



Cluster development «Engineering – Automation – Machinery» in the regions of Kharkiv and Zaporizhzhia

Final report of the ClusteRISE project

SUMMARY OF THE REPORT

**CLUSTERISE IS
THE FIRST IN UKRAINE
A PROJECT TO DEVELOP
CLUSTERS OF INDUSTRIAL
HIGH-TECH SECTORS
SUCH AS EAM
(ENGINEERING –
AUTOMATION –
MECHANICAL)**

The project has a long history since 2016, when the APPAU began trying to change the state of the EAM actors' association in several regions of Ukraine. The project, supported by the European Union and the Government of Germany, aimed at supporting and developing 2 EAM clusters in the regions of Zaporizhzhia and Kharkiv, and lasted from August 2020 to November 2021.

The project plan is based on the principles of the EAM cluster concept, which provides for the implementation of 3 key components in cluster organizations – Smart Organization, Smart Product and Smart Export. The plan also takes into account the provisions of the draft National Cluster Development Strategy of September 2020.

In general, the project plan was implemented, and in some places – overfulfilled due to new initiatives of cluster participants. Instead, the defined criteria for project success, such as the number of participants in cluster organizations, the ability to maintain management and the growth of export performance, are unfulfilled. The main obstacles are the underestimation of the complexity and scope of the tasks of consolidation and uniting of participants in regional communities, the difficulties in implementing an effective management system in cluster organizations.

However, the final findings point to a number of other positive outcomes, such as major changes in the region's innovation ecosystems (which are the basis for Smart Product), a slow but gradual rapprochement with regional authorities and a strong impact on cluster movement in Ukraine. The project also offered a number of methodological developments and best practices available for dissemination and application by other similar clusters in Ukraine.

Thus, the ClusteRISE project can be considered quite successful, both in terms of the viability of new cluster organizations in the regions and in the context of the impact on the national level.

*ClusteRISE Project Manager –
Alexander Yurchak.*

CLUSTERS AS DRIVERS OF ECONOMIC DEVELOPMENT OF REGIONS.

SMART ORGANIZATION.
SMART PRODUCT.
SMART EXPORT.

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The individual views expressed in the materials are the personal views of the authors and do not necessarily reflect the views of the European Union, the German Government or the GIZ.

Compiled by *Alexander Yurchak*.

With the support of coordinators and board members of EAM Kharkiv and Zaporizhzhia clusters.

2. TERMS AND DEFINITIONS

**IN THIS REPORT
THE FOLLOWING LIST
OF ABBREVIATIONS
IS ADOPTED
AND DEFINITIONS**

APPAU – ASSOCIATION OF INDUSTRIAL AUTOMATION ENTERPRISES

OF UKRAINE – national business association that unites leading actors in the development of Industry 4.0. APPAU is the developer of the National Industry Strategy 4.0 program and the initiator-executor of a number of its projects, including clusters of industrial high-tech.

EIF (EXPORT – INTERNATIONALIZATION – FUNDRAISING) – a program created at APPAU to improve exports and internationalization of participants in the Industry 4.0 movement.

IAM (ENGINEERING – AUTOMATION – MECHANICAL) – the concept created by APPAU in 2019 for the development of clusters uniting regional market participants in these three sectors. The APPAU concept was supported in 2019 by the Ministry of Economy, and in 2020 by GIZ within the ClusteRISE project.

CLUSTER – it is a sectoral, territorial and voluntary association of organizations that work closely with each other and with other actors in the value chain to increase the competitiveness of their products, their exports and promote economic development in the region.

LSG – local self-government bodies, elected and other bodies of territorial communities endowed with the authority to resolve issues of local significance.

SMEs – small and medium-sized enterprises (small and medium-sized businesses) are two categories of enterprises, enterprises with up to 50 employees and an annual income of up to 10 million (small businesses), and enterprises with 21 to 250 employees (medium-sized businesses).

INDUSTRIAL HI-TECH – in this report, this term refers to economic activities and medium / high-tech sectors of the economy according to the OECD classification: aerospace, pharmaceuticals, computer and software manufacturing, industrial automation and IT, medical and optical

equipment manufacturing, mechanical engineering (with all subspecies as general mechanical engineering, aircraft, ship, instrument, tractor, car, etc.), electronics, chemical industry, industrial engineering and turnkey construction.

4th Industrial Revolution (4IR) – The fourth industrial revolution. It means the transition of all sectors of the economy, social sphere, public services, etc. to a new level, characterized by the mass introduction of new digital, nano- and biotechnologies.

Industry 4.0 – similarly to 4IR, but it concerns the sphere of industrial production.

CCI (Chamber of Commerce and Industry) – a network of regional non-governmental non-profit organizations that unite on a voluntary basis legal entities and citizens of Ukraine registered as entrepreneurs, as well as their associations.

CEBs – central executive bodies.

RLEB – regional or local executive bodies.

3. CLUSTERISE PROJECT OVERVIEW

The ClusteRISE project arose as a result of previous activities of APPAU and regional partners in the field of cluster development. As a result of the decline in the business of its members in 2014–2015 in the eastern markets, the Executive Management of APPAU begins to study the state of the cluster movement and in 2016 conducts the first broad consultations in 5 regions of Ukraine.

PREREQUISITES OF THE PROJECT

In 2018, in the framework of the project «Development of IoT clusters: Ukraine – Poland» APPAU raises the issue of consolidation of the cluster movement in Ukraine. In 2019, the concept of IAM clusters is launched, supported by the Ministry of Economy. During the pandemic, with partners of the Industry4Ukraine Platform APPAU examines how EU clusters respond to the COVID-19 pandemic and concludes that the resilience of organized European clusters, their ability to respond to challenges is much

higher than the level demonstrated by Ukrainian industry. association. One of the results of these mini-studies was the creation of a working group to write a draft National Strategy for Cluster Development until 2027. The work was completed in September 2020. This paper also presents the state of cluster development of Ukraine in relation to the EU and Eastern European countries.

**IN THE SUMMER OF 2020,
ALL THESE DEVELOPMENTS
AND INITIATIVES
ARE CONVERTED
IN THE CLUSTERISE PROJECT**

German federal company Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, with which APPAU has been cooperating since 2019, has supported the cluster development initiative, and in August 2020 a project to develop EAM clusters in the Zaporizhzhia and Kharkiv regions has been launched. These regions were selected based on the presence of APPAU in these regions, the number of members and the level of readiness of communities to unite at the regional level.

The situation in the regions was somewhat different. While in Kharkiv the activity and leadership belonged to the university community, in Zaporizhzhia the leadership was held by the local CCI, with which APPAU signed a Memorandum on the establishment of the EAM cluster in the spring of 2019. Discussions and meetings of potential participants of the cluster in Zaporizhzhia lasted from 2016 to 2017 on a regular basis, while in Kharkiv the cluster initiative was established only in March 2020. This difference in readiness to merge will further affect the speed of consolidation in young cluster organizations.

