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Regional Action Plan
for Bavaria

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Introduction

The aim of this action plan document is to present an elaborated set of proposed innovation support actions for each of the project partner regions to ensure a sustainable transfer of InnoPeer AVM project results into the regional innovation ecosystems of Central European partner countries.

The action plan is based on former project activities and results, such as the of local framework conditions, mapping of relevant key stakeholders and analysis of strengths and weaknesses in the relevant knowledge dimensions (technologies, human resource/organisation, business model development) that were performed for each partner region and summarized in a joint benchmarking study in earlier project phases.

Further inputs for action planning result from local pilot actions that are implemented within the frame of the project for testing the multi-level InnoPeer AVM training curriculum in order to enable Central European SMEs to become part of transnational advanced manufacturing value chains.

The Action Plan itself is structured into three analytical steps: development of regional visions which describe the pursued picture of the future situation in the relevant field in a mid- to long-term perspective, the elaboration and concrete description of recommended innovation support actions to transfer and mainstream InnoPeer AVM results at the level of the partner region's innovation ecosystem in a short-term perspective and finally the presentation of conclusions from the partner region's point of view about innovation policy actions that are needed for a sustainable transfer of the InnoPeer AVM results at the transnational Central European level.

Along the action planning process all project partners undergo a peer review process which is organised in mutual feedback loops among partner organisations that join similar development goals and/or experience in the implementation of local innovation policies to support the qualification of local enterprises in the relevant knowledge dimensions that are addressed by the InnoPeer AVM project. Following this mutual exchange of experience, the final versions of the Action Plans will be developed for each partner region.

Inputs from Regional Action Plans of all Central European partner regions will finally feed into a transnational Central European Roadmap that will recommend joint innovation policy action in order to improve the qualification of SMEs in the AVM-related knowledge dimensions (technologies, human resource/organisation, business model development) in order to raise their involvement in transnational innovative value chains.

Overview of the InnoPeer AVM actionplanning and roadmapping process





1. Main regional challenges and development needs

Note: Please revisit your regional stakeholder mapping, SWOT analysis and the benchmarking study to identify the most urgent demand for action in order to improve SME capacities regarding the relevant knowledge dimensions. Prioritize the development needs and indicate below approx. 3 main “Main challenges” that need to be tackled by improving AVM-related qualification programmes and innovation support measures in your region.

For each of these “Main Challenges” please describe briefly the deficit that has to be overcome and specify the main target groups that need to be addressed in this context. This will be the basis for the local support actions for improving AVM-related SME qualification and support SME participating in AVM-related value chains to be described in your action plan.

Each “Challenge” should consist of one bold headline describing the visionary goal you want to reach at local level and one or two explaining paragraphs.

- Reference sources: InnoPeer AVM stakeholder mapping, regional SWOT analysis, benchmarking study
- Length of this section: approx. 1 to 1,5 pages

Main Challenge #1: Improve the already strong position in terms of AI and Cybersecurity even further to become the market leader

As the AVM stakeholder mapping, the regional SWOT analysis and the benchmarking study have shown, Bavaria has a leading position in industrial technology. Though Bavaria is one of the leaders in the area of artificial intelligence and cybersecurity in Central Europe, the main challenge is to further develop basic and applied research in artificial intelligence and cybersecurity. This is important as Bavaria is lagging behind worldwide leaders in artificial intelligence like China and the USA, that invest billions of dollars in the applied and basic information system research. Therefore, attracting researchers and computer scientists to work for Bavarian Universities and research institutes in order to develop new cutting-edge technologies and to educate students in these important areas is the first big challenge. The research institutes also work mainly with larger companies, since they have the money and resources for advanced topics such as AI and Cybersecurity. Thus, the second challenge is to implement a direct transfer of these technologies from applied research to practical application between SMEs and research institutes. So far, this technology-transfer is almost non-existent. A further challenge is to raise awareness in SMEs for the topics of artificial intelligence and cybersecurity.

Main Challenge #2: Improve AVM Knowledge transfer from front-runners to laggards

While there are world market leaders in providing or applying innovative technological AVM solutions present in Bavaria, the knowledge transfer from these front-runners to less innovative companies (typically SMEs) is not consistent. Typical Bavarian examples for these front-runners in providing innovative automation solutions with focus on AVM-technologies are Siemens or Kuka. On the other hand, typical end-users are as important as the manufacturers such as the large automobile manufacturers BMW or Audi in Bavaria. Since the application or provision of innovative technologies is very costly, the return of invest is often not yet quantifiable at first. Companies with smaller budget for research and innovation, which is typical for SMEs with a very traditional production, do not have the resources to make investments in this area. This does not apply to all SMEs. There are also SME front-runners, often with very visionary leaders. However, the majority of SMEs are lagging behind in this area.

