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Book of Abstracts

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***“Innovation for a Sustainable Future:
Integrating Technology, Education, and
Cross-Sector Collaboration for a
Competitive Economy and Equitable
Society”***



Staff well-being - the basis of enterprise sustainability

by Oksana Poplavska | KNEU

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Topic: Innovation ecosystems and technology transfer

An enterprise's HR management policy forms its own ecosystem of labor relations. Depending on how sustainable these relations are, the competitiveness of the organization is enhanced.

Considering the ecosystem of social and labor relations of the enterprise, special attention should be paid to the issues of personnel well-being. At the same time, personnel well-being is achieved in the following areas: material, social, moral and ethical, status. Material well-being is achieved through an effective policy of remuneration for labor, motivation. Social well-being is formed through the formation of comfortable working conditions and communications, realization of positive practices of interaction. Separately, it should be noted that social well-being presupposes the existence of a safe spread (for Ukraine, safety in the workplace is important, including through external factors rather than technological reasons). Moral and ethical well-being is closely related to the previously mentioned components of well-being and is formed due to the policy of corporate culture; the indicators of its achievement are the psychological state of employees. Status well-being is the result of a well-thought-out policy of personnel development and career growth.

Systematizing the studies of personnel well-being in conditions of increased turbulence, the following criteria of effectiveness in management:

- consistency in management decisions - only when all decisions regarding personnel management are made taking into account the previous ones and do not contradict one to another, positive changes are possible;
- systematic - any decisions on changes should take into account all possible risks and, if necessary, be adjusted to external factors;
- comprehensiveness - when making decisions related to a certain well-being component, the impact of changes on other well-being components and other business processes should be taken into account, i.e. changes within the ecosystem of the enterprise itself.

It is also important to take into account the values of the staff and the company's goals, which should not contradict each other, and should not conflict with the national interest.

The sustainability of the enterprise directly depends on the creation of an equilibrium

ecosystem of personnel management (if the ecosystem is in equilibrium for a long time, it can be considered sustainable). In this case, the sustainability of the enterprise (SBS) is proposed to be described by the mathematical model. In this model, personnel well-being allows to achieve a “softer” transition to innovation, accumulation of social capital, and forms a positive brand of the enterprise.

Thus, using the author's approach to strengthening the sustainability of the enterprise, focused on ensuring the well-being of personnel, it is possible to minimize losses from non-acceptance of changes, inconsistency of actions, etc.

Partnership as a key to innovative community development

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Event: CloudEARTH Conference 2025

Topic: Cross-sector partnerships and community engagement for sustainability: interdisciplinary approaches

Local governments need an educated community with active civic engagement and social responsibility. In turn, educational institutions benefit from a practical foundation to implement their research and involve students in solving community challenges.

This article highlights three cases of collaboration between educational institutions and local communities in carrying out innovation. Cities with colleges or universities typically exhibit stable development. Higher education institutions generate employment opportunities, attract innovative projects, and serve as hubs for public engagement. Students equipped with innovative thinking skills are prepared to contribute to solving challenges within the local community.

Pereshchepyne is a small town in the Dnipropetrovsk region, located 200 km from the zone of active military actions, and has become a refuge for many forcibly displaced persons. The Center for Analytics and Business Modelling of Sustainable Development at the National University of "Kyiv-Mohyla Academy worked with this community to develop a Strategy.

We noticed three important aspects:

- **Growth of entrepreneurial activity.** IDPs are opening new businesses in the service sector and small and medium-sized enterprises.
- **Fullness of kindergartens and schools.** Even in difficult circumstances, parents try to provide their children with a quality education.
- **Community activity in creating a better life.** People are willing to master new professions and adapt to changes.

The research team facilitated discussions on the strategy, engaging local authorities and the community in the decision-making process. As a result, the community received tools for developing strategic documents, implementing participatory decision-making mechanisms, and strengthening its capacity.

A digital course for seniors was organized in a municipal coworking space VCENTRI Hub in Kyiv. Students from the National Technical University "Kyiv Polytechnic Institute named after Sikorsky" conducted the courses as part of their practice.

Thanks to this initiative:

- ***Seniors learned to use digital services:*** pay utility bills, make doctor's appointments, and transfer meter readings.
- ***Students gained practical teaching experience.***

The community strengthened its digital skills and reduced digital discrimination.

Secondary School No. 5 in Zvyahel, Zhytomyr region, has implemented projects supporting education and environmental changes in the community. The California Miracle project introduced the city's first public composter with California worms, helping to reduce air pollution. The Eco-Furniture Workshop initiative fosters entrepreneurial skills among pupils by teaching them how to create eco-friendly furniture from repurposed materials.

These initiatives demonstrate how educational institutions can cultivate environmental thinking, develop entrepreneurial competencies in young learners, and drive positive ecological change within the community.

Local authorities should consider education as a long-term investment. Educational institutions contribute to economic development, innovation and social activism. Expanding the educational services for the community. It is necessary to support preschool and school education and develop adult education services, new technology, and digital skills.

Creating platforms for cooperation. Facilitation sessions, municipal co-working, and volunteer initiatives can help unite the efforts of students, businesses, and the community.

Partnerships between local authorities and educational institutions are a powerful tool for providing innovation in the community. Successful cases in Ukraine show that through cooperation, it is possible to improve educational opportunities and make communities stronger, resilient, socially responsible, and economically sustainable.

Science-Policy: UNFCCC policymakers' perspective of scientific scenarios and their policy relevance

by Jiesper Tristan Pedersen | OSEAN

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Submitted: March 10, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Cross-sector partnerships and community engagement for sustainability: interdisciplinary approaches

Scenarios play a pivotal role in linking climate science to policy action, informing the Intergovernmental Panel on Climate Change (IPCC) reports and international negotiations within the United Nations Framework Convention on Climate Change (UNFCCC) and its annual Conferences of the Parties (COPs). However, policymakers' (PMs) perspectives remain understudied. Here, we surveyed UNFCCC National Focal Points (N=278/n=57), assessing the knowledge base of international-national PMs, perceptions of scenarios' policy relevance and plausible improvements. Results highlight a significant regional knowledge gap, with lower scenario familiarity for PMs representing low- and middle-income countries. Furthermore, policymakers request more straightforward scenario communication and more detail. To improve scenario relevance (credibility and legitimacy)⁴, we recommend more actively disseminating scenario knowledge (enhancing institutional capacity) in the Global South and providing more policy relevant detail into global scenarios and national extensions (linking scenarios to on-the-ground policy action). This also means reassessing the IPCC's cautiousness concerning being policy neutral.