The overall goal of the project is defined as «supporting the development of 2 export-oriented EAM clusters in the regions of Zaporizhzhia and Kharkiv». The duration of the project is 16 months, from August 2020 to November 2021.

THE SUCCESS CRITERIA OF THE PROJECT WERE DEFINED THE FOLLOWING 5 KPI:

1. The number of permanent members of the cluster is at least 25 legal entities in each region.
2. The cluster is able to maintain an executive structure of at least 2 people and attract new development funds.
3. The activities of the EAM cluster are deeply integrated into regional development plans (not less than 30% of participation in regional plans in the relevant areas of activity).
4. The cluster is included in at least 1 European innovation development project and has at least 2 European partners.
5. The cluster has developed and implemented two services for its members on a regular basis – fundraising and export marketing.

As will be further presented in Section 7, not all of these indicators have been met in full. Instead, the project has

other results that were not planned at the beginning of the project, but which meet the objectives of the project and prove the viability of these clusters and cluster ideas. In particular, one of the indirect but unexpected results of the project is the impact of ClusteRISE on the development of the entire cluster movement in Ukraine and the creation of EAM clusters in 3 more regions – Vinnytsia, Mykolaiv and Kyiv.

To achieve its goals and objectives, the project provided for the involvement and development of relations, development of joint projects with key stakeholders in the regions, which include local RLEB and CEBs, CCI, regional Centers 4.0, leading technical universities, large enterprises, development agencies. The most difficult was to develop relations with the local regional state administrations).

THE PROGRESS OF THE PROJECT INVOLVED 5 MAIN STAGES (DIRECTIONS OF ACTION):

1. The initial stage of institutionalization – initial training, creation of management structures, expanding the number of participants, establishing relations with public authorities.
2. Defining priorities and strategies for cluster development for up to 2 years.
3. Integration into regional programs and plans for industrial development and high-tech in your region. At the same time, synergy projects and action plans are being fixed in the fields of engineering, industry, IT and mechanical engineering, as well as in the areas of innovation development, digitalization, and exports and internationalization.
4. Effective launch of own activities such as regular networking, training of cluster members, joint organization of events.

5. Exports and internationalization were to be the last stage when cluster maturity takes concrete forms and products.

As will be shown later in Section 5, all of these project objectives have been completed, but the clusters have also generated many of their own initiatives that go beyond the official ClusteRISE plan.

4. BASIC STATEMENTS OF EAM CLUSTERS AND THEIR IMPLEMENTATION IN THE CLUSTERISE PROJECT

According to the concept of EAM clusters, there are several basic statements that are the basis of the Cluster Statutes, their mission, vision and values. These statements are important for monitoring because they have the greatest impact on the behavior, actions and performance of clusters. They are presented in detail in the document «Basic Statements» of February 2020, here is a short list.

1

The main mission of the EAM cluster was to increase **the economic potential of its region** through the growth of competitiveness of cluster members and the development of regional innovation ecosystem.

2

The EAM cluster is based on cooperation and production **cooperation of a wide range of players from 3 economic sectors** Engineering, Automation, Mechanical Engineering and from different categories of market participants: small and medium business (SMEs), large enterprises, universities, research institutions and laboratories, incubators, centers technology transfer, etc. The main category of clusters is SMEs in industrial high-tech.

3

This collaboration aims to develop cluster members around the **3 core Smart elements** that respond to key SMEs challenges and distinguish this type of cluster from others like, Fig. 1.

A. SMART PRODUCT & SERVICES – The EAM cluster aims to create a new generation of products (Industry 4.0), with high competitiveness and innovation that meet the requirements of global markets.

B. SMART ORGANIZATION – EAM cluster contributes to organizational change of local producers and their collective capacity to significantly improve innovation and investment and export potential. In particular, this element emphasizes that the use of collective resources to address strategic challenges in these areas is a much more effective strategy, comparing to the approach «everybody for himself».

C. SMART EXPORT – it is about creating and deploying a wide portfolio of tools to support export activities. In particular, this applies to effective positioning on the map of Ukrainian industrial and innovative development, and further – on the map of the EU for maximum use in export purposes; better use of existing and joint marketing tools; developed policies for integration into global value chains.

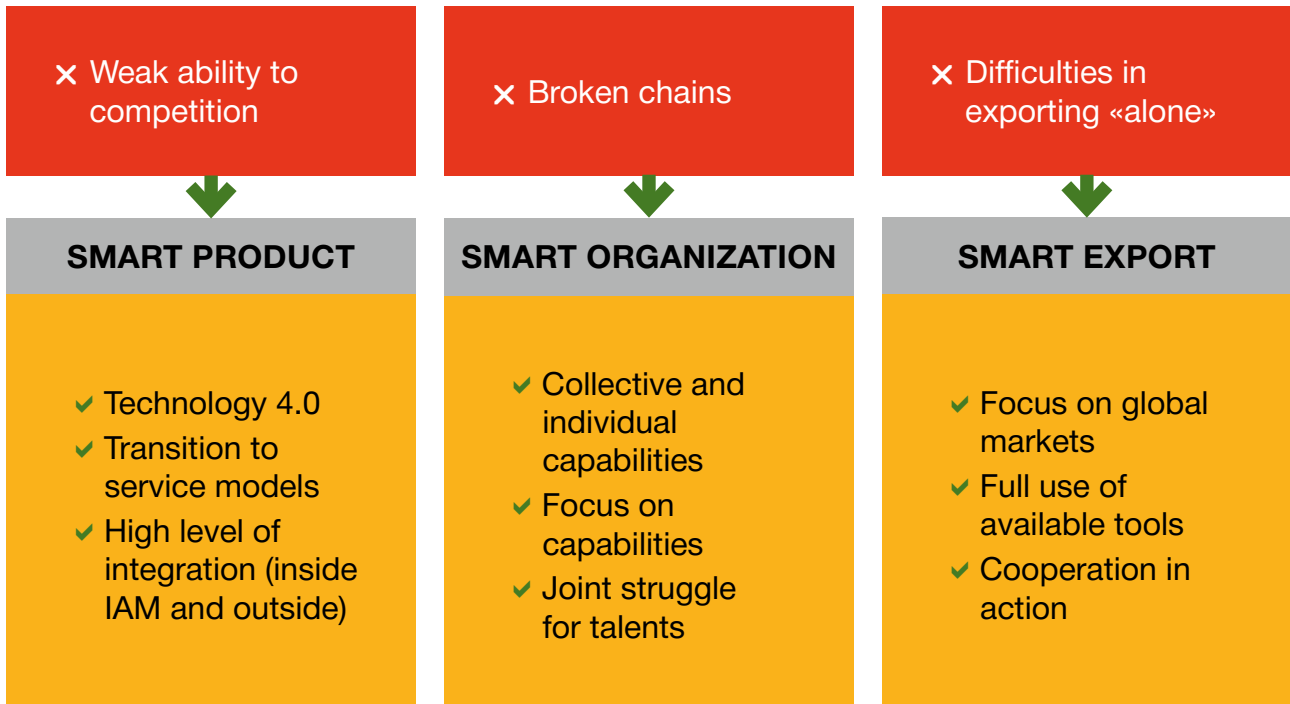


Fig. 1. 3 key components in the ideology of IAM clusters

4

Cluster development is supported by **relevant regional development programs**, including the development of the region's innovation infrastructure, services for participants, and other tools and mechanisms that allow us to respond together and better to common challenges. These development programs are planned and implemented by the cluster members together with regional executive bodies and local self-government.

