



Case study on the Plattform Industrie 4.0, Austria

Contribution to the OECD TIP Digital and Open
Innovation project

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Executive summary

The Plattform Industry 4.0 Austria was established in 2015 as a membership-based non-profit organisation by the Federal Ministry for Transport, Innovation and Technology, the Association for the Electrical and Electronics Industries, the Association of Metaltechnology Industries, the Austrian Federal Chamber of Labour, the Austrian Trade Union for Production Workers and the Federation of Austrian Industries. Membership is open to companies, academic institutions, research organisations, NGOs and further institutions that are leaders in the field of Industry 4.0 in Austria.

The core mandate of the Plattform Industry 4.0 is to facilitate the implementation of Industry 4.0 and to foster collaboration among relevant stakeholders with the aim to secure and create a highly innovative industrial production and to boost quality employment. The Association considers technological innovation, new business models, knowledge transfer and the widespread socially acceptable deployment and implementation of digital technologies to be the key drivers of Industry 4.0. The approach of the Plattform is to bring all involved stakeholder together to jointly address the challenges and opportunities of Industry 4.0 from a social and inclusive angle in order to exploit benefits for everyone participating in the industrial value added chain. To do so, it connects different policy areas and industrial sectors, relevant suppliers, research institutions, networks, social partners and interest groups and covers the key drivers of Industry 4.0 in nine thematic expert groups. Unique in its ample involvement of employee associations, the Association achieved to build an inclusive ecosystem intending to overcome concerns and develop new approaches regarding digitisation and a broad and differentiated understanding of the several challenges of Industry 4.0.

These expert groups work in defined subject areas consisting of top tier experts from their respective fields, aiming for a balanced mixture of experts with scientific experience and extensive practical and operational experience. Around 500 experts are involved in the work; the outputs involve roadmaps, guidelines, strategies, analytical documents, workshops and events.

The Plattform Industry 4.0 has produced quantitative as well as qualitative outputs in a timely manner and increased its paying membership from 6 to 44 within two years. Overall the added value of the Plattform is to manage a powerful competence network of members and experts with various backgrounds. Joint work within the working expert groups - with the structures in place - guarantee an objective, transparent and balanced process of strategy formation, best practise use case identification and visibility of the topics. Having an institution in place that oversees major developments in Austria, both on the national and the regional level and combing this knowledge with international trends provides additional value to members and stakeholders.

Thanks to the platform, several research collaborations have been started between companies and research organisations. One of the primary outputs of the Association are the numerous publications with a strong SME focus developed in the expert groups. In one specific expert group on “Regional Strategies”, where representatives of regional governments and regional agencies come together, a training coalition and cooperation between three regional governments was established. These regions decided to join forces on setting up a research training workshop. In the field of R&D, the platform identified fields of action and measures to increase the Austrian technology competence regarding Industry 4.0 and broaden the research base and thereby shape the content of a call for proposals launched by the Ministry and one by one of the regional funding agencies.

Part I. General overview of Plattform Industrie 4.0

1. The process of creation

1.1. What are the main factors and background conditions that motivated the creation of the Platform Industry 4.0 Austria?

The digital transformation of industry has not just a wide range of impacts on the whole production system itself but also represents a major economic and social challenge. This implies a strong need to involve and foster collaboration among industry, science, regional and national policy makers, associations, trade unions and NGOs to generate a sustainable added value for all of those who are affected. Against this backdrop, the Federal Ministry for Transport, Innovation and Technology (BMVIT) and representatives of the Austrian social partnership (employee and employer associations) took initiative and became the political lead actors in setting up a national Platform on Industry 4.0.

About two years prior to the formal establishment of the Platform Industry 4.0 Austria in 2015, these national key players decided to closely co-operate on the complex system change through the digital industrial transformation, summarized under the term “Industry 4.0”.

In the beginning, it was very important for the short-term persistence of the platform that the Federal Ministry for Transport, Innovation and Technology as a neutral and public body took the lead and also provided the main share of necessary resources. In addition, the preparation of a more formal structure (Association) and the formulation of a first vision and mission of the platform, including the statutes of the Association, were created.

With the formal establishment of the Platform Industry 4.0 Austria in 2015, the installation of a managing board, a general assembly of members and the opening of its office, the national platform on Industry 4.0 entered a new phase, providing a more robust layer for future activities on the system innovation challenge of digital industrial transformation in Austria and beyond.

The six founding members of the Platform are all key players in the Austrian industry-policy sector. These founding members are:

- Austrian Federal Ministry for Transport, Innovation and Technology (BMVIT)
- Austrian Federal Chamber of Labour
- Association for the Electrical and Electronics Industries
- Association of Metal technology Industries
- Federation of Austrian Industries
- Austrian Union of Production Workers

1.2. Did the creation of the Platform involve co-ordination with other policy areas?

In its starting phase, the BMVIT acted as an incubator of a multi-stakeholder process and took the lead in running the national Industry 4.0 network. The initial activities of the network were mainly geared towards giving common orientation on Industry 4.0 related

challenges, and on the organisation of “tentative working groups” in which a wide range of relevant stakeholders from national policy makers, industry, science and interest groups could exchange on needs and future topics to be addressed.

1.3. What are the major challenges that Austria faces related to digital transformation? What is the role/value added of the Platform in addressing them?

