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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 poadmapping 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: Shortage of production capacity

Regarding the benchmark analysis done in several international project from natonal program and also based on own research, level of digitalization among manufacturing companies is very low. Logistic processes are digitalized at a high level only at 5%of the identified companies. Further result is that in production (sensor, robotics, automation) 23% have 0 (level of digitalization), and only 8% can be regarded as experienced user.There are only a few high-quality users.

After the economic crisis in 2008 plenty of SMEs went bankrupt or minimized their production. Since then the demand for production is increased, again, but the technology became outdated, applying novel technologies is available only at some companies. SMEs are not able to fulfill the customer demand as their maturity level has to be increased. In order to increase their production capacity , SMEs have to invest more in R&D.

The new tendencies of digitalization, the increased pressure for going international, and the institutional intermediation between research and business are still part of theoretical discussions.

It is a learning from each business-related study that adaptation of new developments, application of advanced technologies and new business models strongly correlate with the competency of the management. There is an urgent need for translating research results to business value, develop the relevant skills and link the individual unique value propositions with each other both on national and EU-level.

Main Challenge #2: Shortage of labour force

One of the challenges is how to achieve parallelly mental shift of the management, rejuvenation of the production technology in a sustainable way and contribute to the development of value added of the final product.

It is a complex and challenging multitask function, requiring simultaneous interventions at various levels of the businesses – not just on micro level, but also on policy level.

Challenge 2 is not isolated from Challenge 1, as there we wrote about the shortage of production capacity, which is correlated with the fact that there is also a shortage of labour force. "Based on HCSO's latest data, 79,400 people are needed immediately. This number is 19,500 higher than a year before. Process manufacturing needs the most new associates (24 thousand) while the highest rate of unfilled jobs is in service-helping (4.7%). In fact, labour shortage causes considerable problems in the info-communication and healthcare sector, too (3.6%).

Main Challenge #3: THE LACK OF BUSINESS PROCESS INTEGRATION.

Huge amount of data is produced by the processes of the Small and medium-sized enterprises (SMEs). However, the datasets are born in different systems and these so-called islands of information are independent, they are not connected to each other. Therefore, the development of the process-integration procedures is crucial in the next years. Furthermore, there is another challenge here which we should have to take into consideration: it is really hard to ensure that SMEs understand this need and recognize the importance of collecting, evaluating and integrating data, which could ultimately be integrated into a single product.

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: Improve the level of smart production among Hungarian SMEs – production smartification

It focuses on product development. It is possible with creation of customized or improve existing products through technological renewal in the innovation value chain, which provides a competitive advantage, in particular, by using smart technologies and/or advanced materials.As the whole production processes cannot be upgraded in 3 years , we have to choose special manufacturing processes. Based on the feedbacks the most crucial area is :

- Real-time performance monitoring with data analysis: Sensors integrated into manufacturing devices, with 3Dprinted elements, visualized in ERP system, with data monitoring.

Development plan supported by national structural funds would help the processes.

Vision #2: Improve the level of automatization with special attention on human resource

Automatization in production can solve the problem of shortage of labour force.These step, with conncection of Vision 1 would increase the level of digitalization of the companies and would require the usage of novel technologies. However, it is not just a task for the production department. Human-machine cooperation requires a totally different corporate environment than traditional labour force cooperation. The management have to pay attention to avoid the alienation of their employees.

Re-structuring of education system, more attention on "smart education."

This can be solved with adaption of current training paths in Industry 4.0 , where the InnoPeer AVM advanced trainings can be a support for this activities.

Vision #3: : INCREASE OF INNOVATION CAPACITY AMONG SMEs.

In order to design a smart product, the innovation capacity and demand of companies must be increased. It is important to encourage R&D and the acquisition of innovative technologies. Universities and research institutes should work closely with manufacturing companies, not only with major multinationals or automotive companies, but also with SMEs that work for the majority at regional level. This can provide a solution not only to the development needs of SMEs but also to the financial growth of universities.

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 concrete target groups, public business support organisations, further stakeholders and innovation 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: Set-up the center of excellence

The Excellence center is converting complex knowledge into smart products and services by applying the latest digital technology to create value for the manufacturing sector in a financially, socially and technically sustainable way.