Keywords: Emission, climate, impact scenarios; policymaker perspectives; policy relevance; science-policy interface; climate justice; United Nations Framework Convention on Climate Change (UNFCCC); Intergovernmental Panel on Climate Change (IPCC)

FEATURES OF CROSS-FUNCTIONAL BUSINESS PROCESS OPTIMIZATION: THE EXAMPLE OF UKRAINIAN ENTERPRISES

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Topic: Circular economy: supply chains, resource efficiency, innovation, education and awareness

In the modern business environment, companies face the challenge of managing increasingly complex business processes that involve various departments and functions. Traditional management approaches, focused on optimizing individual functions or departments, no longer provide a sustainable competitive advantage. Striving for greater efficiency and flexibility, companies are actively adopting cross-functional business process management (BPM), which has become a key component of organizational success.

The core concept of cross-functional BPM is the integration of activities across different departments to achieve the company's strategic goals. This approach emphasizes the importance of managing business processes as a whole, rather than focusing on individual tasks within separate departments. Effective cross-functional BPM enables organizations to enhance internal communication, streamline workflows, and improve overall performance by eliminating barriers between teams.

In recent years, many Ukrainian companies have actively implemented cross-functional management practices to address the unique challenges of operating in an unstable environment. Enterprises in sectors such as agriculture, energy, IT, and retail have made significant progress in implementing cross-functional business processes to ensure resilience, adaptability, and innovation.

For instance, Ukrposhta, the national postal operator, introduced cross-functional teams to optimize logistics, streamline digital services, and improve customer experience. The integration of IT, logistics, and customer service teams allowed the company to enhance operational efficiency and respond more quickly to market demands.

Another example is Rozetka, one of the largest e-commerce platforms in Ukraine. The company successfully implemented cross-functional processes in supply chain management by combining procurement, warehousing, and delivery teams to improve customer service and reduce order processing times. The use of end-to-end business processes has allowed Rozetka to maintain operational stability even during ongoing geopolitical crises.

In the energy sector, DTEK, the largest private energy company in Ukraine, has adopted cross-functional BPM to manage its production and distribution networks more effectively.

The integration of production, maintenance, and customer service departments enables the company to ensure more reliable energy supply and faster responses to technical issues.

On the other hand, digital transformation plays a crucial role in the implementation of cross-functional BPM in Ukraine. The use of cloud technologies, artificial intelligence (AI), and service-oriented architecture (SOA) allows companies to automate workflows, improve data management, and enhance decision-making processes.

For example, Nova Poshta has adopted digital BPM systems to optimize its logistics network and improve delivery services. The integration of various business functions, such as routing, packaging, and customer support, has allowed the company to adapt more quickly to market changes and customer needs.

Similarly, Oschadbank has implemented cross-functional processes to improve its customer relationship management (CRM) system. The bank's approach combines marketing, sales, and customer support functions, resulting in better customer engagement and higher service quality.

Despite the significant advantages, Ukrainian enterprises also face several challenges in implementing cross-functional BPM. These include:

- Resource constraints
- Resistance to change from employees
- Lack of specialized expertise in process management

To overcome these challenges, companies can invest in training programs to develop the necessary skills for process optimization, promote a corporate culture that values collaboration and open communication, utilize digital tools to support the implementation of cross-functional processes.

In summary, it is important to highlight that cross-functional business process management represents a significant step forward compared to traditional management methods. By focusing on the integration of activities across different departments, organizations can achieve greater efficiency, innovation, and adaptability in changing environments.

In Ukraine, cross-functional BPM has gained particular relevance due to ongoing geopolitical and economic challenges. The examples we mentioned above demonstrate that the implementation of cross-functional processes can lead to improved business performance, enhanced customer service, and greater resilience.

The successful implementation of cross-functional BPM in Ukraine requires a combination of digital transformation, process-oriented management, and a collaborative culture. Companies that follow these principles will be better positioned to navigate the uncertainties of the modern business landscape and achieve long-term success.

Leadership in a turbulent World: What We Need and What We Have?

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Topic: Leadership for Industry 5.0

In time defined by rapid change, geopolitical unrest, climate crises, and technological disruption, the need for strong, adaptive leadership has never been more urgent. The paper explores the evolving landscape of global leadership, identifying the qualities and competencies essential for navigating uncertainty and fostering resilience across sectors. We will examine the gap between the leadership the world requires today—empathetic, agile, brave and globally minded—and the leadership presented currently by the key leaders. By analyzing real-world examples and emerging trends, we will discuss how individuals and organizations can begin to close this leadership gap and cultivate a new generation of leaders equipped for the complexities of our time.

Take It or Leave It: Europe's Opportunity to Bolster Deep Tech Innovation Amid a Shifting Global Landscape

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Event: CloudEARTH*i* Conference 2025

Topic: Innovation ecosystems and technology transfer

Europe's Deep Tech Innovation ecosystem holds immense potential to drive technological breakthroughs and economic growth, yet it faces a critical challenge: a lack of robust incentives to attract and retain top talent. As the United States implements policies that are poised to reshape the global innovation landscape, Europe stands at a pivotal crossroads. This paper explores the opportunity for Europe to capitalize on these shifts by introducing compelling incentives—financial, structural, and cultural—to draw in the world's brightest minds. With the right strategies, Europe could not only strengthen its position in the global innovation race but also redefine its Deep Tech ecosystem for the future. The moment is now: will Europe take it, or leave it to others to lead?