Lassnig et al. (2016)¹ defined the following major challenges for Austrian companies with regard to digital transformation in companies:

- IT and data security
- High investment costs
- Unclear return on investment
- Lack of qualified personnel
- Fear of change among employees
- Uncertainty about technological development paths
- Unsolved technical problems and unclear standards
- Use of cloud infrastructure
- New business models

The Platform Industry 4.0 Austria has established various expert groups that work on key topics on Industry 4.0:

- The expert group on security and safety addresses IT and data security and aims at providing hands on expertise and best practise use cases for SMEs.
- The expert group on qualification and competences bridges the gap between competence demands and qualification offers with regard to digitalisation.
- The expert group on the human in the digital factory addresses fears of employees and provides among others input for the changes of the organisation of work that comes with digitalisation. Moreover, one focus is laid on safety aspects, both physical aspects and mental stress.
- The expert group on research and technology worked out a technology roadmap with the intention to shape top down funding schemes in Austria to make sure that demand and funding offers match.
- The expert group on norms and standards provides information about international norms in industry 4.0-relevant areas and aims at reducing complexity for users of these norms, e.g. in product development, investment decisions etc.
- The expert group on new business models will provide, via best practise use cases, the provision of the competence of the whole network and the inclusion of experts input on investment, opportunities of new business models and possible return on investment opportunities. Research infrastructure, smart production

¹ Markus Lassnig, Petra Stabauer, Georg Güntner, Gert Breitfuß, Katrin Mauthner, Michael Stummer, Michael Freiler, Andreas Meilinger (2016): [Industrie 4.0 in Österreich](#). Kenntnisstand und Einstellung zur digitalen Transformation durch Industrie 4.0 und neue Geschäftsmodelle in österreichischen Unternehmen. Band 2 der Studie im Auftrag des österreichischen Bundesministeriums für Verkehr, Innovation und Technologie (BMVIT) sowie der Österreichischen Forschungsförderungsgesellschaft (FFG) im Rahmen des Programms "Produktion der Zukunft". Salzburg / Wien.

labs, pilot factories etc. are regarded an important means of addressing challenges of SMEs when it comes to the digital transformation.

Overall the added value of the Platform is to manage a powerful network of competence of members and experts with various backgrounds.

Joint work within the expert groups - with the structures in place - guarantee an objective, transparent and balanced process of strategy formation, best practise use case identification and visibility of the topics.

Having an institution in place that oversees major developments in the country, both on the national and the regional level and combing this knowledge with international trends provides additional value to members and stakeholders.

2. Main features of the Platform

2.1. What is the mandate and the specific objectives of the Platform?

The core mandate of the Platform Industry 4.0 is to facilitate the implementation of Industry 4.0 and to foster collaboration among the relevant stakeholders with the aim to secure and create a highly innovative industrial production and to boost quality employment, thus strengthening Austria's future competitiveness. The Platform directly addresses and approaches the challenges and opportunities of Industry 4.0 from a social and inclusive angle in order to exploit benefits for everyone participating in the industrial value added chain. To do so it connects different policy areas and industrial sectors, relevant suppliers, research institutions, networks, social partners and interest groups.

The Platform itself is not an implementation tool in the narrow sense. It can be classified as a **supportive policy coordination hub through which the implementation potentials for Industry 4.0 are identified and prioritised and proposals for further developments are formulated**. Nevertheless, the Association itself also offers services related to the concrete need of members and to the interested public.

The Associations is understood as a **neutral venue for industry specific and societal discourse and collaboration between different stakeholders** as well as for information exchange processes, networking and strategy-building events.

The main objectives of the Platform are:

- To accompany the processes of change driven by Industry 4.0
- To leverage interests between industry, science, national and regional policy makers, employers and employees associations
- To provide and diffuse information, knowledge, best practises and services on Industry 4.0 to companies, academia, research organisations and the general public
- To define fields of action, goals, tasks and proposals for practical implementation of measures/ activities to policy makers
- To develop joint strategies with high leverage on Industry 4.0
- To launch initiatives to steer regional, national and international activities

2.2. What are the Platform's main areas of action?

The main areas of focus and actions are defined consensus-based by the founding and ordinary members of the Platform and subject to ongoing evaluation and development.

The Association considers technological innovation, new business models, knowledge transfer and the widespread socially acceptable deployment and implementation of digital technologies to be the key drivers of Industry 4.0. To thematically cover these key drivers, 9 expert groups were set up on the following **focus areas**:

- Security & Safety
- New Business Models
- Human in the digital Factory
- Qualification and Skills
- Regional Strategies
- Norms and Standards
- Research, Development and Innovation
- Smart Logistics
- Pilot Factory (activities finished)

These expert groups are composed of interested members of the Platform and top tier experts, e.g. from Ministries, regional clusters, funding agencies, standards organisations etc. Within these expert groups members have the opportunity to contribute and to shape Industry 4.0 related topics. Around 200 experts are involved in the work of these thematic groups. Due to the diverse focuses of the expert groups, outputs and processes tend to be different, while working processes are very transparent with meetings taking place on a regular basis. In most cases **outputs** involve roadmaps, guidelines, strategies, analytical document and events. The Association's activities also include policy advice, experimental activities for members, consulting, matchmaking and networking, as well as disseminating research results, case studies and best practices.

To better understand the working methods of the Platform two expert groups with focus on research and innovation are described in more detail:

(1) Expert Group Research, Development and Innovation

The expert group was set up to develop a technology roadmap on Industry 4.0, to work out recommendations for RD&I and to connect relevant actors. Representatives of university- as well as non-university research institutions, of administration, companies and interest groups as well as policy makers act as the central steering committee and define focal areas of work and the content of the activities. The main focus is on optimizing the framework for R & D and Innovation on a regional, national and international level. It does so by promoting cooperation between research institutions and industry, awareness-raising among key stakeholders and accurately addressing the technological and financial needs of the research and innovation community by identifying and anchoring relevant topics for top-down tenders of the federal and regional governments.

Another core task is the dissemination of relevant information from the Austrian R & D environment.

