Interreg Danube Region

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DanubIA Clusters

Report on the state of play on digital/AI based B2B/C2C/B2C cooperation platforms

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Responsible Partner: Union of Slovak Clusters

Content

1. Executive Summary

1.1 Objective

This report aims to comprehensively analyze the current landscape and future potential of digital and AI-based platforms designed to enhance business-to-business (B2B), cluster-to-cluster (C2C), and business-to-cluster (B2C) cooperation within the Danube Region. Drawing from extensive desk research, stakeholder surveys, interactive sessions, and detailed contributions from national partners, the report identifies the main strengths, challenges, best practices, and significant opportunities provided by digital and AI-enabled cooperation platforms. Additionally, it provides strategic recommendations to ensure these platforms maximize innovation, international collaboration, and economic competitiveness across the region.

1.2 Scope

The scope of this report focuses specifically on clusters and small- and medium-sized enterprises (SMEs) in the Danube Region, covering Czech Republic, Hungary, Romania, Slovakia, and Ukraine. It emphasizes the crucial role of digital and AI-driven platforms in facilitating efficient international cooperation, fostering innovation, and enhancing the competitive advantage of clusters and SMEs. The analysis evaluates existing European and national-level platforms, identifies current gaps and opportunities, and provides concrete suggestions for advancing the adoption and integration of AI-driven tools into future cluster collaboration practices.

1.3 Key Highlights

Overview of Analyzed Platforms

The report reviews key European-level platforms including:

- **European Cluster Collaboration Platform (ECCP)**: Promotes international cluster collaboration through comprehensive matchmaking, information sharing, and capacity-building activities.
- **Enterprise Europe Network (EEN)**: Supports SMEs and clusters through matchmaking events, technology transfer, and funding advisory services.
- **Other EU-funded platforms and projects**: Including **DanuBioValNet**, **ClusterPoliSEE**, offering specialized tools for cluster innovation, policy alignment, and sustainable cross-border partnerships.

At the national level, prominent platforms analyzed include:

- **Czech Republic**: National Cluster Association (NCA), with structured cluster mapping and validated profiles.
- **Hungary**: Hungarian Cluster Alliance (HCA), emphasizing competence mapping, academic partnerships, and regular cluster ecosystem analyses.
- **Romania**: Romanian Cluster Association (CLUSTERO), known for systematic analytical support for national policymaking.
- **Slovakia**: Slovak Cluster Monitor and Union of Slovak Clusters, providing visibility and international cooperation support.
- **Ukraine**: Ukrainian Cluster Alliance (UCA), known for clear cluster identification criteria, dedicated matchmaking tools, and extensive international collaboration efforts.

Main Challenges and Gaps Identified

Key identified challenges and gaps across platforms include:

- **Variability in Data Quality and Frequency of Updates**: Inconsistent data reliability and updating practices significantly reduce platforms' strategic effectiveness.
- **Limited Platform Interactivity**: Current platforms lack robust interactive tools for real-time collaboration, thus restricting dynamic cooperation opportunities.
- **Insufficient Integration of AI Tools**: There is limited practical integration of advanced AI functionalities, such as intelligent partner matchmaking, predictive analytics, and personalized user experiences.
- **Lack of Standardization**: Diverse data formats, technical standards, and lack of interoperability hinder effective cross-border collaboration and seamless integration between national and European platforms.

Recommendations for Future Developments

The report offers specific recommendations aimed at addressing current gaps and maximizing the future potential of digital/AI platforms:

Core Recommended Features for Digital/AI Platforms:

- Intelligent AI-driven matchmaking tools for efficient partnership formation.
- Real-time analytics and predictive insights to support proactive decision-making.

- Enhanced interactive collaboration tools enabling seamless communication and joint project management.
- Comprehensive competence mapping and personalized content delivery for targeted user experiences.
- Robust integration and standardization with European and national-level systems, ensuring seamless interoperability.

Policy and Strategic Considerations:

- Clear alignment of platform goals with European and national policy frameworks (e.g., Green Deal, Digital Europe).
- Sustainable financing mechanisms and cost-sharing models to support long-term platform viability.
- Advanced data governance, ethical AI practices, and strong cybersecurity standards.
- Inclusive capacity-building initiatives to enhance digital literacy among cluster members and SMEs.
- Structured mechanisms for continuous user feedback, adaptation, and innovation.

By addressing these recommendations systematically, stakeholders can ensure the development of robust, user-friendly, and strategically aligned digital and AI-driven platforms. Such enhancements will significantly boost regional innovation, cross-border cooperation, and economic competitiveness across the Danube Region, positioning it as a leading example of effective international cluster collaboration.

2. Introduction

2.1 Context

2.1.1 Importance of Digital/AI-enabled Platforms in Cluster Cooperation

In the current global economic landscape, digitalization and artificial intelligence (AI) have emerged as essential drivers of competitiveness, innovation, and sustainable growth for cluster organizations and their members. Digital and AI-based platforms significantly enhance the capabilities of clusters to collaborate effectively at regional, national, and international levels. These platforms play a critical role by providing advanced tools such as real-time data analytics, intelligent matchmaking between clusters and SMEs, and predictive insights that facilitate more strategic and informed decision-making.

Digital/AI-enabled platforms address key collaboration challenges identified across partner countries, including the Czech Republic, Hungary, Romania, Slovakia, and Ukraine. Commonly highlighted issues such as the lack of transparent communication channels, difficulties in finding aligned goals among clusters, limited access to accurate and updated data, and inefficient resource management can be substantially mitigated by deploying digital solutions. Specifically, functionalities such as AI-driven matchmaking algorithms, personalized content delivery, and automated project monitoring enhance operational efficiency and create more targeted opportunities for partnership and growth.

The recent insights from cluster stakeholders, gathered through structured sessions and comprehensive surveys, further underline the crucial importance of digital platforms. These stakeholders emphasized the role of digital platforms not only in overcoming traditional cooperation barriers but also in proactively identifying emerging market opportunities and threats through AI-driven data analysis and predictive functionalities.

Moreover, AI-powered tools offer a unique advantage in fostering innovation and competitiveness among SMEs within clusters. By harnessing advanced analytics, clusters can quickly adapt to market changes, optimize resources, and facilitate more effective cross-sectoral and international partnerships. This capability is particularly relevant given the complexity and rapid evolution of global market dynamics.

2.1.2 Relevance to the Danube Region and International Cooperation

The Danube Region, with its diverse economic ecosystems spanning numerous countries, faces unique opportunities and challenges in fostering international cluster cooperation. Given the region's economic diversity and strategic location bridging Western, Central, and Eastern Europe, digital and AI-powered platforms can significantly enhance regional integration, innovation exchange, and the overall competitiveness of clusters and SMEs in the area.

Historically, cooperation within the Danube Region has been characterized by active engagement in numerous international projects and initiatives such as Interreg programs, Horizon Europe, and cross-border collaborations that highlight the region's strong potential for innovation and growth. National partner reports from Czech Republic, Hungary, Romania, Slovakia, and Ukraine indicate extensive experience and substantial success in using international funding opportunities to enhance innovation capacities, engage in meaningful cross-border partnerships, and drive regional economic growth.

However, these reports also outline persistent challenges, including administrative complexity, varying levels of digitalization among cluster partners, sustainability of partnerships beyond initial funding periods, and cultural differences. AI-powered digital platforms tailored specifically to the needs and characteristics of the Danube Region clusters can directly address these challenges. For instance, digital platforms enable streamlined administrative processes, foster better cultural understanding through multilingual interfaces, and provide robust data analytics to bridge digitalization gaps.

Specifically, for clusters within the Danube Region, platforms could support:

- Enhanced cross-border matchmaking and partnership formation.
- Real-time analytics to identify transnational market opportunities and threats.
- Automated project management to simplify administrative burdens and improve project outcomes.
- Integration and interoperability with existing European and national databases for seamless collaboration and information sharing.

Additionally, stakeholders within the Danube Region strongly advocate for the development of AI-powered digital tools to optimize resource allocation, predict market shifts, and enhance overall innovation capacity. The DanubIA project itself serves as a cornerstone initiative aimed at harnessing AI-driven cooperation tools, demonstrating a clear commitment to positioning the region as a leader in digital cluster cooperation.

In conclusion, the deployment of digital/AI-based cooperation platforms is not merely advantageous but essential for clusters within the Danube Region. These platforms promise significant improvements in inter-cluster communication, resource optimization, and international competitiveness, thereby contributing directly to sustainable regional economic development.

2.2 Objectives of the Report

This report aims to provide a comprehensive analysis of the current landscape and future potential of digital and AI-enabled platforms specifically designed to enhance cooperation within business-to-business (B2B), cluster-to-cluster (C2C), and business-to-cluster (B2C) interactions. Given the increasing relevance of digitalization and artificial intelligence in boosting economic cooperation and competitiveness, this report focuses on the following key objectives:

2.2.1 Analysis of Current State of Digital/AI Platforms

The report aims to thoroughly examine existing digital and AI-enabled platforms across the partner countries (Czech Republic, Hungary, Romania, Slovakia, Ukraine) and more broadly in the Danube Region. This analysis includes:

- Identifying current platforms used by clusters and SMEs, highlighting their core functionalities and effectiveness.
- Evaluating the quality, usability, and interactivity of these platforms, with specific attention to their impact on facilitating B2B, C2C, and B2C cooperation.
- Documenting experiences and satisfaction levels of platform users to capture the real-world effectiveness of these tools in supporting international cooperation and growth.

2.2.2 Identification of Best Practices, Challenges, and Opportunities

Building upon the detailed analysis of existing platforms and practices, the report further seeks to:

- Highlight best practices implemented by successful platforms, including specific examples of AI-driven matchmaking, predictive analytics, resource mapping, and collaborative functionalities that have significantly enhanced cluster cooperation.
- Clearly articulate challenges faced by clusters and their members when using current digital cooperation platforms, such as technical complexity, limited data accuracy, or inadequate customization.

- Identify new opportunities arising from digital and AI advancements, including emerging functionalities, potential improvements in usability, integration possibilities with European-wide initiatives, and the development of innovative solutions tailored specifically for the needs of cluster organizations.

Through achieving these objectives, this report aims to provide actionable insights and clear recommendations for enhancing digital and AI-driven cooperation platforms, ultimately supporting more robust international partnerships, increased competitiveness, and sustainable economic growth within the Danube Region and beyond.

2.3. Methodology

The methodology applied for developing this report integrates several complementary research and data-collection approaches to ensure a comprehensive and accurate assessment of digital and AI-based cooperation platforms. The methods employed include desk research, stakeholder questionnaires, session outputs, and national contributions from project partners, detailed as follows:

2.3.1 Desk Research

Desk research provided the foundational context for this report by systematically reviewing relevant secondary resources, including existing studies, policy documents, and strategic guidelines on digital platforms and AI tools utilized in cluster cooperation. Additionally, the research focused on existing digital cooperation platforms actively used within the partner countries and throughout the Danube Region. This allowed for:

- Identification of prevailing practices and existing solutions.
- A preliminary understanding of platform functionalities and user experiences.
- Insight into strategic documents (national and European) related to digital transformation, AI integration, and international cooperation.

2.3.2. Stakeholder Questionnaires

To capture insights directly from stakeholders, a structured online questionnaire was conducted, receiving responses from 73 participants representing clusters and their member organizations. The survey specifically aimed to:

- Gauge current usage patterns and effectiveness of digital/AI cooperation platforms.
- Identify key features valued by users and highlight areas needing improvement.

- Understand stakeholder perspectives on future platform developments and AI functionalities.
- Map key unmet needs and preferred regions or sectors for future cooperation.

Quantitative and qualitative data from these questionnaires informed the identification of gaps, challenges, priorities, and opportunities outlined in this report.

2.3.3 "The Cluster Cooperation Quest" Session Outputs

An interactive session titled **"The Cluster Cooperation Quest"** within Project Generation Seminar was held during a European cluster meeting in Chișinău, Moldova on October11th, 2024. This event gathered 42 cluster representatives divided into multiple groups, fostering in-depth discussions and collaborative brainstorming. The session was structured around interactive and gamified elements, encouraging active participant engagement. Participants were tasked with:

- Identifying current cooperation challenges and barriers.
- Prioritizing essential functionalities and improvements needed for future digital platforms.
- Envisioning innovative AI functionalities that could significantly enhance cluster cooperation.

Insights from these structured discussions provided valuable qualitative data, highlighting user-centric views and innovative proposals directly applicable to platform development.

2.3.4 Partner Contributions at the National Level

Each partner country involved in the DanubIA project (Czech Republic, Hungary, Romania, Slovakia, and Ukraine) prepared detailed national-level contributions, outlining the state of play regarding digital and AI-based platforms in their respective countries. These contributions covered:

- Current national platforms, detailing their core functionalities, strengths, and limitations.
- Mechanisms and tools supporting cluster members and SMEs at national and regional levels.
- Records of past and current international cooperation projects, emphasizing experiences with digital tools and platforms.
- Suggestions and strategic recommendations for future AI-enabled cooperation platforms, including desired functionalities and necessary features.

These detailed national inputs provided rich contextual insights, enabling a nuanced understanding of diverse national ecosystems and ensuring regional specificities are accurately reflected in the report.

By employing this integrated methodological approach, the report provides robust and evidence-based recommendations, accurately reflecting the current status and future potential of digital and AI-powered cooperation platforms within the Danube Region.

3. Overview of Platforms Supporting Cluster Cooperation

3.1 European-Level Platforms

European-level platforms play a vital role in enhancing collaboration among clusters and SMEs, facilitating cross-border cooperation, and driving innovation across Europe. This section provides a detailed overview of the most significant platforms currently supporting European clusters and their members: the **European Cluster Collaboration Platform (ECCP)**, the **Enterprise Europe Network (EEN)**, and other relevant EU-funded initiatives.

3.1.1 European Cluster Collaboration Platform (ECCP)

The European Cluster Collaboration Platform (ECCP) is a central hub supported by the European Commission to enhance cluster collaboration across the EU and internationally. It serves as an interactive platform aiming to connect clusters, promote excellence, and foster transnational and cross-sectoral collaboration.

Role and functionalities:

- **Cluster Mapping and Matchmaking:** ECCP provides comprehensive databases of clusters, allowing users to search for potential partners based on industry, sector, region, and competencies. Advanced matchmaking tools enable clusters and SMEs to identify relevant partners for project consortia, business cooperation, or knowledge exchange.
- **Information and Knowledge Sharing:** ECCP disseminates critical information, including upcoming events, funding opportunities, success stories, and policy developments. Regular webinars, workshops, and cluster talks support continuous learning and engagement among members.
- **Promotion of Cluster Excellence:** ECCP supports the international visibility of European clusters by providing certification information (e.g., cluster labeling and excellence assessments), thereby enhancing credibility and global competitiveness.

- **Capacity Building:** The platform offers resources such as the Cluster Booster Academy, aimed at strengthening managerial and operational capacities of cluster managers and members.

Identified gaps and limitations:

Despite its widespread use and comprehensive functionalities, stakeholders identified several challenges with ECCP:

- **Technical complexity:** Users reported usability issues, citing complexity in navigation and occasional technical difficulties affecting user experience.
- **Generalized information:** Platform content sometimes lacks detailed, up-to-date information necessary for strategic decision-making.
- **Limited customization and personalization:** ECCP's ability to provide tailored content or personalized recommendations based on individual user needs remains relatively limited.
- **Insufficient interactivity:** Users highlighted a need for more dynamic and interactive collaboration tools to support real-time project collaboration and information exchange.

Addressing these gaps—particularly in personalization, data accuracy, usability, and interactivity—would significantly enhance the ECCP's value proposition for European clusters.

3.1.2 Enterprise Europe Network (EEN)

The Enterprise Europe Network is the largest support network for small and medium-sized enterprises (SMEs) funded by the European Commission. It operates through numerous regional and national contact points to facilitate SMEs' access to markets, funding, innovation, and international partnerships.

Support mechanisms for SMEs and clusters include:

- **Matchmaking and Partnership Opportunities:** EEN regularly organizes B2B matchmaking events, trade missions, and networking opportunities across Europe and beyond, facilitating international business cooperation and market expansion.
- **Innovation Support and Technology Transfer:** The network provides specialized services assisting SMEs and clusters in identifying and adopting innovative technologies. It actively supports technology transfer between academia, research institutions, and businesses.

- **Funding and Grant Advisory Services:** Expert advisors within EEN help clusters and SMEs access EU funding opportunities, guiding them through complex application procedures and assisting them in identifying suitable programs and grants.
- **Capacity Building and Training:** EEN provides extensive training, workshops, and seminars on internationalization, digital transformation, and innovation management.
- **Sector-specific Support:** Dedicated sector groups within EEN support clusters in specialized fields, providing tailored advice and fostering focused collaborations.

EEN is highly valued for its extensive geographical coverage, robust matchmaking events, and personalized support. However, continued efforts to enhance digital interaction tools, particularly regarding matchmaking precision and data-driven partnership recommendations, would further increase its effectiveness.

3.1.3 Other Relevant EU-Funded Platforms

Several EU-funded projects and platforms have successfully supported transnational cluster cooperation, providing sector-specific tools and insights:

Danubiovalnet:

Danubiovalnet (2017–2019) was an Interreg Danube Region project aimed at fostering eco-innovation and developing bio-based value chains across the Danube region countries.

- **Key Tools and Functionalities:**
    - Developed transnational bioeconomy value chains through detailed market analysis and mapping.
    - Provided matchmaking opportunities specifically tailored to bio-based industries.
    - Established cross-border joint action plans for eco-innovation initiatives.
- **Benefits and Gaps:**

  Danubiovalnet successfully demonstrated the potential for specialized, sector-driven matchmaking platforms, although stakeholders identified challenges such as long-term sustainability and continuity beyond project funding cycles.

ClusterPoliSEE:

ClusterPoliSEE (2012–2014), funded by Interreg Southeast Europe, aimed to enhance policy learning and innovation among clusters in Southeast Europe.

- **Key Tools and Functionalities:**
    - Policy benchmarking and best practice exchange across regional clusters.
    - Development of guidelines for cluster policy implementation.
    - Promotion of policy-driven innovation initiatives and inter-cluster collaborations.
- **Benefits and Gaps:**

  ClusterPoliSEE improved the policy environment and facilitated regional knowledge exchange but faced limitations in creating durable, ongoing cooperation mechanisms post-project completion.

These examples highlight the significant impact EU-funded platforms and projects can have in fostering specialized, regionally targeted cluster cooperation. Yet, sustainability, scalability, and integration with broader EU-level initiatives remain key challenges requiring ongoing attention and resources.

Through continuous improvement and integration of these European-level platforms, clusters and SMEs can achieve greater innovation, international competitiveness, and sustainable growth.

3.2 National-Level Platforms

The DanubIA partner countries—Czech Republic, Hungary, Romania, Slovakia, and Ukraine—provide diverse examples of national platforms that support clusters and their members. This section summarizes each country's key platforms, highlighting their purpose, core functionalities, and the current challenges and opportunities identified by national partners.

3.2.1 Czech Republic

Platform: Map of Clusters and Technological Platforms in the Czech Republic

- **Purpose**: Managed by the National Cluster Association (NCA), this platform aims to facilitate systematic interdisciplinary cooperation at national and international levels.

- **Core Features**:
    - Database containing detailed profiles of Czech cluster organizations and technological platforms.
    - Regularly updated cluster mapping to enhance visibility and collaboration.
    - Mandatory validated profiles for clusters seeking grant applications.
- **Challenges & Improvements Needed**:
    - Regular updates and enhancement of member profiles.
    - Increased linking to individual clusters' websites for better integration.

Czech clusters also benefit from consistent grant support and actively use ECCP and Enterprise Europe Network services to facilitate international cooperation.

3.2.2 Hungary

Platform: Hungarian Cluster Alliance (HCA)

- **Purpose**: Centralized platform supporting clusters, advocating for cluster development and policy-making, and representing cluster interests.
- **Core Features**:
    - Comprehensive cluster database and ecosystem analyses.
    - Services supporting cluster certifications and international collaborations.
    - Competency mapping and regular reports providing strategic insights.
- **Challenges & Improvements Needed**:
    - Maintaining accurate and timely information updates.
    - Expanding platform interactivity and multilingual support.
    - Strengthening integration with EU-level platforms.

Hungarian clusters particularly emphasize enhanced matchmaking, collaboration tools, and real-time analytics as critical for future platform development.

3.2.3 Romania

Platform: Romanian Cluster Association – CLUSTERO

- **Purpose**: CLUSTERO supports internationalization, digital transformation, and integration of clusters into global value chains.
- **Core Features**:

- Cluster mapping with extensive data on 54 cluster members, events, and services.
- Continuous cluster competitiveness analysis since 2010.
- Support for cluster excellence evaluation and project management.

- **Challenges & Improvements Needed**:
  - Motivating clusters to regularly update profiles.
  - Enhancing direct linking and integration of data with government platforms.