To promote the application of AVM-technologies in Bavarian SMEs, there are many regional support programmes such as the “Mittelstand 4.0-Kompetenzzentrum Augsburg ” (Competence Center SME 4.0 Augsburg) or “Wissenstransfer Region Augsburg” (WiR = Knowledge Transfer Region Augsburg) and other national associations like the VDMA and Clusters like the Cluster Mechatronic and Automation, which is also



a project partner in InnoPeer. These programs often have the focus to build up AVM-knowledge from scratch and do not provide deeper knowledge in certain AVM-areas. There are workshops and trainings for specific technologies, but even they are more focused on giving an introduction than to further deepen the knowledge. To archive a high level of innovation in AVM-technologies, either external experts have to be hired or internal knowledge has to be build up by employing separate experts in this area. Since both of these options are very expensive, most SMEs have no budget for these activities, which leaves them on a very basic knowledge level. While knowledge is one aspect, the development and application of AVM-technologies in its own production are also very costly and often set to a low priority.

In sum, this leads to a gap between companies with a very high level of knowledge and application of AVM-technologies and the laggards, who have only very basic knowledge and almost no applications. This massively hinders a broad application of such technologies, as a critical market share within SMEs has to be reached to make certain technologies such as extended connectivity and data analytics really useful and their development profitable. It should also be in the interest of larger companies to transfer this knowledge: As a manufacturer of AVM technology, this kind of knowledge in SMEs means that they are able to apply it and therefore buy the respective components, so there is a fast return on invest in this kind of knowledge transfer. As a large enterprise end user, knowledge transfer to SMEs could mean, that there is more awareness for the topic of AVM, which leads to more product development and therefore a diversified market for components. The closing of this AVM Knowledge gap is our second main challenge.

Main Challenge #3: Too much focus on advanced technological initiatives and not enough on capabilities in terms of org. and HR management

A further challenge in the AVM initiatives in Bavaria is their focus on advanced technologies. However, a central shortage are organisational and human resource capabilities to transform the economy towards advanced manufacturing. Currently, billions are invested to transform the economy towards advanced manufacturing, however, simple measures to improve the productivity of organisations by better organisational design or better recruiting, motivation or career practices are neglected. Specifically, in small and medium sized firm's management of the organisation and HRM could be further professionalised to also tackle the shortage of skilled workers. Given the high emphasis on transforming technologies, it is surprising, how little the effort for transforming organisational designs and HRM is. Importantly, Universities could invest in a new center for Work and Organisation 4.0 in Bavaria as well as the Bavarian Internet and the ZD.B improve their offers on transforming the human part of companies.



2. Visions

Note: Please use the visions to depict a pursued future situation with regard to the qualification of SMEs in AVM-relevant key dimensions and their participation in transnational innovative value chains. To define a starting point for future development, regional innovation strategies should be addressed (RIS3). The timeline for these visions to be realized should cover the mid-term perspective, at least 3+ years. In order to boost the impact of InnoPeer AVM action plans and strategy roadmap as a strategic input for regional planning, it is recommended to make reference to the ongoing strategic process for defining “RIS 2030 goals” in your region.

Each Vision should consist of one bold headline describing the visionary goal you want to reach at local level and one or two explaining paragraphs.

- Reference sources: Regional innovation strategies, ongoing RIS 2030 strategy process
- Length of this section: approx. 1 to 1,5 pages

Vision #1: To be the worldwide leader in providing and applying AVM-technologies

Germany can generally be seen as a very innovative nation in terms of the application of I4.0-technologies. This also applies to Bavaria, since many large companies with focus on AVM-technologies, such as Siemens or Kuka are based here, but are not typically put in connection with the region of Bavaria. While these companies are already some of the world leaders in providing AVM-technologies, the application rate of these technologies in smaller companies is very low, as already mentioned in main challenge #2. As our vision, we as Bavaria want to become the worldwide leader in providing and applying AVM-technologies, especially compared to the USA, China or Japan. This means that we have a comprehensive distribution throughout the complete supply chain, from large companies to SMEs and from the OEM to all suppliers. This is especially important since the German government proclaims that one of the main aspects of AVM (or Industrie 4.0 how it is called in Germany) is a consistent networking throughout the complete value-adding network. It means everyone has to participate in order to generate a greater benefit of Industrie 4.0. To reach this vision, the Bavarian Ministry of Economic Affairs, Energy and Technology has provided action plans called “Zukunftsstrategie Bayern Digital” (Future Strategy Bavarian Digital) and the “Masterplan Bayern Digital II”, which state concrete steps to facilitate digitalization and therefore Industrie 4.0 in the Bavarian region.