One central output of the group is the publication of its R & D strategy paper. It identifies priority research fields in the context of Industry 4.0, while strengthening Austria's strengths. Moreover, it gives suggestions to the further development of existing funding

instruments. More than 70 representatives from policy making, industry, science and employees have worked together to develop a joint roadmap, understandable also to non-experts. In this report, eight interdisciplinary research fields were identified (Virtualization, Sensor-Systems, Software Engineering, Physical Systems, Cyber-Physical Systems, Intelligent Work and Assistance Systems, Business Models, Domain Knowledge) that will be central to technology development in Austria in the future. However, these must not be understood as isolated individual materials. Only through interaction they become the central pillars of the industrial future: virtualization becomes a powerful tool through intelligent sensor systems and software solutions that are used on innovative machines (physical systems). This combination creates a cyber-physical system. Intelligent work and assistance systems as well as experience and specialist knowledge (domain knowledge) are required to operate the CPS. Applied Industry 4.0 technologies and domain knowledge contribute to creating new business models.

The fields identified can be seen as a successful football team - each one has an important role, but only together is it practical. Overall, the R & D strategy paper is an indicator for politics and companies, which technological developments and non-technological innovations are desirable for a successful and sustainable industrial production in Austria.

(2) Expert Group Pilot Factory

A pilot factory is a realistic and operating model of a factory - a laboratory situation with real machines and logistics systems. The aim is to create a real and neutral testing and research environment in which development and testing can take place without disrupting ongoing production, open to partner and non-partner companies.

A pilot factory serves equally for

- the joint development of new products (prototypes) and processes;
- as a test facility for complex, modern manufacturing systems;
- for interdisciplinary research (e.g. mechanical engineering, mechatronics, electrical engineering, computer science, ergonomics);
- as a training and further education centre and industry-related learning environment as well as
- a classical research infrastructure.

After the opening of the first pilot factory by the Vienna University of Technology in Vienna Aspern, BMVIT planned the tendering of three more pilot factories. The expert group, together with BMVIT and the Austrian Research Promotion Agency, carried out a consultation process with companies regarding the thematic focus of the call for tenders for three pilot factories - with the aim of focusing on Austrian fields of strength and ensuring complementarity with the existing pilot factory.

The expert group identified three focus areas that were included in the call for tender: Smart Electronic Based Systems, Manufacturing of Discrete Goods and Process Engineering.

2.3. Do the activities of the Platform's focus on specific sectors or technologies? If so, which ones? Are there mechanisms in place to ensure interdisciplinary approaches to research and innovation?

Given the diverse backgrounds of the members and stakeholders of the Platform, the target audience of the activities is similarly diverse. Primarily, the Platform focuses on the needs of enterprises and their employees, research organisations and academia in the area of industrial production. Temporary focus areas and activities are derived from the current needs of the members and direct stakeholders.

Each expert group has a chairperson; its activity is coordinated by a staff member of the operative office of the Association. This allows following a continuous line of work, ensures interdisciplinary approaches and creates synergies between the focus areas. Moreover, each expert group has a dedicated board member, who oversees the work and is part of the board of directors, the strategic decision making body of the Association.

So far, the strategy of the Platform Industry 4.0 is to cover topics that are not related to any specific sector or technology so as to ensure cross-sectoral learning.

2.4. What is the annual budget allocated to the Platform? What are the sources of funding?

The funding model of the Platform is based on two pillars: Basic seed funding provided by the six founding members and membership fees. The seed funding provided by the six founding members amounts to approximately EUR 300,000 per year, aiming to secure the basic financing of operations. The second part of the income is retrieved from the Association's currently 41 ordinary members. Membership is based on an annual membership fee in the form of a three-tier model. Large companies with more than 1000 employees located in Austria contribute an annual fee of EUR 7,500. Smaller companies, research institutions; trade unions, etc. pay €5,000. Additionally, a start-up scheme paying EUR 750 annually was introduced. As more and more members have joined the Association in the last years, the basic seed funding by the founding members will be reduced, yet not completely abolished, since founding members have more rights than ordinary members, e.g. each of them has its own representative on the Board of the Association. The annual budget amounts to approx. EUR 600,000.

These funds are only used for covering the operational costs of the activities of the platform itself. For any industry 4.0-relevant activity, e.g. setting up a qualification scheme in a region, funding an Industry 4.0-related R&D activity, commissioning a study, other funding sources (e.g. research funding, funding of training activities, etc.) are being used.

3. The Platform Industry 4.0 Austria in practice

3.1. What type of organisational structure does the Platform have?

The Platform Industry 4.0 Austria is formally established as a non-profit, membership-driven association, with its registered office in Vienna.

In structural terms, it consists of currently eight active expert groups, a coordinating office, a board of directors and a general assembly.

The members of the association are divided into statutory members and ordinary members. Statutory members are the six founding members:

- Austrian Federal Ministry for Transport, Innovation and Technology
- Austrian Federal Chamber of Labour
- Association for the Electrical and Electronics Industries
- Association of Metal technology Industries
- Federation of Austrian Industries
- Austrian Union of Production Workers

Ordinary members pay a membership fee and are actively participating in the work of the Association. To become an ordinary member the company or organisation has to have employees in Austria and create an added value for the Austrian industrial sector. The board of directors decides on the admission of new ordinary members by a simple majority vote. The platform currently consists of 47 members as of October 2018, including founding members, ranging from companies and academic institutions to public research organisations, NGOs and several federal institutions, such as a ministry, a business agency or the Social Insurance for Occupational Risks.

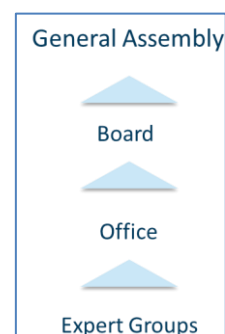


The Association is governed by the General Assembly, the Board of Directors (Strategic unit) and platform's office (Coordination/ Service unit).

The General Assembly is the main decision body of the Platform Industry 4.0. Once a year the General Assembly, consisting of delegates of each member, takes place. The Board of Directors, supported and prepared by the platform's office, gives information on the general development of the association and proposes new board members and strategic directions to the general assembly.