5

The EAM cluster supports and develops R&D activities, which in turn depend **on the general macroeconomic and fiscal instruments** of the regional level and Ukraine. To maximize economic growth, these tools need to be tailored and foster innovation and development. The primary task of the EAM cluster is to systematize the current situation and provide proposals for the development of these tools.

6

In developing its best practices, the EAM cluster is guided by the standards of the European Cluster Quality Label Program. These practices include issues of monitoring, evaluation and impact of cluster structures on the economic development of the region.

7

According to the concept of EAM clusters, as well as surveys of participants of cluster initiatives conducted in the regions of Zaporizhzhia, Kharkiv, as well as among the participants of APPAU, which is also a cluster organization, the main areas of cluster development are:

A. EXPORT AND INTERNATIONALIZATION: cluster members formulate common goals and objectives for the growth of joint export activities and better integration into international chains.

B. DEVELOPMENT OF INNOVATION AND R&D: cluster members strengthen the common innovation ecosystem on which they create joint products and projects.

C. STRENGTHENING HUMAN RESOURCES: cluster members plan and implement an action program aimed at preventing the leakage of personnel from the region and from industrial high-tech companies, as well as promoting the maintenance and improvement of staff skills.

D. REGIONAL DEVELOPMENT: EAM clusters are part of the overall regional development, which aims to increase the production of goods, increase the number of jobs, the arrival of new investments and improve the infrastructure of the region.

Also a separate provision, the document fixes the direction of broad cooperation – in its activities EAM clusters work closely with other participants in regional, innovative, digital and industrial development – both at the regional level and at the national and European levels. These provisions were the basis at the beginning of the regular work of the Zaporizhzhya EAM cluster in February 2020 and they are fully correlated with those in the draft National Cluster Development Program, which was released in September 2020.

The strategic goal of the ClusterRISE project was to implement these provisions in the real life of the stakeholders of the 2 regions and these realities of implementation turned out to be much more complex than what was seen and planned at the beginning of the project.

5. HOW THE PROJECT WAS IMPLEMENTED – MAIN ACHIEVEMENTS AND GROWTH ZONES

In general the initial planning of the project fully complies with the above provisions, especially in relation to the transition to the 3-Smart model (Fig. 2), we see here a consistent deployment of capabilities: from smart organization – to smart exports.



Fig. 2. Deployment of 3 Smart in the form of a road map in the ClusteRISE project
(measures not implemented in red)

The stage of smartionization of cluster organizations – that is, the creation of strong, structured management appropriate to this level of maturity is a key success factor for any development strategy. In fact, this stage is still going on in EAM clusters and its deployment turned out to be the most difficult in the project. Both clusters quickly passed the initial stage of evolution, where the following tasks were performed:

1

Formalization of cluster initiatives in legal entities.

2

Initial structuring – appointment of heads to executive directorates, election of board members.

3

Regular board meetings to address strategic and operational development challenges.

4

Partial delegation of development tasks to partners (as the CCI in Zaporizhzhia).

5

Launch regular networking as the main tools of the association at the initial stage.



Fig. 3. Photo from the networking meeting of the Zaporizhzhya EAM cluster and a member of the cluster in March 2021. The cluster went on regular networking in February 2021.

Clusters have not yet been able to fulfill the main task of structuring management with a **clear division of roles and functions within board members**. This task arose at the end of 2020, when it became clear that the cluster coordinators themselves could not cope with the scope of tasks. This issue of the distribution of roles and functions remained unresolved until the end of the project. The main reason is the lack of willingness of key stakeholders to make specific commitments, while CEOs lack time (part-time), experience, competencies and resources. These processes of self-organization are complex and dynamic, but it is important to note the positive dynamics. In particular, in October 2021, the Kharkiv EAM cluster significantly strengthened the structure of the Management Board of leading Kharkiv enterprises and introduced a new executive director with much more time.

The next 2 stages also have a positive dynamics and gradually overcome many difficulties in the process of growth. Among the positive changes and achievements is the following.

SMART PRODUCTS & SERVICES

1

Created initial innovative landscapes of EAM clusters – mapping is the initial tool of innovative development and matchmaking.

2

Much work has been done in Kharkiv to consolidate, attract and integrate the clusters of technical universities. The turning point was the round table on October 12, which formulated a joint statement of universities and businesses, and which includes an action plan for the Free Economic Zone.



Fig. 4. Photo of the last meeting in Kharkiv on October 27, 2021, at which the Memorandum with the city hall was signed

3

Kharkiv also proposed a series of technological meetups, the second of which ended with the formulation of a national agenda in the field of «CAD in mechanical engineering ». This approach is today the basis for the deployment of plans and actions in other areas of Industry 4.0.

4

Zaporizhzhia Polytechnic National University has started the process of transition to the DIH model, created a new site that reflects the current state of university services for industrial SMEs.

5

Some actors from both regions are involved in the new APPAU EIF innovation fundraising program, where several participants have applied for a European competition.

6

Both clusters are gaining the image of innovation and are almost the only business associations in their regions that constantly and systematically raise the issue of innovative development of industrial sectors.

7

Active networking and matchmaking processes have been launched and brought to the system level – in particular, universities and innovative companies and developers are involved in regular visits to enterprises in the regions.



Fig. 5. Photo in Kharkiv – another meeting with a local leader in the categories of SMEs, the Ukrainian Weighing Company. In total, the head of PEC Ivan Movchan organized 3 visits to his company.

SMART EXPORT AND INTERNATIONALIZATION

Export and international activities are just beginning in both structures.

Certain achievements include the following.

1

Carrying out in April Cluster Week – the first international manifestation of EAM clusters, which also attracted 8 more clusters of Ukraine.

2

The Kharkiv Cluster's initiative to develop relations with Kazakhstan includes several visits, exchanges and an exhibition in Karaganda in June. There have also been attempts to attend a major Ukrainian–Kazakh conference, but these plans have been postponed to 2022.

3

Lithuanian–Ukrainian exchanges, which were initiated by the Zaporizhzhya CCI on the topic of the cluster.