Romanian clusters actively leverage European initiatives and have significant experience with European-funded projects focusing on digital transformation, innovation, and sustainability.

3.2.4 Slovakia

Platforms: Slovak Cluster Monitor and Union of Slovak Clusters

- **Purpose**: Platforms operating in Slovakia ensure visibility, promote international participation, and support the development of cluster-related policies.
- **Core Features**:
  - Comprehensive databases with cluster profiles and events.
  - Support mechanisms for international certification and participation in international projects.
  - Competency mapping tools for improved collaboration and partnership formation.
- **Challenges & Improvements Needed**:
  - Ensuring active engagement and regular updates by cluster members.
  - Increasing interactivity and incorporating more advanced communication tools.

Slovak clusters have actively participated in international projects such as Danubiovalnet and ClusterPoliSEE, enhancing their experience and capacities significantly.

3.2.5 Ukraine

Platform: Ukrainian Cluster Alliance (UCA)

- **Purpose**: UCA supports national and international cluster development, represents clusters, and coordinates cluster-based projects.
- **Core Features**:
  - Detailed cluster mapping and profiles, regularly updated.
  - B2B matchmaking and fundraising platforms (e.g., new.b2b-matchmaking.com.ua).
  - Comprehensive resource centers and digital innovation hubs to facilitate digitalization among SMEs.
- **Challenges & Improvements Needed**:
  - Ensuring timely and accurate updates from cluster members.
  - Expansion of interactive functionalities and multilingual capabilities for improved international collaboration.

Ukrainian clusters have significant experience participating in EU-funded projects (e.g., Horizon Europe, Interreg), highlighting the importance of digital tools to overcome digitalization gaps and support sustainable international collaborations.

3.2.6 Summary of National Platforms

The national-level platforms across partner countries share several common strengths and challenges:

- **Strengths**:
  - Comprehensive mapping and profiling of clusters, enhancing national and international visibility.
  - Active engagement in European-level initiatives (ECCP, Interreg, Horizon Europe), contributing to internationalization and capacity building.
  - Increasing use of digital tools (matchmaking platforms, real-time analytics, digital collaboration tools) for enhanced interactivity and cooperation.
- **Common Challenges**:
  - Regular updating and validation of cluster profiles.
  - Ensuring active engagement and contributions from cluster members.

- Need for better integration and interoperability with EU-level and national databases and platforms.

National contributions consistently highlight the importance of digital and AI-enabled platforms in overcoming existing barriers, facilitating international partnerships, and driving innovation at regional and European levels. Continuous efforts are required to improve these platforms' interactivity, accuracy, and integration capabilities.

4. Key Findings

4.1 Challenges and Gaps

The analysis of national reports, session outcomes, and stakeholder survey responses has highlighted several common challenges and significant gaps across current digital and AI-enabled cooperation platforms within the Danube Region. Key areas of concern include variability in data quality, limited interactivity, insufficient integration of AI-driven tools, and a lack of standardization across platforms.

4.1.1 Variability in Data Quality and Update Frequency

A recurring challenge identified in all partner countries is the variability and inconsistency of data quality across national and European-level platforms. Despite platforms often featuring detailed cluster profiles, there is notable variation in the accuracy, comprehensiveness, and timeliness of updates provided by cluster members. Platforms from Romania, Ukraine, Slovakia, Hungary, and the Czech Republic reported consistent difficulties in motivating cluster organizations to regularly and accurately update their profiles, thus impacting the reliability and strategic value of available information.

For instance:

- In **Ukraine** and **Hungary**, platform administrators highlighted substantial challenges in ensuring consistent data accuracy due to passive engagement by clusters.
- **Romania** and **Slovakia** reported similar challenges, emphasizing the need for stronger mechanisms to encourage regular data updates from clusters.

This inconsistency negatively affects users' ability to rely on platforms for strategic decisions, partnership formation, and effective resource allocation.

4.1.2 Limited Interactivity of Current Platforms

Another significant issue highlighted across all contributions is the limited interactivity and collaboration functionality provided by current digital platforms. Many platforms, including ECCP and national platforms such as the Slovak Cluster Monitor, Ukrainian Cluster Alliance, and Romanian CLUSTERO, primarily serve as static information repositories, with limited tools for dynamic interaction or real-time collaboration.

Session participants and stakeholders repeatedly called for:

- More advanced interactive tools such as real-time matchmaking, shared digital workspaces, collaborative project management environments, and integrated communication tools.
- Enhanced functionalities to support ongoing engagement, real-time information exchange, and collaborative project development between clusters and SMEs.

This limitation reduces the effectiveness of platforms, restricting their ability to facilitate genuine collaborative partnerships and continuous engagement among members.

4.1.3 Insufficient Integration of AI-driven Tools

While the potential benefits of artificial intelligence in enhancing cluster cooperation were widely acknowledged, practical integration of AI functionalities into current platforms remains limited. Platforms currently lack robust AI-driven capabilities, particularly those related to advanced partner matchmaking, predictive analytics, and personalized user experiences.

Participants and partners clearly identified gaps such as:

- Absence of predictive analytics to anticipate market changes and emerging opportunities.
- Limited automated tools for generating tailored content, such as customized newsletters or event recommendations.
- Insufficient use of AI to optimize resource allocation or streamline administrative tasks.

While some national-level platforms (such as the B2B matchmaking platform in Ukraine) incorporate basic matchmaking functionalities, widespread adoption of advanced AI features remains limited, hindering the effectiveness of platforms to proactively support clusters and SMEs.

4.1.4 Lack of Standardization Across Platforms

A significant gap identified across all countries is the absence of standardized approaches, formats, and interoperability among national and European-level cluster cooperation platforms. Each national partner reported diverse technical specifications, varying data structures, and different operational standards. This lack of standardization significantly hampers effective cross-border cooperation, data exchange, and seamless integration between platforms.

Specific issues include:

- Difficulty integrating national-level platforms with EU-level tools such as ECCP or Enterprise Europe Network.
- Diverse approaches to data handling and data privacy regulations, causing compatibility challenges.
- Varied user experiences, interfaces, and navigation structures, complicating usage for stakeholders active across multiple platforms.

Standardization was highlighted as essential for improving user experience, enhancing platform usability, and ensuring seamless cross-border collaboration.

Addressing these identified challenges and gaps is crucial for optimizing the effectiveness and value of digital/AI-based platforms. Solutions must focus on improving data reliability, enhancing platform interactivity, significantly integrating advanced AI functionalities, and standardizing platform structures to fully support cluster cooperation and international competitiveness in the Danube Region.

4.2 Best Practices

The best practices identified by Danube Region partners underscore the importance of structured and systematic approaches to enhance digital and AI-based cluster cooperation platforms. Competence mapping, structured analytical methodologies, and transparent cluster identification criteria represent crucial success factors that other clusters and regions can adopt to improve their operational efficiency, strategic policymaking, and international visibility.

Integrating these proven practices into digital platforms will strengthen cluster ecosystems across the Danube Region, facilitating more effective collaboration, enhanced innovation, and sustainable economic growth.

4.2.1 Competence Mapping and Academic Collaboration (Hungary, Slovakia)

Competence mapping emerged as a highly effective practice in Hungary and Slovakia, significantly enhancing collaboration within clusters and facilitating international partnerships. Hungarian clusters, particularly under the Hungarian Cluster Alliance (HCA), systematically utilize detailed competence mapping, creating precise profiles of member capabilities, specializations, and technological expertise. Similarly, Slovakia has implemented competency maps through platforms such as the Slovak Cluster Monitor,

enabling clusters to quickly identify key areas of expertise among their membersNational Partner Contri...National Partner Contri....

Benefits observed:

- **Effective Partner Matching:** Accurate competence mapping streamlines the process of finding complementary partners, significantly accelerating collaborative initiatives.
- **Academic-Industry Synergies:** Extensive partnerships with universities facilitate R&D collaboration, foster innovation ecosystems, and enhance knowledge transfer, as exemplified by Hungarian and Slovak clusters cooperating closely with prominent universities (e.g., Technical University of Košice, Slovak Technical University).
- **Enhanced International Visibility:** Clearly defined competence profiles increase clusters' attractiveness and credibility in international networks.

4.2.2 Structured Analysis to Inform Policymaking (Romania)

The Romanian Cluster Association (CLUSTERO) provides an excellent example of employing structured analyses to shape national and regional cluster policies effectively. Since 2010, CLUSTERO has consistently conducted comprehensive analyses and cluster mapping exercises, offering critical inputs to Romanian policymakers. This structured approach has enabled robust data-driven policy development aligned with national economic priorities, such as the National Competitiveness Strategy, Industrial Strategy of Romania, and the National Smart Specialization StrategyNational Partner Contri....

Benefits observed:

- **Evidence-Based Policies:** Reliable data from regular cluster analyses supports targeted, informed policy interventions.
- **Improved Resource Allocation:** Policymakers use insights from structured analyses to strategically allocate resources and funding to clusters, ensuring higher efficiency and impact.
- **Long-term Strategic Planning:** Continuous analyses allow policymakers to anticipate economic trends, market shifts, and innovation needs, thus proactively adjusting policies and support mechanisms.

4.2.3 Development of Clear Criteria for Cluster Identification (Ukraine)

The Ukrainian Cluster Alliance (UCA) has implemented clear and transparent criteria for identifying and mapping clusters. Establishing well-defined criteria enhances the

transparency, reliability, and effectiveness of the cluster ecosystem. This best practice has significantly contributed to the structured growth and international credibility of Ukrainian clustersNational Partner Contri….

Benefits observed:

- **Enhanced Credibility and Transparency:** Clear, standardized identification processes build trust among national and international stakeholders, making clusters more attractive for international cooperation.
- **Simplified Cooperation and Integration:** Standardized criteria greatly facilitate the matching of clusters and SMEs with compatible partners, streamlining international and cross-sectoral collaboration.
- **Stronger Policy Alignment:** Clear criteria for cluster identification allow more effective integration into national strategic initiatives and enable better policy alignment, supporting more coherent and impactful economic development efforts.

4.2.4 Additional Notable Practices

In addition to the highlighted practices, the reviewed documents identified other noteworthy approaches:

- **Virtual Events and Cross-sectoral Sessions:** Regularly conducted virtual and in-person events, as observed in Romanian and Hungarian clusters, foster ongoing member engagement, knowledge sharing, and capacity-building.
- **Integration of European Initiatives and Programs:** Romanian and Slovak clusters particularly leverage EU funding (e.g., Horizon Europe, Interreg) effectively, significantly enhancing their international competitiveness and innovation capacities.
- **B2B Matchmaking Platforms:** Ukraine's active development of dedicated B2B matchmaking platforms demonstrates a focused strategy for enabling efficient partner discovery and project collaborations.

4.3 AI Potential and Limitations

Artificial intelligence (AI) holds transformative potential for cluster cooperation platforms, offering significant opportunities for improving efficiency, enabling better decision-making, and enhancing strategic foresight. However, these advantages come alongside various challenges and risks, notably data privacy, implementation costs, and potential digital disparities.

4.3.1 AI Potential and Opportunities

The analysis across national reports, stakeholder feedback, and session outcomes highlights three key AI-enabled functionalities that can substantially enhance cooperation platforms:

1. AI-Driven Matchmaking

- AI-driven matchmaking was widely recognized as one of the most beneficial functionalities for future platforms. Using advanced algorithms, AI can efficiently identify and propose optimal collaboration partners based on clusters' specific competencies, project goals, industry sectors, and strategic interests.
- Practical examples from partner countries, such as Ukraine's dedicated B2B matchmaking platform, illustrate how intelligent matchmaking algorithms can significantly streamline and accelerate partnership formation, thereby driving effective international collaboration and innovation.

2. Real-Time Data Analytics

- Real-time analytics capabilities powered by AI are critical for rapidly processing large volumes of data and delivering actionable insights. Such analytics can provide clusters and SMEs with instant access to valuable market intelligence, industry trends, and competitive dynamics, enabling quicker, data-driven decisions.
- Stakeholders emphasized the value of AI-powered dashboards, enabling continuous monitoring of economic indicators, member activities, and emerging opportunities, as clearly indicated by partners from Romania and Slovakia.

3. Predictive Insights and Forecasting

- Predictive analytics emerged as another critical area where AI can provide clusters with significant strategic advantages. By analyzing historical and current data, AI can predict future market developments, enabling clusters to proactively anticipate opportunities and mitigate risks.

- Examples from Hungary, Romania, and Slovakia illustrate that predictive tools can support clusters in preparing for disruptions, such as supply chain issues or market shifts, and enable them to develop informed, forward-looking strategies.

4.3.2 AI Limitations and Risks

While AI presents remarkable opportunities, stakeholders and national partners identified several critical limitations and risks that must be proactively managed:

1. Data Privacy Concerns

- Stakeholders across all partner countries consistently raised concerns regarding data privacy and compliance with GDPR regulations. AI systems inherently require extensive data collection and analysis, which can involve sensitive and proprietary information about cluster members and SMEs.
- Ensuring stringent data protection standards, establishing clear consent frameworks, and transparent communication of data usage practices are essential for building trust and safeguarding privacy.

2. High Implementation Costs

- The initial investment required for developing robust AI-driven platforms remains a major barrier, particularly for smaller clusters and SMEs with limited financial resources.
- Stakeholders from Ukraine, Romania, and Slovakia specifically highlighted the necessity of leveraging EU and national funding instruments or developing joint financing models to share costs and mitigate financial burdens.

3. Digital Literacy and Technology Adoption

- Digital literacy emerged as a significant limitation. Stakeholders from all partner countries recognized that varying levels of digital expertise among cluster members, especially SMEs, could impede widespread and effective adoption of sophisticated AI tools.
- Providing user-friendly interfaces, comprehensive training, and ongoing support was identified as crucial to overcoming this barrier.

4. Risks of Algorithm Bias

- AI-driven matchmaking and predictive algorithms carry a risk of unintended bias, potentially leading to unequal access or unintentionally excluding certain stakeholders.

- Regular audits, fairness assessments, and iterative updates of AI algorithms were strongly recommended by partners to ensure fairness and equity in platform interactions.

4.3.3 Summary of AI Potential and Limitations

In conclusion, AI presents significant potential to revolutionize cluster cooperation platforms through advanced matchmaking, real-time data analytics, and powerful predictive capabilities. Nevertheless, careful attention is required to address substantial limitations, including data privacy, high costs, digital literacy gaps, and algorithmic biases. A balanced and proactive approach to integrating AI—emphasizing transparency, affordability, user support, and ethical standards—is essential to fully unlock its transformative potential for clusters within the Danube Region.

5. International Cooperation Record

5.1 Examples of Successful Projects

These examples clearly illustrate the diverse benefits and impacts derived from international cooperation projects. Clusters involved in these initiatives gained substantial experience, strengthened international partnerships, enhanced innovation capacities, and significantly improved their strategic positioning within international value chains. Continued participation in such projects is vital for the sustained growth, resilience, and competitiveness of clusters across the Danube Region and beyond.

1. DanuBioValNet (Interreg Danube Region Programme, 2017–2019)

- **Focus Area**: Eco-innovation and development of bio-based value chains.
- **Participating Countries**: Czech Republic, Slovakia, Romania, Germany, Hungary, among others.
- **Core Activities**:
    - Established transnational bio-based value chains.
    - Conducted comprehensive market analyses and mapping of clusters specialized in bioeconomy sectors.
    - Facilitated matchmaking events specifically tailored to bio-based industries.
- **Key Outcomes**:
    - Creation of a robust network enhancing cross-border cooperation among clusters focused on eco-innovation.
    - Development of detailed joint action plans, fostering sustained collaboration beyond project completion.
- **Impact**:
    - Strengthened collaboration within the Danube Region, positioning clusters as critical players in sustainable bioeconomy markets.

2. ClusterPoliSEE (Interreg Southeast Europe Programme, 2012–2014)

- **Focus Area**: Policy learning, innovation, and regional cluster policy development.
- **Participating Countries**: Slovakia, Romania, Italy, Greece, among other Southeast European countries.
- **Core Activities**:
    - Benchmarking of regional policies supporting cluster development.
    - Extensive exchange of best practices among policymakers, researchers, and clusters.
    - Preparation of detailed guidelines for effective cluster policy implementation.
- **Key Outcomes**:
    - Comprehensive policy guidelines influencing regional and national cluster development strategies.
    - Enhanced knowledge transfer across participating regions, substantially benefiting policymaking processes.
- **Impact**:
    - Improved regional policy environments, creating more effective support structures for cluster growth and innovation.

3. Danube Peer Chains (Interreg Danube Region Programme, 2020–2022)

- **Focus Area**: Capacity building, training, and empowerment of labor and business support organizations.
- **Participating Countries**: Romania, Austria, Germany, Hungary, Serbia, among others.
- **Core Activities**:
    - Integrated capacity-building programs designed for labor market and business support organizations.
    - Comprehensive training programs aimed at enhancing skills, particularly in digitalization and industry innovation.

- **Key Outcomes**:
    - Establishment of collaborative networks and structured peer-level cooperation across Danube Region clusters.
    - Enhanced employability and digital skills among regional workforce participants.
- **Impact**:
    - Strengthened regional economic resilience through improved collaboration and upgraded workforce capabilities.

4. Clusters4Defense (Initiative by Ukrainian Cluster Alliance)

- **Focus Area**: Strengthening defense-sector capacities through cluster collaboration.
- **Participating Countries**: Ukraine and international partners.
- **Core Activities**:
    - Strategic coordination of defense-focused clusters, SMEs, and research institutions.
    - Joint development and implementation of innovation-driven defense projects.
- **Key Outcomes**:
    - Enhanced cooperation among defense clusters, SMEs, and innovation ecosystems.
    - Increased capacity and innovation within the Ukrainian defense sector.
- **Impact**:
    - Strengthened defense industry resilience and technological capabilities, contributing to national and regional security priorities.

5.2 Lessons Learned

Analyzing the experiences from international projects and initiatives within the Danube Region provides valuable insights into factors that significantly influence successful cluster cooperation. Partners from Czech Republic, Hungary, Romania, Slovakia, and

Ukraine highlighted several key lessons from their extensive participation in international collaboration projects.

1. Strong and Sustainable Partnerships Require Continuous Engagement

Effective international cooperation depends heavily on establishing and sustaining long-term partnerships. Project experiences consistently show that sustained success requires ongoing engagement among partners, extending beyond the lifespan of any single project.

- **Best Practice Examples:** Projects such as **DanuBioValNet** and **Danube Peer Chains** illustrate the importance of ongoing communication, regular workshops, and joint activities that maintain partner engagement beyond initial funding cycles.
- **Recommendation:** Establish structured mechanisms (e.g., regular online meetings, thematic webinars) to keep partners continuously engaged, fostering long-term trust and cooperation.

2. Clear Alignment of Objectives and Strategic Priorities is Essential

The success of cross-border cluster projects strongly correlates with clear alignment among partners regarding objectives, strategic priorities, and expectations. Differences in goals or priorities can lead to fragmentation and reduced effectiveness.

- **Best Practice Examples:** Projects like **Accelerate GDT** clearly defined shared goals around digital and green transitions, helping align diverse international partners effectively.
- **Recommendation:** At the outset, explicitly agree on shared objectives, strategic priorities, and expected outcomes, ensuring clarity and cohesion among all stakeholders.

3. Effective Cross-Cultural Communication and Mutual Understanding

Cross-border cluster cooperation often faces challenges related to cultural differences in communication styles, business practices, and decision-making processes. Effective international cooperation requires conscious efforts to foster mutual understanding and intercultural communication.

- **Best Practice Examples:** Experiences from **ClusterPoliSEE** and projects involving Ukrainian and Romanian partners emphasized the value of regular, face-to-face interactions (or virtual equivalents), intercultural training, and facilitated workshops to bridge cultural divides.

- **Recommendation:** Integrate cross-cultural training and proactive communication strategies into project plans, explicitly addressing potential intercultural misunderstandings.

4. Robust and User-Friendly Digital Tools Facilitate Cooperation

Effective digital and AI-powered platforms significantly enhance cooperation efficiency and effectiveness. Conversely, inadequate digital tools or low digital literacy can severely limit project success and impact.

- **Best Practice Examples:** Platforms used in the **ReStart SMEs** project demonstrated significant benefits from intuitive interfaces, accessible AI tools, and effective digital collaboration functionalities, facilitating rapid adoption by SMEs.
- **Recommendation:** Prioritize the development and deployment of user-friendly, robust, and interactive digital tools, accompanied by targeted training programs to improve digital literacy among clusters and SMEs.

5. Realistic and Sustainable Project Planning

Successful international cooperation requires realistic planning and sustainability considerations from the outset. Projects that set achievable milestones and sustainable outcomes are better positioned to deliver long-term impact.