The following tasks are reserved for the general assembly:

- resolution on the budget estimates;
- receiving and approving the statement of accounts and the financial statements with the involvement of the auditors;
- election and removal of the members of the board of directors and the auditors;
- discharge of the board of directors;
- fixing the level of the membership fee and the annual membership fees;
- passing of changes to the Articles of Association and the voluntary dissolution of the Association;
- Advice and decision-making on those fundamental issues of the association, which the executive board submits to the general assembly for decision.



The Board of Directors is composed of 11 members. Six seats are assigned to representatives of the founding members, with five additional seats representing universities, public research organisations, large industry as well as SMEs. Having four board meetings a year, it has the character of a decision making body. It prepares and executes the strategic direction of the association and actions/ measures to be taken. The board is responsible for managing the Association, together with the managing director.

Currently four people, including the managing director, are full-time employed directly at the Association's office. This office has the character of a service and coordination unit for the members and the interested public and is operatively running the platform. It coordinates the expert groups, manages and contributes to the activities and initiatives of the platform, functions as main point of contact and organizes events such as the annual platform conference ("Summit Industrie 4.0"). The office also makes proposal on actions that should be taken to the Board of Directors.

3.2. What are the mechanisms in place to ensure that the activities of the Platform are in line with its general objectives/mandate?

Creating a coordination office is a key driver allowing the Platform to follow a continuous line of work. Having a committed team, contributing to, coordinating and following up the work of the experts groups, serves as an excellent framework in steering the expert groups. It also allows for maximising synergies within the diverse fields of topics covered by platform.

Each expert group includes a relatively small core working group and a thematic sub expert group. The core group is the steering body of the whole expert group and assembles and coordinates the inputs and proposals of the sub groups.

It usually consists of representatives of all of the six founding members as well as of thematic experts. This diverse set up as well as the strategic involvement of a designated member of the board of directors guarantees transparent, neutral and comprehensive work processes.

In terms of implementation mode, the founding members have had an important role to direct the course of the Platform in the beginning. While the ministry and the other founding members had the key role of defining the strategic focus of the Platform and the expert groups, lately one can see an evolution towards a more bottom –up approach with the Board of Directors' members orienting more along the priorities of the Platform's ordinary members.

Together with the office, the board of directors set up a procedure of choosing topics to be dealt with, in order to align the activities with the general mandate of the Platform. To do so, the chair of the expert group, in cooperation with the corresponding member of the Board of Directors, drafts a vision paper that serves as an orientation for the structure of the expert groups and the main topics to be addressed and discussed.

In most cases, expert group outputs involve roadmaps, guidelines, strategies, or analytical documents. These publications are drafted by its core group members and the office personnel. Those drafts are further discussed in the expert group and ultimately approved by the board of directors.

In all of the aforementioned expert groups, the office personnel and the designated member of the Board of Directors act as an intermediary between the expert group and the Board of Directors. This guarantees a constant revision of the scope of work,

functioning as a corrective pendulum in the ever-changing environment of Industry 4.0. Furthermore, it aligns the focus of the expert groups with the general objectives of the platform.

3.3. What challenges have been faced during the process of design and/or implementation of the Platform (if any) and how are these being addressed?

Initially, there were doubts whether the initiative would succeed, given the involvement of both employee and employer associations. Additionally, small companies feared that large companies would dominate the activities too much.

Ensuring space for sensitive discussions and compromise on the one hand and timely delivery of results on the other can be a challenging endeavour. The combination of industry 4.0's thematic complexity with diverging viewpoints of the members creates a risk of reducing contents to the smallest common denominator with little value added to ongoing discussions. No matter how inspiring the discussions, they often do not serve as publication material. As a result, external observers may get the impression that relatively few outputs are produced; yet, the discussions are an important part of the platform's culture.

However, perceived barriers did not become reality. Unique in its ample involvement of employee associations, the Association achieved to build an inclusive ecosystem intending to overcome member's concerns regarding digitisation. The Platform has produced quantitative as well as qualitative outputs in a timely manner and increased its paying membership from 6 to 44 within two years.

The key dimensions of the work processes of the Platform that ensure its success:

- 1. Open character of the Platform:** Non-exclusivity, a strong network function, an explorative and flexible platform design, the enabling of objectivity and open discussions without dogmas, the ambition of members and management for building bridges and a broad and differentiated understanding of the several challenges of Industry 4.0 are contributing to an open character of the platform.
- 2. Balanced and effective composition of the Platform:** Building a dynamic and well-organized network of all relevant stakeholders from policy, associations, NGOs, agencies, economy/industry and research, the right choice and mixture of individual stakeholders with leverage, the engagement of experts with scientific experience, the engagement of experts with extensive practical and operational experience as well as clear rules and transparent criteria for the selection of stakeholders can contribute to a balanced and effective composition of the platform.
- 3. Mutual trust between members:** Clear responsibilities of each relevant actor, clear rules and processes for exchange between stakeholders, internal transparency e.g. on different interests, strategic focusing and the distribution of working topics/priorities, neutrality of chair, regular feedback and valuation/appreciation between the members as well as the visibility of members contributions can strengthen mutual trust between the members.

4. **Generation of (short term) added value and results:** Clear and measurable goals and objectives (short-term and longer-term), thematic and strategic focusing, success monitoring, the picking of “low hanging fruits”, the linkage of the (scarce) time resources of all participants to a concrete value/output (like a roadmap, strategy or a foresight), the allocation of studies, noticeable services for members and interested public, the development of topics for tenders/funding of projects, and the organisation of events on a regular basis can contribute to the generation of (short term) added value and results. One success factor is that the Platform focuses on a limited number of specific topics within which selected projects are defined. There is no intention to cover all aspects of Industry 4.0.
5. **Professional organisation of processes and availability of resources:** Professionalism of the platform management and support, professional moderation of processes, professional interfaces to members, stakeholders and the public, professional formats, regular "physical" meetings, detailed planning, annual work programme with specific content and projects, fixed financing of concrete projects and initiatives and fixed financing of necessary resources for the platform are necessary prerequisites for successful work of the Platform Industry 4.0.