Fig. 6. Photo from the visit of the participants of the Zaporizhzhya EAM cluster to Vilnius, September 2021

4

Zaporizhzhya EAM cluster, thanks to the CCI, became part of the Ukrainian delegation to Uzbekistan in March 2021.

5

Exhibition stand of the Zaporizhzhya cluster at the international exhibition in Brno in November 2021, this event is already taking place within the framework of a new grant project, which the cluster received thanks to German federal company Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ).

The project task plan for Smart Product & Smart Export elements is 90% fulfilled according to the project plan. And about 10 initiatives and events have already been created by the clusters themselves, as a result of proposals «from below».

On the other hand, the impact of all these measures to increase product innovation or business performance is still much lower than expected and established by the KPI.

3 MAIN REASONS FOR LACK OF EFFICIENCY

1

The number of companies involved – current and potential cluster participants in these initiatives is low, and this is generally due to the low number of business participants involved in cluster activities. In both regions, no more than 10 business participants are involved in innovation development measures, and no more than 15–20 in export.

2

The second reason is weak returns – low ability of firms to absorb the proposed number of development activities. This, in turn, is due to the structure of companies and the lack of specialized managers. According to a separate report on the Export Development Project, *«there is simply no one to teach export marketing, innovation management, fundraising or other business development functions – all of which are usually led by C-level executives, but never have to deal with them»*.

3

The third reason is the passivity and inability of technical universities in the regions to integrate into the proposed agenda of cluster development. This was most evident in February–March 2021, when the Technological and Innovation Days took place. Kharkiv has made considerable efforts to bring the cluster members' expectations closer in the coming months. Instead, the leadership in Zaporizhzhia Polytechnic National University, which de facto has no «competitors» in innovative development among the local EAM cluster, turned out to be much less.

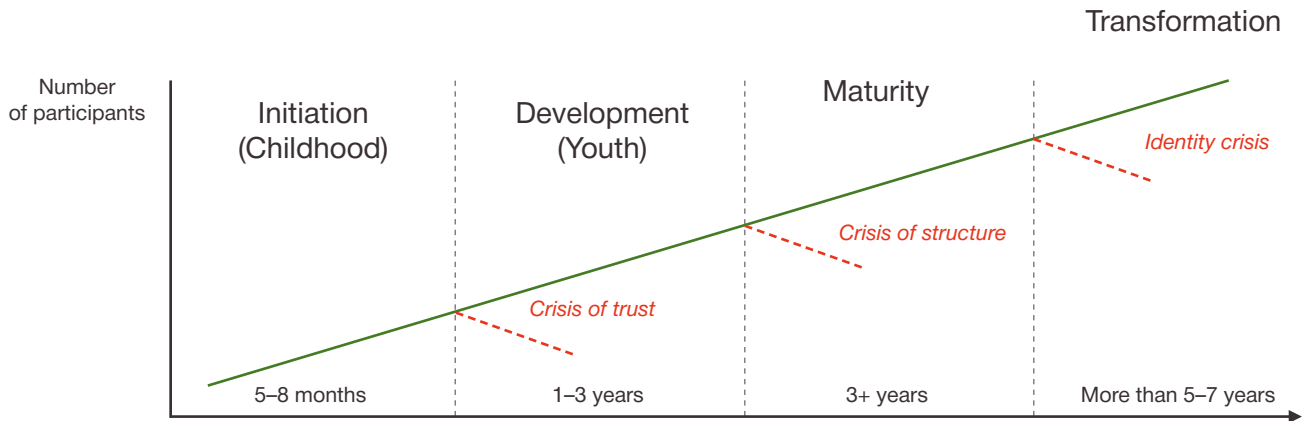
In summary, better involvement of market participants, greater focus on results (rather than processes) and better cooperation with universities – were the 3 main obstacles to the implementation of the 3 SMART components, and which clusters could not fully overcome. These growth zones remain relevant for the 2022 solution.

6. METHODOLOGICAL DEVELOPMENTS

DURING THE CLUSTERISE PROJECT, APPAU, AS THE MAIN EXECUTOR, TOGETHER WITH THE TEAMS OF IAM CLUSTERS DEVELOPED A SET OF METHODOLOGICAL RECOMMENDATIONS AND DEVELOPMENT TOOLS, WHICH ARE NOW AVAILABLE FOR THESE CLUSTERS AND OTHERS IN OTHER REGIONS OF UKRAINE.

1. LIFE CYCLE MODEL CLUSTER ORGANIZATION

This model is the key to making strategic decisions in many aspects of development, especially in relation to the goals of the relevant tools and processes within cluster organizations, Fig. 7.



CHALLENGES	INITIAL TRUST	STRATEGY OF GROWTH	EXPANSION AND IMPACT	CHANGES MODELS
SIGNS OF EXIT	<ol style="list-style-type: none"> 1. Formal organization. 2. Minimum number of participants (10–15 participants). 3. Plan and strategy. 4. Membership fees. 5. Initial promotion. 	<ol style="list-style-type: none"> 1. Strategy and plans (deeper and more accurate). 2. Specialization is growing. 3. New value chains are formed. 4. New projects and initiatives. 5. Joint product and solution initiatives. 	<ol style="list-style-type: none"> 1. Geographical and sectoral expansion, international cooperation. 2. Increasing influence. 3. Working committees and groups are formed. 4. Possible coalitions with other clusters. 5. The management team is growing. 	<p>The business model, strategy and practices are changing significantly.</p>
MAIN INSTRUMENTS	<ol style="list-style-type: none"> 1. Networking. 2. Training. 3. Exchange of experience. 	<ol style="list-style-type: none"> 1. Matchmaking. 2. Internal cooperation projects. 3. Fundraising. 	<ol style="list-style-type: none"> 1. Tools for export and international cooperation. 2. GR. 3. Cooperation. 	<p>Depending on the business model.</p>

Fig. 7. Maturity model of the cluster organization adopted in the ClusterISE project

The model is described in detail by [reference](#) and in relation to the matchmaking tool. Both quickly passed the first threshold of growth in the association of 10-15 members, business participants. But then growth stopped. One of the reasons is the need to expand the tools and the ability of clusters to generate a better and larger package of services, including development projects.

Thus, the model is an important tool for diagnosing and strategizing development according to the maturity of the cluster. A separate export report describes in detail how this technique works and whether it is possible in practice to jump from the «childhood» phase to the «youth» phase.

2. GETTING STARTED TOOLBOX

Getting started toolbox is an initial cluster startup toolkit that includes:

- a. General provisions for EAM clusters (mission, goals, benefits,...) – as a basis for the first strategic sessions.
- b. Templates of Chapter documents.
- c. Examples of strategies.
- d. Templates for planning and development tools – diagnostics, cluster / stakeholder mapping, questionnaires, monthly reports, etc..

The level of use of these tools in the project is high, except for analytical mapping tools.