- **Best Practice Examples:** The strategic project planning demonstrated by **INNO4.0** and **Clusters4Defense** ensured achievable goals, realistic timelines, and clearly defined long-term benefits, which translated into tangible, lasting results.
- **Recommendation:** Adopt project management practices emphasizing realistic milestone setting, measurable outputs, clear sustainability plans, and achievable deliverables.

6. Enhanced Policymaking and Strategic Alignment Through Structured Analysis

Systematic data collection, structured cluster analyses, and competency mapping significantly contribute to effective policymaking and strategic alignment. Data-driven insights consistently enable clusters to align more effectively with national and European policies.

- **Best Practice Examples:** The structured analytical approach adopted by Romania's CLUSTERO provided crucial inputs to national policies, demonstrating the tangible benefits of evidence-based policymaking.

- **Recommendation:** Incorporate structured data collection and analysis as core components of international cooperation projects to inform strategic decisions, policy alignment, and resource allocation.

7. Effective Management of Risks Related to AI and Digital Tools

Implementing advanced digital and AI tools within cluster cooperation requires proactive risk management, addressing issues such as data privacy, cybersecurity, algorithmic fairness, and high implementation costs.

- **Best Practice Examples:** Stakeholders from Ukraine, Romania, and Slovakia emphasized the need for rigorous data security measures, transparent data governance frameworks, regular algorithm fairness audits, and shared financial strategies for platform implementation.
- **Recommendation:** Develop comprehensive risk management strategies addressing data privacy, algorithm transparency, cybersecurity, and cost-sharing mechanisms to facilitate successful, secure, and inclusive AI implementation.

The lessons derived from extensive international cooperation experiences highlight critical success factors, including sustained partner engagement, strategic alignment, effective communication, robust digital tools, realistic planning, evidence-based policymaking, and careful AI risk management. Integrating these insights into future projects will significantly enhance cluster cooperation, innovation potential, and competitiveness across the Danube Region and beyond.

6. Recommendations for Future Platform Development

6.1 Core Features for Digital/AI Platforms

Based on comprehensive research, stakeholder questionnaires, and international session insights, several essential core features have been identified as critical for the future development of digital and AI-enabled platforms to effectively support cluster cooperation across the Danube Region. These recommendations address the most urgent needs, fill current platform gaps, and leverage innovative AI-driven functionalities.

1. Intelligent AI-driven Matchmaking Tools

- **Purpose:** Efficiently connect clusters, SMEs, and stakeholders by intelligently matching their competencies, resources, strategic interests, and objectives.
- **Recommended Functionalities:**
    - Advanced algorithms capable of automatic, real-time partner suggestions based on detailed user profiles and specific project goals.
    - Integration of predictive analytics to anticipate suitable partnerships and potential collaboration opportunities.
    - User-friendly interfaces enabling easy access and intuitive interaction for diverse users.

2. Real-Time Data Analytics and Dashboards

- **Purpose:** Provide clusters with instant access to strategic insights, enabling rapid, informed decision-making based on real-time market data.
- **Recommended Functionalities:**
    - Real-time dashboards displaying relevant economic indicators, market trends, competitive analysis, and cluster member activities.
    - Customizable data analytics tools allowing personalized insights tailored to specific cluster needs.

- Automated alerts and notifications highlighting critical changes or emerging opportunities, enhancing proactive decision-making.

3. Predictive Analytics and Market Intelligence

- **Purpose:** Enable clusters to proactively respond to market dynamics and prepare strategically for future trends and opportunities.
- **Recommended Functionalities:**
  - AI-driven predictive modeling to forecast market developments, identify upcoming industry trends, and anticipate economic disruptions.
  - Advanced analytics capable of providing foresight on supply chain vulnerabilities, demand fluctuations, and evolving competitive landscapes.
  - Integration with external databases and information sources for enhanced predictive accuracy.

4. Enhanced Interactive Collaboration Tools

- **Purpose:** Foster effective real-time collaboration, ongoing engagement, and seamless project management among clusters and SMEs.
- **Recommended Functionalities:**
  - Digital collaboration spaces supporting real-time communication, virtual meetings, document sharing, and joint project management.
  - Integrated tools such as shared calendars, task management systems, and instant messaging for seamless collaboration.
  - Virtual event hosting capabilities, including webinars, matchmaking events, workshops, and training sessions.

5. Detailed Competence Mapping and Resource Visualization

- **Purpose:** Clearly visualize and efficiently utilize available competencies and resources within and across clusters.
- **Recommended Functionalities:**
  - Comprehensive, regularly updated competence mapping tools clearly displaying clusters' and SMEs' areas of expertise and technological capacities.

- Interactive visualization tools such as heatmaps and resource maps to identify concentrations of expertise, innovation clusters, and collaboration potential.
- User-friendly search and filtering options for quick identification of relevant partners and resources.

6. Personalized Content Delivery and Recommendations

- **Purpose:** Increase user engagement and platform value through highly personalized content and tailored user experiences.
- **Recommended Functionalities:**
  - AI-powered personalized recommendations for events, potential partnerships, funding opportunities, and relevant cluster initiatives.
  - Customized communication channels delivering tailored newsletters, notifications, and content based on user profiles, preferences, and activities.

7. Integration and Standardization with EU and National Systems

- **Purpose:** Enable seamless interoperability and coherent integration with existing European and national digital infrastructures.
- **Recommended Functionalities:**
  - Open APIs and standardized data protocols for smooth data exchange and platform integration with EU-level platforms (ECCP, Enterprise Europe Network).
  - Standardized data structures and formats to ensure compatibility across multiple platforms and national systems, facilitating streamlined international collaboration.

8. Advanced Security, Data Privacy, and Ethical Standards

- **Purpose:** Ensure robust security measures and full compliance with GDPR and data privacy regulations, enhancing trust among platform users.
- **Recommended Functionalities:**
  - State-of-the-art cybersecurity frameworks, encrypted data storage, and secure data transmission channels.
  - Clear user consent mechanisms, transparent data governance policies, and regular security audits.

- Ethical guidelines and regular algorithmic fairness evaluations to mitigate potential biases and ensure equitable platform use.

9. User Training and Comprehensive Support

- **Purpose:** Facilitate effective user adoption, particularly among SMEs with varying levels of digital literacy and technical proficiency.
- **Recommended Functionalities:**
  - Intuitive, user-friendly platform interfaces requiring minimal technical knowledge to operate effectively.
  - Comprehensive online training resources, video tutorials, FAQs, and interactive user support channels (e.g., chatbots, helpdesks).
  - Regularly scheduled virtual training sessions to ensure continuous capacity-building and effective platform utilization.

Implementing these recommended core features—intelligent matchmaking, real-time data analytics, predictive insights, interactive collaboration tools, competence mapping, personalized content, system integration, robust security measures, and comprehensive user support—will significantly enhance the effectiveness, usability, and strategic value of future digital and AI-enabled cooperation platforms. Such enhancements are critical to fully leveraging the potential of international cooperation, innovation, and competitiveness for clusters and SMEs within the Danube Region and beyond.

6.2 Policy and Strategic Considerations

Successful implementation of future digital and AI-based platforms for cluster cooperation extends beyond technical functionalities alone. It also requires strategic alignment with national and European policy frameworks, sustainable financing models, and considerations of broader socio-economic and ethical implications. This section highlights essential policy and strategic recommendations necessary to maximize the long-term effectiveness and impact of these platforms.

1. Alignment with European and National Policies

Future platform developments should explicitly align with existing European strategies, such as the European Digital Strategy, Green Deal, Industrial Strategy, and Smart Specialization Strategies. National reports from Czech Republic, Hungary, Romania, Slovakia, and Ukraine indicate that clearly integrating platform objectives into broader European and national frameworks ensures coherence, enhances legitimacy, and facilitates easier access to funding and policy support.

- **Recommendation:**
    - Ensure platform objectives explicitly reflect key European priorities (e.g., digital transformation, sustainability, twin transition) and national strategic documents.
    - Actively involve policymakers and key institutional stakeholders early in platform development to ensure seamless integration into policy frameworks.

2. Sustainable Financing and Cost-Sharing Models

The high costs associated with developing and maintaining robust digital/AI platforms were consistently highlighted as significant challenges. Therefore, establishing sustainable financing and cost-sharing mechanisms involving clusters, SMEs, public institutions, and European funding sources is critical.

- **Recommendation:**
    - Leverage available European funds (Horizon Europe, Digital Europe Programme, Interreg) and national support schemes for initial platform investments and sustainability.
    - Develop innovative financing strategies such as shared investment models among multiple clusters, public-private partnerships (PPPs), or subscription-based services offering additional premium features.

3. Transparent Data Governance and Ethical AI Practices

Ensuring robust data governance and ethical practices is vital to maintain trust and compliance, particularly given strict data privacy frameworks such as GDPR. Transparent data use policies and clearly communicated ethical standards must underpin AI implementations.

- **Recommendation:**
    - Establish clear, transparent data privacy policies, consent frameworks, and rigorous cybersecurity measures aligned with European data protection regulations.
    - Implement regular algorithmic audits and ethical AI guidelines to avoid biases, ensure fairness, and maintain user trust and inclusivity across clusters and SMEs.

4. Enhanced Digital Literacy and Capacity Building

Significant variations in digital literacy among SMEs and clusters pose barriers to effective AI adoption. Enhancing digital skills through targeted training and capacity-building measures must accompany technological deployments.

- **Recommendation:**
    - Provide comprehensive digital skills training, focusing specifically on AI and digital platform functionalities through structured workshops, online modules, and continuous support.
    - Foster collaboration with universities, vocational training institutions, and digital innovation hubs (DIHs) to deliver ongoing skills development programs tailored to clusters and SMEs.

5. Standardization and Interoperability

Given the diverse technical environments across national platforms, enhancing standardization and interoperability is critical for enabling seamless cross-border collaboration, data sharing, and effective international integration.

- **Recommendation:**
    - Promote common technical standards and interoperability protocols, aligning closely with existing EU-level platforms such as ECCP and Enterprise Europe Network.
    - Encourage active dialogue and collaboration among national platform administrators to agree on standardized data formats, integration procedures, and communication protocols.

6. Long-term Sustainability and Continuous Engagement

Ensuring long-term sustainability and continuous stakeholder engagement is vital for the success of cluster cooperation platforms. Sustainable development plans should extend beyond initial launch phases, ensuring continuous usage, regular updating, and ongoing stakeholder participation.

- **Recommendation:**
    - Develop clear sustainability roadmaps with defined long-term operational plans, funding strategies, and stakeholder engagement activities.

- Maintain continuous dialogue and feedback mechanisms with cluster members, policymakers, and SMEs through regular meetings, user surveys, interactive webinars, and virtual events.

7. Inclusive and Balanced Regional Development

Digital platforms should aim for inclusive and balanced development, considering varying regional capacities and disparities within the Danube Region. Addressing digital divides and regional imbalances ensures equitable access and broad-based benefits.

- **Recommendation:**
  - Identify and proactively support clusters and SMEs from less digitally developed regions with tailored training, capacity-building measures, and dedicated platform functionalities.
  - Promote cross-regional cooperation through incentives, targeted matchmaking initiatives, and focused policy measures to foster balanced development.

8. Cross-Sector Collaboration and Innovation

Promoting cross-sector collaboration and multidisciplinary partnerships significantly enhances innovation potential. Future platforms should strategically encourage interactions and synergies between different industries and sectors.

- **Recommendation:**
  - Actively facilitate cross-sector matchmaking, encouraging collaborations that combine complementary expertise from diverse industries.
  - Provide specific tools and incentives within platforms designed explicitly to foster innovative, cross-sectoral, and multidisciplinary partnerships.

Addressing these strategic considerations—aligning with policy frameworks, ensuring sustainable funding models, enhancing data governance and ethical standards, promoting digital literacy, standardizing interoperability, ensuring long-term sustainability, fostering inclusive regional development, and encouraging cross-sectoral innovation—is essential. Effectively integrating these considerations into future digital and AI-based platforms will maximize their strategic value, usability, and long-term impact for clusters and SMEs across the Danube Region.

7. Session Outputs: "The Cluster Cooperation Quest"

7.1 Activity Summary

The interactive session titled **"The Cluster Cooperation Quest"** within Project Generation Seminar was conducted during the European clusters meeting in Chișinău, Moldova on October 11th, 2024. A total of 42 participants from various European clusters were divided into five teams, each representing a fictional international cluster entity to foster an engaging and collaborative atmosphere.

Session Objective:

The primary objective was to collaboratively shape insights and generate ideas that would inform the development of an innovative AI-powered digital platform for cluster cooperation. Through structured challenges, participants contributed their experiences, identified current cooperation gaps, and envisioned future digital functionalities leveraging artificial intelligence.

Interactive Game Format:

The session was structured as an interactive, gamified event designed to facilitate active participation, creativity, and strategic thinking among participants. The session was facilitated through a combination of presentation slides and interactive digital tools, notably the platform **Sli.do**, to enable real-time input collection and participant interaction.

The session followed these structured activities:

1. Introduction (5 minutes)

Participants were welcomed by the facilitator, who briefly introduced the session objectives and outlined the interactive activities planned. It was emphasized how their contributions would directly inform the functionalities of a future AI-empowered cluster cooperation platform.

2. Team Formation (5 minutes)

Participants were grouped into five teams of approximately six members each. Each team represented a fictional international cluster cooperation entity to stimulate creative engagement. Within each team, specific roles were assigned (spokesperson, strategist, scribe) to encourage organized participation and collective brainstorming.

3. Cooperation Challenges (40-50 minutes)

The core interactive segment consisted of three main challenges, each addressing critical aspects of cluster cooperation and AI-driven functionalities:

Challenge 1: The Great Cooperation Debate

- Teams internally discussed general challenges and experiences with current cluster cooperation.
- Participants shared key challenges, engagement practices, and required support tools.
- Responses were collected through Sli.do, allowing live voting on ideas to identify the most resonant insights.

Challenge 2: The Platform Builders

- Participants brainstormed essential functionalities for future digital cooperation platforms.
- Discussions included priority platform features, critical cooperation tools, and experienced shortcomings of existing platforms.
- Teams submitted their ideas digitally, emphasizing innovative features and practical improvements.

Challenge 3: The AI Power-up and The Future Vision

- Teams creatively explored potential applications of artificial intelligence to revolutionize cluster collaboration.
- Participants proposed AI functionalities to enhance partner matching, real-time data analytics, automated content creation, and personalized communication.
- Teams also addressed potential challenges associated with AI, such as data quality, security, and ethical considerations.
- Ideas were again digitally submitted, and participants voted on the most impactful and innovative AI-driven concepts.

Scoring and Interaction:

Points were awarded throughout the session based on criteria such as creativity, practical insight, participant engagement, and the popularity of ideas within the group voting on Sli.do. This gamification aspect encouraged robust participation, discussion, and creative thinking.

Wrap-up and Next Steps (5 minutes)

At the conclusion, the facilitator thanked all participants for their valuable contributions and clarified how their input would shape the final report and directly inform the development of the envisioned AI-powered cooperation platform.

7.2. Insights Gathered

7.2.1. Challenges in Current Cooperation Models

Participants from the "Cluster Cooperation Quest" session identified several key challenges that clusters currently face when cooperating on international and inter-cluster levels:

1. Lack of Effective Connection and Communication Platforms

Clusters face difficulty in establishing direct, meaningful connections with potential partners. The current cooperation ecosystem lacks reliable digital platforms that facilitate straightforward communication and networking.

2. Difficulty Finding Common Goals and Values

Participants noted significant challenges in identifying partners that share compatible interests, values, and strategic objectives. Without clearly aligned goals, sustainable and productive cooperation remains challenging.

3. Limited Transparency and Availability of Information

Existing cooperation platforms fail to provide adequate transparency about available resources, expertise, and opportunities. There is an absence of clearly presented data or resource maps, making it hard to quickly identify relevant information or potential collaborators.

4. Complexity and Usability Issues

Clusters often struggle with the complexity of existing digital tools. Specific examples mentioned include:

- **ECCP (European Cluster Collaboration Platform)**: Technical problems and complicated interfaces.
- **Participant Portal (European Commission)**: Complexity related to finding funding opportunities and tenders.
- **GENS platform**: The new interface demands significant learning efforts, slowing down cooperation processes.

5. Slow Communication Processes

The speed of communication between clusters was highlighted as a critical challenge. Delayed responses and lengthy processes impede timely cooperation, impacting productivity and responsiveness.

6. Lack of Real Value Proposition

Participants pointed out that many existing platforms do not clearly articulate a tangible value proposition. Without clear, practical benefits, cluster members lack motivation to actively engage and invest resources into cooperation.

7. Resource and Time Constraints

Clusters highlighted limited human resources and available time as significant barriers. Participants noted that teams are often too small or overextended, which restricts their ability to regularly participate in collaboration activities or events.

8. Financial Constraints

Clusters frequently face limited funding for international cooperation activities, restricting their capability to engage fully and effectively in collaboration efforts. Without sufficient financial backing, cluster cooperation activities often remain underdeveloped or sporadic.

7.2.2. Priority Features and Unmet Needs for Future Platforms

Participants from the "Cluster Cooperation Quest" identified several priority features and currently unmet needs that future digital and AI-powered cooperation platforms should address:

1. Advanced Matching and Partnering Tools

Participants emphasized the need for highly efficient matching functionalities. The ideal platform should rapidly and intelligently connect clusters and their members by aligning goals, values, resources, and interests, ensuring meaningful and productive partnerships.

2. Detailed Resource Mapping

A clear, interactive, and continuously updated resource mapping feature was identified as essential. Clusters require comprehensive visibility into available resources, expertise, regional specializations, and partnership opportunities.

3. High-Quality, Specific, and Up-to-Date Data

Participants stressed the critical importance of accessing detailed, precise, and current data about clusters and their members, including:

- Market intelligence and trends
- Business models and market barriers
- Distribution channels
- Precise cluster profiles, interests, and projects

4. Personalization and Information Filtering

To avoid information overload, participants highlighted the importance of personalized content delivery. Advanced filtering features should help users quickly identify the most relevant partners, projects, and data tailored specifically to their needs.

5. Interactive Collaboration Capabilities

Participants prioritized platforms that facilitate dynamic, real-time collaboration. Features like interactive forums, thematic virtual meetings, joint project management spaces, and real-time messaging are essential for effective cooperation.

6. Regular Online Events and Thematic Workshops

Clusters expressed a clear need for regular online events, thematic webinars, and virtual networking sessions. Such events would enhance relationship-building, knowledge exchange, and continuous engagement among international clusters.

7. Cross-Sector Collaboration

There is a significant unmet need for platforms explicitly designed to foster cross-sectoral partnerships. Facilitating interactions and cooperation between clusters from diverse sectors can unlock novel innovation opportunities and broader market access.

8. External Expertise and Support

Participants emphasized the importance of easy access to external experts beyond the immediate cluster environment. A future platform should enable clusters to quickly connect with specialized experts for advice, insights, or project support.

9. Visual Tools (e.g., Heatmaps)

Clusters recommended integrating visualization tools, such as heatmaps, to illustrate regional concentrations of resources, capabilities, and market activities. This feature would help clusters quickly identify promising geographic regions for collaboration or market entry.

7.2.3. Innovative AI Functionalities Envisioned by Participants

During the "Cluster Cooperation Quest," participants envisioned several innovative functionalities leveraging artificial intelligence (AI) to significantly enhance cluster collaboration and management:

1. Intelligent Partner Matching ("Cluster Tinder")

Participants suggested an AI-powered matchmaking system capable of automatically and intelligently recommending ideal collaboration partners based on shared goals, needs, activities, resources, and strategic alignment, enabling faster and more accurate partnership formation.

2. Real-time Data Analytics

AI-driven analytics to swiftly process and interpret large volumes of data were identified as crucial. This functionality could allow clusters to rapidly detect emerging industry trends, identify market opportunities, monitor threats, and proactively respond to challenges.

3. Automated Content Generation and Project Pre-evaluation

Participants saw potential in using generative AI to support cluster management through:

- Automatic drafting of project proposals, reports, or communication materials based on input data.
- Preliminary evaluation of project concepts or proposals, enhancing the quality and efficiency of project assessment processes.

4. Personalized Content Delivery

Leveraging AI for personalized content curation was a frequently mentioned functionality. Tailored content based on user interests, cluster profiles, previous interactions, and needs would optimize user engagement and effectiveness.

5. Monitoring Member Activity on Social Media and Media Channels

Clusters envisioned AI tools that systematically track and analyze social media and media channels. These tools would provide valuable insights into the innovations, activities, and strategic interests of potential collaboration partners.