3.4. Are other policy initiatives (also in other policy areas) in line with the objectives of the platform? In what ways do they reinforce each other?

The Platform is strongly embedded into the Austrian industrial policy and research landscapes both on national as well as on regional level. Key stakeholders are founding or ordinary members, and there are more than 20 strategic partnerships with other national organisations to enable the platform to be the central Industry 4.0 hub in Austria.

Thanks to the platform, several research cooperations have been started between companies and research organisations. One of the primary outputs of the Association are the numerous publications developed in the expert groups, for example the Normungskompass (“standardisation compass”) which is used by the Swiss Industry 2025 initiative and the Austrian Standardisation Organisations. Furthermore, in the expert group on Regional Strategies, where representatives of regional governments and regional agencies come together, cooperation between three regional governments was established. These regions decided to join forces on setting up a research training workshop. In the field of R&D, the platform identified fields of action and measures to increase the Austrian technology competence regarding Industry 4.0 and broaden the research base and thereby successfully shaped the content of a call for proposals launched by the Ministry and one by one of the regional funding agencies. In terms of qualitative outputs, all constituents see Industry 4.0 more positively as a result of discussions held during the platform’s meetings.

4. International dimension

4.1. Does the Platform have an international dimension?

Although the focus of the work of the Platform is primarily national and regional by nature, there is an increasing focus on international activities. These can be divided into two forms:

1) EU-level activities

The Digitising European Industry initiative as part of the Digital Single Market strategy was launched in April 2016. The aim of this initiative is to digitise Europe. It consists of four pillars:

1. **European platform of national initiatives on digitising industry** – the platform was launched in March 2017, is an EU coordination forum and brings together all EU Member States to ensure coherence and collective steering.
2. **Digital Innovation Hubs (DIHs)** are one-stop-shops where companies get support to improve production processes, products and services by means of digital technologies.
3. **Strengthening leadership through partnerships and industrial platforms** through Public-Private Partnerships and the development of digital industrial platforms and large-scale piloting.
4. **Preparing Europeans for the digital future** – adapting the workforce, education and learning systems as well as reskilling citizens are in the focus of this initiative.

The Platform Industry 4.0 Austria and the Federal Ministry for Transport, Innovation and Technology are actively participating in the working groups at the European level.

In the course of the work of the Austrian platform, the importance of international exchange is being discussed regularly. The following topics benefit from a European perspective: Norms and standards, expertise and access to digital innovation hubs (DIHs) and education and training are mentioned regularly as topics where European coordination brings important value added.

2) National initiatives

The types of platforms that are equivalents to the Platform Industry 4.0 Austria can be considered key to implement policy instruments that are systemic in nature (“system innovation”). By this is meant that a combination of different instruments together foster systemic change. E.g. on the level of an SME: a combination of training schemes for a CEO of a small company, a workshop with other companies, access to a maturity model scheme and subsequently research funding.

Given the different platform structures, financing models, participating partners and missions, there is an increasing need for platforms to exchange good practise, identify strengths and weaknesses of their specific structures and engage in cross-border cooperation on various topics.

All platforms tackle several policy areas covering the broad area of digitisation. These include, among others, norms and standards, research and innovation, education, the

human in the digital factory, new business models, security issues, logistics, funding schemes, etc.

5. Impact

5.1. Has the platform's impact already been evaluated? If so, what have been the outcomes? If not, how and when are impacts planned to be evaluated?

So far there has not been any evaluation of the impact of the Platform Industry 4.0. Yet there is the intention of the Federal Ministry of Transport, Innovation and Technology to perform an impact evaluation in the next years.

Part II. Insights on selected projects

6. The Austrian Industry Maturity Model

Assessing the digital readiness of a company is often the first step to kick-start a digital transformation strategy. Especially SMEs face considerable obstacles on their way to digitalization. Lack of vision and strategy, high investment costs and uncertainty regarding future trends in technology and possible return of investment often keep SMEs away from implementing Industry 4.0 technologies.

The Austrian Industry 4.0 Maturity Model, an initiative of Business Upper Austria, the University of Applied Sciences Upper Austria and the Platform Industry 4.0 Austria supports businesses in this process by providing a technology-neutral Industry 4.0 assessment within a not-for profit organisational structure. The evaluation can either be performed by the company itself or by specifically trained consultants. Either the experts from the Cluster and from the University of Applied Sciences support the particular operator.

The Austrian Industry Maturity Model **evaluates the digitisation readiness of firms**. It contributes to the measurement and dissemination of Industry 4.0 and can therefore be seen as a match making between company goals and the most promising digitalization measures (research findings) to reach these goals. It has been developed by the Mechatronics Cluster (Business Upper Austria) and the Center of Excellence for Smart Production at the University of Applied Sciences Upper Austria, a member of the Association Industry 4.0.

A strategy-led approach is used to identify concrete digitalisation potentials and project proposals that lead from the actual to the target maturity level. The target position represents the economic and strategically optimal degree of maturity of a company, which is achieved after realization of concrete project proposals. The results of the evaluation are fed into a benchmark database where consultants and companies have access to the gathered data. Great care has been taken that all data are anonymous. Furthermore, the results can be used at the political level to assist decision makers.