Recent data underscores the urgency of this opportunity. A new study conducted in early 2025 reveals that 70% of researchers, including PhD students and postdoctoral scholars in the United States, are contemplating leaving the country due to policy changes and economic instability. This survey, encompassing over 5,000 respondents across STEM fields, highlights how funding cuts, visa restrictions, and an uncertain research climate are driving talent to seek opportunities elsewhere. Europe, with its stable funding programs and a growing emphasis on collaborative ecosystems, is well-positioned to attract this exodus of expertise. The stakes are high: failure to act could see this talent pool dispersed to competitors like Canada or Asia instead.

AccessEARTH: An AI-Based Multi-Source Platform for Accelerated and Accurate Mineral Exploration

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Event: CloudEARTH Conference 2025

Topic: Innovation ecosystems and technology transfer

AccessEARTH is an advanced geoscientific platform that revolutionizes mineral exploration through the integration of artificial intelligence (AI), cloud computing, and 3D modeling technologies. Traditional mineral exploration methods often rely on manual interpretation of disparate datasets—such as satellite imagery, geophysical surveys, and geochemical assays—resulting in time-consuming and potentially biased assessments. AccessEARTH overcomes these limitations by automating the assimilation, processing, and interpretation of multi-source geospatial data using AI-driven algorithms. These algorithms identify patterns and correlations that may elude conventional analysis, enhancing the detection of mineralized zones with greater precision and confidence. A core innovation of AccessEARTH is its ability to generate detailed geological interpretations, predictive prospectivity maps, and digital elevation models (DEMs) in real-time. These outputs are dynamically visualized through an intuitive, mobile-accessible interface, facilitating rapid decision-making directly in the field. The platform also supports cloud-based processing, enabling scalable analysis of large regional datasets and fostering collaborative workflows across geoscientific teams. Unlike traditional software such as Erdas or Global Mapper, which offer isolated capabilities, AccessEARTH provides an integrated environment that combines AI-based data fusion, 3D geological modeling, and automated classification within a single, user-friendly system. This holistic approach not only reduces exploration costs and timelines but also contributes to more sustainable resource discovery by minimizing environmental impact through targeted prospecting. Overall, AccessEARTH represents a paradigm shift in mineral exploration, empowering geoscientists with a robust, data-driven tool to uncover hidden mineral resources with unprecedented accuracy and efficiency.

Technological Scouting in the Corporate Sector of Ukraine

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Event: CloudEARTH*i* Conference 2025

Topic: Innovation ecosystems and technology transfer

Large companies that don't have or even have their own R&D departments often face significant obstacles in creating innovative products, given the limited human resources, corporate rules and processes, long time to market, high technical and other risks. Under these conditions, innovation and technology scouting has become a tool for overcoming such obstacles, identifying new products, services and solutions that can significantly increase the value proposition. From this perspective, technology scouting involves a strategic review of all startups, technologies, patents, experts that can affect the company and its product, and is an element of strategic technology management at the enterprise.

The undoubted advantages of technology scouting are:

- ready-made solutions that do not require wasting time and resources;
- competitive advantages;
- improving the company's product;
- attracting talent;
- expanding horizons through obtaining new insights and generating new ideas.

Among the sources for scouting are important technology conferences, scouting firms, innovation ecosystems and business incubators. In addition, a company can independently search for technological solutions by organizing contests, hackathons and innovation competitions, opening joint laboratories and research and development centers, developing internal entrepreneurship systems, patent searches, creating its own incubators and accelerators.

The stages of technological scouting include in general 7 stages (Diagram 1):

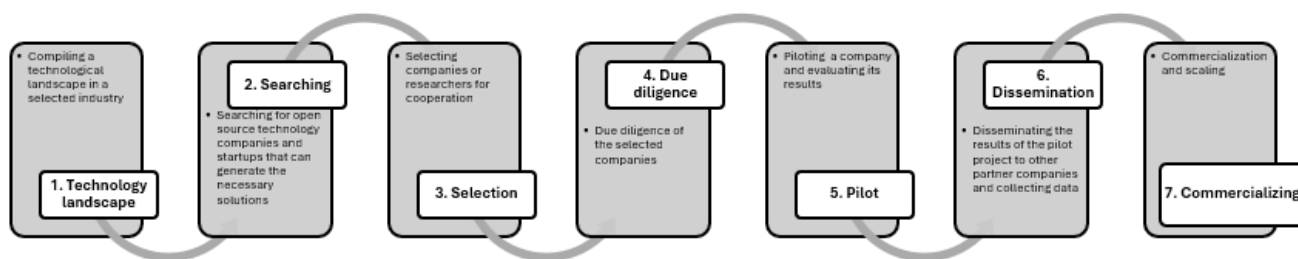


Diagram 1. The stages of technology scouting

The critical success factor is often no longer technology competence but the selection of the best technologies relevant to a certain industry.

The corporate sector in Ukraine suffers from uncertainty, extremely limited budgets, the need to focus on short-term achievements, and pressure from foreign competitors. However, despite the war, there is an active development of innovation activity - in the field of digital and defense technologies, energy and biotechnology, including the system of the National Academy of Sciences of Ukraine. Large enterprises such as DTEK, implementing modern corporate standards, including ESG reporting, decarbonization measures, and achieving the Sustainable Development Goals, are beginning to seek innovative ideas from outside their organizations, particularly in the international space.

Technology scouting in Ukraine has emerged as a pivotal strategy for companies aiming to foster innovation and maintain a competitive edge in the rapidly evolving global market. Ukrainian firms, leveraging the country's rich pool of IT talent and creative minds, actively engage in identifying and assessing technological trends and breakthroughs that align with their strategic goals. This process involves monitoring both domestic and international technological advancements, building networks with startups, research institutions, and innovation hubs, and staying abreast of new developments in fields such as artificial intelligence, blockchain, and green technologies. By adopting technology scouting, Ukrainian companies not only enhance their capacity for innovation but also position themselves as proactive participants in the global technology landscape.