6. Enhanced Communication Channels

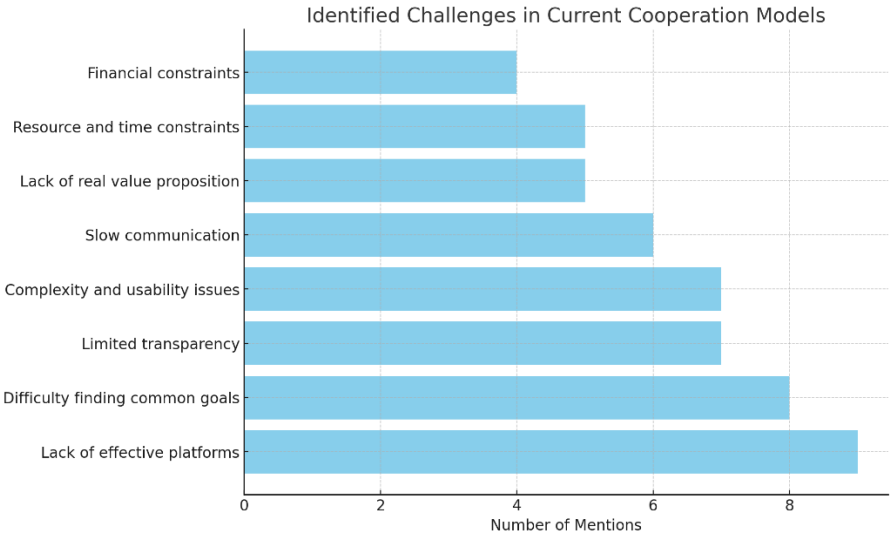
Participants recommended AI-assisted diversification and optimization of communication methods among clusters. AI could streamline communication, support multilingual interaction, or suggest the best communication channels based on cluster preferences and past interactions.

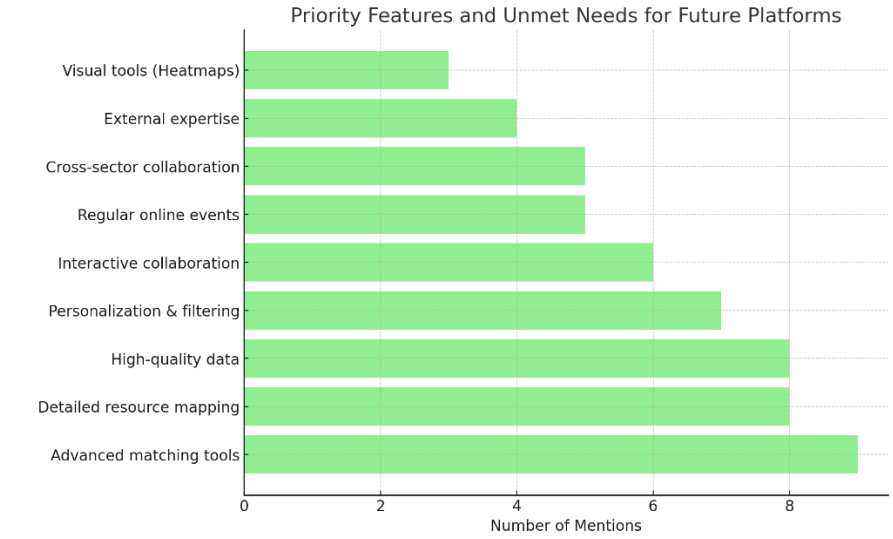
Potential AI Challenges and Recommendations:

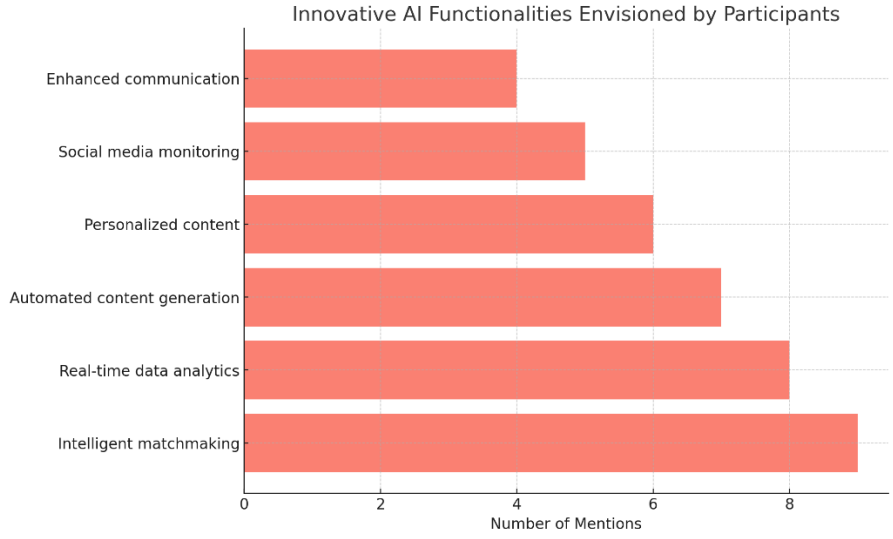
Participants also recognized potential risks and challenges related to AI implementation, noting that:

- AI should serve as a supportive tool rather than a decision-maker. Human oversight remains crucial.
- Ensuring high-quality data is essential to prevent AI-driven errors and misinterpretations.
- Data privacy and security standards must be maintained rigorously.
- The financial costs and skill gaps associated with AI tools represent significant barriers that must be strategically addressed.

7.3. Visual Data







8. Conclusion

8.1 Recap of findings and their implications for cluster cooperation

This comprehensive analysis of digital and AI-based cooperation platforms within the Danube Region provides valuable insights and actionable guidance for clusters, policymakers, and stakeholders engaged in international collaboration. The main findings from national reports, stakeholder surveys, and session activities emphasize both the significant potential and notable gaps in current cooperation practices.

Key Findings:

1. Challenges and Gaps:

- **Variability in data quality and updates:** Consistently reliable, updated data remains a major challenge, undermining the platforms' strategic value.
- **Limited interactivity:** Current platforms often lack robust interactive tools, reducing real-time collaboration and engagement opportunities.
- **Insufficient integration of AI tools:** The integration of advanced AI-driven functionalities, such as intelligent matchmaking and predictive analytics, remains limited across the region.
- **Lack of standardization:** The absence of uniform standards and interoperability between national and European platforms hinders seamless international cooperation.

2. Best Practices:

- **Competence mapping and academic collaboration:** Demonstrated successfully in Hungary and Slovakia, detailed competence mapping and strong academic-industry partnerships enhance innovation, collaboration efficiency, and strategic positioning.
- **Structured analysis informing policymaking:** Romania's structured analytical approaches significantly improve evidence-based policymaking and resource allocation, setting a clear benchmark for others.
- **Clear criteria for cluster identification:** Ukraine's development of standardized criteria effectively boosts transparency, credibility, and international cooperation opportunities.

3. AI Potential and Limitations:

- **AI-driven functionalities:** There is clear recognition of significant potential for AI-enhanced matchmaking, real-time data analytics, and predictive insights, substantially benefiting clusters and SMEs.
- **Key risks and limitations:** Stakeholders consistently highlight concerns regarding data privacy, high implementation costs, digital literacy gaps, and algorithmic fairness, emphasizing the need for careful and responsible AI implementation.

4. International Cooperation Experiences:

- Successful international projects (e.g., DanuBioValNet, ClusterPoliSEE, Accelerate GDT) clearly illustrate the benefits and impacts of cross-border cooperation, including enhanced innovation capabilities, strengthened international partnerships, and improved policy alignment.
- Key lessons learned stress the importance of sustained engagement, clear strategic alignment, effective cross-cultural communication, robust digital tools, realistic planning, and systematic data collection for successful international cooperation.

Implications for Cluster Cooperation:

These findings carry important implications for future cluster cooperation within the Danube Region:

- Addressing identified challenges—particularly around data quality, interactivity, AI integration, and standardization—will significantly enhance the effectiveness and attractiveness of cooperation platforms.
- Implementing identified best practices, including detailed competence mapping, structured analyses, and clear identification criteria, will foster stronger partnerships, improved policy alignment, and greater international visibility.
- Carefully leveraging AI's transformative potential, while proactively managing associated risks, will allow clusters to harness advanced technologies for strategic foresight, improved decision-making, and competitive advantage.
- Learning from past international projects emphasizes the need for sustained, strategic, and culturally aware cooperation approaches, ensuring long-term and meaningful collaboration.

By systematically addressing these implications, clusters within the Danube Region can significantly enhance their capacity for innovation, internationalization, and sustainable economic growth.

8.2 Vision for the future of digital/AI platforms in the Danube Region

Looking towards the future, the Danube Region can become a vibrant ecosystem characterized by cutting-edge digital and AI-driven cooperation platforms that significantly enhance cluster performance, innovation, international collaboration, and sustainable economic growth. The envisioned future platform environment for the Danube Region encompasses several key dimensions:

1. Fully Integrated, AI-Powered Cooperation Platforms

- **Seamless Integration:** Future platforms should seamlessly integrate at national and European levels, allowing clusters and SMEs to effortlessly navigate between local, regional, and international collaboration opportunities.
- **AI-driven functionalities:** Robust, AI-powered tools for intelligent matchmaking, real-time analytics, predictive insights, and personalized content delivery will become standard, significantly enhancing strategic decision-making and efficiency.

2. Enhanced Cross-Border and Cross-Sectoral Collaboration

- **Dynamic, Cross-Sectoral Partnerships:** Platforms will actively foster collaborations not only between clusters within the same sector but across diverse industries, stimulating innovation through cross-sectoral interactions.
- **Strengthened Regional Cohesion:** Enhanced digital platforms will actively reduce regional disparities by facilitating balanced access and inclusive participation for clusters and SMEs across all Danube countries.

3. User-Centric and Accessible Platform Design

- **Intuitive Interfaces and Advanced UX:** Future platforms will prioritize intuitive, user-friendly designs and personalized user experiences to ensure easy adoption and effective use by stakeholders of all digital skill levels.
- **Accessible Digital Literacy Training:** Comprehensive and continuous digital skills training will be integral to platforms, empowering SMEs and cluster organizations to maximize their engagement with advanced AI-driven functionalities.

4. Secure, Ethical, and Transparent Digital Environments

- **Advanced Data Security:** Platforms will set a high standard for cybersecurity and data privacy, strictly adhering to GDPR and ethical guidelines, thereby fostering trust and confident engagement among users.
- **Transparency and Fairness:** Transparent governance structures and regular fairness audits of AI algorithms will ensure equitable access and prevent potential biases or exclusion, reinforcing user trust and inclusivity.

5. Continuous Learning, Adaptation, and Innovation

- **Dynamic Responsiveness:** Platforms will continuously evolve, adapting quickly to changing market conditions, technological advancements, and user feedback, thus ensuring sustained relevance and effectiveness.
- **Innovation Hubs:** Digital and AI-driven platforms will become vibrant hubs of innovation, actively facilitating the discovery of new ideas, technologies, and collaborative models, positioning clusters in the Danube Region at the forefront of global innovation trends.

6. Sustainable Development and Green Transition

- **Digital Platforms for Sustainability:** Platforms will explicitly support sustainability and green innovation, aligning closely with European Green Deal objectives and regional sustainability strategies, thereby promoting eco-innovation and sustainable growth.
- **Monitoring and Reporting Tools:** AI-powered platforms will offer comprehensive monitoring, reporting, and analytical tools to support clusters in meeting their sustainability targets, managing environmental impacts, and driving the green transition.

7. Strong Alignment with European and National Strategic Goals

- **Policy Integration and Support:** Future digital/AI platforms will clearly align with European and national strategic frameworks, facilitating policy coherence and easier access to relevant funding mechanisms.
- **Strategic Policy Engagement:** Active engagement with policymakers will become a central feature, ensuring that platforms continually address evolving regional economic priorities and contribute to broader strategic objectives.

In summary, the envisioned future for digital and AI-based cooperation platforms in the Danube Region positions them as dynamic, integrated ecosystems that dramatically

enhance clusters' capabilities to innovate, collaborate internationally, and contribute sustainably to regional prosperity. Realizing this vision will establish the Danube Region as a leading example of digital transformation and cross-border cooperation, significantly strengthening its global competitiveness and long-term economic resilience.

8.3 Next steps for implementing recommendations

To effectively transition from the current state toward the envisioned future of digital and AI-powered cooperation platforms in the Danube Region, stakeholders must undertake several concrete and strategic next steps. These immediate and medium-term actions are crucial for successfully implementing the recommendations outlined in this report:

1. Establishing a Cross-National Task Force

- **Objective:**
  To oversee and coordinate the implementation of platform enhancements and recommendations across the Danube Region.
- **Actions:**
  - Convene representatives from partner countries, cluster associations, SMEs, academia, and policymakers.
  - Define clear roles, responsibilities, and timelines for the task force.
  - Facilitate regular meetings (quarterly) to ensure sustained collaboration, review progress, and adjust strategies as needed.

2. Conducting a Comprehensive Feasibility Study

- **Objective:**
  To identify specific requirements, resources, costs, and implementation timelines for developing enhanced digital/AI platforms.
- **Actions:**
  - Evaluate existing platforms for potential integration or upgrades, pinpointing technical gaps and opportunities.
  - Develop detailed technical specifications, including AI functionalities, interoperability standards, and cybersecurity frameworks.

- Outline financial models and funding strategies (EU programs, public-private partnerships, cost-sharing models).

3. Securing Sustainable Funding and Resources

- **Objective:**
  To ensure adequate resources for initial development and ongoing sustainability of future digital/AI platforms.
- **Actions:**
  - Identify suitable European and national funding sources (Horizon Europe, Digital Europe Programme, Structural Funds).
  - Prepare joint applications for EU funding calls and regional grant opportunities.
  - Explore cost-sharing mechanisms, membership subscriptions, and potential sponsorships from industry stakeholders.

4. Developing Standardization and Interoperability Guidelines

- **Objective:**
  To enable seamless integration of national-level platforms with EU platforms such as ECCP and Enterprise Europe Network.
- **Actions:**
  - Convene technical working groups to develop standardized data formats, open APIs, and interoperability protocols.
  - Agree on minimum standards for data quality, update frequency, privacy, and security.
  - Initiate pilot projects to demonstrate successful platform integration and standardization.

5. Implementing AI Functionalities and Ethical Guidelines

- **Objective:**
  To integrate advanced AI functionalities while ensuring transparency, fairness, and ethical practices.
- **Actions:**
  - Identify suitable technology providers and expert partners to collaboratively develop and integrate AI-driven tools (matchmaking, analytics, predictive modeling).

- Establish transparent AI governance frameworks, ethical guidelines, and regular algorithm audits to prevent bias and ensure compliance with GDPR and data privacy standards.

6. Launching Capacity-Building and Digital Literacy Initiatives

- **Objective:**
  To facilitate broad and effective adoption of advanced digital and AI tools among clusters and SMEs.
- **Actions:**
  - Develop targeted training programs, workshops, and online courses specifically designed to enhance digital skills and AI literacy.
  - Collaborate with academic institutions, innovation hubs, and training providers to deliver continuous skill development initiatives across all participating countries.

7. Establishing Robust User Feedback Mechanisms

- **Objective:**
  To continuously improve platform usability, effectiveness, and relevance based on stakeholder feedback.
- **Actions:**
  - Implement regular user satisfaction surveys, interactive feedback sessions, and platform analytics to monitor usage and identify areas for improvement.
  - Actively involve cluster managers and SMEs in ongoing co-creation activities, ensuring the platform evolves to meet changing user needs and expectations.

8. Promoting Strategic Alignment with European and National Policies

- **Objective:**
  To ensure that platform development aligns strategically with broader policy frameworks and contributes meaningfully to regional and European objectives.
- **Actions:**
  - Engage policymakers early and regularly throughout the implementation process to maintain alignment with relevant strategies (European Digital Strategy, Green Deal, Industrial Strategy, Smart Specialization).

- Advocate for inclusion of platform development goals into national and regional strategic policy documents to secure sustained support and alignment.

Timeline for Immediate Actions (12–18 months):

- **Months 1–3:**
  - Form Cross-National Task Force
  - Initiate Feasibility Study
  - Identify immediate funding opportunities
- **Months 4–9:**
  - Complete Feasibility Study
  - Establish Technical Working Groups (standardization, AI development, ethical guidelines)
  - Launch initial pilot projects for AI functionalities and interoperability
- **Months 10–18:**
  - Begin roll-out of capacity-building initiatives and training programs
  - Secure funding for larger-scale implementation phases
  - Establish regular stakeholder engagement and feedback loops

By systematically implementing these next steps, stakeholders can successfully transition toward enhanced, fully integrated, and sustainable digital and AI-driven platforms. This structured approach will significantly strengthen international collaboration, boost regional innovation capacity, and ensure the Danube Region fully capitalizes on the opportunities provided by digital transformation and artificial intelligence.

Appendices

Stakeholder Questionnaire

Key Observations:

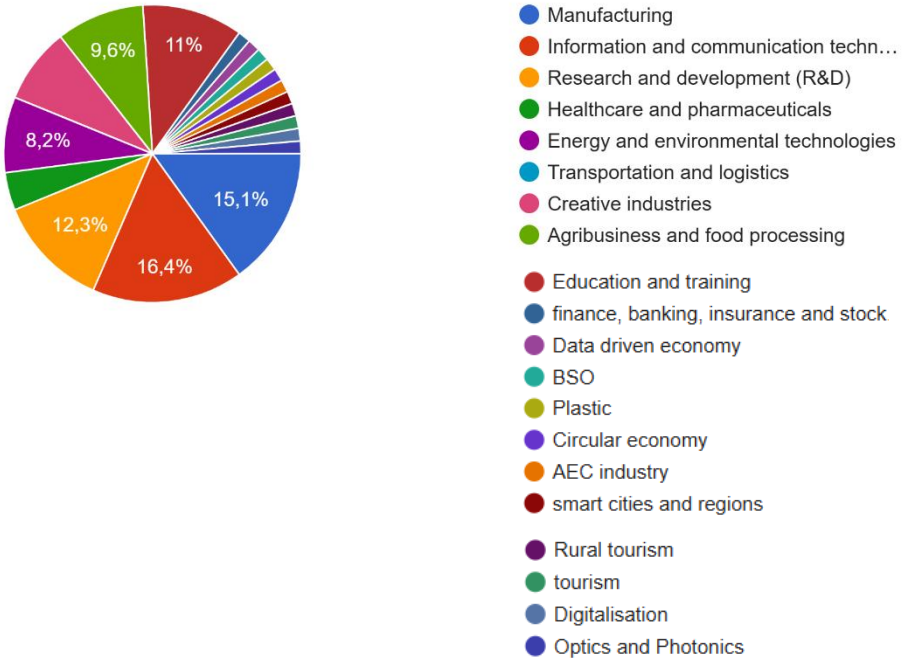
1. Types of Organizations Represented:
    - The majority of respondents represent cluster organizations and research or academic institutions.
2. Main Areas of Activity:
    - Education and training, along with manufacturing and creative industries, were the primary sectors represented.
3. Participation in Cluster-related Activities:
    - Most respondents have participated in cluster-related activities either as cluster members, project partners, or leaders. However, there's still significant interest from those who haven't participated yet.
4. Frequency of Partner Matchmaking via Digital Platforms:
    - Most respondents regularly use digital platforms for partner matchmaking, though there is room for increased frequency and better integration.
5. Importance of Project Management Functionalities:
    - Project management functionalities are highly valued by respondents, with most rating them as important or very important.
6. Importance of AI-based Partner Matching:
    - Respondents strongly recognize the value of AI-driven partner matching, suggesting it should be a core feature in future cooperation platforms.
7. Greatest Unmet Needs:
    - Key unmet needs include access to reliable and up-to-date data, efficient partner discovery mechanisms, improved communication tools, cross-border cooperation support, and better training resources.
8. Preferred Regions for Future Cooperation:
    - Respondents primarily prefer to cooperate with global clusters in key industries, followed by national clusters.

What type of organization do you represent?

73 odpovedí

What is your organization's main area of activity?

73 odpovedí



Have you participated in any cluster-related cooperation activities?

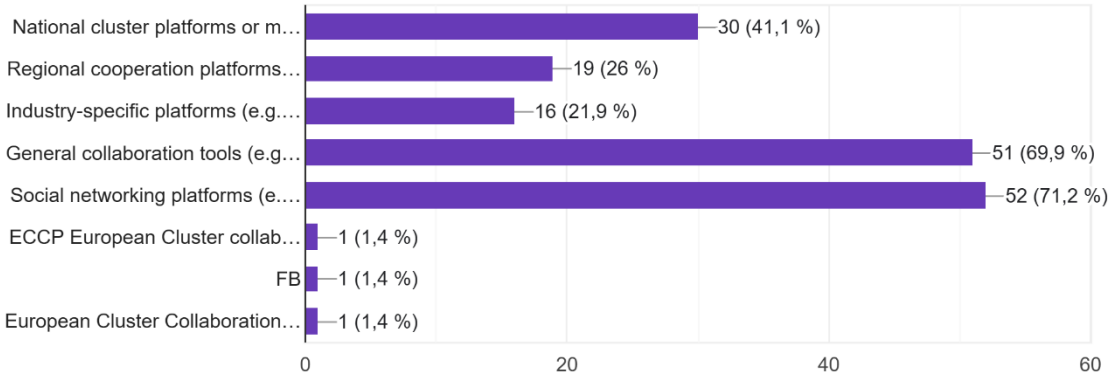
73 odpovedí

Have you participated in any cluster-related cooperation activities?