The assessment of Industrie 4.0 maturity is based on a scale from 0 to 10 in the dimensions (1) data, (2) intelligence and (3) digital transformation. This assessment can be done by advisors or companies who obtained a specific training and license. These are described below:

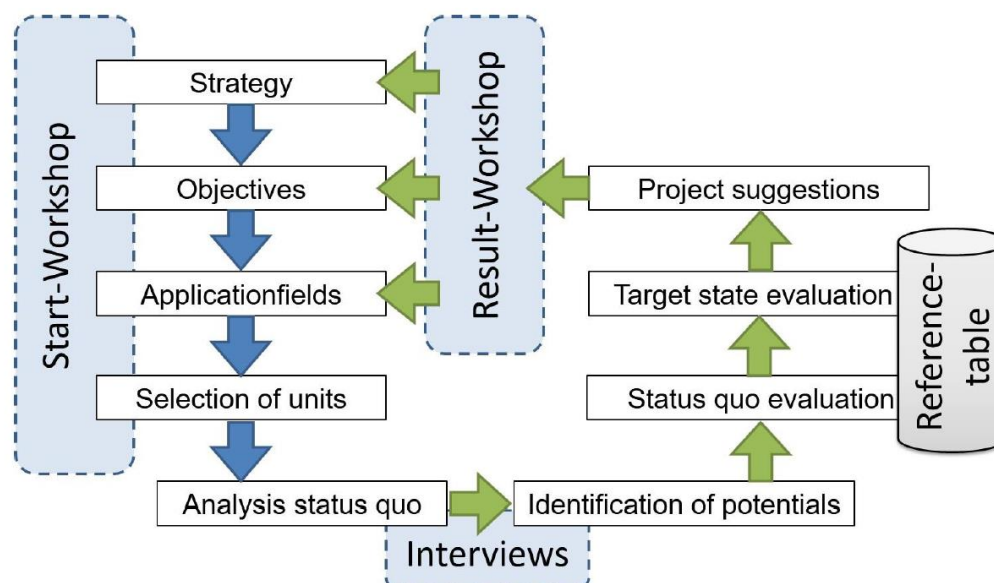
1. **Data** constitute the foundation and the main resource for Industry 4.0. Big data with the 5Vs (Volume, Velocity, Variety, Veracity, Visualization) describes the ability to capture, process, correct, analyse, evaluate, and finally make meaningful use of large amounts of data. Furthermore, in a networked world, the criteria of openness and security are of great importance, since existing data are ideally used by several entities and must therefore be protected against misuse.
2. The dimension **intelligence** evaluates things or systems (enablers) that are able to act intelligently, based on data (use of machine intelligence). Machine intelligence reduces the need for human intervention in the execution of tasks. Owing to their properties, it requires enablers that allow machine intelligent action. In a production environment, for example, transport containers, products or machines can represent such enablers. Only when sufficient enablers are present in a company, intelligent actions can be realized by them. The criterion intelligence considers this machine intelligent action. A distinction is made whether enablers are merely used to process standard tasks or whether systems exist that cooperate with people and with other systems, work independently, react and learn.
3. **Digital transformation** represents the third dimension of the maturity assessment. It increases the share of digital value creation in the company and on the market. In order to initiate this transformation, corresponding prerequisites in the dimensions of data and intelligence are required. The goal is to replace physical with digital objects or to achieve as much value as possible in the virtual world. In order to enable digital transformation in companies, human abilities and

skills are required and also include aspects whether employees can, want and are allowed to drive the digital change.

The higher the rating, the more industry 4.0 aspects are implemented in the company. Each dimension is evaluated according to criteria and sub-criteria, by using reference tables. The evaluation of these criteria leads to the maturity of the parent dimension. Subsequently, the maturity of the three dimensions leads to the maturity of the company.

6.1. How is the evaluation being organised?

In a starting workshop, an agreement is reached on the strategy and goals of the assessment in the company. The question, which areas are strategically important and should provide benefit for the company with a high degree of maturity gain, is used to select a variety of application fields. Application fields represent selected divisions, processes, or tasks of a company that are analyzed for their Industrie 4.0 maturity. The essential elements within the application fields are called "units". As an example, an application field like assembly can be mentioned here. Units to be examined here can be the PDC system, workpiece carrier, production planning and control, personnel deployment planning, material supply, etc. The application fields to be assessed are subsequently recorded by means of semi-structured interviews with several degrees of freedom for individual adjustment of the operator. At the same time, the current status is determined by trained advisers, so that subsequently all criteria and sub-criteria can be evaluated accordingly. Using strategies, goals, interviews and reference tables, potentials are identified that lead to improved Industrie 4.0 maturity. On the basis of information obtained, the target maturity level is determined by the operator (including feedback and domain knowledge from the company) and concrete project proposals and suggestions are provided to reach the target maturity level. The entire information will be discussed in the result workshop with the company.



In order to support businesses of all sizes and to promote Industry 4.0, the Platform Industry 4.0 Austria launched a joint initiative of the Mechatronics Cluster of Upper

Austria, the University of Applied Sciences Upper Austria and the Platform Industry 4.0 with the aim of promoting the nation-wide roll-out of this ‘Industry 4.0 Maturity Model’. At the regional level, the Platform Industry 4.0 Austria tried to involve all the regional business agencies, in order to promote the Maturity Model in the regions. The stakeholder independent, neutral and objective assessment helps companies to overcome the biggest hurdles, kick start strategy formulation and furthermore with the implementation of Industry 4.0 technologies.