Sources of information for technological scouting of Ukrainian companies are digital platforms and various ecosystems in which startups are grown. In particular, these can be innovation and scientific expertise marketplaces Flintbox, the AUTM Innovation Marketplace or Crunchbase, which accumulate university developments, contain a database of patents and startups. DTEK turned to the UK innovation ecosystem for ideas renowned for its dynamic support of startups, particularly in the energy sector. British startups are pioneering solutions focused on renewable energy, energy efficiency, and smart grid technologies, aiming to transform traditional energy models into more sustainable ones. Through government support, access to cutting-edge research, and an abundance of venture capital, the UK continues to foster an environment where energy innovations can thrive and

contribute to global sustainability goals. The priority areas were identified as: decarbonization, energy storage, carbon-neutral production of hydrogen and hydrogen system components, network flexibility, etc. The goal of integrating innovation ecosystems, in addition to finding fundamentally new solutions and technologies, is to form a culture of open innovation in the company.

In conclusion, technology scouting represents a critical component in the strategic arsenal of Ukrainian companies striving for innovation excellence. By systematically identifying and integrating emerging technologies, these firms can innovate more effectively, adapt to changing market dynamics, and address consumers' evolving needs. As Ukraine continues to solidify its position as a technology hotspot, the role of technology scouting will become increasingly vital, driving sustained economic growth and technological leadership on the international stage.

GREEN FINANCE IN POST-WAR REBUILDING OF UKRAINIAN ECONOMY

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Topic: Green economy

This research aims to explore the role of green finance in the post-war rebuilding of Ukraine, considering the possibility of sustainable development principles integration into post-war rebuilding strategies. The economic, social, and environmental damage caused by the ongoing full scale war are estimated at the primary stage. The particular focus is made on the destruction of critical infrastructure, particularly in the energy sector. The study provides overview and comparative analysis of post-war and post-crisis recovery initiatives, namely the Marshall Plan and the EU post-COVID recovery plan. The case study method is used to provide the retrospective analysis of recovery plans and their possible connection with contemporary green finance initiatives. This means the possibility to provide so-called “reason - result” connection, looking for the lessons that could be applicable to post-war rebuilding in Ukraine. The cases are selected based on their relevance to post-crisis recovery, financial mechanisms that were used, social and economic impacts in both short-term and long-term. Namely, the Marshall plan and the EU post-Covid-19 recovery plan are chosen to provide the retrospective analysis before considering the issue of green finance in Ukrainian post-war recovery plan. In particular, the Marshall plan has historical importance, providing successful example of complex recovery, having both short-term and long-term impacts in European countries. The EU post-Covid-19 recovery plan is focused on sustainable development in Europe in modern time that enables consideration of further economic and environmental influences of appropriate activities. The paper highlights the importance of green finance mechanisms, such as green bonds, sustainable investment funds and public-private partnerships for strengthening post-war recovery efforts. Conclusions and recommendations are provided based on previous analysis of challenges and opportunities for green rebuilding in Ukraine. There is an opportunity for Ukrainian economy rebuilding, based on “green recovery” and “sustainable development” principles. This causes the need of common sustainable-oriented activity of businesses, Ukrainian government and international organizations. In particular, Ukrainian government may elaborate a specific policy framework to encourage green finance within post-war rebuilding strategy, including: development of tax incentives, subsidies, green bonds, etc. attracting Ukrainiana and international investors to support green projects and businesses; facilitation of investment in renewable energy, sustainable infrastructure and environmentally responsible industrial practices; focus on decarbonization and pollution control, providing benefits for investors and businesses, which are able to participate in this activity; providing

background for public-private partnership to strengthen collaboration between state and private sector, fostering green innovation. International organizations are able to provide both financial resources for post-war recovery in Ukraine and technical expertise for strengthening energy infrastructure and achieving decarbonization goals to ensure long-term sustainability. Businesses, which are able to integrate ESG in their activity, contribute both to post-war recovery and sustainable development globally.

Collision-Aware Cooperative Multi-UAV PathPlanning with Hierarchical PPO-LSTM

by Alparslan GUZEY | ATAM Technology

Abstract ID: 120

Submitted: May 3, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Circular economy: supply chains, resource efficiency, innovation, education and awareness

Coordinating fleets of unmanned aerial vehicles (UAVs) in obstacle-dense airspaces requires simultaneously pursuing long-range mission goals and guaranteeing split-second collision safety—objectives that overwhelm flat optimisation or single-level reinforcement-learning (RL) agents as fleet size and map complexity grow. This study introduces a hierarchical RL architecture that decouples global path planning from local collision avoidance. A high-level Manager, implemented with feed-forward Proximal Policy Optimisation (PPO), selects discrete way-points for individual UAVs every K primitive steps, while a shared low-level Worker, realised with PPO augmented by a Long Short-Term Memory (LSTM) network, executes short motion sequences relying solely on local observations. The Worker is pre-trained and then frozen, stabilising subsequent Manager learning in a centralised-training, decentralised-execution regime. Formal analysis proves that every subgame-perfect equilibrium of the induced hierarchical game is collision-free and that enlarging the waypoint dictionary can only improve the expected team return.

The controller is evaluated on three 10×10 grid benchmarks containing two, four, and six UAVs and 20 %–40 % static-obstacle coverage. Against baselines of plain PPO and end-to-end PPO-LSTM, the hierarchical approach sustains at least 90 % mission success—up to 16 percentage points higher than PPO-LSTM and 28 points higher than plain PPO— while reducing collision incidence to ≤ 10 %, a $2.5\text{--}3.8 \times$ decrease relative to the baselines.

These safety gains incur no more than three additional primitive moves and less than 5 % extra battery expenditure per UAV, and training converges 25–35 % faster than the best flat alternative. Welch’s t-tests confirm that all improvements are statistically significant ($p < 0.01$). Ablation studies verify that freezing the Worker, choosing $K = 20$, and adopting a 64-waypoint dictionary are critical to performance. The results demonstrate that separating strategic waypoint assignment from memory-based local control offers a scalable, provably safe solution to cooperative multi-UAV navigation under partial observability. Future work will extend the hierarchy to continuous dynamics, moving obstacles, and multi-objective missions, paving the way for real-world deployment in inspection, logistics, and search-and-rescue operations.