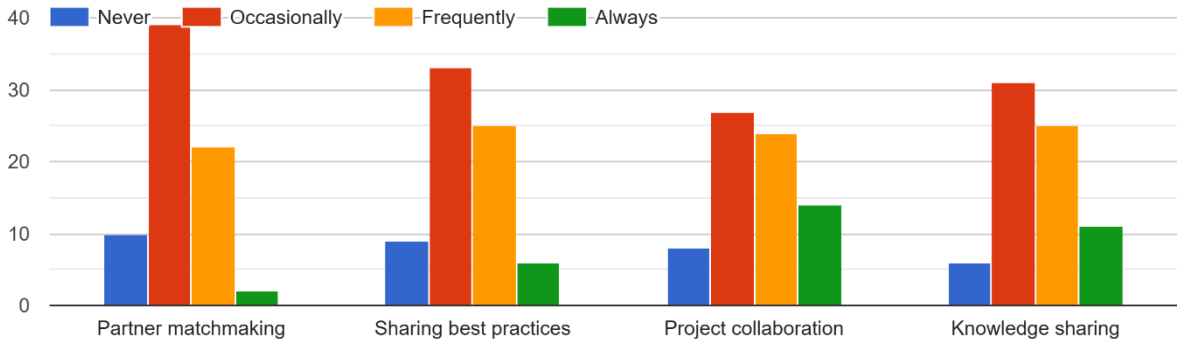
73 odpovedí

Which digital platforms do you currently use for cooperation? (Select all that apply)

73 odpovedí

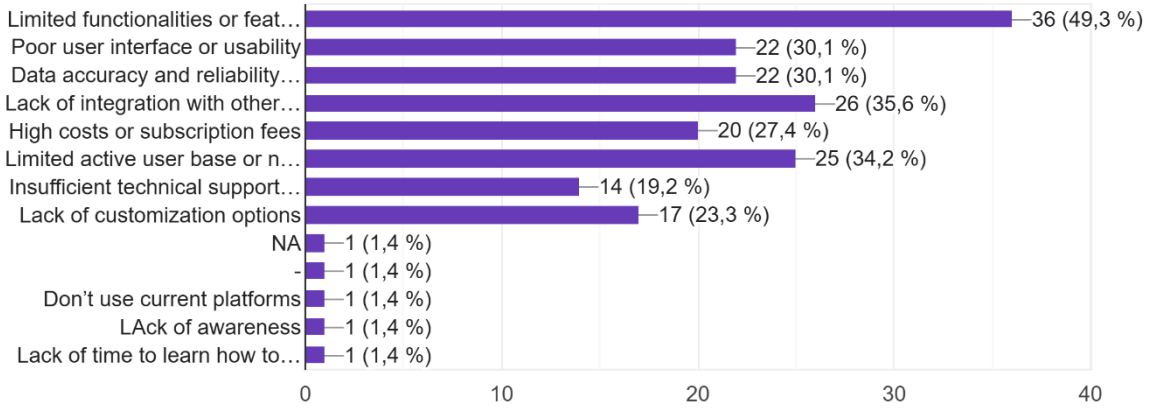


How often do you use digital platforms for the following purposes? (Select one per row)

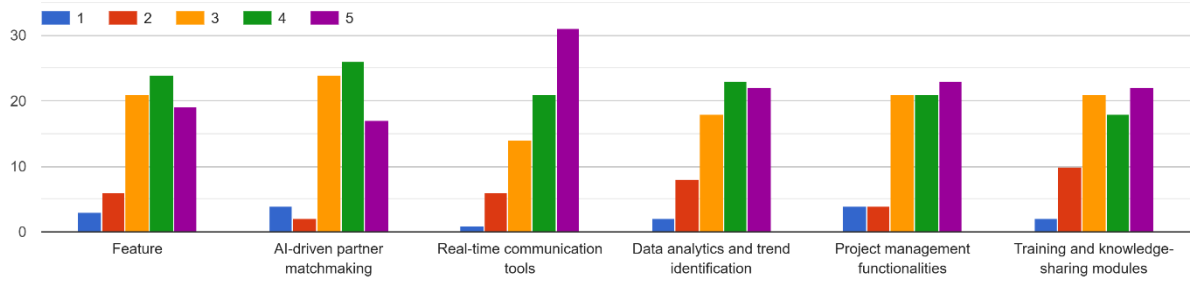


What challenges have you encountered with current platforms? (Select all that apply)

73 odpovedí

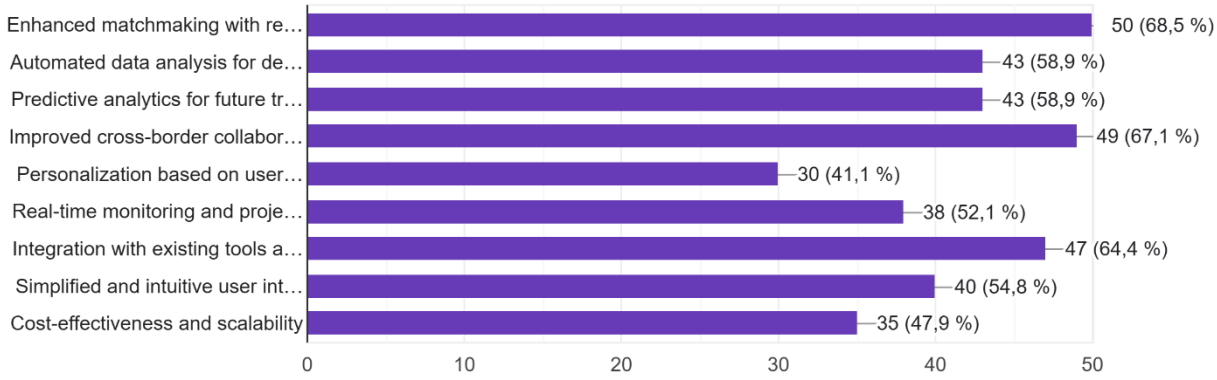


Please rate the importance of the following features in a digital cooperation platform: (1 = Not Important, 5 = Very Important)

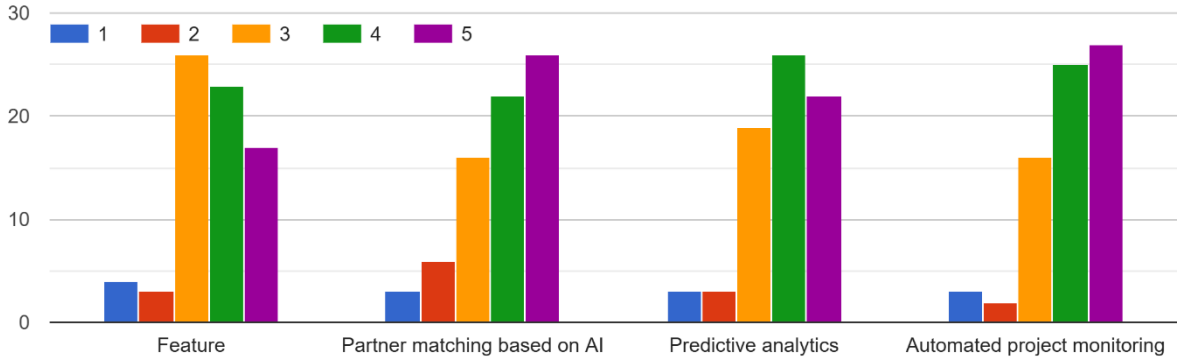


What are your expectations for an AI-empowered cooperation platform? (Select all that apply)

73 odpovedí



How important are the following AI features for improving cooperation? (1 = Not Important, 5 = Very Important)

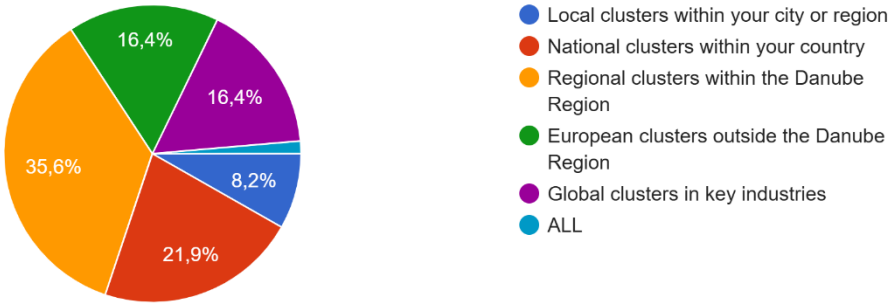


What is the greatest unmet need in current cluster cooperation activities?

73 odpovedí

Which regions or clusters would you prioritize for future cooperation? (Select one)

73 odpovedí



Additional Resources

Links to relevant platforms and reports:

National-Level Reports (Partner Contributions) (Annex No. 1)

- **National Partner Contributions to the Report – Czech Republic**
  (Document provided by Czech project partners)
- **National Partner Contributions to the Report – Hungary**
  (Document provided by Hungarian project partners)
- **National Partner Contributions to the Report – Romania**
  (Document provided by Romanian project partners)
- **National Partner Contributions to the Report – Slovakia**
  (Document provided by Slovak project partners)
- **National Partner Contributions to the Report – Ukraine**
  (Document provided by Ukrainian project partners)

Session Documentation

- **"The Cluster Cooperation Quest" Session Outputs** (Chișinău, Moldova, 2024)
  (Document with summarized findings from the interactive session)

Stakeholder Survey Data

- **Stakeholder Questionnaire Responses** (2024-2025, 73 respondents)
  (Structured dataset from online questionnaire involving cluster representatives and SMEs in the Danube Region)

EU-Level Platforms and Projects

- **European Cluster Collaboration Platform (ECCP)**
  https://clustercollaboration.eu
- **Enterprise Europe Network (EEN)**
  https://een.ec.europa.eu
- **DanuBioValNet Project (Interreg Danube Region Programme, 2017–2019)**
  http://www.interreg-danube.eu/approved-projects/danubiovalnet
- **ClusterPoliSEE Project (Interreg Southeast Europe Programme, 2012–2014)**
  http://www.southeast-europe.net/en/projects/approved_projects/?id=158
- **INNO4.0 Project (Interreg Europe Programme, 2019–2023)**
  https://www.interregeurope.eu/inno40

- **Danube Peer Chains Project (Interreg Danube Region Programme, 2020–2022)**
  http://www.interreg-danube.eu/approved-projects/danube-peer-chains
- **Accelerate GDT Project (Interreg Europe Programme, 2024–2026)**
  (Information provided within national partner documents)
- **ReStart SMEs Initiative (EU-funded Initiative, 2021–2023)**
  https://clustercollaboration.eu/content/restart-smes
- **Clusters4Defense Initiative (Ukrainian Cluster Alliance)**
  (Information provided within Ukrainian partner contribution)

Desk Research & Policy Documentation

- European Commission: **European Digital Strategy**
  https://digital-strategy.ec.europa.eu/en
- European Commission: **European Green Deal**
  https://commission.europa.eu/strategy-and-policy/priorities-2019-2024/european-green-deal_en
- European Commission: **European Industrial Strategy**
  https://ec.europa.eu/growth/industry/strategy_en
- European Commission: **Smart Specialisation Platform**
  https://s3platform.jrc.ec.europa.eu

Partner Contributions

Interreg Danube Region

Co-funded by the European Union

DanubIA Clusters

National Partner Contributions to the Report on the state of play on digital/AI based B2B/C2C/B2C cooperation platforms

Deliverable D 1.1.1

Responsible Partner: National Cluster Association

Content

1. Partner Information

- **Country:** Czech Republic
- **Organization Name:** National Cluster Association
- **Contact Person:** Jiri Herinek, herinek@nca.cz, +420 724 315 041
- **Date of Submission:** 28. 2. 2025

2. National Platforms Overview

1. **Platform Information:**
    - **Platform Name:** Map of Clusters and Technological Platforms in the Czech Republic
    - **Purpose:** The NCA strives to get to know its members as well as to support and promote systematic cross-cluster interdisciplinary cooperation at national and international levels. In doing so, it leverages the wealth that lies within the membership base of cluster organisations and technology platforms. The main tool is detailed profiles of cluster organisations and technology platforms and their members. The NCA also collects data on non-member clusters and creates and regularly updates the MAP OF CLUSTERS IN THE CZECH REPUBLIC. Information from the NCA database is taken from members´ websites as it is linked to the NCA websites.
    - **Core Features:**
        - Database of Czech cluster organisations and technology platforms
        - Detailed profiles of cluster organisations (NCA members and non-members) on a similar scale to the BRONZE label of cluster excellence
        - The validated profile (completely filled) of the cluster organisation in the Cluster Map is a condition for submitting an application for a cluster development grant
        - Each cluster organisation keeps a list of its members

- **URL:** https://nca.cz/en/clusters-map/

2. **Data Quality:**
    - **What information does the platform contain?** Profile of the cluster organisation (contact persons, focus, vision, goals, working groups, education, international cooperation, etc.)
    - **Are the data accurate and regularly updated?** Yes, on a yearly basis.
3. **Challenges:**
    - **What are the main challenges in managing or using the platform?** High-quality update, development of profiles of member companies of individual clusters
    - **What improvements are needed?** direct linking to more websites of individual clusters (NCA members) - so far, there is a direct link to three members

3. Tools and Mechanisms Supporting Cluster Members and SMEs

Describe the tools, systems, or mechanisms in place to support cluster organisations and their members.

1. **Existing Tools:**
    - **Funding mechanism:** continuous support from 2004 - financed from the ERDF program under the Ministry of Industry and Trade for cluster development, research infrastructure for cluster organisations and shared R&D
    - European Cluster Collaboration Platform is well known and used
    - **Enterprise Europe Network:** Clusters Meet Regions, Matchmaking events, Cluster Booster Academy and other tools provided by ECCP are used by Czech clusters

- **Online and offline events organised by the National Cluster Association** (regular monthly online members meetings, Days of clusters, informal events).
- **Cross-sectoral events organised by many cluster organisations**

2. **Collaboration with Other Entities:**
    - **Universities**
        - **Transfera.cz:** Technology Transfer Offices association
        - **Universities are important part of the most cluster organisations** (including National Cluster Association)
    - **VC funds**
        - **Transfera.cz provides the list of investors and VC funds**
    - **Public institutions**
        - **Agentura API** provides grant support for cluster organization
        - **Ministry of Industry and Trade is** creator of the grand calls

Summary: Although the Czech Republic does not have an official cluster policy, cluster organisations have continuous grant support for their development, shared infrastructure and collective research. Clusters form an important part of the innovation ecosystem of the Czech Republic.

4. Record of International Cooperation

Provide details of your organization's international collaboration efforts.

1. **Past and Current Projects:**
    - **Examples of International Projects**
        - **EDU-Ma Tech:** The project was funded by the operational program: 304000 - Interreg V-A Slovak Republic - Czech Republic 2014-2020, 197.990 €. The project enables establishment of strategic partnerships and preparation of advanced courses in a lifelong

education for enterprises and clusters with innovation potential in the fields of machinery and automotive engineering.

- **KETGATE**: This project was co-financed by the Interreg CENTRAL EUROPE program under the European Regional Development Fund. The project is co-funded by the European Union from the programme Interreg CENTRAL EUROPE. KETGATE opens access to the small and medium-sized companies to use Key Enabling Technologies –KETs) in order to increase product innovation across multiply industrial sectors throughout Europe. „KETs" include photonics, mikro and nano-electronics, nanotechnologies, advanced materials, industrial biotechnologies and advanced production technologies. All of these fields are closely interconnected; therefore demand excessive amount of knowledge, experience and expertise.
- **PL-CZ GREEN CLUSTER** (01/01/2019 - 21/12/2021): Project was co-funded by the European Union as a part of the Interreg V-A Czech Republic- Poland Programme. 149.734,6 €. The project addresses insufficient collaboration between the stakeholders from Poland and the Czech Republic active in the areas of green economy, healthy tourism, sustainable development, social economics (such as municipalities, enterprises, schools, universities non-profit organisations).
- **EDIH NORTHERN AND EASTERN BOHEMIA** (05/2023 - 04/2026): Provider: The project is funded by the European Union - DIGITAL EUROPE PROGRAMME and the NATIONAL RENEWAL PLAN. Budget: 3 686 565,24 EUR. The DIH Northeast consortium is mainly made up of entities from the Liberec and Hradec Králové regions, under the leadership of ARR, the Regional Development Agency. We work with partners in Germany and Poland, our common goal being to build a European digital innovation hub in the region. Success in the the European Commission means that we are close. The last step awaits us - national call announced by the Ministry of Industry and Trade.
- **Eurocluster Rural Tourism** (09/2022 - 02/2025): Traditionally based on local or regional demand, this sector has now the opportunity o extend markets by working together on a transnational base in the Eurocluster Rural Tourism - ERT.

- **Main Outputs:**
    - **EDU-Ma Tech: the** strategic partnership between Czech and Slovak companies was established
    - **KETGATE:** direct support to 10 SMEs – technology transfer from R&D institutions
    - **PL-CZ GREEN CLUSTER**: the strategic partnership between Czech and Poland companies was established
    - **EDIH NORTHERN AND EASTERN BOHEMIA**: various services were delivered to SMEs, mainly in cybersecurity, 3D printing and others
    - **Eurocluster Rural Tourism**: 190 SMEs received support from experienced consultants and improved their business

2. **Benefits and Challenges:**
    - **Key Benefits:**
        - **Strengthened Partnerships:**
            - Close collaboration with clusters, companies and R&D institutions was built.
            - New projects and business collaboration was established.
        - **New Funding Opportunities:**
            - Access to European Union funds, such as Horizon Europe and Interreg, has boosted financial resources for innovation and development.
        - **Capacity Building:**
            - Enhanced skills and knowledge among cluster managers through participation in international workshops and training sessions.
    - **Challenges:**
        - Cultural Differences: we had the opportunity to learn from each other
    - **Administrative Hurdles**

        - European projects are administered in a different way than the grants offered in the Czech Republic and it is necessary to learn this way
    - Sustainability
        - Continue cooperation after the end of the project
        - Managing cash flow and capacity when there are alternating periods when there are multiple projects and when there are none running.

Summary: By participating in European projects, it acquires strong social capital, can bring opportunities to companies and R&D institutions in cluster organisations, and contributes to implementing the European Economic Strategy.

5. Suggestions for Future Digital/AI Platforms

1. **Key Features for Digital/AI Platforms:**
    - **1. Key Features**
        - Real-time data analytics – visualization of membership, activities, funding, and market trends.
        - AI-driven matchmaking – smart recommendations for collaboration partners (e.g., companies, research institutions, startups).
        - Predictive analytics – machine learning to forecast industry trends and challenges.
        - Automated project management – AI assistants for task assignment, tracking progress, and project coordination.
        - Virtual networking & community engagement – interactive forums, discussion rooms, and recommendation algorithms for connecting relevant members.

- Digital marketplace – a platform for sharing resources, services, and technologies among cluster members.

- **2. Key Design Aspects**
  - Modularity and scalability – adaptable to different types of clusters and needs.
  - Interoperability – integration with existing national and European databases.
  - Open APIs – allowing integration with other tools and software.
  - AI-driven personalization – tailored content and partner recommendations.
  - Security and trustworthiness – protection of sensitive cluster member data, blockchain for transaction verification.
  - User-friendly interface – intuitive navigation for users with varying levels of technical expertise.
- **3. Example Use Cases**
  - Business cluster – AI-based recommendations for business partners and suppliers.
  - Research and innovation cluster – connecting companies with academic institutions based on research focus.
  - IT and technology cluster – shared projects and agile management of new product development.
  - Automotive cluster – coordination between manufacturers, suppliers, and startups in e-mobility.
- **Desired Outcomes:**
  - **1. Enhanced Collaboration and Networking**
    - **Improved cross-border collaboration** – easier connection and cooperation with international partners, fostering global innovation.
    - **Stronger inter-cluster cooperation** – better communication and collaboration between different industry clusters.

        - **AI-driven partner matching** – more efficient identification of suitable business and research partners.
    - **2. Increased Engagement and Participation**
        - **Enhanced member engagement** – more active participation through interactive tools, virtual events, and networking opportunities.
        - **Community-driven knowledge sharing** – a platform for exchanging best practices, expertise, and industry insights.
        - **Higher retention and satisfaction of members** – providing added value to businesses and organizations within the cluster.
    - **3. Improved Innovation and Business Growth**
        - **Faster R&D cycles** – AI-driven trend forecasting and technology scouting to accelerate innovation.
        - **Increased funding and investment opportunities** – better access to grants, investors, and funding programs.
        - **Higher competitiveness of cluster members** – leveraging AI to optimize business strategies and decision-making.
    - **4. Operational Efficiency and Digital Transformation**
        - **More efficient project management** – automation of administrative tasks and AI-assisted workflow management.
        - **Data-driven decision-making** – real-time analytics for strategic planning and risk assessment.
        - **Scalability and adaptability** – ensuring the platform can grow with the evolving needs of the cluster ecosystem.