3. CYCLE «TOOLS FOR DEVELOPMENT AND PROMOTION OF THE INITIAL PERIOD»

The Initial Development and Promotion Tools cycle demonstrates which tools are important and basic in each of the 4 development categories and how they are related.

This framework guides cluster coordinators on the list of necessary tools and indicates priorities. For example, it is not possible to quickly and efficiently create a cluster website or brochure about innovative solutions if they have been carefully analyzed and data have not been entered into the relevant databases.

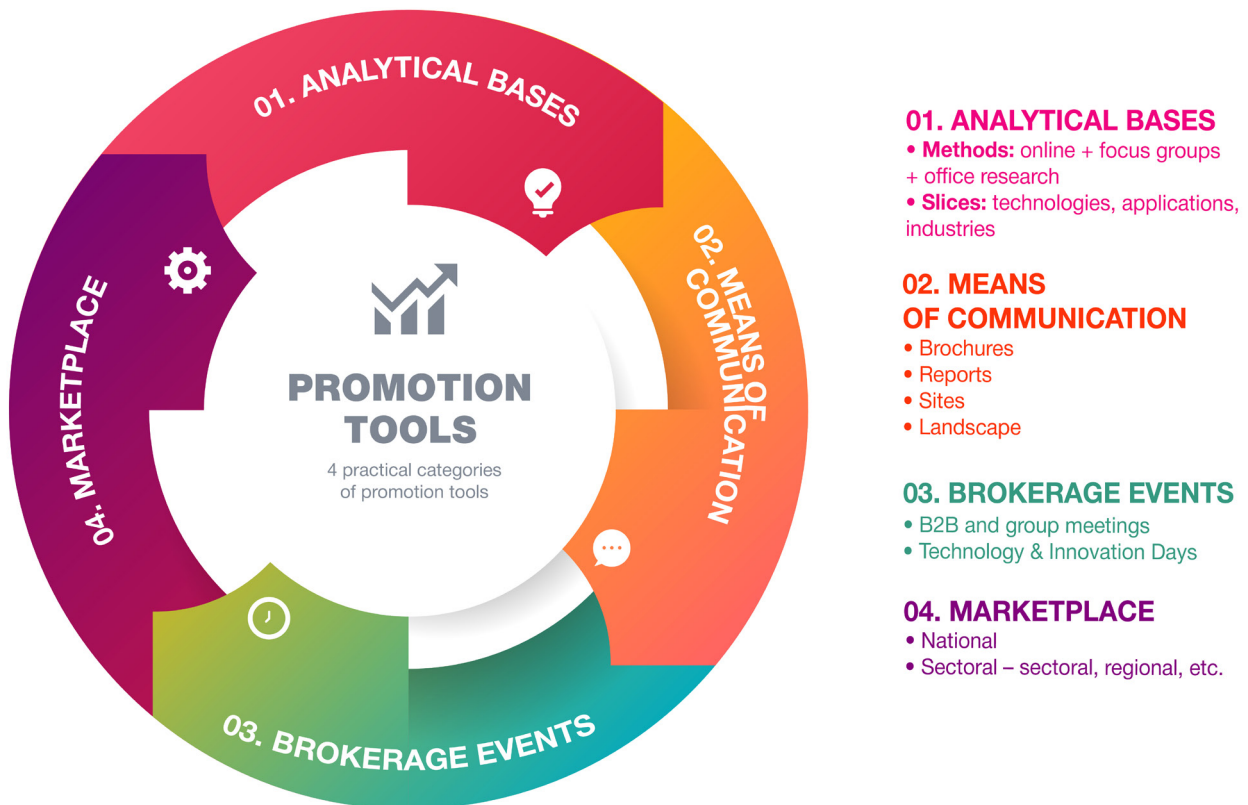


Fig. 7. Cycle «Tools for promotion and development of the basic level»

4. COOPERATION MODEL 4.0

The Cooperation Model 4.0 offers a Ukrainian version of the Entrepreneurship Dialogue (EDP). This technique is important at the stages of implementation of cluster plans for integration into regional development plans, but also innovative development, regardless of the goals of smart specialization. In particular, this version of the EDP provides a list of challenges at the regional level and makes appropriate recommendations to address Fig. 8.

For example, in Kharkiv, EAM members of the EAM cluster broke the «circle of mistrust» (Section 2) between business, universities, and government through gradual, systematic iterations. Or, as in Zaporizhzhia, we made the website of the Center 4.0 in 3 weeks, and in Kharkiv we organized successful technological myths in a few weeks (item 6 about «quick wins»).

For more information on the rules of «business dialogue», see Section 8, as well as the full report «Better cooperation between government, business, science and education, in response to the challenge of deindustrialization».

Ineffectiveness of plans and actions. Lack of responsibility.	1	Distribution of roles according to real abilities
Circle of distrust / Fragmentation	2	Gradual iterative convergence
Weak and broken communications	3	Single information field / Regular communications
Lack of integrity and consistency	4	Single Agenda (Roadmap)
Unclear goals and results S3	5	4 categories of SMART results
Inadequate time settings	6	Focus on Quick Wins
Disintegration of policies and programs at the regional and national levels	7	Full integration with national initiatives

Fig. 8. The specificity of the Ukrainian version of EDP is in the adaptation to the local context

5. FRAMEWORK FOR TECHNOLOGICAL AND INNOVATION DAYS

It was not planned to conceptualize these measures too much and to create separate, detailed frameworks especially for them. But the first attempts to spend these days in February and March were rather unsuccessful. We have not received high-quality innovation maps (landscapes), and the question is what is real, that is, the full map of innovations of Zaporizhzhia or Kharkiv regions remains open to this day.

Accordingly, later there was a belief in the concept itself, Fig. 9 with the search for cause and effect.