Vision #2: To be the “unicorn-factory” in AVM (cluster of AVM start-ups with market capitalization > € 1 Bn.)

Based on the Bayern Digital II strategy of the Bavarian government and initiatives (e.g. Gründerland Bayern), Bavaria has an excellent starting position for further developing its strong position in AVM technologies. With leading universities, global leaders in technology and a dense network of innovative firms (Automation valley, medical valley, chemical clusters, etc.) and innovative software firms Bavaria is already in a very strong position. However, an important vision for Bavaria is to become a “unicorn” factory in AVM. Unicorns are start-ups with a market capitalization of more than 1 billion Euro. A “unicorn-factory” is therefore a cluster of unicorns. With Celonis Bavaria has already its first unicorn, however, given the large number of established firms, start-ups and universities, and their dense clustering in the larger Munich and Nürnberg Area, Bavaria has the potential to regularly produce such successful start-ups. Therefore, the vision for Bavaria is to become the “unicorn-factory” in advanced manufacturing.



Vision #3: To remain the market leader in industrial automation technology despite rising nations

While Bavaria is currently one of the leading regions regarding AVM technologies in Germany and can even be considered one of the worldwide market leaders, this position can easily be challenged by rising nations such as China or India. Today, they put even more focus on digitalization in terms of investments as a 2018 study of McKinsey showed. Other nations like USA, Japan or China are today's biggest competitors in terms of AVM-technologies. The vision is that Bavaria can stay ahead of current competitors or rising nations and keep the status of being one of the market leaders in terms of AVM-technologies and industrial automation technology in general.

3. Proposed actions to address the regional challenges

Note: The idea of an "Action" is that this will be concrete innovation support activity that could be immediately implemented in your region within the existing innovation policies and framework conditions. Actions should address the local challenges (section 1) and should be oriented towards the visionary goals that have been defined for your region previously (section 2).

Actions should be elaborated as the description of a concrete project that could be immediately discussed and implemented in cooperation with local RIS actors. Depending on the scope of the local actions you propose, you are asked to develop 1-3 actions within this Regional Action Plan. In case of more than one proposed action, single actions should address different actors (RIS stakeholders, like innovation agencies, funding institutions, educational institutes, but also your own organisation) and reach out for different target groups.

- Reference sources: Section 1 and 2 in this document, results and learnings from InnoPeer AVM pilot actions, inputs from ongoing RIS 2030 strategy process in your region
- Length of this section: approx.. 1 page per action

Guiding questions:

- What is the goal of the proposed activities?
- Who will be involved: Which target groups, public business support organisations, further stakeholders and innovation concrete actors, etc.)
- How will actions be organised? Define implementation phases and steps
- Proposed timeframe
- Potential impacts and how these could be assessed
- Required resources / budget needed
- Sustainability considerations – how could the actions be mainstreamed and/or transferred

Action #1: To enhance knowledge transfer regarding AVM

The goal of the following activities is a consistent knowledge transfer from front-runners to laggards in order to achieve a comprehensive development and application of AVM. For this, front-runners, laggards as well as mediators like regional associations or clusters need to be involved. The following activities are services offered by the Cluster Mechatronics and Automation with the goal of enhancing knowledge transfer.

- 1) **Stimulating cooperation:** The Cluster Mechatronics and Automation always strives to stimulate collaborations within its network. The cooperation between front-runners and laggards is particularly successful for the knowledge transfer of AVM. Within research projects smaller companies can learn from larger ones. Especially for SMEs, financial support is an important criterion for the participation in research projects, which is why the cluster offers help in the search for suitable funding opportunities.
- 2) **Clusterforum:** The Cluster Mechatronics and Automation organises several events called "Clusterforum" per year. These events usually take place on the premises of a front-runner, where the more successful company can share its experience with the laggards. The events include factory tours, lectures, workshops and networking activities between front-runners and laggards in order to



trigger a knowledge transfer regarding AVM. Prior to these events, the work of Cluster managers is crucial. They know the market and companies and can identify front-runners as well as laggards, which can learn from each other.

- 3) **MechatronikAkademie:** The Cluster Mechatronics and Automation has its own advanced training academy, where a wide variety of trainings, seminars and workshops is offered. The advanced training opportunities are offered all over Bavaria and cover various topics related to AVM. They are carried out by the Cluster's education partners, like university lecturers, members of research institutes or technicians, who work in companies and are experts in their field. A transfer of knowledge from front-runners to laggards is on the one hand achieved by lecturers training participants, but also by participants exchanging their experience and knowledge on AVM during the training.