Application of the SMART Analysis Methodology to Enhance the Effectiveness of Organizational Feedback

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Submitted: May 8, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Leadership for Industry 5.0

During the martial law in Ukraine, precise and timely feedback is crucial not only as a tool for managing performance but also as a means to support employees' emotional well-being, resilience, and motivation. In organizational practice, a variety of feedback analysis methods are employed to evaluate communication effectiveness and identify growth opportunities. For instance, the 360° feedback method collects evaluations from peers, subordinates, supervisors, and clients to provide a comprehensive analysis of professional competencies. Pulse surveys consist of short, frequent questionnaires (e.g., weekly) to monitor employee sentiment and facilitate rapid response. The Employee Net Promoter Score (eNPS) measures staff loyalty by assessing their willingness to recommend the organization as a workplace.

In our study, we chose the SMART analysis methodology because it offers a dynamic yet straightforward framework that is especially valuable under continuous operational challenges. SMART evaluates feedback through five criteria: Specific—how clearly and unambiguously messages are formulated; Measurable—the extent to which one can assess the outcome or impact of feedback on employee performance; Achievable—whether proposed actions or expectations are realistic given the organization's resources; Relevant—whether feedback aligns with employees' needs and the organization's strategic objectives; and Time-bound—whether feedback is delivered at the moment when it can have the greatest effect.

To apply this methodology, we selected the specialized enterprise "Tilarme Security LLC," which provides design, installation, and maintenance of fire safety systems. Together with the organization's management, we surveyed 54 employees, asking them to rate the presence of each SMART criterion in the company's feedback practices on a scale from 0 to 5. The results revealed the following average scores: Specific—3.2; Measurable—2.8; Achievable—3.9; Relevant—3.1; Time-bound—2.5. These findings indicate a basic level of feedback capability but highlight weaknesses such as irregular delivery, vague formulations without clear KPIs, delayed timing, and lack of connection to individual employee goals.

In addition to the SMART survey, we interviewed the company's leadership and discovered the existing feedback channels and tools: oral briefings at the beginning of shifts, real-time messages in Viber and Telegram, monthly review meetings, and situational remarks or expressions of gratitude on site. We also conducted a series of follow-up questions with employees to uncover the reasons behind these scores. This qualitative investigation

confirmed the absence of a formal feedback protocol, low process transparency, lack of documentation mechanisms, unidirectional communication, and no anonymous platforms for unrestricted idea exchange.

Synthesizing these data, we formulated recommendations to improve the organization's feedback system. First, establish an official feedback policy document specifying feedback formats, frequency, responsible parties, and data-collection tools. Second, organize regular one-on-one meetings between managers and employees for performance evaluation and development planning, preceded by coaching and effective feedback training for supervisors. Third, develop an anonymous electronic feedback channel—an online platform for secure expression of suggestions and concerns. Fourth, define key performance indicators (KPIs) relevant to fire safety services, for example: percentage of scheduled inspections completed on time, rate of corrective actions resolved within 24 hours, level of customer satisfaction, and system uptime percentage.

In conclusion, applying the SMART analysis methodology enabled us to identify problem areas and propose targeted enhancements to the feedback process. Implementing these recommendations will transform “Tilarme Security LLC” from a reactive feedback approach to a systematic, development-oriented model—an essential shift in an environment characterized by ongoing uncertainty and elevated risk.

Strategic Public Relations in Science and Innovation Events: A Case Study from the Academ.City

by Halyna Posenko | Academ.City

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Event: CloudEARTH*i* Conference 2025

Topic: Circular economy: supply chains, resource efficiency, innovation, education and awareness

In the context of growing emphasis on science communication and innovation ecosystems, effective public relations (PR) strategies play a vital role in shaping public perception, fostering trust, and amplifying the impact of research-driven initiatives. This case study presents a practical approach to integrated PR communications based on the experience of the Academ.City PR team in supporting high-profile events within the Seedplus project framework.

Drawing from recent activities—including webinars, science and technology transfer workshops, conferences, hackathons, round tables, and the Demo Day of the Academ.City Acceleration Program—the case demonstrates how PR efforts can bridge the gap between scientific content and broader audiences. The objective is not only to increase visibility but also to build meaningful, long-term engagement with stakeholders across academia, business, and policy.

The communication strategy addressed three core areas:

1. **Strategic stakeholder engagement** through qualitative and quantitative interaction with speakers, guests, and partners to ensure clarity, consistency, and relevance of messaging;
2. **Comprehensive media coverage** using social media, articles, and multimedia content to maximize reach and reinforce credibility;
3. **Humanizing the event narrative** by presenting behind-the-scenes perspectives that highlight the people and processes involved in organizing the events.

This approach integrates messaging consistency, cross-platform visibility, and authentic storytelling to support the development of trust and sustained relationships with target audiences. The creation of a coherent, human-centered public image contributes to the long-term positioning of innovation programs in the public and professional spheres.

The case highlights the importance of professional PR support in science and business

cooperation, showing how communication practices can be systematically applied to increase the effectiveness and societal relevance of innovation-related events.

Advancements in Basalt Fiber Technology: Innovations and Prospects for Production Enhancement

by Oleksandr Chechel | Iryna Diduk | Yurii Chuvashov | Olga Yashchenko | Maryna Storozhenko |
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Topic: Innovation for a Sustainable Future

The development of basalt fiber technology originated in the 1970s at the Frantsevich Institute of Problems of Materials Science of the National Academy of Sciences of Ukraine (IPMS NASU). For many years, basalt technology and products remained relatively unknown, as their applications were primarily concentrated within the military-industrial complex.

However, following the 1990s, basalt technology and fiber-based products gained international recognition and expanded beyond their initial scope. They found widespread use across Europe, North America, Southeast Asia, the Middle East, and various other regions worldwide.