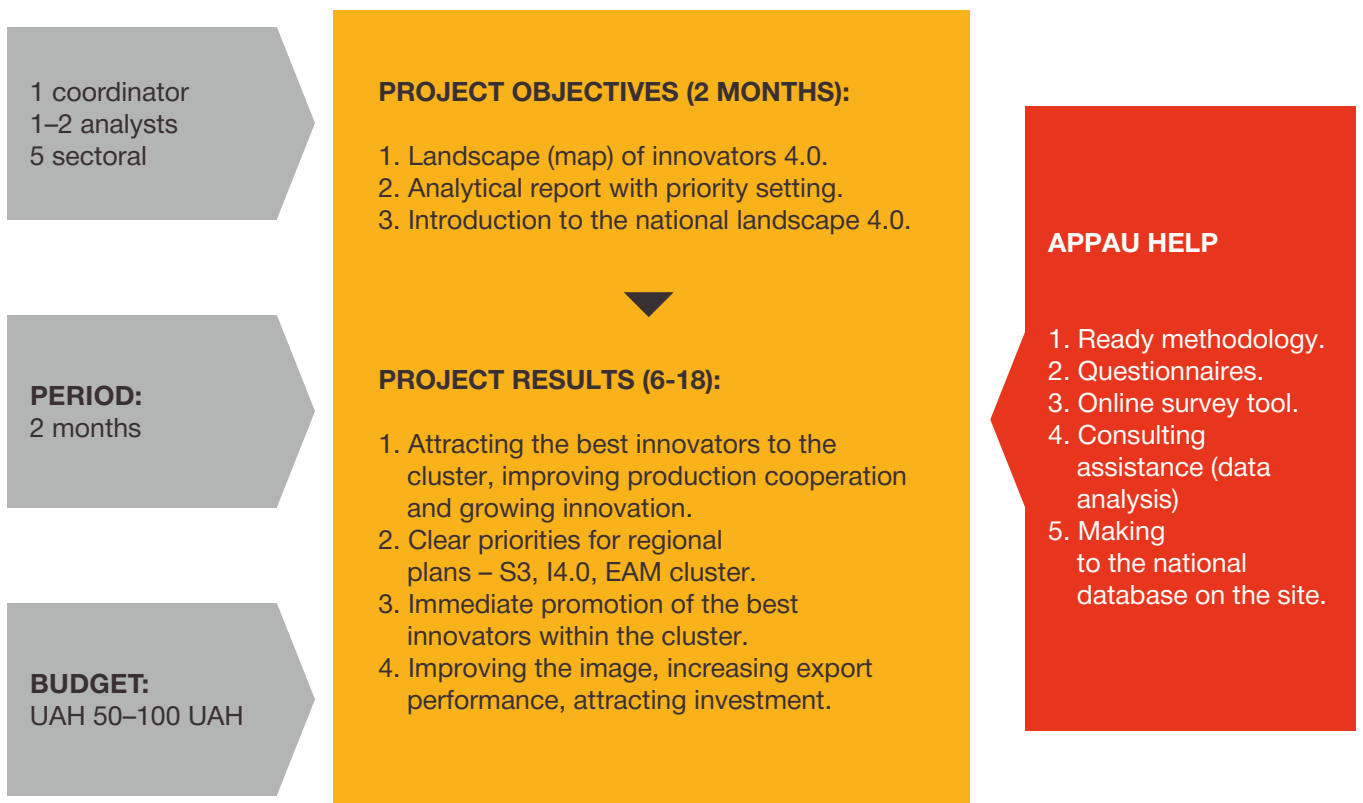


Fig. 9. Format of Technological and Innovation Days

The analysis shows that the fundamental problem is the quality of executive staff. Managers from universities were unable to complete most of the necessary tasks. In other words, the problem was not in the concept, or in the action plan, or in the budget – but in the implementation and at the level of performers.

Later in the project workshops in April and May, we concluded that **the problem is common at the national level and concerns the almost complete lack of innovation management** is the main one and applies to all universities in the country, Fig. 8. This awareness has further facilitated a number of negotiations with key actors at the regional and central levels, including the rectors of several universities.



Fig. 9. APPAU analysis of the country’s ability to respond to challenges according to the Aberdeen Group, PACE

The analysis showed that the problem (the narrowest place) is not in the lack of assistance tools as funds. The key constraint is the low capacity of universities to set up appropriate processes and structures in 4 key areas – internal and external communications, innovation brokerage, innovation and product marketing, and fundraising.

Thus, from the point of view of repeating TID in Kharkiv or Zaporizhzhia regions, or for conducting TID in other regions of the country, the ClusteRISE project **recommends to be very careful about universities' statements about their ability to be partners in regional innovation analysis. For such work it is necessary to look for real specialists with experience in market research and technical background.** Instead, businesses can return to talking about collaboration in this area and focus on universities, such as advanced 4.0 Centers or DIH (Digital Innovation Hub), only if the latter actually invest in their innovation brokerage and marketing functions and create relevant positions. and effective structures capable of establishing appropriate business processes.

6. FRAMEWORK FOR CONDUCTING TECHNOLOGICAL MEETUPS

Conceptualization of technological meetups in hybrid online modes is important for the consolidation of the expert community both at the level of EAM clusters and APPAU – as the national cluster association of Industry 4.0.

If the TID days were rather unsuccessful, the experiments of technological myths that began in Kharkiv in June have paid off. One of the conclusions made jointly by the EAM cluster board in Kharkiv was the awareness of the roles of university specialists in which they feel comfortable and motivated to cooperate. Usually, and as noted above, these roles do not apply to innovation management. Instead, as technical experts, most professionals feel quite comfortable.

Accordingly, the proposed framework, Fig. 10 offered a careful selection of the best technical experts from different categories of market participants in order to discuss common challenges and solutions in a particular technology segment.

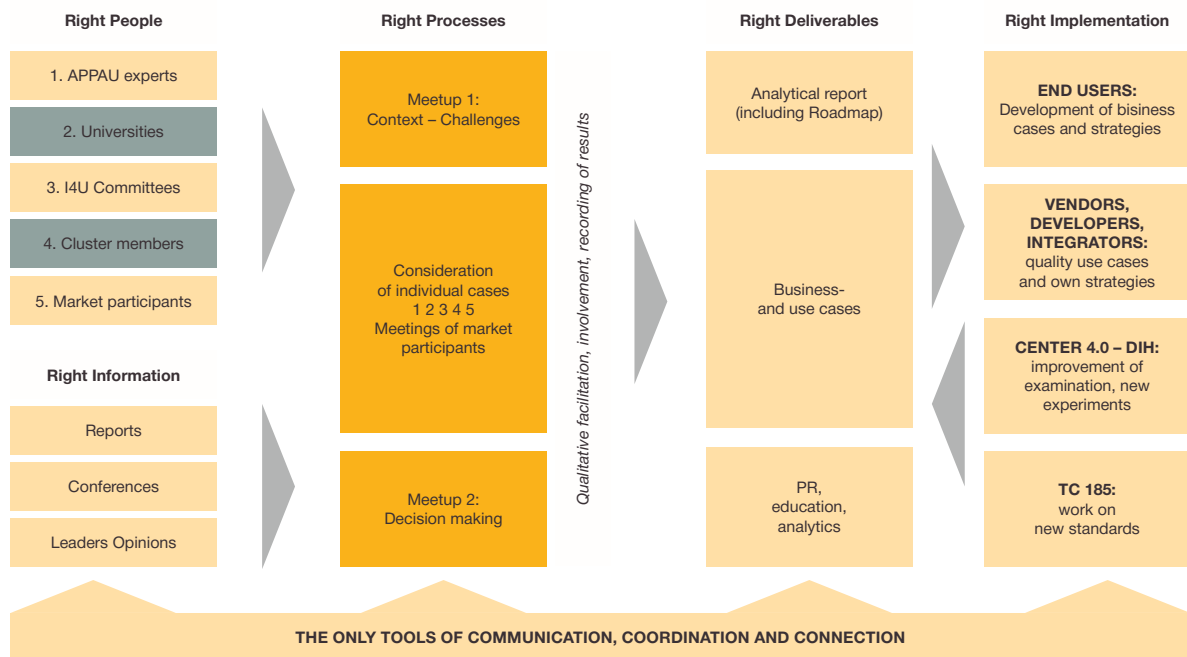


Fig. 10. A framework of technological myths that take regional or national agenda to a new level

In essence, this framework is an extension and continuation of the Ukrainian version of EDP to address specific challenges of innovation development.