Action #2: Develop capabilities in HRM, Organization and Business Model transformation

A central goal of the proposed activities in this action is to improve the productivity and change readiness of Bavarian Firms and their employees. Central for transforming the regional innovation system towards advanced manufacturing is the readiness of firms and employees. Therefore, a central action is to establish a culture of continuous change and flexibility that is open to dynamic changes through technology.

In order to do so, various target groups are involved. First, the state and its educational institutes like the universities, the chambers and the clusters have to implement programmes for further education in the areas of HRM, organisational and business model capabilities. For example, the IHK could offer a certificate for AVM-HRM-Managers or AVM-Organizational designers as an advanced certification for IHK Betriebswirte. Furthermore, the IHK and intermediaries like clusters can enhance awareness of the need for cultural change in firms towards more flexibility and continuous change. However, SME can organize themselves more openly in regional networks enabling their members to share experiences and knowledge or identify further development needs, e.g. the Industry 4.0 Network in Regensburg and in Sonthofen are examples where regional SME started their changes process together. In Austria the qualification initiative "Qualifizierungsverbund Digitalisierung" is launched, in which member companies define specific development needs of their employees.

Actions to improve the capabilities can be organised by a concerted action of all involved stakeholders (e.g. theme of the year). First, all involved stakeholders should agree on central measures, e.g. advertising best practices like the Industry 4.0 Networks or others and on developing training courses and consulting in all Bavarian regions by the IHKs. Second, the stakeholders should develop the measure and implement them. The timeframe would be until 2022.

However, for changes in the educational concepts of the IHK a more complex coordination with multiple stakeholders is needed as they would develop official certificates. Based on the complex coordination the timeframe for changes in education may be until 2025. First coordination with stakeholder would take up to two years and the further development of the curriculum up to three years, then the implementation phase is one to two years.

The potential impacts of a highly flexible workforce and organizations as well as the readiness for business model changes is high as they adapt very fast to changes in the environment. It can be assessed by low unemployment rates and high growth rates of the GDP.

Resources and budget needs are rather low, as IHKs, clusters and universities only have to adapt and refine existing curricula. Furthermore, changes can be part of general revisions of curricula.

Established curricula can be transferred in all European countries, furthermore, training for flexibility allows employees to adapt over their whole life and has potentially high impacts and is sustainable. Similarly, supporting the flexibility of organizations and preparedness of business model changes is highly sustainable as it allows existing business to grow and adapt to changes.



4. Inputs for the InnoPeer AVM Strategy Roadmap

Note: When developing your “Actions” in section 3, please also keep in mind the intended transnational Central European dimension of the strategic results of InnoPeer AVM which will be reflected in project activity A.T1.4 (Development of a Strategy Roadmap on AVM-related capacity building and build-up of AVM value chains in Central Europe).

In this section of the Action Plan you are asked to give input from the partner region’s perspective concerning potential strategic measures to support the project goals at the transnational Central European level. Proposed measures will address a wider geographical scope for successful implementation and will probably need more preparation and substantial innovation policy changes compared to the Regional Actions proposed in section 3.

Section 4 inputs from all Regional Action Plans will be an important reference and further aggregated to a Central European level for the elaboration of the InnoPeer AVM Strategy Roadmap in follow-up project activities..

- Reference sources: former sections of this Action Plan document
- Length of this section: Headline + 1 explanation per suggested Roadmap input

Input for Central European Strategy Roadmap #1: Disseminating knowledge and enriching practice of AVM

Though Bavaria is a leading region for AVM Technology, it could benefit from stronger cooperation with its neighbouring countries in Central Europe as well as the neighbour countries from the Bavarian Competence in AVM. The cooperation can be in terms of knowledge exchange and common educational standards.

Explanation

A central measure for disseminating the knowledge about AVM is more cooperation between the regions, e.g. like the Czech-Bavarian dialogue of Research Institutes or more exchange of researchers in SME, academia and large corporations. Furthermore, there are big differences between the regions in the application of AVM technologies in SMEs and in research on AVM in the research institutes. Therefore, Bavaria could benefit as a lead market from selling its products to neighbouring countries (which are already quite advanced in applying technology) and continuously improve the products by the feedback given in these regions.

Furthermore, we proposed a common education on business models, organizational and HRM capabilities. Such a common educational frame would improve the interoperability of personnel and organizations in Central Europe and thereby, serve as a common standard similar to OPC-UA in the technological world.

To be continued acc. to the number of suggested inputs for the CE Strategy Roadmap