle, Joanneum Research and the Graz University of Technology, which coordinates the project. With the test tracks of the ALP.lab for autonomous driving, a unique test infrastructure is to be created throughout Europe in the coming years. The ALP.Lab will also offer comprehensive services for customers with the support of Telemotive. Several large companies have already signaled lively interest

Other regions also prepare test tracks for autonomous driving. For example, urban autonomous mobility is tested through a self-propelled bus in Vienna. By the end of June 2017, a test region in the area of Linz-Wels-Steyr with "DigiTrans" was prepared. Commercial and special vehicles are in the focus here. In the province of Salzburg and in Niederösterreich, test regions for rural areas are being prepared.

¹⁰ <http://pilotfabrik.tuwien.ac.at/>

¹¹ <https://www.ffg.at/21-ausschreibung-produktion-der-zukunft>

¹² <https://www.telemotive.de/de/unternehmen/news/blog/alplab/>

V. Digitising European Industry (DEI) Pillar 3 - Digital Innovation Hubs actions

Salzburg Research: "Maintenance Competence Center"

The Maintenance Competence Center (MCC) was founded by dankl + partner consulting, Messfeld and Salzburg Research as a practical one-stop shop for all questions concerning innovation and the digital transformation of maintenance. It provides a starting point on the way to excellent maintenance 4.0. Organizational and technological aspects are also the focus, as is the human factor and the changed competence requirements in the networked factory. The Maintenance competence Center addresses the following topics:

- Predictive Maintenance: acquisition of sensor data streams in real-time, big-data analysis, planning of maintenance measures, etc.
- Condition Monitoring: The acquisition of environmental parameters allows the monitoring of states and analysis of contexts
- Connect and collect sensor, machine data: Internet-based communication protocols, cloud services, etc.
- Assistance systems for employees in maintenance (maintenance instructions, manuals, etc.)

Contact: Birgit Strohmeier; T: +43/662/2288-248, M: +43.664.814 20 04

Artificial Intelligence Research Center Linz

In July 2017, Audi and Johannes Kepler University (JKU) Linz opened a joint research center ("Audi.JKU") for deep learning technologies. With this cooperation between the automotive brand and the chair of bioinformatics (Prof. Sepp Hochreiter), Audi intends to make use of artificial intelligence (AI) in automobiles. Prof. Sepp Hochreiter is one of the most important experts in Europe in the research field of artificial intelligence (AI). He has contributed decisively to the fundamental research of deep learning technologies. His institute for Bioinformatics at the JKU Linz has been a renowned address for many years under AI experts.

Research Studios Austria Forschungsgesellschaft: Data Market Austria

The DataMarket Austria¹³ project establishes a data services ecosystem in Austria by creating a significantly improved technology base for secure data markets and cloud interoperability and the establishment of a data innovation environment. The project is run commonly by several research partners, industry partners and SME.

Contact: Allan Hanbury, office@researchstudio.at; Leopoldskronstr. 30; 5020 Salzburg

COMET Centres

COMET (Competence Centers for Excellent Technologies) is operated as a program at the federal level, and is managed by the Research Promotion Agency (FFG). The evaluation is carried out by FFG together with external experts, funds for the promotion of scientific research (FWF) and Christian Doppler Forschungsgesellschaft. The COMET program is funded by two federal ministries (bmvit; Federal Ministry of Science, Research and Economy), the Länder support the program with additional, own regional resources.

¹³ <https://datamarket.at/>

In July 2016, the ministry announced the funding of a total of seven K1 competence centers with 60 million euros as part of COMET, among which 2 are in the area of Industry 4.0. The individual centers of competence are usually joint enterprises of the national economic development organization with resident universities and business people, but this is not a prerequisite. One third of all the partners in the centers come from abroad, which shows the good international networking of the program. In the meantime, the Center for Digital Production (CDP) at the University of Technology Vienna and the Center “Products and Production of the Future (Pro2Future) at the Johannes Kepler University Linz and the University of Technology Graz have been selected as new Competence Centers under the COMET scheme.

The competence centers are funded up to half of the budget, while the business partners will have to provide up to 45%; scientific partners will have to provide 5% of the budget. About half of the business financing comes from non-Austrian partners.

European Network of National Big Data Centers

The “European Network of National Big Data Centers” is a joint big data research initiative, founded and coordinated by the Austrian KnowCenter; funded through the COMET scheme, and the German Big Data Forum. The objectives of this initiative are to increase exchange and collaboration in big data research; to identify synergies for educational collaboration; to foster matchmaking between research programs and initiatives and to share best practices and lessons learned on business approaches. 13 more Centers of Excellence in the area of big data have been invited to join the network. Among other, topics close to industry 4.0 are covered, such as sensor stream analytics on massive realtime data or predictive maintenance and error prediction.

Contact: Stefanie Lindstaedt, Know-Center GmbH, Inffeldgasse 13/6, 8010 Graz, Austria.

VI. Digitising European Industry (DEI) Pillar 4 - Skills development

Skills development

The Industrie 4.0 platform deals with the requirements arising from the digitization process and the future development of the workgroup qualifications and competencies. A working group on skills and qualification has been established, including active participation of two ministries (Federal ministry of education BMB; Federal Ministry of Labour, Social Affairs and Consumer Protection BMASK) together with Arbeiterkammer Wien and other relevant actors. The task of the working group is to identify key competences and gaps in relation to industry 4.0 and to develop priority areas of action. Other topics are the digital infrastructure and "digital skills" of the teachers and the recognition of non-formal and informally acquired competences. A position paper has been announced.¹⁴

Bmvit has initiated a study on qualification measures in connection with Industrie 4.0 [6]. The study concludes that digital competencies are becoming more and more important in production, while simple routines are the most affected. The study recommends strategies such as in-company training and dualization in tertiary education. Furthermore, fostering Women in technology as well as Digitization of apprenticeship should be promoted.