2. **AI Opportunities and Risks:**
    - **How could AI help cluster organisations and SMEs?**

      AI can significantly enhance the efficiency, competitiveness, and innovation capacity of cluster organisations and small & medium-sized enterprises (SMEs). Below are key areas where AI can create value:

1. **Business Growth & Market Expansion**
    - **AI-driven matchmaking** – AI algorithms can connect SMEs with relevant business partners, investors, or suppliers based on industry needs and past collaborations.
    - **Smart market insights** – AI tools analyze global trends, customer preferences, and competitor strategies to help SMEs adapt and expand into new markets.
    - **Personalized marketing automation** – AI can optimize customer segmentation, targeting, and campaign execution to increase sales efficiency.
2. **Innovation & Product Development**
    - **AI-powered R&D support** – AI can analyze patents, research papers, and industry trends to suggest new areas for innovation.
    - **Rapid prototyping & design automation** – AI tools (e.g., generative design in CAD software) can help SMEs create optimized product designs faster.
    - **Predictive maintenance in manufacturing** – AI-driven sensors detect equipment failures before they happen, reducing downtime.
3. **Operational Efficiency & Cost Reduction**
    - **AI-assisted automation** – AI-powered chatbots, virtual assistants, and automated workflows can reduce administrative burdens.
    - **Smart supply chain optimization** – AI can analyze logistics, supplier performance, and demand patterns to optimize inventory and reduce costs.
    - **AI-driven project management** – predictive analytics can help manage risks, timelines, and resource allocation in complex projects.
4. **Workforce & Skills Development**

- **AI-powered training & upskilling** – personalized e-learning platforms use AI to tailor training programs based on individual skill gaps.
- **Augmented decision-making** – AI provides data-driven recommendations, helping SMEs make informed strategic decisions.
- **Enhanced recruitment & HR analytics** – AI helps identify the best candidates for open positions and predicts employee retention risks.

- **What risks or challenges should be addressed?**

  While AI brings many opportunities, it also presents risks that cluster organizations and SMEs must address:

  1. **Ethical & Legal Risks**
     - Bias in AI algorithms – AI systems may reinforce biases if trained on non-representative or flawed data.
     - Data privacy concerns – SMEs handling sensitive customer or business data must comply with GDPR and other regulations.
     - Intellectual property (IP) risks – AI-generated innovations may raise legal challenges in terms of ownership and patents.
  2. **Economic & Workforce Risks**
     - Job displacement – AI automation may reduce demand for certain jobs, requiring workforce reskilling.
     - High implementation costs – SMEs may struggle with the initial investment required for AI adoption.
     - Dependence on AI providers – relying on third-party AI solutions could lead to vendor lock-in and loss of control over critical business functions.
  3. **Operational & Technical Risks**

- AI decision-making transparency – many AI models function as "black boxes," making it difficult to understand how decisions are made.
- Data security vulnerabilities – AI systems can be targets for cyberattacks, leading to business disruptions.
- Scalability challenges – not all SMEs have the infrastructure to implement AI effectively, leading to uneven adoption rates.

6. Additional Comments

To maximize AI benefits while mitigating risks, cluster organizations and SMEs should:

- Develop AI adoption roadmaps – phased implementation to gradually integrate AI.
- Ensure AI transparency & explainability – using interpretable AI models to build trust.
- Prioritize AI upskilling programs – helping employees adapt to AI-powered work environments.
- Adopt AI ethics guidelines – ensuring fair and responsible AI use.
- Invest in cybersecurity – protecting AI-driven operations from cyber threats.

Attachments

In the Czech Republic, several key resources focus on cluster organizations:

- National Cluster Association (Národní klastrová asociace - NCA): A non-governmental, non-profit organization that unites entities and individuals to coordinate and sustainably develop cluster initiatives and policies in the Czech Republic.

  www.nca.cz

- Cluster Map of the Czech Republic: An interactive map provided by the NCA, detailing the distribution and specifics of cluster organizations across the country.

- RIS3 Strategy - Cluster Mapping: Part of the National Research and Innovation Strategy for Smart Specialization of the Czech Republic, this resource offers insights into the regional distribution and focus areas of clusters, highlighting significant concentrations in regions like Moravia-Silesia and South Moravia.

  www.ris3.cz

- Methodology for Cooperation with Clusters: Published by the Ministry of Industry and Trade, this document provides an overview of the performance of Czech cluster and sectoral organizations, based on benchmarking studies.

  mpo.gov.cz

Interreg Danube Region

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DanubIA Clusters

National Partner Contributions to the Report on the state of play on digital/AI based B2B/C2C/B2C cooperation platforms

Deliverable D 1.1.1

Responsible Partner: Hungarian Cluster

Content

1. Partner Information

- **Country:** Hungary
- **Organization Name:** Hungarian Cluster Alliance
- **Contact Person:** Peter Kiss, k.peter@baudekor.hu +36305769438
- **Date of Submission:** 24.03.2025

2. National Platforms Overview

1. Platform Information:

- **Platform Name:** web-site of HCA Hungarian / Cluster Ecosystem Analysis
- **Purpose:** Provides an overview of Ukrainian cluster organizations, supports their participation in international projects and certifications.
- **Core Features:**
    - Database of Ukrainian clusters
    - Information about events and updates
    - Support for international certification
- **URL:**
    - Tools for matchmaking and international collaboration: https://www.clusters.org.ua/en/map-of-clusters
    - the regular reports, Cluster Ecosystem Analysis https://www.interregeurope.eu/sites/default/files/2025-02/Ukrainian%20Cluster%20Ecosystem%20Analysis.pdf

2. Data Quality:

- **What information does the platform contain?**
  It contains profiles of Ukrainian cluster organizations, information about their activities, events, and collaboration opportunities.

- **Are the data accurate and regularly updated?**
  Yes, the data are regularly updated in cooperation with clusters and relevant institutions.

3. Challenges:

- **What are the main challenges in managing or using the platform?**
  Ensuring the accuracy of information and motivating clusters to regularly update their profiles and deliver the information about their news.

  Providing the regular, deep survey and reporting about clusters state, changes in needs and challenges, strategies and achievements.

- **What improvements are needed?**
  Increasing the volume and quality of information form clusters / platform's interactivity and expanding its features to improve communication among clusters.

  integration with EU platforms, and multilingual support

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1. Platform Information:

- **Platform Name:** Ukrainian Cluster Alliance
- **Purpose:** Supporting the development of clusters and cluster policies in Ukraine, representing members' interests, and promoting collaboration among clusters.
- **Core Features:**
  - Representation of members at the national and international levels
  - Representation of services providing to clusters, icnlduing those from Structural division of UCA (such as Resource Centers, Committees etc)
  - Representation of common and inter-clusters projects led by UCA
  - Organization of events and workshops
  - Implementation of projects to support clusters
- **URL:** general - https://www.clusters.org.ua/en/home-page/ / clusters mapping https://www.clusters.org.ua/en/map-of-clusters

2. Data Quality:

- **What information does the platform contain?**
  Information about UCA's members, their activities, common projects, success stories and best practices, updates in the field of clusters.
- **Are the data accurate and regularly updated?**
  Partly 'Yes', the data are regularly updated by the platform administrators and UCA members. However the information from cluster is not accurate and is not updated as regularly as needed.

3. Challenges:

- **What are the main challenges in managing or using the platform?**
  Maintaining the accuracy of information and ensuring active participation of members.
- **What improvements are needed?**
  Expanding the content with clusters activities, project information, best practices and success stories in the field of clusters.

3. Tools and Mechanisms Supporting Cluster Members and SMEs

1. Existing Tools

- **Competency Maps:**
  - Ongoing work in mapping competencies of cluster members to foster partnerships.
  - Mapping typically provided and adjusted in Structural divisions (Resource Centers and Commitees).
- **Partnerships with Universities:**
  - 20 clusters+ forms partnerships with 30+ universities
  - 5 clusters have formal agreements
  - The most successful is Kharkiv-IT clusters wchich forms and support relationships with 50 Universities
  - 5 clusters cooperates with Universities in framework of EDIH consortiums
- **Funding Mechanisms:**

- Funding mechanisms include European grants (e.g., International donors in Ukraine (as GIZ), Horizon Europe, Interreg programs).
- Almost NO support from national public institutions.

- **Digital Platforms:**
  - UCA web-site provide general information about UCA, and its clusters, events, best practices (incl knowledge base), and clusters mapping https://www.clusters.org.ua/en/map-of-clusters
  - B2B-matchmaking & fundrasing platform https://www.new.b2b-matchmaking.com.ua/
  - Landscape of Innovators oof Industry 4.0 (incl database of companies split by segment and technology) https://land4developers.com/
- **Specific Initiatives:**
  - UCA develop strategic 'Program & Project' approach which develop long-term programs of international collaboration oriented to the Recovery of Ukraine https://www.clusters.org.ua/en/blog-about-clusters/uca-project-portfolio-as-a-response-to-challenges/
  - Example of a program Clusters4Defense https://www.clusters.org.ua/en/clusters4defense-initiative/

2. Collaboration with Other Entities

- **Universities and EDIHs:**
    - Yes, universities play a significant role in the cluster ecosystem. For instance:
        - 5 UCA clusters lead EDIHs consortium together with 10 Universities .
        - There is a local / regional collaboration with Universities in 10 regiuons.
- **VC Funds (Venture Capital):**
    - No special collaboration yet.
- **Public Institutions:**
    - National level – 6 Ministries (Economy, Strategic Industries, Digital Transformation, Agri-food, Reconstruction, Defense).
    - Regional level – 9 regional administration and their Agencies of Regional development
- **Notable Partnerships:**
    - **APPAU:** leads the national movement Industry 4.0-5.0
    - **Kharkiv IT Cluster:** Has created an strong educational ecosystem involving partnerships with global IT companies, universities, and local startups.

Summary: The Ukrainian cluster ecosystem provides a variety of tools and mechanisms to support cluster members and SMEs. Key elements include university and EDIH partnerships, access to funding through European grants, and the development of digital platforms for member interaction. Challenges remain in effectively engaging Public institutions (policy level), VC funds and expanding technological initiatives.

4. Record of International Cooperation

1. Past and Current Projects

- **Examples of International Projects:**
    - **BOWI** (2021-23)
        - Focus: creation and development of Digital Innovation Hubs.
        - Partners: the National Technical University 'KPI named after Igor Sikorsky', Polish EDIHs, Funding box, APPAU
    - **IDEALIST** (Horizon Europe): (2023-2025)
        - Focus: twin transition of SMEs in 3 target industrial ecosystem.
        - Partners: Participants from Italy, France, Poland, Czech Republic and Germany.
    - **Accelerate GDT** (Interreg Europe): (2024-2026)
        - Focus: implementing twin transition element into cluster policies
        - Partners: Participants from Ireland, Hungary, Italy, Austria, Spain, Czech Republic and Germany.
    -
- **Main Outputs:**
    - **BOWI**: creation of first working services model in Ukraine in digitalization of SMEs using University and Cluster capacities
    - **IDEALIST**: set of tools of acceleration of SME in twin transition
    - **Accelerate GDT**: new cluster policies of national and regional level (new ongoing projects in Ukraine with public institutions)

2. Benefits and Challenges

- **Key Benefits:**
    - **Strengthened Partnerships:**
        - Close collaboration with clusters and institutions across Europe has built long-term relationships and increased trust.

        - Partnerships have led to joint participation in additional projects and initiatives.
    - **New Funding Opportunities:**
        - Access to European Union funds, such as Horizon Europe and Interreg, has boosted financial resources for innovation and development.
    - **Capacity Building:**
        - Enhanced skills and knowledge among cluster managers through participation in international workshops and training sessions.
        - Creating the first working DIHs model in Ukraine
    - **Policy Influence:**
        - Contributions to shaping European cluster policies and aligning them with Ukrainian cluster needs.
- **Challenges:**
    - **Cultural Differences:**
        - Variations in communication styles and business practices sometimes create misunderstandings or delays.
    - **Administrative Hurdles:**
        - Complex EU funding applications and reporting requirements can be resource-intensive.
    - **Sustainability of Collaboration:**
        - Ensuring long-term engagement and commitment from international partners beyond project completion.
    - **Digitalization Gaps:**
        - Disparities in the adoption of digital tools among partners can hinder seamless collaboration.
        - Difficulties in the adoption right methodology of assessment of digital maturity of SME, clusters members

Summary:
Ukrainian Clusters Alliance has actively engaged in international cooperation, contributing to numerous successful projects and fostering cross-border partnerships.

These collaborations have resulted in significant outputs, including tools, policies, and networks that benefit cluster members. While challenges exist, the benefits of strengthened partnerships, funding opportunities, and enhanced skills far outweigh the hurdles.

5. Suggestions for Future Digital/AI Platforms

1. Key Features for Digital/AI Platforms

- **Functionalities to Include:**
    - **Real-Time Data Analytics:**
        - Tools to gather & monitor information about trends, member activity, and economic indicators relevant to cluster members and aligned to their industry dynamic
        - Dashboards that provide actionable insights for decision-making.
    - **AI-Driven Matchmaking Tools:**
        - Algorithms to connect and match cluster members with potential partners, both locally and internationally, based on their profile, as well on their competencies, projects, and goals.
    - **Collaboration Tools:**
        - Digital workspaces for seamless communication, file sharing, and virtual meetings.
        - Features like shared calendars and integrated project management tools.
    - **Virtual Events and Training:**
        - Platforms for hosting virtual workshops, webinars, and matchmaking events.
        - Personalized recommendations for participants to maximize networking opportunities.
    - **Market Intelligence Tools:**

        - AI tools that analyze market trends, funding opportunities, and competitor activity.
        - Alerts for new business opportunities or calls for proposals.
    - **Integration with Existing Systems:**
        - APIs to connect with government databases, funding platforms, and other digital tools.

- **Desired Outcomes:**
    - **Improved Cross-Border Collaboration:**
        - Facilitation of partnerships between clusters in different countries and regions.
        - Support for joint projects and grant applications.
    - **Enhanced Member Engagement:**
        - Increased participation in events, discussions, and joint initiatives through personalized notifications and targeted content.
    - **Efficiency Gains:**
        - Reduction in time spent on administrative tasks through automated processes.

2. AI Opportunities and Risks

- **How Could AI Help Cluster Organizations and SMEs?**
    - **Enhanced Networking and Collaboration:**
        - AI can identify complementary partners or clusters based on data such as company profile, competencies, ongoing projects, and member needs.
        - Example: Matching a Ukrainian engineering SME with a Czech general contractor from Energy sector.
    - **Predictive Insights:**
        - AI can forecast trends and demand, allowing clusters and members to anticipate market changes.
        - Example: Analyzing market trends and predicting the disruption of supply chain in a given industry (f.e. composite materials for

transport builders) will allow to cluster management start mitigation activities (as searching new suppliers, or developing some expertise / capacity in the own cluster).

- **Automated Content Generation:**
  - AI tools can generate tailored newsletters, event invitations, and reports for members.
- **Resource Optimization:**
  - AI can optimize resource allocation within clusters, suggesting the best use of funding, training, and other support services.

- **What Risks or Challenges Should Be Addressed?**
    - **Data Privacy:**
        - Collecting and processing data from cluster members raises concerns about compliance with GDPR and other privacy regulations.
        - Mitigation: Implement secure data encryption and clear consent mechanisms.
    - **Implementation Costs:**
        - High initial costs for developing and maintaining an AI-driven platform may strain budgets.
        - Mitigation: Leverage EU funding and explore cost-sharing among participating clusters.
    - **Digital Literacy:**
        - Members may face challenges in adopting new tools, particularly SMEs with limited tech expertise.
        - Mitigation: Offer training and user-friendly interfaces.
    - **Bias in AI Algorithms:**
        - Poorly designed algorithms could reinforce existing inequalities or exclude certain members.
        - Mitigation: Regularly review and update algorithms to ensure fairness.

Summary:
Future digital and AI platforms for clusters should prioritize real-time analytics, intelligent matchmaking, and collaborative tools to enhance engagement and cross-border cooperation. While AI offers significant opportunities, careful attention to data privacy, implementation costs, and digital literacy is essential to maximize its potential and ensure equitable benefits for all members.

6. Additional Comments

Further Insights and Recommendations for Platform Development

1. **Enhanced User Experience (UX):**
    - Simplify the user interface to ensure accessibility for cluster members with varying levels of digital literacy.
    - Provide multilingual support (e.g., English and local languages) to facilitate international collaboration.
2. **Integration with EU and Global Platforms:**
    - Establish APIs or data exchange mechanisms with platforms like the European Cluster Collaboration Platform or other regional cluster networks.
    - Enable seamless access to international project opportunities and best practices.
3. **Advanced Analytics and AI Features:**
    - Introduce predictive analytics tools to forecast trends, identify funding opportunities, and recommend partnerships.
    - Utilize AI to create personalized user experiences, such as tailored recommendations for events, grants, or collaborations.
4. **Gamification:**
    - Implement gamified elements to encourage participation, such as badges for active engagement or points for completing updates on profiles.
5. **Knowledge Hub:**
    - Develop a centralized repository for reports, research papers, webinars, and case studies related to clusters and SMEs.
    - Regularly update with content showcasing successful projects and innovative practices.
6. **Training and Support:**
    - Provide online training modules on topics like grant application processes, project management, and digital transformation.
    - Establish a help desk or chatbot for real-time support.

7. **Mobile Accessibility:**
    - Develop a mobile-friendly version of the platform or a dedicated mobile app to ensure access on the go.
8. **Monitoring and Feedback Mechanisms:**
    - Include tools for tracking the platform's impact, such as metrics on collaboration activities or user satisfaction.
    - Collect user feedback through surveys and focus groups to guide continuous improvements.
9. **Funding and Incentive Models:**
    - Introduce funding matchmaking tools to connect clusters with appropriate grants, investors, or venture capital.
    - Offer incentives (e.g., discounts on services or premium features) to clusters that actively contribute to the platform's content and network.
10. **Focus on Sustainability and Green Innovation:**
    - Highlight initiatives supporting sustainability and the green transition, aligning with EU priorities.
    - Feature clusters working on renewable energy, circular economy, and eco-innovation prominently.

By implementing these features and strategies, Ukrainian cluster platform can increase engagement, foster innovation, and solidify their position as key facilitators in the regional and international cluster ecosystems.

Interreg Danube Region

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DanubIA Clusters

National Partner Contributions to the Report on the state of play on digital/AI based B2B/C2C/B2C cooperation platforms

Deliverable D 1.1.1

Responsible Partner: Romanian Cluster Association - CLUSTERO

Content

1. Partner Information

- **Country:** ROMANIA
- **Organization Name:** Romanian Cluster Association-CLUSTERO
- **Contact Person:** Daniel Cosnita E-mail: daniel.cosnita@clustero.eu
  M:+ 40-721244306
- **Date of Submission:** 28.02.2025

2. National Platforms Overview

Provide a detailed description of the key platforms in your country.

2.1 Platform Information:

- **Platform Name:** Analysis of Cluster Competitiveness and Cluster Mapping
- **Purpose:** CLUSTERO supports its members in internationalization, twin transition, integration into the global value chains, thus contributing to increasing their competitiveness. Cluster analyses were developed in 2011,2013, 2016 and 2020. CLUSTERO is constantly updating the map of clusters in Romania using data from members' websites as it's linked to the CLUSTERO website. The first cluster mapping was developed in 2010 and others followed in 2017 and 2022.
- **Core Features:**

  Database on the 54 cluster members, detailed profiles and technology platforms

  Information about events (i. e National Cluster Conferences-International events-13 editions)

  Support for cluster excellence evaluation; services for members etc

  Projects of CLUSTERO team
- **URL (if available):** www.clustero.eu

2.2 Data Quality:

- **What information does the platform contain?**

How to become a CLUSTERO member?

Profile of the cluster organization (field, location, contact person, international cooperation, website

- **Are the data accurate and regularly updated?** Yes, whenever necessary, in cooperation with clusters

2.3 Challenges:

- **What are the main challenges in managing or using the platform?** - Ensuring the accuracy of information and motivating clusters to regularly update their profiles
- **What improvements are needed?** Direct linking to more clusters such as the 79 clusters registered by the Ministry of Economy, Digitalization, Entrepreneurship and Tourism

3. Tools and Mechanisms Supporting Cluster Members and SMEs

Describe the tools, systems, or mechanisms in place to support cluster organizations and their members.