Basalt rocks are the cheapest raw materials, large reserves of which exist on all continents of our planet. The basalt-based fibers surpass the well-known glass fibers in mechanical strength, elastic modulus, heat resistance, wear resistance, and resistance to aggressive alkaline and acidic environments. Basalt is available to produce environmentally friendly materials and products. Basalt production waste is subjected to further use and complete recycling. The range of basalt products includes heat and sound insulation materials, mesh, reinforcements, fabrics, knitted and non-woven materials. Basalt-based composite materials are used in energy, defense, space, aviation, shipbuilding, automotive industries, civil construction, and the sports industry.

Such industrial giants as Airbus, Boeing, BMW, GM, and others widely use basalt fiber composites in their products, which meet international requirements for the transition of industry to environmentally friendly technologies that effectively use natural raw materials in production. The need for basalt materials and products made from them is growing from year to year and significantly exceeds the volumes of their production that exist today.

The scientific developments of researchers from the IPMS NASU laid the groundwork for the establishment of an enterprise dedicated to the production of basalt materials. These developments have significantly contributed to the evolution of basalt technology, fostering innovation and expanding industrial applications. The integration of research-driven methodologies has strengthened the enterprise's ability to refine production techniques,

enhance material properties, and support the broader adoption of basalt-based solutions across various sectors. Like any science-intensive production technologies, the technologies created in our Institute are constantly being improved and modernized.

Our scientists offer mutually beneficial cooperation to all those interested in our developments and experience in their implementation, further development, and improvement of basalt technologies, in the construction of new enterprises to produce basalt products. The specialists of the IPMS NASU develop the best solutions for enterprises, considering the properties of local raw materials, logistics, and the final products. Our developments are certified, and we have patents and copyrights for "know-how". "Know-how" arising in the process of designing and building new enterprises is registered as "joint property" of the developer and the investor.

Ground slag and plasticizing additives in cement concrete as an element of energy efficiency and innovation

by Artem Lapchenko | National Transport University

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Topic: Innovation for a Sustainable Future

Today, it is extremely important to ensure the physical and mechanical performance of modern cement concrete at a high level in order to comply with: the designed service life, reliability, cost-effectiveness, energy efficiency, environmental friendliness and innovation. Such provision of the corresponding indicators of cement concrete is possible through the use of chemical additives with plasticizing action. In addition, these additives are able to reduce the amount of cement, as one of the most energy-intensive and costly components of cement concrete. An additional factor in reducing the energy intensity and cost of cement can be the partial replacement of cement with ground blast furnace slag. Adding ground blast furnace slag to cement reduces the share of the most energy-intensive clinker component and makes Portland cement cheaper. In addition to reducing the cost and energy intensity of cement and concrete production based on it, the environmental factor is additionally improved due to the processing and release of territories from granulated blast furnace slag. Such an approach in construction can contribute to overall energy efficiency in the global industry. According to the baseline scenario of the International Energy Agency's World Energy Outlook, by 2050, energy consumption in industry may increase to 185 EJ (excluding fuel use as a feedstock). For comparison, according to the same agency, energy consumption by industry in 2009 was 105 EJ. Due to the introduction of energy-efficient measures and technologies, increased waste recycling, the growth of energy consumption in industry in 2050 may not exceed 140 EJ. The results of this study emphasize the importance of using energy-efficient technologies in the production of cement concrete with the addition of ground blast furnace slag and chemical plasticizing additives, which can not only increase efficiency and energy efficiency in combination with ensuring improved properties of this material, but also contribute to the energy efficiency of global industry. The proposed approach of this study provides an idea of one of the potentials of energy saving in different regions of the world.

INNOVATIVE TRAINING OF TEACHERS FOR VOCATIONAL EDUCATION: DIGITAL TECHNOLOGIES AND SUSTAINABLE DEVELOPMENT

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Topic: Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education for green and tech-driven jobs

Modern challenges of the globalised world, such as digitalisation, climate change, and the transition to a green economy, are dramatically changing the requirements for vocational education. In this context, the role of higher teacher education is growing, as it should provide training for teachers for the vocational education system who are able to work effectively in a digital environment and promote the formation of environmentally oriented thinking among students.

Traditional approaches to teacher training often do not meet the needs of the modern labour market. The lack of an adequate level of digital competence, a limited understanding of the principles of sustainable development, and insufficient readiness to implement innovative educational technologies are key challenges in modernising the educational process of Ukrainian vocational education institutions.

Digitalisation of education involves not only technical equipment but also a change in the learning paradigm. A striking example is the Master's programme in Vocational Education (Digital Technologies), which is being implemented at Lutsk National Technical University. The aim of the study programme is to develop general and professional competences in the field of digital technologies in vocational education, which will enable future specialists to solve complex non-standard tasks and practical problems of vocational education of a research and innovative nature, to apply methods and means of modern digital educational technologies in a comprehensive and creative way.

In the training of teachers for vocational education institutions, it is important to master distance and blended learning tools (Microsoft Teams, Google Workspace, Moodle), develop digital content, use VR/AR technologies, simulators and electronic laboratories. This is the basis for ensuring quality lifelong learning (Sustainable Development Goal (SDG) 4). Teacher training for vocational education is based on methods that form a proactive position: project and problem-based learning, case studies, gamification, and mentoring. The development of soft skills, such as critical thinking, emotional intelligence, and adaptability, is of particular importance.

The special feature of the educational programme is a combination of pedagogical and digital technological training, focused on the regional needs of the labour market. The training of specialists with professional IT competencies in accordance with the needs of the employment sector helps to reduce youth unemployment (SDG 8 Decent Work and Economic Growth). Training in innovative technologies such as 3D printing, IoT, big data, etc. is driving the digital transformation of industry (Industry 4.0). This supports SDG 9 Industrialisation, Innovation and Infrastructure through training for smart factories, automated production, and IT solutions.