The province of Carinthia together with Infineon have announced the setup of the first "learning factory" for Industry 4.0 at the Technical Academy St. Andrä. The Technical Academy St. Andrä is expanding its range of training and continuing education courses even more significantly towards Apprenticeship 4.0 with an "Industry 4.0 learning factory".

¹⁴ <http://plattformindustrie40.at/qualifikationen-kompetenzen-fuer-industrie-4-0/?lang=en>

VII Specific National Measures

Innovation promotion

Tax incentives

In Austria, companies can benefit from a tax incentive for R&D (“research premium” – “Forschungsprämie”) for their research and experimental development expenses. They can apply at their financial authority for up to 12 percent of their research subsidies. Businesses that do not show a profit can as well benefit from the research premium. A report from the Austrian Research Promotion Agency (FFG) is a prerequisite.

In 2016, the Austrian government has attributed around 100 million euros to an increase in the research premium from 10 percent to 12 percent. Overall, the Federal Government is expected to invest EUR 627.7 million in research bonuses for companies. From 2018 onwards the research premium will be raised to 14%.

Structural Funds

According to the ICT Monitoring Tool¹⁵, Austria is planning the following ICT Investments under ESIF with relevance to smart manufacturing research and dissemination:

- EAFRD - ICT in rural funds: 27 M
- 044 - Intelligent transport systems (including the introduction of demand management, tolling systems, IT monitoring, control and information systems): 6 M
- 015 - Intelligent Energy Distribution Systems at medium and low voltage levels (including smart grids and ICT systems): 1 M
- 082 - ICT Services and applications for SMEs (including e-Commerce, e-Business and networked business processes), living labs, web entrepreneurs and ICT start-ups): 0.5 M

Which is summing up to a total of 34.5 mio. Euro.

Support for the digital transformation of SME – the program “KMU Digital”

In September 2017, the Federal Ministry of Science, Research and the Economy (BWF) together with the Austrian Economic Chambers (WKÖ) announced a new initiative “KMU DIGITAL” (“Digital SME”) ¹⁶ which is funded with a budget of 7 mio. Euro (Sept. 2017 through end of 2018). The initiative provides direct business support on several levels and with a multitude of instruments¹⁷:

- A free Online Status Check; providing a quick first status check to identify the digital starting position (“How digital is my company?”)
- A free potential analysis (600 Euro maximum): an entry-level consulting service that systematically analyses digital trends, opportunities and risks for a company. (“What should/could be changed?”)
- Consulting Services (50% bonus; 1.000 Euro per topic and 4.000 Euro per company maximum) with a focus on a) e-commerce / social media, b) business models and business processes, c) improving IT security. Consulting services can be booked for more than one

¹⁵ http://s3platform.jrc.ec.europa.eu/ict-monitoring/-/tool/search?p_auth=ooVYaa5J

¹⁶ <https://www.bmwf.gv.at/Innovation/Foerderungen/Seiten/KMU-DIGITAL.aspx>

¹⁷ Details can be found on the SME DIGITAL website at www.kmudigital.at

topic. Certified consultants will provide assistance to SME by systematically defining and implementing concrete steps of their respective digitization strategy (“How should I do it”).

- Qualification: Extending digital skills. This part of the initiative consists of webinars, funded training measures all over the country as well as of the an e-business roadshow (“digital.now”). The ministry provides a 50% bonus for training measures for entrepreneurs and employees.
- Furthermore, the ministry plans the establishment of further Digital Innovation Hubs in Austria as part of the KMU Digital initiative.

The initiative is also an answer to statistics on ICT use in Austrian companies that show that there is still a great potential for improvement, for example in the areas of e-commerce, in data analysis (big data), in various automation fields (IoT, Industrie 4.0), in digital business models and in other areas.

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Facilitate access to finance

The Austrian Federal Government is expected to invest EUR 3.4 billion in R&D in 2017, of which a total of EUR 627.7 million is part of research awards for companies (see “tax incentives”). The corporate sector remains the most important financing sector with an estimated share of 48.2 per cent of the corresponding total expenditures, with an estimated € 5.5 billion of R&D expenditures. The financial contribution from abroad is estimated at 1.7 billion euros and a share of 15.4 percent.

VIII Investments for Digitising European Industry

Activity	Timeframe	Reliability	Amount (€)
Research funding (overall bmvit investment in DEI – 100 mio. Goods industry; 85 mio. ICT research). This budget includes pilot plants, Endowed Chairs and the bmvit share on the COMET program	Per year	Press release	185 M
3 Pilot plants	3 years		18 M
Embedded Chairs	5 years	Press release	9 M
Studies Industrie 4.0	Total		400k
Co-Funding Plattform Industrie 4.0			???
“Produktion der Zukunft Initiative”	Total	Personal communication	20-25 M
Digital Innovation Hubs / COMET			
Tax incentives / Research bonuses	yearly	Press release	628 M
ESIF funds			34.5 M
KMU Digital	09/2017-12/2018		7 M
Other			

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