3.1 Existing Tools:

- **Funding mechanisms under ERDF Program-**Regional Operational Program of the 8 Regional Development Agencies; Priority 1-A competitive region through innovation and dynamic enterprises for a smart economy - Intervention 1.2.2 Innovative clusters .
- **European Cluster Collaboration Platform** -Clusters meet regions; Matchmaking events; C2Labs; Cluster Booster Academy; EU Cluster Talks; Support for Green transition; Funding opportunities
- **Enterprise Europe Network**
- **European Cluster Alliance**
- **Online and offline events organized by CLUSTERO (regular monthly** online meetings, National Cluster Conferences, international events, informal events)

- **Cross-sectoral events organized by CLUSTERO members**
- **Competence mapping to identify key areas of expertise among cluster** members, fostering collaboration and business development
- **Partnerships with ministries, universities, professional associations, regional development agencies, NGOs**
- **Support for clusters and SMEs within European Programs (Horizon Europe; Interreg; COSME; EEA grants etc)**
- **Collaboration with Digital Innovation Hubs** where clusters are members.

Specific Initiatives:

IMAGO MOL Cluster, the only medical imaging cluster in Romania and EU is the coordinator of the project MEDIC NEST-Precision MEDicine Clusters integrating Digital Technologies for New EcoSystems in HealthCare founded by COSME (2022-2024).

OPEN HUB Creative Cluster carried out The *ReGreen VR* project that is an innovative initiative aimed at using virtual reality (VR) technology to educate and raise public awareness about the importance of the green transition and ecosystem restoration. The project is the result of a collaboration between the Openhub Creative Cluster and VRINN Immersive Learning Cluster from Norway, combining expertise in environmental education and VR technology to create an interactive educational tool (2024-2025).

3.2 Collaboration with Other Entities:

- **Universities** play a key role in each cluster, some of them acting as catalysts for the formation of these clusters."
- **Research and development institutes** are members of clusters, facilitating technological transfer to cluster enterprises.
- **Ministries** collaborate with CLUSTERO in the development of strategic document such as: National Strategy for Competitiveness 2015-2020; Industrial Strategy of Romania 2024-2030; National Strategy for Research, Innovation and Smart Specialization 2022-2027

- **Regional Development Agencies** collaborate with CLUSTERO in elaboration of Applicant Guide for calls of projects within Regional Operational Programs
- **Digital Innovation Hubs -**the majority of clusters are members in DIHs
- **Local Public Administrations** are component of clusters and collaborate for implementing the concepts of smart cities and smart villages

  Summary-The Romanian cluster ecosystem offers a range of tools and mechanisms to support clusters and SMEs. CLUSTERO works closely with regional cluster consortia and thematic consortia to help clusters access funding and integrate into global value chains by developing digital platforms for member interaction

4. Record of International Cooperation

Provide details of your organization's international collaboration efforts.

4.1 Past and Current Projects

- **DanuBioValNet -**Cross-clustering partnership for boosting eco-innovation in developing a joint bio-based value-added network for the Danube Region (2017–2019):
- **INNO4.0-Inno industry** -Improving Innovation delivery of policies within 4.0 industry in Europe is supported by Interreg Europe Program (2019-2023)
- **Danube Peer Chains-**Integrated capacity building and training program for Danube area labor and business support organizations, local industry and entrepreneurs (2020-2022)
- **GoDanuBio-**Participative Ecosystems for fostering the revitalization of rural-urban cooperation through governing Danube Circular-Bioeconomy (2020-2022)
- **ReStart SMEs s** is the initiative promoted by the European Commission which aims to build resilience of manufacturing SMEs in automotive, machinery & equipment, food and textile by analyzing their digitalization needs and offering concrete tools to adopt modern technologies such as AI, robotics, cybersecurity & IoT (2021-2023)

- **Innovative services for twin transition in SMESs and Clusters** is supported by a grant from Iceland, Liechtenstein and Norway through the EEA Grants Romania 2014-2021 in the frame of the SME Growth Program Romania (2023-2024)
- **Plan C -Moving Plastics and Machine Industry towards Circularity** is supported by Interreg Program Danube Region (2024-2026)
- **Synergies for Greener European Horizons** is supported by a grant from Iceland, Liechtenstein and Norway through the EEA Grants Romania 2014-2021 in the frame of the SME Growth Program Romania (2024-2025)
- **DanubIA Clusters - AI based Cluster Cooperation in the Danube Region** is supported by the Interreg Danube Region Programme (2024-2025)

Main Outputs:

- **DanuBioValNet-** Strengthening cooperation between clusters in the Danube Region, with a focus on eco-innovation and bio-based industries.
- **INNO4.0-Innoindustry-** increase the rate of clusters that develop activities to support the transformation towards Industry 4.0 through the improvement of regional and national policies.
- **Danube Peer Chains**- to empower Labour market Support Organizations and Business Support Organizations together with their target groups and further local high-potentials (entrepreneurs, SME employees, digitalisation specialists) in a joint capacity building and training approach to upskill to high-qualified jobs in the Danube region and to gain sustainable recognition as PEER-level collaboration partners in innovative transnational value chains.
- **GoDanuBio**- to enhance the socioeconomic status of the regions, contribute to environmental, climate and resource protection as well as foster development of rural areas; co-creation and new forms of integrated urban-rural cooperation.
- **ReStart SMEs -** support to manufacturing SMEs in post-COVID-19 crisis recovery through transitioning into Industry 5.0, a more sustainable and resilient approach to automation in the sectors of automotive, machinery & equipment, food and

textile. Beneficiaries accessed new technologies such as AI, robotics, cybersecurity and IoT as well as assistance in the innovation of process, product and business models.

- **Innovative services for twin transition in SMESs and Clusters-** to increase the competitiveness of Romanian companies based on green industry (eco) innovation, digitalization approaches and internationalization, with a particular focus on strengthening the Romanian-Norwegian business & innovation relationships.
- **Plan C-** is targeting the mobilization of the plastics and plastics processing machine industry for a clean and circular economy and follows the goal of leaving no one behind and understanding the economic challenges and financial opportunities of the transition into a greener industry.
- **Synergies for Greener European Horizons** - to enhance cluster-based Romanian–Norwegian-Icelandic cooperation in the field of green transition by making use of all available bilateral and European support mechanisms.
- **DanubIA Clusters**- to increase the level of collaboration between cluster members SMEs and other actors of the quadruple helix in the Danube Region in order to boost their innovation potential and better position them on international strategic value chains via an AI empowered cluster cooperation platform.

4.2 Benefits and Challenges:

- **Benefits**
  - **Strengthened Partnerships** within clusters, inter-clusters at regional, national, European and international level; creation of consortia for various projects
  - **New Funding Opportunities:** European funds (Horizon 2020, Horizon Europe, COSME, INTERREG, Digital Europe, Creative Europe etc), national and regional funds

- **Capacity Building:** Enhanced skills and knowledge among cluster managers through participation in international workshops and training sessions.
- **Exchange of best practices** through study visits, matchmaking events etc

- **Challenges:**
  - **Cultural Differences**: we had the opportunity to learn from each other
  - **Sustainability of collaboration**: Continue cooperation after the end of the project and in other projects
  - **Digitalization Gaps:** Disparities in the adoption of digital tools among partners can hinder seamless collaboration.

Summary: By participating in European projects, it gains valuable experience, creates opportunities for SMEs and other cluster members, and contributes to the implementation of European Strategic Documents.

5. Suggestions for Future Digital/AI Platforms

Romania's government approved the National Artificial Intelligence Strategy for 2024-2027 in July 2024. This strategic document outlines the country's approach to adopting and integrating AI technologies across various sectors, aligning with the European Union's ambitions to become a global leader in AI. The strategy focuses on five key areas:

- Digital public administration
- Digital economy
- Digital education
- Cybersecurity
- Emerging technologies include Artificial Intelligence, 5G, Internet of Things, quantum communications, robotics, blockchain, and smart cities.

5.1 Key Features for Digital/AI Platforms:

Functionalities to Include:

- **Real-Time Data Analytics:**

  Tools to monitor trends, member activities, market trends, funding programs, and economic indicators relevant to cluster members.

  Dashboards that provide actionable insights for decision-making.

- **AI-Driven Matchmaking Tools:**

  Algorithms to connect cluster members with potential partners, both locally and internationally, based on competencies, projects, and goals.

- **Collaboration Tools:**

  Digital workspaces for seamless communication, file sharing, and virtual meetings.

- **Virtual Events and Training:**

  Platforms for hosting virtual workshops, webinars, and matchmaking events.

  Personalized recommendations for participants to maximize networking opportunities.

- **Integration with Existing Systems:** it's important to connect with government institutions databases, funding platforms, and other digital tools
- **Digital Marketplace**- a platform for sharing resources, services and technologies among cluster members
- **Interoperability** -integration with existed national and European databases
- **Cyber security** -for protection of cluster members data
- **User-friendly interface**- facile navigation for users with varying levels of technical expertise

Examples:

Transylvania IT Cluster www.transilvaniait.ro/en/ - AI-based recommendations for business partners and suppliers. This cluster is the initiator of a Digital Innovation Hub in the North West region and an active member of the European Coalition for Digital Skills and Jobs. The cluster is partner in ENERGENIUS project-Horizon Program aims to accelerate the energy transition by leveraging cutting-edge technologies such as gamification, AI-assisted learning and advanced digital

service models. Through collaboration with international partners, the project seeks to develop accessible, citizen-focused digital solutions that will revolutionize the way energy is managed and conserved, driving innovation and sustainability in the energy sector.

Desired Outcomes:

- **Improved Collaboration and networking:**
  - Facilitation of partnerships between clusters in different countries and regions.
  - Stronger inter-cluster collaboration-better communication and cross-sectoral cluster collaboration
  - Support for joint projects and grant applications.
- **Enhanced Member Engagement:**
  - Increased participation in events, discussions, and joint initiatives through personalized notifications and targeted content.
  - Community-driven knowledge sharing- a platform for exchanging best practices, expertise and industry insights
- **Improve Innovation and competitiveness of cluster members-**leveraging AI to optimize business strategies and decision-making
- **Digital transformation** -more efficient project management-automation of administrative tasks and AI-assisted workflow management.

5.2 AI Opportunities and Risks

- **How Could AI Help Cluster Organizations and SMEs?**
  - **Enhanced Networking and Collaboration:**

    AI can significantly enhance the efficiency, competitiveness and innovation capacity of cluster organizations and SMEs. AI can identify complementary

partners or clusters based on data such as competencies, ongoing projects, and member needs.

- **Predictive Insights:**

  Artificial Intelligence can forecast trends and demand allowing clusters and members to anticipate market changes.

- **Automated Content Generation**

  AI tools can generate tailored newsletters, event invitations and reports for members.

- **Resource Optimization:**

  AI can optimize resource allocation within clusters, suggesting the best use of funding, training and other support services.

- **Development of AI solutions** within Digital Innovation Hubs where clusters and SMEs are members

- **What Risks or Challenges Should Be Addressed?**
  - **Data Privacy:**

    Collecting and processing data from cluster members raises concerns about compliance with GDPR and other privacy regulations.

  - **Implementation Costs:**

    High initial costs for developing and maintaining an AI-driven platform may strain budgets.

  - **Data security vulnerabilities** – AI systems can be targets for cyberattacks, leading to business disruptions.

  - **Digital Literacy:**

    Cluster members may face challenges in adopting new tools, particularly SMEs with limited tech expertise.

  - **Intellectual property (IP) risks –** AI-generated innovations may raise legal challenges in terms of ownership and patents.

- **Job displacement** – AI automation may reduce demand for certain jobs, requiring workforce reskilling.

Summary:

Future digital and AI platforms for clusters should prioritize real-time analytics, intelligent matchmaking, and collaborative tools to enhance engagement and cross-border cooperation. While AI offers significant opportunities, careful attention to data privacy, implementation costs, and digital literacy is essential to maximize its potential and ensure equitable benefits for all members.

6. Additional Comments

- [Add any further insights or recommendations regarding the report or platform development.]

To maximize AI benefits while mitigating risks, cluster organizations and SMEs should:

- Develop AI adoption roadmaps – phased implementation to gradually integrate AI.
- Ensure AI transparency & explainability – using interpretable AI models to build trust.
- Increasing the level of SMEs 'awareness of the various AI challenges and models
- Prioritize AI upskilling programs – helping employees adapt to AI-powered work environments.
- Adopt AI ethics guidelines – ensuring fair and responsible AI use.
- Invest in cybersecurity – protecting AI-driven operations from cyber threats.
- Integration with EU and Global Platforms inclusively financing of AI field
- Exchange of best practices in the Danube Region on using AI by clusters and SMEs
- Develop a mobile-friendly version of the platforms or a dedicated mobile app
- Ensuring funding for updating platform data

Using the DanubIA clusters platform, clusters can increase engagement, foster innovation, and solidify their position as key facilitators within regional, national, and international ecosystems.

Attachments

- National Strategy in the Field of Artificial Intelligence 2024-2027 (National AI strategy for 2024-2027)
- Kramer, J.-P. G. (2023). Clusters meet Regions Event "Clusters as drivers of regional innovation ecosystems" - the case of Romania. Bruxelles: ECCP. Retrieved from https://clustercollaboration.eu/content/clusters-meet-regions-iasi-romania
- National Strategy for Research, Innovation and Smart Specialization 2022-2027
- National Competitiveness Strategy 2021-2027
- Industrial Strategy of Romania 2023-2027
- Digital Decade Country Report 2023: Romania

Interreg Danube Region

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National Partner Contributions to the Report on the state of play on digital/AI based B2B/C2C/B2C cooperation platforms

Deliverable D 1.1.1

Responsible Partner: Union of Slovak Clusters

Content

1. Partner Information

- **Country:** Slovakia
- **Organization Name:** Union of Slovak Clusters
- **Contact Person:** Andrej Gero, gero@uksk.sk, +421 904 111 456
- **Date of Submission:** 31.1.2025

2. National Platforms Overview

1. Platform Information:

- **Platform Name:** Slovak Cluster Monitor
- **Purpose:** Provides an overview of Slovak cluster organizations, supports their participation in international projects and certifications.
- **Core Features:**
    - Database of Slovak clusters
    - Information about events and updates
    - Support for international certification
- **URL:** https://www.inovujme.sk/sk/slovensky-klastrovy-monitor

2. Data Quality:

- **What information does the platform contain?**
  It contains profiles of Slovak cluster organizations, information about their activities, events, and collaboration opportunities.
- **Are the data accurate and regularly updated?**
  Yes, the data are regularly updated in cooperation with clusters and relevant institutions.

3. Challenges:

- **What are the main challenges in managing or using the platform?**
  Ensuring the accuracy of information and motivating clusters to regularly update their profiles.

- **What improvements are needed?**
  Increasing the platform's interactivity and expanding its features to improve communication among clusters.

---

1. Platform Information:

- **Platform Name:** Union of Slovak Clusters
- **Purpose:** Supporting the development of clusters and cluster policies in Slovakia, representing members' interests, and promoting collaboration among clusters.
- **Core Features:**
  - Representation of members at the national and international levels
  - Organization of events and workshops
  - Implementation of projects to support clusters
- **URL:** https://uksk.sk/

2. Data Quality:

- **What information does the platform contain?**
  Information about union members, their activities, projects, and updates in the field of clusters.
- **Are the data accurate and regularly updated?**
  Yes, the data are regularly updated by the platform administrators and union members.

3. Challenges:

- **What are the main challenges in managing or using the platform?**
  Maintaining the accuracy of information and ensuring active participation of members.
- **What improvements are needed?**
  Expanding the content with best practices and successful case studies in the field of clusters.

3. Tools and Mechanisms Supporting Cluster Members and SMEs

1. Existing Tools

- **Competency Maps:**
    - Slovak cluster organizations use competency mapping to identify key areas of expertise among their members, fostering collaboration and business development.
    - The "Slovak Cluster Monitor" enables efficient search for member competencies.
- **Partnerships with Universities:**
    - Several clusters have formal partnerships with universities, such as:
        - Technology clusters collaborating with the Technical University of Košice to develop innovative technologies.
        - Partnerships with Comenius University, focusing on research and innovation to benefit small and medium enterprises (SMEs).
- **Funding Mechanisms:**
    - Funding mechanisms include national and European grants (e.g., Horizon Europe and Interreg programs).
    - The Slovak Innovation and Energy Agency (SIEA) offers clusters advisory services and financial support through innovation-focused tools.
- **Digital Platforms:**
    - “Inovujme.sk” provide online tools for networking, information sharing, and project management among cluster members.
- **Specific Initiatives:**
    - **Slovak Energy Cluster:** Actively supports research in renewable energy sources, including projects linked with industrial partners and universities.

2. Collaboration with Other Entities

- **Universities:**
    - Yes, universities play a significant role in the cluster ecosystem. For instance:
        - The Faculty of Electrical Engineering and Information Technology at STU collaborates with industrial clusters on sensor technology development.
        - Constantine the Philosopher University in Nitra participates in projects focused on biofeedback and sensor integration within Industry 5.0.
- **VC Funds (Venture Capital):**
    - Clusters have yet to widely leverage VC funds; however, some technology clusters have started collaborating with venture capital funds to finance product and service development.
- **Public Institutions:**
    - The Slovak Investment and Trade Development Agency (SARIO) and the Ministry of Economy of the Slovak Republic actively support cluster organizations through grant calls and partnerships.
- **Notable Partnerships:**
    - **Automotive Cluster Slovakia:** Collaborates with major car manufacturers, providing members with access to advanced technologies and training.
    - **Košice IT Cluster:** Has created an ecosystem involving partnerships with global IT companies, universities, and local startups.

Summary: The Slovak cluster ecosystem provides a variety of tools and mechanisms to support cluster members and SMEs. Key elements include university partnerships, access to funding through national and European grants, and the development of digital platforms for member interaction. Challenges remain in effectively engaging VC funds and expanding technological initiatives.

4. Record of International Cooperation

1. Past and Current Projects

- **Examples of International Projects:**
    - **Danubiovalnet** (2017–2019):
        - Focus: Strengthening cooperation between clusters in the Danube Region, with a focus on eco-innovation and bio-based industries.
        - Partners: Clusters and research organizations from Austria, Germany, Hungary, and other Danube region countries.
    - **ClusterPoliSEE** (2012–2014):
        - Focus: Policy learning and innovation among clusters in Southeast Europe.
        - Partners: Participants from Italy, Greece, Romania, and other countries in the region.
- **Main Outputs:**
    - **Danubiovalnet:**
        - Development of cross-regional value chains in bio-based industries.
        - Establishment of joint action plans for eco-innovation initiatives.
    - **ClusterPoliSEE:**
        - Exchange of best practices in cluster policy implementation.
        - Creation of policy guidelines for fostering cluster cooperation.

2. Benefits and Challenges

- **Key Benefits:**
    - **Strengthened Partnerships:**
        - Close collaboration with clusters and institutions across Europe has built long-term relationships and increased trust.
        - Partnerships have led to joint participation in additional projects and initiatives.

- **New Funding Opportunities:**
    - Access to European Union funds, such as Horizon Europe and Interreg, has boosted financial resources for innovation and development.
- **Capacity Building:**
    - Enhanced skills and knowledge among cluster managers through participation in international workshops and training sessions.
- **Policy Influence:**
    - Contributions to shaping European cluster policies and aligning them with Slovak cluster needs.

- **Challenges:**
    - **Cultural Differences:**
        - Variations in communication styles and business practices sometimes create misunderstandings or delays.
    - **Administrative Hurdles:**
        - Complex EU funding applications and reporting requirements can be resource-intensive.
    - **Sustainability of Collaboration:**
        - Ensuring long-term engagement and commitment from international partners beyond project completion.
    - **Digitalization Gaps:**
        - Disparities in the adoption of digital tools among partners can hinder seamless collaboration.

Summary:
Union of Slovak Clusters has actively engaged in international cooperation, contributing to numerous successful projects and fostering cross-border partnerships. These collaborations have resulted in significant outputs, including tools, policies, and networks that benefit cluster members. While challenges exist, the benefits of strengthened partnerships, funding opportunities, and enhanced skills far outweigh the hurdles.

5. Suggestions for Future Digital/AI Platforms

1. Key Features for Digital/AI Platforms

- **Functionalities to Include:**
  - **Real-Time Data Analytics:**
    - Tools to monitor trends, member activity, and economic indicators relevant to cluster members.
    - Dashboards that provide actionable insights for decision-making.
  - **AI-Driven Matchmaking Tools:**
    - Algorithms to connect cluster members with potential partners, both locally and internationally, based on competencies, projects, and goals.
  - **Collaboration Tools:**
    - Digital workspaces for seamless communication, file sharing, and virtual meetings.
    - Features like shared calendars and integrated project management tools.
  - **Virtual Events and Training:**
    - Platforms for hosting virtual workshops, webinars, and matchmaking events.
    - Personalized recommendations for participants to maximize networking opportunities.
  - **Market Intelligence Tools:**
    - AI tools that analyze market trends, funding opportunities, and competitor activity.
    - Alerts for new business opportunities or calls for proposals.
  - **Integration with Existing Systems:**
    - APIs to connect with government databases, funding platforms, and other digital tools.