The integration of online tools, distance learning platforms and open educational resources allows us to expand access to quality education for socially vulnerable groups, people with disabilities, rural residents and internally displaced persons, thereby reducing educational and social inequality and ensuring the implementation of SDG 10 Reduce Inequality. The use of digital technologies in vocational education contributes to the achievement of SDG 12 - Responsible Consumption and Production. Digital technologies ensure the rational use of resources, reduce the need for printed materials, minimise energy consumption by switching to virtual simulators and electronic laboratories, and develop a conscious attitude to consumption and environmental footprint among students.

Thus, innovative teacher training for the vocational education system should be based on the synergy of digital technologies and the concept of sustainable development. This will help to create a workforce that is able to train modern specialists in accordance with market needs, ensuring not only professional competence but also social responsibility. Digital technologies in vocational education not only modernise learning, but also contribute to the achievement of at least five Sustainable Development Goals by creating a more inclusive, flexible, environmentally conscious and competitive education system.

Keywords: higher education, vocational education, teacher training, digital technologies, sustainable development competences of the XXI century.

AiBlue: Evolutionary Intelligence for a Sustainable Nordic-Baltic Blue Economy - Bridging Challenges and Building Futures

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The Nordic-Baltic blue economy is under increasing pressure from accelerating Arctic climate change, rising geopolitical tensions and biodiversity loss that threatens fisheries, aquaculture, and coastal livelihoods. At the same time, traditional AI models in marine settings remain too static, fragmented, and poorly integrated with ethical and societal frameworks, limiting resilience and public trust. AiBlue responds to these challenges by deploying responsible, self-adaptive AI systems that support sustainability, inclusion, and digital innovation across the region. By embedding ethics, inclusivity, and transparency into technology development, AiBlue positions AI as a trusted public good aligned with Nordic-Baltic values.

The project's vision is to make AI work for the oceans—supporting sustainable fisheries and aquaculture while strengthening social cohesion. Its approach is grounded in inclusive innovation, co-designed with Indigenous, local, and minority communities. AiBlue will develop and operationalize evolutionary AI models capable of continual learning and local adaptation, enabling predictive monitoring, automation, and decision support. These technologies will be deployed through real-world pilots in Norway, Latvia, and Greenland, raising AI readiness from TRL 3 to 7 during the project, with a clear roadmap to reach TRL 9 within three years post-project.

Led by UiT and supported by Nofima, NORCE, BIOR, GINR, and Umeå University, the consortium spans expertise in marine science, artificial intelligence, social science, ethics, and policy—ensuring methodological depth and contextual relevance. AiBlue's interdisciplinary approach combines Design-Based Research, participatory action research, legal mapping of the EU AI Act, and stakeholder co-creation. Five interconnected objectives guide the work: developing adaptive AI for climate-resilient marine systems; ensuring ethical and legal compliance; delivering education to upskill stakeholders; building networks for long-term uptake; and communicating results through engagement with citizens via workshops, media, and science-art initiatives.

Expected results are rigorously tracked through deliverables, KPIs, and milestones set

across all work packages. A dedicated sustainability and exploitation plan ensures post-project impact, including TRL advancement, open-access tools, FAIR-compliant datasets, and synergy with other national and European projects and initiatives. Inclusivity is a core value—reflected in data governance, educational access, gender balance, and targeted support for marginalized communities.

By aligning with the European Green Deal, the EU AI Act, the New Innovation Agenda, and SDGs 4, 10, 13, and 14, AiBlue reinforces the region's leadership in ethical, AI-driven sustainability. It offers robust Nordic-Baltic added value by strengthening industrial competitiveness, supporting blue and green transitions, and advancing responsible Deep Tech for the benefit of people and the planet.

The impact of war on human capital development in the renewable energy sector of Ukraine: challenges and adaptation

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Topic: Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education for green and tech-driven jobs

The war in Ukraine has had a significant impact on the renewable energy sector, especially on human capital, which is a key element for the development of the industry. The challenges include four areas: physical insecurity, migration, employee psychological health, and the demographic crisis.

The **physical danger** to employees has increased due to the hostilities. Between 22 March and 31 August 2024, Russian carried out nine large-scale waves of coordinated attacks on Ukraine's energy infrastructure. According to the UN, these attacks resulted in the loss of about 9 gigawatts of production capacity [United Nations, 2025].

Migration of skilled workers to safer regions or abroad has also increased. It is estimated that between 5 to 9 million Ukrainians have moved abroad, 3 million of which are of working age. In addition, a significant number of people are in the temporarily occupied territories [DW, 2025]. According to a survey by the Ministry of Economy, 19% of employers have lost up to 20% of their staff, 17% - 20-50%, and 15% - more than 50%

There is a deterioration in the mental health of employees due to stress, uncertainty and post-traumatic effects. According to a study by 4Service Holding, 71% of Ukrainians admit that the deterioration of employees' mental health significantly affects their professional performance. This is most often manifested in reduced productivity, inattention, and mistakes [Krasina O., 2023].

Among other areas, the demographic crisis, which is deepening due to population decline and male mobilisation, has a significant impact on human capital. In 2022, only about 195,000 children were born, the lowest number in the country's history, and this trend has intensified since 2022 due to the war. The mobilisation became more intense, the conscription age was lowered from 27 to 25, combined with losses at the front, led to an acute shortage of working-age people.

These challenges have an impact on the economic model of enterprises in the renewable energy sector in particular:

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1. Increased costs for staff adaptation and infrastructure restoration. The direct losses of Ukraine's energy sector due to Russia's full-scale invasion are estimated at more than \$16.1 billion, and indirect losses are almost \$40.4 billion [KSE, 2024].
 2. Reduced efficiency due to a shortage of qualified personnel. Also, the available personnel face the problem of lack of reservation for renewable energy workers in Ukraine. Renewable energy (RES) workers are not included in the list of critical professions defined by the Ministry of Energy.
 3. Difficulties in implementing innovative projects due to a lack of resources and human capacity. Due to the loss of control over some territories and the destruction of infrastructure after 2022, 75% of the country's wind and more than 20% of its solar generation remained in the occupied territories [BDO Ukraine, 2024]. This limits the opportunities for introducing new technologies and innovative projects in the sector.