Two similar meetups took place in Kharkiv – in July on BIM technologies and in August – «CAD in mechanical engineering». Both topics are a priority for Kharkiv in terms of regional capacity and specialization. The results of the last meetups are presented in a report on the APPAU website. This model is now replicated in other activities of APPAU and EAM clusters, in particular, it is used in its activities by the BOWI project of Center 4.0 in National Technical University of Ukraine «Igor Sikorsky Kyiv Polytechnic Institute».

7. MATCHMAKING RECOMMENDATIONS

The lack of an automatic transition from networking to matchmaking was another major challenge for the ClusteRISE project and was addressed at the 2nd Intercluster Forum in Kharkiv in September 2021 and posted on Industry4Ukraine for all clusters as general recommendations. They call for a conscious focus, the development of relevant skills and the use of tools in 3 areas of cluster development:

- 1** Deep knowledge of demand (unresolved issues) on the part of cluster members.
- 2** Knowledge of solutions and solutions providers.
- 3** Knowledge and perfect mastery of the tools of matching supply and demand.

Summarizing all the methodological developments of the ClusteRISE project, it should be noted once again that their understanding, study and practical development remains a challenge for EAM cluster management, but it is also a good base of practice and knowledge for all other clusters in this phase.

7. EVALUATION OF RESULTS IN ACCORDANCE WITH PLANNED INDICATORS

THE MAIN PERFORMANCE INDICATORS RELEVANT TO THE PROJECT OBJECTIVES WERE IDENTIFIED AT THE BEGINNING OF THE PROJECT, IN AUGUST 2020.

Further evaluating the project according to the plan-fact criterion, we note that although the project objectives and KPIs are the main criteria for project success and the subject of donor reporting, our experience shows that predefined targets cannot be the only criteria for project success of similar complexity. The most difficult and unknown factor at the beginning was the ability of clusters to implement the proposed plan. Another factor, or rather multiple factors of influence were the variable parameters of the environment. For example, at the beginning of the project it was impossible to predict that it would be so difficult to develop relations with regional stakeholders in both regions. Or that in the Zaporizhzhia Polytechnic National University leadership elections will take more than 1.5 years, which in turn will virtually block the activities of local experts on innovation development.

The combination of these factors affected the course of the project – 4 months after the start of the project, in January 2021 the project plan was significantly adjusted, and the entire project period was extended until the end of November 2021.

Accordingly, in the estimates below, we proceed from the thesis of planning «as the main coordination tool, not dogma» and also point to a number of others in addition to targets – which were not planned in the project, but in their importance and essence are important for estimates success.

First of all, we present the results of the survey of cluster participants from the beginning of November 2021.

1

Respondents find all project activities useful and effective, most of all networking activities and cluster forums in Mykolayiv and Kharkiv. There are no evaluations of «unsuccessful or ineffective» measures.

2

Estimates of quantitative and qualitative indicators of the project are dominated by the estimate «**something has been done, but the full potential of the cluster is unrealized**». Most of the unsatisfactory assessments (20% of respondents) have only 2 indicators – «the ability to keep 2 people in the executive directorate» and the launch of export marketing services.

3

Respondents consider the lack of involvement of market participants to be an obstacle to achieving the best indicators.

4

100% of respondents believe that «the project was definitely useful for us, very important and similar projects should be continued».

The assessment of all project indicators by the ClusterRISE project management at the time of its completion is shown in Fig. 11.

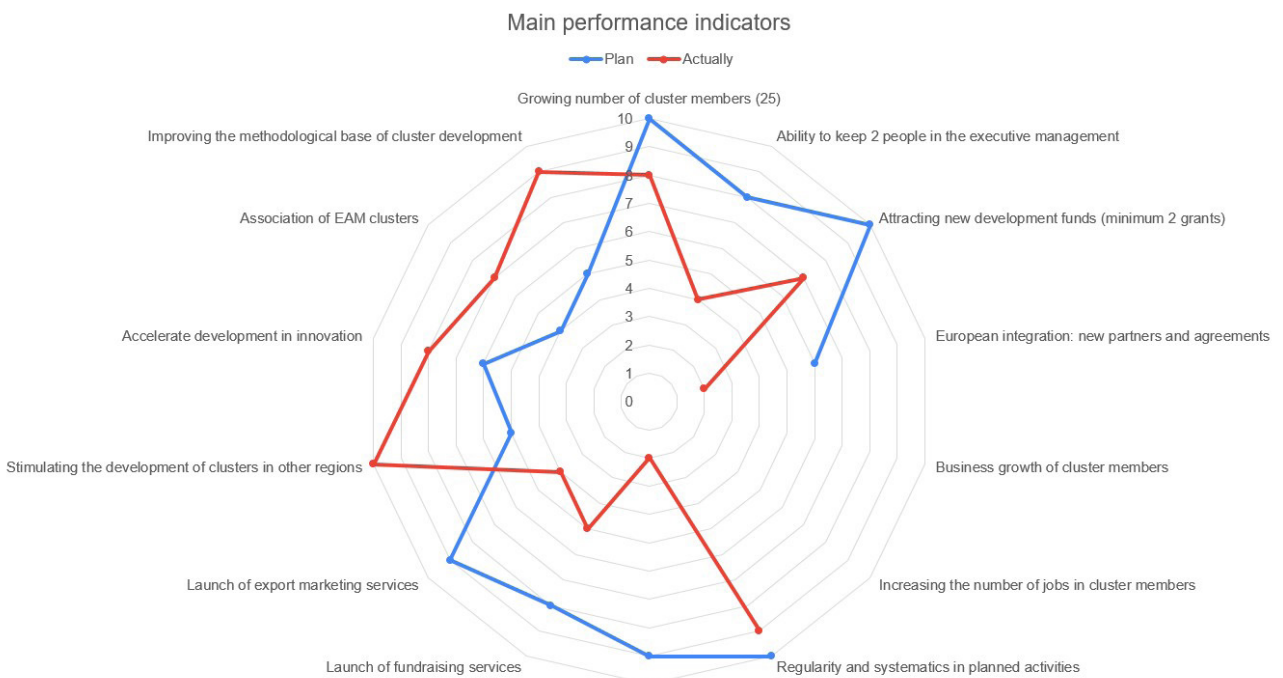


Fig. 11. Evaluation of project results by the ClusterRISE project management

Quantitative indicators of the project, which were planned at the beginning of the project, are as follows:

- 1** The indicator of attracting new members looks the best – in both clusters it is 20 with a plan of 25.
- 2** Zaporizhzhia region received a new grant and fulfilled its plan for the sustainability of financial capacity for the next period.
- 3** With some delays, but steady growth is demonstrated in the direction of exports – internationalization: a number of events with Central Asia (Kazakhstan, Uzbekistan), the Baltics (Lithuania) and the Czech Republic (exhibition in Brno). More important than the formal indicator of the plan (2 memoranda) is the number of established business relationships and partnerships. This should yield results in 2022.
- 4** The results of the project’s activities related to technical regulation and standardization are controversial. In the context of the course of European integration, this is a mandatory part of internationalization and exports. Three webinars on this topic were aimed at training exporters from both clusters. And because the webinars were open, they attracted and were very useful for the technical communities of APPAU and the industry 4.0 movement from different regions of Ukraine. However, the participation of representatives of Kharkiv and Zaporizhzhia was weak, which indicates a lack of understanding and involvement of regional communities in the importance of these aspects.
- 5** There is little progress in plans for integration into regional development plans. Changes have taken place here only in the last months of the project – Kharkiv signed a memorandum with the city hall, and in Zaporizhzhia development plans until 2025 include measures to support the development of the industrial park and clusters for which the local EAM cluster is responsible.
- 6** The launch of fundraising and export marketing services also looks weak.
- 7** As for the financial readiness of both clusters to maintain management at their own expense, this issue is still unresolved.

The main reason for these deviations is the weak growth rate of new members, which in turn is due to the low rate of change required. The indicators of integration into regional development plans were significantly affected by the difficulties in building relations with regional authorities, frequent elections – re-elections, and the lack of motivated, responsible persons. **Several indicators and results are higher than expected, and some of them were not specifically planned by the project:**

1

The project stimulated the development of other EAM clusters in Vinnytsia, Kyiv and Mykolayiv, as well as the cluster movement in Ukraine in general.

2

In general, there is a significant revival of regional discourses about the role and importance of industry for economies, and, finally, we see that the government is responding.

3

There were no new innovative products in the cluster, but in fact there are serious changes in the attitudes of key actors in regional innovation ecosystems. First of all, this is noticeable in Kharkiv, where the relevant memorandum of cooperation was signed by the Kharkiv City Hall, and there is a real integration and interaction with several universities.

4

EAM clusters from 5 regions had a number of meetings, joint technological myths and 2 cluster forums – in Mykolayiv and Kharkiv. Together, this forms the basis for interregional cooperation, as well as highlights the creation of joint, sharing tools for support and development.

5

We also did not specifically plan, but due to the formalization of practice and experience, we received a number of methodological developments that may be useful for other clusters of Ukraine (see Section 6).

In general, despite the fact that some indicators were not achieved, it can be stated that both cluster organizations have demonstrated sufficient viability and growth dynamics. This is a guarantee of further development of both clusters. In the context of the fact that there are practically no existing clusters of this type (industrial high-tech) at the regional level in Ukraine, this result is important and quite self-sufficient.

8. ALL RESULTS OF THE PROJECT

EACH OF THESE CONCLUSIONS GENERATES THE CORRESPONDING ONES DIRECTIONS OF ACTION FOR 2022 AND WE RECOMMEND THE CLUSTER BOARD TO CONSIDER THEM CAREFULLY. THE FINAL RECOMMENDATIONS OF THE PROJECT WILL BE MADE AFTER THE FINAL PROJECT CONFERENCE, WHICH IS SCHEDULED FOR NOVEMBER 25 IN ZAPORIZHZHIA.

1

The ClusteRISE project has become a catalyst for the growth of industrial high-tech clusters in the regions of Ukraine. With the continued support of GIZ and other international donors, we can finally break the negative trends of «cluster stagnation» in industry that have continued in Ukraine for the past 20 years.

2

In this context, it is important to note that even in the state of initial maturity, clusters can immediately become prominent actors on the regional map of industrial high-tech. The slogan «clusters – as drivers...» can not yet be attributed to the economic development of regions, but it is already possible – to innovation and digital development in the industrial sphere. It turned out that these areas are virtually «empty», and not so much in the sense of the absence of regional actors, as their ability to develop effective development strategies and consolidate ecosystems.

3

Despite some tactical mistakes and circumstances, the ClusteRISE project plan looks quite effective for replicating other young clusters and / or regions. Proper allocation of measures and activities for growth in accordance with the level of maturity of the organization, its management is the main factor of success. Several changes that need to be made to the plans of such projects relate to corrective measures and tools to influence the milestones of the project plan.

4

An important conclusion for members of cluster communities should be that savings on cluster management throw the whole organization back to stagnation. In the ClusteRISE project, we saw numerous opportunities for collective growth. But their implementation is possible only with proper payment of managers and permanent employment. The latter is due to the fact that the amount of work on coordination, consolidation, integration and construction of real chains of production cooperation and innovation is really very large, and the tasks are very complex. At the same time, the experience of all successful Ukrainian and foreign clusters speaks unequivocally – «to have something, you need to invest in it».

5

ClusteRISE's model of maturity and experience also proves that young clusters in the «childhood» phase really need «guardians» or curators – partnerships with other, more experienced organizations. This is less the case for donors, whose expediency in the early stages is obvious and understandable a priori. But without guardians, the «children» are left to fend for themselves, simply do not yet know «where to run» and how to perform complex tasks, even when there is external funding. As a result, organizations can make many mistakes, lose sustainability, enter a crisis of confidence, and eventually break up. Accordingly, cluster board should immediately consider the distribution of roles and conditions of partnership with strong regional and national actors in its field as one of the key development strategies.

APPAU Executive Board, as the main executor of the ClusteRISE project, wishes all participants of the project sustainable and successful growth, thanks for the cooperation and expresses readiness for further cooperation in development.

ADDITION 1. ALL MAJOR REPORTS AND ANALYTICAL PUBLICATIONS OF THE CLUSTERISE PROJECT IN 2021

March – «Better cooperation between government, business, science and education in response to the challenge of deindustrialization»

February – report of the first technological and innovation day in Zaporizhzhia «EAM regional landscape»

March – report on the first technological and innovation day in Kharkiv «Regional Landscape Industry 4.0»

April – звіт про holding the first Ukrainian cluster week.

May – report on the results of technological and innovation days «Development of innovative ecosystems in the regions of Zaporizhzhia and Kharkiv»

July – the first forum of EAM clusters in Mykolayiv

August – report on the first technological meetups in Kharkov «CAD in mechanical engineering»

October – export activity report «The first steps for young EAM clusters»