The 3 main central goals are to:

- create a network for Research and Technological Development Labs and projects
- create a service centre specialized on the application and presentation of most recent manufacturing technologies
- Transfer of existing smart solutions, methodologies and tools to Hungarian SMEs

To set up an industry 4.0 excellence center would have 4 "legs":
1 Product development
To reach the intended impact there are two ways in the product development. First one is the product smartification and the second one to offer smart services to the users.

Leg 2 Training service
The core function of the training venue is to give SMEs the opportunity to interactively acquire modern manufacturing and technological knowledge through a tailor-made training and demonstration program. The training will be held in small groups where the owners and management of SMEs are involved. The training lasts from 1-2 days
The main target group of the activity is organizations interested in technology, ERP / CRM and online modules and smart services.

Leg 3 Technology Audits

With the help of Industry 4.0 maturity survey this activity provides a comprehensive and transparent picture of the current status of maturity of business and production processes. The results of the maturity survey show the focus areas where the greatest progress and results can be achieved. And this diagnosis is necessary to develop a strategy. The aim is that with the help of this strategy the company identifies the realistic development directions and priorities which fitted directly to the customer needs. It coordinates the organization's functional activities to achieve the targeted goals too.

Leg 4 Adapting the Learnings to smart service center

Based on the learnings form the international partnerships, study visits, trainings, the aim of this leg is to create a service centre specialized on the application and presentation of most recent manufacturing technologies

Target Group	Example for Inclusion
BSO:	BSOs can offer a service for their stakeholders to increase their knowledge about industry 4.0 and also make them able to apply for the national and international funds
Higher Education & Research Institute:	Through the trainings and product development the possibility for know-how transfer is given.
Schools & Training Institution:	Trainings are a big added-value for schools.
LPA:	The flagship will help to have an overview/fundamental knowledge about technological topics important for the promotion of local economic development.
RPA:	The flagship will help to have an overview/fundamental knowledge about technological topics important for the promotion of regional economic development.
NPA:	The flagship will help to have an overview/fundamental knowledge about technological topics important for the promotion of national economic development.
LE:	The product development Leg can support the operation of Large companies, too.
SME:	SMEs can participate in the services offered by each Leg of the flagship project.

Cooperation partners:

- am-LAB

- University in Sopron and Szombathely

- Support from local authorities, like city or county level

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The center is multi-funded

- National sources
- EU sources
- Own funds
- Trainings organized with public grant integration

The overall cost of the project is 540.000 EUR

- 240.000 for investment

- 300.000 for start-up phase and operation

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Action #2: Improving the level of automation

An obvious solution to labour shortage is increasing the level of automation. This includes the following fundamental tools:

- robots,

- systems supporting small-series production,

- automated machinery and

- logistics automation

In addition to procuring digitalised tools, government influence is also important in supporting the integration of new tools on a company level. It matters how the company approaches the creation of a robotised cell, and how the new unit will communicate with existing ones. Analysing and overhauling the company processes to which these i4.0 or advanced technologies are to be integrated should be a fundamental objective to support. Knowledge accumulated at the University may support this process.

The main goals are, as follows:

- assessing the current level of digitalisation in companies,

- choosing digitalisation areas to support based on the assessment,

- helping companies with specific process organisation projects so that the technologies to be integrated can work as expected,

- introducing automated and digitalised tools

The University of Sopron may be involved in the following areas:

- Modifying an existing and tried i4.0 questionnaire according to the current challenges, and teaching students how to use the questionnaire. (An i4.0 questionnaire was created that assesses the requirements for digitalisation. Process organisation knowledge is required for understanding this and evaluating companies.) Teaching 10 students in 2+1 sessions.

- Short company evaluations by questionnaire – half a day per company

- University associates provide advising for companies in choosing automation and digitalisation areas based on the assessment – half a day per company

- In co-operation with the university, process organisation experts can participate in specific projects if the companies need this. We believe that this can prepare the successful procurement of digitalisation or automation tools – 2-3 month long co-operation projects with companies.

Funding can bring serious advantages in the following areas:

- Digitalisation projects for SMEs, machine procurement, IT solutions (e.g. purchasing and integrating an ERP, creating MES systems, logistics digitalisation)
- Digitalisation of micro-enterprises (e.g. creating appointment scheduling systems for micro-enterprises)
- Tools to support individual entrepreneurs to co-operate with their partners (CAD/CAM solutions, EDI systems, etc.)