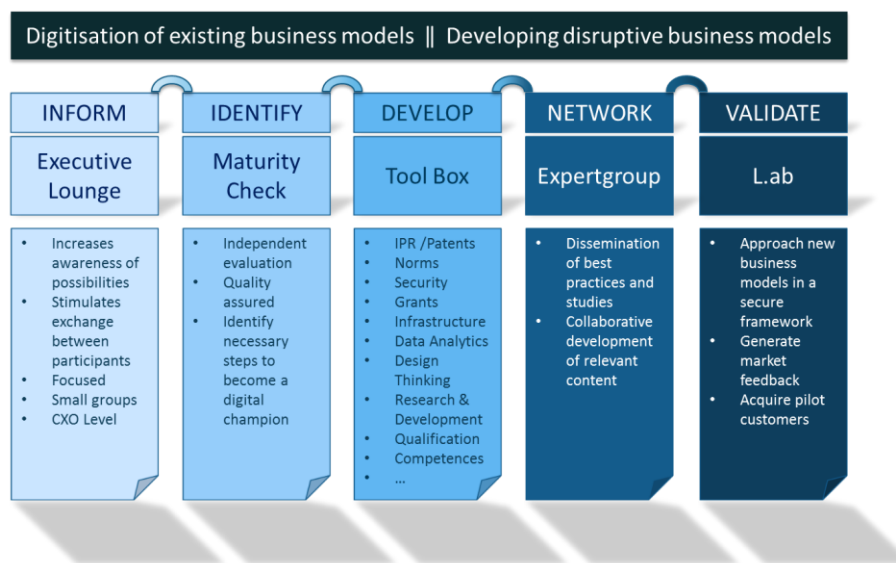
This approach generates the following benefits for a company:

- Structured evaluations regarding Industrie 4.0 maturity
- Recognize Industry 4.0 potential
- Concrete implementation recommendations of Industrie 4.0 measures
- Industry 4.0 benchmark within the industry or within the application fields

The digital transformation of companies does not only increase productivity, but also generates new products, services and business models, which potentially lead to a positive employment effect and strengthen the competitiveness. New business models that are enabled through digitization are becoming increasingly disruptive. Hence, companies are pressured to constantly reviewing and adapting their existing business models in the market, or even breaking new ground. In many cases, a "trial and error" principle makes sense on a small scale in order to develop, adapt and refine a successful business model in close cooperation with suppliers, customers and experts. New business models rarely arise on the drawing board, but rather in interaction with others.

Based upon the results of 2017’s strategy meeting, where all members of the Platform Industry 4.0 were involved, modules have been developed to help members fully implement their digitization strategies and develop new business models, leveraging the expertise of the entire platform network. The five pillars cover relevant topics and areas that help companies to transfer their business models into the digital age (Figure 1).

Figure 1. Five pillars of business model transformation



Through its **Executive Lounge**, the platform aims to inform people with decision-making power on the latest trends of business models. The goal is to increase the awareness of the

possibilities of the digital transformation. Accompanied by relevant impulse lectures, it seeks to stimulate the exchange between small numbers of participants through a series of workshops.

When asked how far a company is in implementing a digitization strategy or what steps should be taken next, the **maturity model Industry 4.0** offers an independent and technology neutral evaluation. This model is able to assess the current Industry 4.0 status of a company and identifies necessary steps to become a digital champion.

Once the status is known and there is a clear vision, the **Tool Box** supports companies by combining all competences of the whole network of the Platform Industry 4.0 and giving an overview on concrete implementation tools and solutions. Acting as a guidepost, the Platform developed a tool that codified all areas of knowledge within its network, enabling members to easily obtain information on who would be the best partner for a certain area.

Furthermore, in the **expert group "New Business Models"**, additional content is developed on relevant topics and the network character is further strengthened (e.g. effect of new business models on sales personnel).

Having developed the necessary aspects of a new business model, one has to validate his model and generate adequate feedback. This is where the fifth pillar assists in form of the "Business Model L.ab". The **Business Model L.ab** enables companies to easily test and try out new business model approaches in a secure framework. The aim is to generate market feedback and to acquire pilot customers. Through leveraging the platforms network, members benefit from the mutual trust that characterizes the platform. In a series of participatory workshops a clear and transparent process and a set of rules has been created. Throughout the whole process, the initiating company will be the driver and decision maker. In this framework, the platform is acting solely as a guidepost and the project must be clearly anchored in the company - including budget reservation and commitment of the management.

6.2. How is the Business Model L.ab organised?

1. The initiator² of the case prepares a short briefing, to enable the platform to initiate a targeted search for partners.
2. The Platform initiates the search for a potential project partner. As desired, either informally or publicly in its network.
3. The Platform provides a template for a non-disclosure agreement, as well as proposal for dealing with intellectual property rights.
4. The Platform presents potential partners and hands the organizational sovereignty over to the initiator. From now on the platform remains in an advisory capacity.
5. The Initiator carries out workshops and further measures to achieve the input of the defined objective. At all points of the project it is possible to draw insights and assistance from the Business Model Tool Box.
6. After completion of the project, a short final report will be sent to the platform, which will be published in the network.

Through its open character, a balanced and effective composition of its members and mutual trust - established while working on joint projects for the platform - the Business

² Company that introduces the initial problem or idea

Model L.ab is seen as an innovative way of easily finding suitable project partners. It is one of many activities to foster collaboration among its stakeholders and facilitate new technological developments and innovations.

This approach generates the following benefits for a company:

- Validating new ideas
- Generating market feedback
- Acquiring pilot customers

7. Qualification and Competences for Industry 4.0

Industry 4.0 and digitization are key words when discussing technology-driven changes that have particular impact on peoples' work and their businesses, and therefore on society as a whole. In an increasingly digitized environment, conditions are changing rapidly and information is available in the shortest possible time. It is therefore important that everybody is equipped and meets required skills in order to participate in the digital world. The technological progress must not lead to a split in our society, into those who possess required qualifications and those who can no longer participate in it.

Education is therefore one of the central topics in the context of Industry 4.0 and digitalization, and plays a key role in successful digital transformation. In recent years, a number of activities have been generated to improve framework conditions in terms of the application of Industry 4.0 technologies in companies and educational institutions, as well as research facilities.