- **Desired Outcomes:**
    - **Improved Cross-Border Collaboration:**
        - Facilitation of partnerships between clusters in different countries and regions.
        - Support for joint projects and grant applications.
    - **Enhanced Member Engagement:**
        - Increased participation in events, discussions, and joint initiatives through personalized notifications and targeted content.
    - **Efficiency Gains:**
        - Reduction in time spent on administrative tasks through automated processes.

2. AI Opportunities and Risks

- **How Could AI Help Cluster Organizations and SMEs?**
    - **Enhanced Networking and Collaboration:**
        - AI can identify complementary partners or clusters based on data such as competencies, ongoing projects, and member needs.
        - Example: Matching a Slovak manufacturing SME with an Austrian innovation cluster for joint R&D.
    - **Predictive Insights:**
        - AI can forecast trends and demand, allowing clusters and members to anticipate market changes.
        - Example: Analyzing supply chain vulnerabilities and suggesting alternative suppliers.
    - **Automated Content Generation:**
        - AI tools can generate tailored newsletters, event invitations, and reports for members.
    - **Resource Optimization:**
        - AI can optimize resource allocation within clusters, suggesting the best use of funding, training, and other support services.

- **What Risks or Challenges Should Be Addressed?**
    - **Data Privacy:**
        - Collecting and processing data from cluster members raises concerns about compliance with GDPR and other privacy regulations.
        - Mitigation: Implement secure data encryption and clear consent mechanisms.
    - **Implementation Costs:**
        - High initial costs for developing and maintaining an AI-driven platform may strain budgets.
        - Mitigation: Leverage EU funding and explore cost-sharing among participating clusters.
    - **Digital Literacy:**
        - Members may face challenges in adopting new tools, particularly SMEs with limited tech expertise.
        - Mitigation: Offer training and user-friendly interfaces.
    - **Bias in AI Algorithms:**
        - Poorly designed algorithms could reinforce existing inequalities or exclude certain members.
        - Mitigation: Regularly review and update algorithms to ensure fairness.

Summary:
Future digital and AI platforms for clusters should prioritize real-time analytics, intelligent matchmaking, and collaborative tools to enhance engagement and cross-border cooperation. While AI offers significant opportunities, careful attention to data privacy, implementation costs, and digital literacy is essential to maximize its potential and ensure equitable benefits for all members.

6. Additional Comments

Further Insights and Recommendations for Platform Development

1. **Enhanced User Experience (UX):**
    - Simplify the user interface to ensure accessibility for cluster members with varying levels of digital literacy.
    - Provide multilingual support (e.g., English and local languages) to facilitate international collaboration.
2. **Integration with EU and Global Platforms:**
    - Establish APIs or data exchange mechanisms with platforms like the European Cluster Collaboration Platform or other regional cluster networks.
    - Enable seamless access to international project opportunities and best practices.
3. **Advanced Analytics and AI Features:**
    - Introduce predictive analytics tools to forecast trends, identify funding opportunities, and recommend partnerships.
    - Utilize AI to create personalized user experiences, such as tailored recommendations for events, grants, or collaborations.
4. **Gamification:**
    - Implement gamified elements to encourage participation, such as badges for active engagement or points for completing updates on profiles.
5. **Knowledge Hub:**
    - Develop a centralized repository for reports, research papers, webinars, and case studies related to clusters and SMEs.
    - Regularly update with content showcasing successful projects and innovative practices.
6. **Training and Support:**
    - Provide online training modules on topics like grant application processes, project management, and digital transformation.
    - Establish a help desk or chatbot for real-time support.

7. **Mobile Accessibility:**
    - Develop a mobile-friendly version of the platform or a dedicated mobile app to ensure access on the go.
8. **Monitoring and Feedback Mechanisms:**
    - Include tools for tracking the platform's impact, such as metrics on collaboration activities or user satisfaction.
    - Collect user feedback through surveys and focus groups to guide continuous improvements.
9. **Funding and Incentive Models:**
    - Introduce funding matchmaking tools to connect clusters with appropriate grants, investors, or venture capital.
    - Offer incentives (e.g., discounts on services or premium features) to clusters that actively contribute to the platform's content and network.
10. **Focus on Sustainability and Green Innovation:**
    - Highlight initiatives supporting sustainability and the green transition, aligning with EU priorities.
    - Feature clusters working on renewable energy, circular economy, and eco-innovation prominently.

By implementing these features and strategies, Slovak cluster platforms can increase engagement, foster innovation, and solidify their position as key facilitators in the regional and international cluster ecosystems.

Attachments

Sources:

SIEA predstavila Slovenský klastrový monitor

21. apríla 2021 — Platforma má pomáhať klastrom aj v zapájaní sa do zahraničných projektov a pri certifikácii. Práve v oblasti medzinárodnej certifikácie ...

[PDF] klastre na slovensku | siea

Slovenské klastrové organizácie predstavujú významnú ekonomickú silu – združujú 眴椀 rmy a organizácie s vyše 100 000 zamestnancami a s celkovým ročným.

Úloha Európskeho sekretariátu pre klastrové analýzy (ESCA) v ...

Táto platforma umožňuje registrovaným klastrom sa prezentovať prostredníctvom svojho profilu, vrátane vlastných aktivít, podujatí alebo účastí v medzinárodných ...

Certifikácia klastrových organizácií - Inovujme.sk

Slovenská inovačná a energetická agentúra (SIEA) ponúka pre registrované klastrové organizácie na Slovensku možnosť národnej certifikácie v rámci Národného ...

Únia klastrov Slovenska

Únia klastrov Slovenska vznikla v roku 2010 ako záujmové združenie právnických osôb s cieľom podpory rozvoja klastrov a klastrovej politiky na Slovensku. Viac .

Novinky - Únia klastrov Slovenska

Od 1. októbra 2020 sa začala realizácia inovačného projektu CO-FRESH financovaného z programu Horizont 2020. Projekt je zameraný na podporu udržateľnejších a ...

Ciele a aktivity klastra | Slovenská asociácia udržateľnej energetiky

V rámci SAPI-klastrovej organizácie pôjde o klastrového manažéra a administratívneho pracovníka. V rámci pracovnej náplne jednotlivých zamestnancov bude ...

[PDF] Medzinárodná certifikácia klastrov na Slovensku

klaster používajú klastrové organizácie priamo vo svojom názve, termín klastrová organizácia používa Slovenská inovačná a energetická agentúra (SIEA), ktorá ...

Základné informácie - Bioeconomy Cluster

Hlavným cieľom klastra je spolupráca s praxou a zároveň prepájanie praxe s vedou a výskumom. Klaster v tomto ohľade zabezpečuje zastupovanie svojich členov, ...

klastre - InnoNews.blog

Slovenská inovačná a energetická agentúra (SIEA) v spolupráci s Úniou klastrov Slovenska ponúka pre

Interreg Danube Region

Co-funded by the European Union

DanubIA Clusters

National Partner Contributions to the Report on the state of play on digital/AI based B2B/C2C/B2C cooperation platforms

Deliverable D 1.1.1

Responsible Partner: Ukrainian Cluster

Content

1. Partner Information

- **Country:** Ukraine
- **Organization Name:** Ukrainian Cluster Alliance
- **Contact Person:** Alex Yurchak, yurchak.alexandre@clusters.org.ua +380503273461
- **Date of Submission:** 04.03.2025

2. National Platforms Overview

1. Platform Information:

- **Platform Name:** web-site of UCA Ukrainian / Cluster Ecosystem Analysis
- **Purpose:** Provides an overview of Ukrainian cluster organizations, supports their participation in international projects and certifications.
- **Core Features:**
    - Database of Ukrainian clusters
    - Information about events and updates
    - Support for international certification
- **URL:**
    - Tools for matchmaking and international collaboration: https://www.clusters.org.ua/en/map-of-clusters
    - the regular reports, Cluster Ecosystem Analysis https://www.interregeurope.eu/sites/default/files/2025-02/Ukrainian%20Cluster%20Ecosystem%20Analysis.pdf

2. Data Quality:

- **What information does the platform contain?**
  It contains profiles of Ukrainian cluster organizations, information about their activities, events, and collaboration opportunities.

- **Are the data accurate and regularly updated?**
  Yes, the data are regularly updated in cooperation with clusters and relevant institutions.

3. Challenges:

- **What are the main challenges in managing or using the platform?**
  Ensuring the accuracy of information and motivating clusters to regularly update their profiles and deliver the information about their news.

  Providing the regular, deep survey and reporting about clusters state, changes in needs and challenges, strategies and achievements.

- **What improvements are needed?**
  Increasing the volume and quality of information form clusters / platform's interactivity and expanding its features to improve communication among clusters.

  integration with EU platforms, and multilingual support

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1. Platform Information:

- **Platform Name:** Ukrainian Cluster Alliance
- **Purpose:** Supporting the development of clusters and cluster policies in Ukraine, representing members' interests, and promoting collaboration among clusters.
- **Core Features:**
  - Representation of members at the national and international levels
  - Representation of services providing to clusters, icnlduing those from Structural division of UCA (such as Resource Centers, Committees etc)
  - Representation of common and inter-clusters projects led by UCA
  - Organization of events and workshops
  - Implementation of projects to support clusters
- **URL:** general - https://www.clusters.org.ua/en/home-page/ / clusters mapping https://www.clusters.org.ua/en/map-of-clusters

2. Data Quality:

- **What information does the platform contain?**
  Information about UCA's members, their activities, common projects, success stories and best practices, updates in the field of clusters.
- **Are the data accurate and regularly updated?**
  Partly 'Yes', the data are regularly updated by the platform administrators and UCA members. However the information from cluster is not accurate and is not updated as regularly as needed.

3. Challenges:

- **What are the main challenges in managing or using the platform?**
  Maintaining the accuracy of information and ensuring active participation of members.
- **What improvements are needed?**
  Expanding the content with clusters activities, project information, best practices and success stories in the field of clusters.

3. Tools and Mechanisms Supporting Cluster Members and SMEs

1. Existing Tools

- **Competency Maps:**
  - Ongoing work in mapping competencies of cluster members to foster partnerships.
  - Mapping typically provided and adjusted in Structural divisions (Resource Centers and Commitees).
- **Partnerships with Universities:**
  - 20 clusters+ forms partnerships with 30+ universities
  - 5 clusters have formal agreements
  - The most successful is Kharkiv-IT clusters wchich forms and support relationships with 50 Universities
  - 5 clusters cooperates with Universities in framework of EDIH consortiums
- **Funding Mechanisms:**

- Funding mechanisms include European grants (e.g., International donors in Ukraine (as GIZ), Horizon Europe, Interreg programs).
- Almost NO support from national public institutions.

- **Digital Platforms:**
  - UCA web-site provide general information about UCA, and its clusters, events, best practices (incl knowledge base), and clusters mapping https://www.clusters.org.ua/en/map-of-clusters
  - B2B-matchmaking & fundrasing platform https://www.new.b2b-matchmaking.com.ua/
  - Landscape of Innovators oof Industry 4.0 (incl database of companies split by segment and technology) https://land4developers.com/
- **Specific Initiatives:**
  - UCA develop strategic 'Program & Project' approach which develop long-term programs of international collaboration oriented to the Recovery of Ukraine https://www.clusters.org.ua/en/blog-about-clusters/uca-project-portfolio-as-a-response-to-challenges/
  - Example of a program Clusters4Defense https://www.clusters.org.ua/en/clusters4defense-initiative/

2. Collaboration with Other Entities

- **Universities and EDIHs:**
    - Yes, universities play a significant role in the cluster ecosystem. For instance:
        - 5 UCA clusters lead EDIHs consortium together with 10 Universities .
        - There is a local / regional collaboration with Universities in 10 regiuons.
- **VC Funds (Venture Capital):**
    - No special collaboration yet.
- **Public Institutions:**
    - National level – 6 Ministries (Economy, Strategic Industries, Digital Transformation, Agri-food, Reconstruction, Defense).
    - Regional level – 9 regional administration and their Agencies of Regional development
- **Notable Partnerships:**
    - **APPAU:** leads the national movement Industry 4.0-5.0
    - **Kharkiv IT Cluster:** Has created an strong educational ecosystem involving partnerships with global IT companies, universities, and local startups.

Summary: The Ukrainian cluster ecosystem provides a variety of tools and mechanisms to support cluster members and SMEs. Key elements include university and EDIH partnerships, access to funding through European grants, and the development of digital platforms for member interaction. Challenges remain in effectively engaging Public institutions (policy level), VC funds and expanding technological initiatives.

4. Record of International Cooperation

1. Past and Current Projects

- **Examples of International Projects:**
    - **BOWI** (2021-23)
        - Focus: creation and development of Digital Innovation Hubs.
        - Partners: the National Technical University 'KPI named after Igor Sikorsky', Polish EDIHs, Funding box, APPAU
    - **IDEALIST** (Horizon Europe): (2023-2025)
        - Focus: twin transition of SMEs in 3 target industrial ecosystem.
        - Partners: Participants from Italy, France, Poland, Czech Republic and Germany.
    - **Accelerate GDT** (Interreg Europe): (2024-2026)
        - Focus: implementing twin transition element into cluster policies
        - Partners: Participants from Ireland, Hungary, Italy, Austria, Spain, Czech Republic and Germany.
    -
- **Main Outputs:**
    - **BOWI**: creation of first working services model in Ukraine in digitalization of SMEs using University and Cluster capacities
    - **IDEALIST**: set of tools of acceleration of SME in twin transition
    - **Accelerate GDT**: new cluster policies of national and regional level (new ongoing projects in Ukraine with public institutions)

2. Benefits and Challenges

- **Key Benefits:**
    - **Strengthened Partnerships:**
        - Close collaboration with clusters and institutions across Europe has built long-term relationships and increased trust.

        - Partnerships have led to joint participation in additional projects and initiatives.
    - **New Funding Opportunities:**
        - Access to European Union funds, such as Horizon Europe and Interreg, has boosted financial resources for innovation and development.
    - **Capacity Building:**
        - Enhanced skills and knowledge among cluster managers through participation in international workshops and training sessions.
        - Creating the first working DIHs model in Ukraine
    - **Policy Influence:**
        - Contributions to shaping European cluster policies and aligning them with Ukrainian cluster needs.
- **Challenges:**
    - **Cultural Differences:**
        - Variations in communication styles and business practices sometimes create misunderstandings or delays.
    - **Administrative Hurdles:**
        - Complex EU funding applications and reporting requirements can be resource-intensive.
    - **Sustainability of Collaboration:**
        - Ensuring long-term engagement and commitment from international partners beyond project completion.
    - **Digitalization Gaps:**
        - Disparities in the adoption of digital tools among partners can hinder seamless collaboration.
        - Difficulties in the adoption right methodology of assessment of digital maturity of SME, clusters members

Summary:
Ukrainian Clusters Alliance has actively engaged in international cooperation, contributing to numerous successful projects and fostering cross-border partnerships.

These collaborations have resulted in significant outputs, including tools, policies, and networks that benefit cluster members. While challenges exist, the benefits of strengthened partnerships, funding opportunities, and enhanced skills far outweigh the hurdles.

5. Suggestions for Future Digital/AI Platforms

1. Key Features for Digital/AI Platforms

- **Functionalities to Include:**
    - **Real-Time Data Analytics:**
        - Tools to gather & monitor information about trends, member activity, and economic indicators relevant to cluster members and aligned to their industry dynamic
        - Dashboards that provide actionable insights for decision-making.
    - **AI-Driven Matchmaking Tools:**
        - Algorithms to connect and match cluster members with potential partners, both locally and internationally, based on their profile, as well on their competencies, projects, and goals.
    - **Collaboration Tools:**
        - Digital workspaces for seamless communication, file sharing, and virtual meetings.
        - Features like shared calendars and integrated project management tools.
    - **Virtual Events and Training:**
        - Platforms for hosting virtual workshops, webinars, and matchmaking events.
        - Personalized recommendations for participants to maximize networking opportunities.
    - **Market Intelligence Tools:**

        - AI tools that analyze market trends, funding opportunities, and competitor activity.
        - Alerts for new business opportunities or calls for proposals.
    - **Integration with Existing Systems:**
        - APIs to connect with government databases, funding platforms, and other digital tools.

- **Desired Outcomes:**
    - **Improved Cross-Border Collaboration:**
        - Facilitation of partnerships between clusters in different countries and regions.
        - Support for joint projects and grant applications.
    - **Enhanced Member Engagement:**
        - Increased participation in events, discussions, and joint initiatives through personalized notifications and targeted content.
    - **Efficiency Gains:**
        - Reduction in time spent on administrative tasks through automated processes.

2. AI Opportunities and Risks

- **How Could AI Help Cluster Organizations and SMEs?**
    - **Enhanced Networking and Collaboration:**
        - AI can identify complementary partners or clusters based on data such as company profile, competencies, ongoing projects, and member needs.
        - Example: Matching a Ukrainian engineering SME with a Czech general contractor from Energy sector.
    - **Predictive Insights:**
        - AI can forecast trends and demand, allowing clusters and members to anticipate market changes.
        - Example: Analyzing market trends and predicting the disruption of supply chain in a given industry (f.e. composite materials for

transport builders) will allow to cluster management start mitigation activities (as searching new suppliers, or developing some expertise / capacity in the own cluster).

- **Automated Content Generation:**
  - AI tools can generate tailored newsletters, event invitations, and reports for members.
- **Resource Optimization:**
  - AI can optimize resource allocation within clusters, suggesting the best use of funding, training, and other support services.

- **What Risks or Challenges Should Be Addressed?**
    - **Data Privacy:**
        - Collecting and processing data from cluster members raises concerns about compliance with GDPR and other privacy regulations.
        - Mitigation: Implement secure data encryption and clear consent mechanisms.
    - **Implementation Costs:**
        - High initial costs for developing and maintaining an AI-driven platform may strain budgets.
        - Mitigation: Leverage EU funding and explore cost-sharing among participating clusters.
    - **Digital Literacy:**
        - Members may face challenges in adopting new tools, particularly SMEs with limited tech expertise.
        - Mitigation: Offer training and user-friendly interfaces.
    - **Bias in AI Algorithms:**
        - Poorly designed algorithms could reinforce existing inequalities or exclude certain members.
        - Mitigation: Regularly review and update algorithms to ensure fairness.

Summary:
Future digital and AI platforms for clusters should prioritize real-time analytics, intelligent matchmaking, and collaborative tools to enhance engagement and cross-border cooperation. While AI offers significant opportunities, careful attention to data privacy, implementation costs, and digital literacy is essential to maximize its potential and ensure equitable benefits for all members.

6. Additional Comments

Further Insights and Recommendations for Platform Development

1. **Enhanced User Experience (UX):**
    - Simplify the user interface to ensure accessibility for cluster members with varying levels of digital literacy.
    - Provide multilingual support (e.g., English and local languages) to facilitate international collaboration.
2. **Integration with EU and Global Platforms:**
    - Establish APIs or data exchange mechanisms with platforms like the European Cluster Collaboration Platform or other regional cluster networks.
    - Enable seamless access to international project opportunities and best practices.
3. **Advanced Analytics and AI Features:**
    - Introduce predictive analytics tools to forecast trends, identify funding opportunities, and recommend partnerships.
    - Utilize AI to create personalized user experiences, such as tailored recommendations for events, grants, or collaborations.
4. **Gamification:**
    - Implement gamified elements to encourage participation, such as badges for active engagement or points for completing updates on profiles.
5. **Knowledge Hub:**
    - Develop a centralized repository for reports, research papers, webinars, and case studies related to clusters and SMEs.
    - Regularly update with content showcasing successful projects and innovative practices.
6. **Training and Support:**
    - Provide online training modules on topics like grant application processes, project management, and digital transformation.
    - Establish a help desk or chatbot for real-time support.

7. **Mobile Accessibility:**
    - Develop a mobile-friendly version of the platform or a dedicated mobile app to ensure access on the go.
8. **Monitoring and Feedback Mechanisms:**
    - Include tools for tracking the platform's impact, such as metrics on collaboration activities or user satisfaction.
    - Collect user feedback through surveys and focus groups to guide continuous improvements.
9. **Funding and Incentive Models:**
    - Introduce funding matchmaking tools to connect clusters with appropriate grants, investors, or venture capital.
    - Offer incentives (e.g., discounts on services or premium features) to clusters that actively contribute to the platform's content and network.
10. **Focus on Sustainability and Green Innovation:**
    - Highlight initiatives supporting sustainability and the green transition, aligning with EU priorities.
    - Feature clusters working on renewable energy, circular economy, and eco-innovation prominently.

By implementing these features and strategies, Ukrainian cluster platform can increase engagement, foster innovation, and solidify their position as key facilitators in the regional and international cluster ecosystems.