We envision supporting at least 50 companies per year this way, which a budget as follows:

- training students: 2.000,- Eur / 10 students
- short company evaluations: 25.000,- Eur / 50 companies
- advising regarding digitalisation: 25.000,- Eur / 50 companies
- digitalisation projects: 24.000,- Eur / company

This totals a 172.000 Eur net, in case at least five companies apply for actual project funding.

The program could be implemented through EU projects and the involvement of enterprises.

Action #3: Subsidizing the procurement of tools and methods required for the design, production and maintenance of smart products – improving the level of innovation through training

Just like improving the level of automation addresses certain issues, other i4.0 tools can effectively answer the challenges related to manufacturing smart products. This includes the more widespread utilisation of:

- a 3D printers,
- AR/VR technologies, or
- a CAD/CAM systems.

This should extend to not only the procurement of the appropriate products, which should be supported by the government. Modern education strategies should be introduced that focuses on the rapid, and sometimes very specific training in the use of these tools. This may need to go beyond a 'simple' general IT training, and extend to high level education in certain specific areas of IT. This may not be considered as a traditional IT education at all, but rather a very specialised kind of training providing skills that are necessary and adequate for the operation of a given process. Our proposal envisions module-based trainings that would, after completing a basic module, allow company associates to choose the required modules according to their specialised needs.

Theoretical education would be complemented by the practical training of company associates. The training infrastructure of some companies would be also utilised in the program as much as possible.

We are also planning to put the learnings in practice through co-ordinating projects to solve the actual problems of the company.

Therefore, the main goals are, as follows:

- Creating a basic module that is more like a 'digitalisation appetizer', which introduces the selection of which companies can choose the trainings they want.

- Creating specialisations, i.e. teaching modules, in co-operation with the companies that want to participate in the program.
- Trainings according to company preferences
- Coordinating small projects at the companies.

The University of Sopron may be involved in the following areas:

- Organising roadshows to introduce our module-based training concept (half a day per roadshow). This is aimed to companies to show that the University is prepared for both theoretical education and practical training. We are looking for solutions that can generate long-term revenues for the University through participating in actual industrial projects. This also creates opportunities for the associates of the University for industrial networking.
- Teaching the basic module, which should motivate the companies to learn more, to improve and to make their operations more efficient – 2 days/company
- Module-based training; modules are chosen by the companies from the selection offered. They can tailor their own trainings. Complex general training is not always expedient; many companies can profit more from specific trainings tailored to their own needs – 10 day/company/module
- Coordinating small projects that is aimed at transferring the theoretical knowledge into practical experience on the one hand, and at teaching project management skills to company engineers on the other – 1 month/company

Funding can bring serious advantages in the following areas:
- SMEs and large companies involved in manufacturing
- Service sector

We envision supporting at least 10 companies per year this way, which a budget as follows:
- roadshows: 4.000,- Eur / 10 students
- teaching the basic module: 20.000,- Eur / 10 companies
- module-based training: 100.000,- Eur / 10 companis / module
- small projects: 40.000,- Eur / 10 companies
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A total of 364.000 Eur net, if at least 10 companies are engaged in the roadshows, and if they chose at least 3 specialisations in addition to the basic module.

The program could be implemented through EU projects and the involvement of enterprises.

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*

For Hungray it could be beneficial if it have a stronger cooperation within the county as well as with its neighbouring countries to be able to exchange knowledge and to be able to do further steps to soleve the labour shortage.
Furthermore Industry 4.0 will not reach more actors in Hungary if there is a lack of working force with proper competences.

Therefore the development of a "Center of excellence" is necessary to be able to apply Industry 4.0 properly in Hungary. As in Action #1 we previously described the "center of excellence"'s main goals are to:

- Create a network for R&D Labs and projects

- Create a service center specialized on the application and presentation of most recent manufacturing technologies

- Transfer of existing smart solutions, methodologies and tools to Hungarian SMEs.

Overall the main purpose of the two Action represented in this regional action plan is to provide training programs for employees and students and to teach SMEs how they can become competitive on the market with increasing their level of digitalization within their country and in European level too.

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