Digital transformation in Austria can only be successfully implemented if essential qualifications and competences are taught, as well as creating a suitable environment for learning and teaching. In this regard education is essential for the Austrian Platform Industry 4.0. With Industry 4.0, new content and new methods will be applied in education and training, which should also lead to new collaborations of relevant actors in order to better face future challenges.

7.1. Expert Group “Qualifications and Competences for Industry 4.0”

The Expert Group "Qualifications and Competencies" was set up by the Plattform Industry 4.0 and involves representatives of all founding members, representatives of educational institutions, research institutions, policy makers and administration as well as companies and interest groups and is acting as a central steering committee to focus on the content alignment of the activities of the Plattform Industry 4.0 in this working group.

The participants agreed on the following **vision**:

- Employees, jobseekers and young people are offered educational and further training contents that allow them adequate, interesting and high-quality employment in the future job market.
- Young people are optimally prepared for the requirements of Industry 4.0 and can recognize and take advantage of the opportunities resulting from new job profiles.
- The economy is actively training employees and as a result, it can better utilize growth opportunities from industry 4.0.
- The matching of existing and requested qualification has increased.

The **objective** was defined as follows: Supporting people (young people, employees and jobseekers), companies as well as education and training providers to develop their skills and qualification programs in order to proactively exploit opportunities offered by Industry 4.0 and digitization. As qualification and competences is such a broad topic, the decision was made to create three sub-groups to make sure that optimal expert know-how is available. The subjects were:

1. Qualification and competence requirements for Industry 4.0
2. Digital infrastructure in education and training and digital skills of teachers
3. Recognition of non-formally and informally acquired competences

Subject 1. Qualification and competence requirements for Industry 4.0

The following steps were taken:

- Identification of key competences
- Definition of gaps in education and training system
- Defining priority fields of action

The objective was to close gaps in education and training system and qualify employees as well as jobseekers. The Expert Group was in a first phase collecting inputs from existing national and EU wide studies and actively exchanged with experts to get an overview on industry 4.0 key competences. In addition, the Austrian Ministry of Transport, Innovation and Technology, founding member of the Plattform Industry 4.0, was assigning two studies in this thematic area. Besides key competences, gaps in the education and training system as well as priority fields of action were discussed in a next step.

The findings of the assigned studies together with the desk research outcome were discussed in several meetings, smaller events and workshops within the Expert Group and with external experts, researchers and the general public.

Step 1: Identification of key competences

- Input and research phase/ Collection of national and EU wide studies/ Bmvit Studies
- Workshops with national and international experts and researchers

Step 2: Definition of gaps in education and training system

Step 3: Discussion of priority areas of action

Subject 2. Digital infrastructure in education and training and digital skills of teachers

The objective of this thematic area was to focus on the responsible use of digital media and devices that need to be learned at an early stage. Two main aspects are covered:

- Improving infrastructure at schools and further education facilities (hardware)
- Know-how of teachers and use of digital devices

The Expert Group started evaluating the status quo of implemented digital infrastructure at schools and education facilities as well as digital skills of teachers. Key experts of the Sub Group were representatives of the Austrian Ministry of Education and the pedagogical university. The results and findings were discussed within the Expert Group, which at the end was fed into the overall strategy.

Step 1: Installing a sub expert group

Step 2: Elevation of status quo of above aspects

Step 3: Definition of fields of action

Step 4: Discussing with the expert group

Subject 3. Recognition of non-formally³ and informally⁴ acquired competences

The objective was to find a way of recording and recognizing competences acquired non-formally and informally. The Expert Group was discussing this topic with national experts involved in the meetings and was also addressing this in the two main workshops, where all members of the Austrian Platform Industry 4.0 and further stakeholders on national level:

Step 1: Status quo on national, regional and EU level positions and discussions

Step 2: Organising a conference with national and international experts

Step 3: Discussion with the expert group and external experts

Main Workshops

Two big workshops were organized by representatives of the Platform Industry 4.0, social partner organizations, the Ministry for Transport, Innovation and Technology, the Ministry for Education and the Ministry for Social Affairs, national associations and interest groups as well as company representatives, education organizations and the Austrian employment service with the aim to discuss the Expert Group's previous work and specify Industry 4.0 qualification and competence requirements as well as the need for action and change in the education sector.

The results of the workshops and of all previous work of the Expert Group were included in the Strategy Paper of the Platform Industry 4.0.

7.2. The Strategy Paper 'Qualification and Competences for Industry 4.0' of the Austrian Platform Industry 4.0

There was broad consensus that overall the quality of education and training in Austria is – also by international standards– high. Yet, due to the rapid technological and social changes adaptations at all levels of the education system were deemed necessary.

The position paper, compiling 81 recommendations in seven fields of action and 5 levels (general recommendations, school, initial vocational training, tertiary education and continuous training) were identified:

- Combining new and old learning methods
- Enhancing diversity of learning places –besides schools universities etc. increasingly other learning places emerge; particularly the work place will in the future play a big role for learning activities; this means that companies need to

³ Non-formal qualification includes trainings where a student does not get an academic degree but a certificate.

⁴ Informal Competences encompass trainings, e.g. on the job where no certificate whatsoever is given.

adapt to this trend (online learning, learning modules, a learning supportive organisation, spare time for learning etc.)

- Promoting access to learning
- Optimizing framework conditions
- Supporting co-operations - the focus is primarily on cooperation among institutions; cooperation and exchange between schools, between schools and HEI and between teaching institutions and companies increase quality and relevance
- Breaking stereotype role models and
- Pursuing a strategy.

The Platform Industry 4.0 will further share and discuss the paper with relevant stakeholders and support the implementation of the recommendations.

Lessons learned

Initiating a broad and consensus based strategy process, that took approx. 2 years, involving all relevant stakeholders is seen a valuable method to include various facets of the digital transformation and their effects on the education system and thus balancing different views.