The issue of human capital shortages in the renewable energy sector during the war is currently being studied at the analytical level by academic institutions:

1. The economic context of the war:

1.1. Studies by the National Academy of Sciences of Ukraine indicate a loss of 20% of engineers in the nuclear power sector due to migration and lack of staff renewal. For example, Zaporizhzhia NPP experienced a 15% reduction in staff after 2022.

1.2. The work of the Ptukha Institute records an increase in the share of women in technical professions from 23% to 34% (2014-2024), which is due to the mobilisation of men.

2. Adaptation strategies of enterprises:

2.1. Studies of productive forces show an increase in economic activity in western Ukraine (Lviv and Ivano-Frankivsk regions) by 12-18% after the relocation of enterprises from the frontline areas.

3. Innovative approaches:

3.1. Digital technologies, such as the AI system for monitoring the condition of NPP equipment (project of the National Academy of Sciences of Ukraine in 2023), demonstrate the effectiveness of digital solutions to compensate for the shortage of personnel.

3.2. Flexible business models with a focus on resilience. Research by the Ptucha Institute suggests integrating resilience indicators into human development assessment.

At the time of this study, the war is ongoing and these challenges remain relevant, and thus their monitoring, evaluation and analysis continue. In particular, the analysis of 6 expert interviews (management) with representatives of the sector between 1 January and 30 March 2025, indicates that, given the significant shortage of qualified personnel, human

capital development is critical for the growth of the industry. Without adequate staffing, opportunities for innovation, project scaling and integration into the European energy system will be limited. Further research will clarify the soft and hard skills that the Ukrainian renewable energy sector expects from its workforce.

Cultural Risk in AI-Mediated Human Relations: An Analytical Framework for Multicultural Organizations

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Topic: Ethics, Equity, and Inclusion in the Age of Deep Tech

The rapid integration of artificial intelligence (AI) into human-centered functions—ranging from recruitment and performance evaluation to customer engagement and internal communication—poses novel cultural risks for multinational and diverse organizations. This presentation critically examines how AI-driven tools can inadvertently perpetuate cultural biases, undermine relational trust, and conflict with localized norms of emotional expression and interpersonal conduct. Drawing on empirical studies in algorithmic hiring, sentiment analysis in chatbots, and AI-facilitated team collaboration, we identify three principal dimensions of cultural risk: (1) **Bias Amplification**, where training data reflect and reinforce existing cultural stereotypes; (2) **Normative Dislocation**, in which AI-generated communications disrupt established conventions of face-to-face interaction; and (3) **Equity Divergence**, where unequal access to or understanding of AI tools exacerbates cross-cultural power imbalances.

To address these challenges, we propose a **Culturally Adaptive AI Assessment (CAAA) Framework** that integrates Cultural Intelligence (CQ) constructs with risk management methodologies. The framework offers practical guidelines for auditing AI systems, incorporating stakeholder feedback loops, and calibrating algorithms to respect diverse value systems and communication styles. By embedding cultural risk analysis at each stage of AI design and deployment, organizations can harness AI's operational benefits while safeguarding the integrity of human relations across cultural contexts.

This research contributes to the emerging interdisciplinary discourse on AI ethics, organizational behavior, and cross-cultural management, offering both theoretical advances and actionable recommendations for scholars and practitioners.

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CIRCULAR ECONOMY - A PRIORITY DIRECTION OF UKRAINE'S POST-WAR RECONSTRUCTION

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Topic: Circular economy: supply chains, resource efficiency, innovation, education and awareness

The full-scale aggression of the Russian Federation against Ukraine, leads to significant destruction and damage to infrastructure, industrial facilities, loss of human capital and natural resources, while creating both challenges and opportunities for rethinking the economic model of development of the affected territories. According to World Bank estimates, the total cost of post-war reconstruction of Ukraine is approaching 524 billion USD. Therefore, post-war reconstruction of Ukraine represents a unique opportunity for a fundamental transformation of the economy through the implementation of a circular economy. A circular economy, based on the principles of minimizing waste and maximizing the reuse of resources, can become the optimal model for post-war reconstruction of Ukraine, ensuring simultaneously economic efficiency, environmental sustainability.

According to preliminary estimates, the volume of construction waste resulting from the destruction in Ukraine is approximately 10-12 million tons, which is comparable to the amount of solid household waste generated in the country on average per year. Implementing circular economy principles will allow up to 90% of these materials to be reused, which will not only reduce the negative impact on the environment, but also significantly reduce the cost of reconstruction through the reuse of materials and resource-efficient technologies. The experience of post-war reconstruction in Germany and Japan demonstrates that the use of construction waste recycling technologies reduces the need for new materials by 40-45%, which accordingly reduces the cost of reconstruction and accelerates its pace.

Ukraine's energy sector also needs a radical transformation in accordance with the principles of a circular economy. In the context of European integration processes and the implementation of the European Green Deal, the development of renewable energy will allow achieving the national goal of 42.5% green energy in Ukraine's energy balance by 2030.

Post-war reconstruction creates an opportunity for a modernization of the industrial complex of Ukraine through the introduction of resource-efficient and waste-free technologies. Particularly promising areas are: the creation of industrial ecosystems, where the waste of one enterprise becomes raw material for another; the implementation of additive manufacturing technologies (3D printing), which allow minimizing production

waste; the introduction of eco-design principles, which ensure easier dismantling, repair and recycling of products after the end of their useful life. That is, the transition to circular production models can ensure an increase in labor productivity in industry by 15-20% and a decrease in the resource intensity of production by 25-30%.

For effective implementation of the principles of circular economy it is necessary to create a comprehensive regulatory framework, develop financial incentives and provide institutional support. The experience of EU countries shows that the introduction of a landfill tax (30-50 euros per ton) and an extended producer responsibility system allows increasing the level of waste recycling from 30% to 70-85% within 5-7 years.

Thus, the implementation of the principles of the circular economy in the post-war reconstruction of Ukraine will allow not only to effectively use limited resources, but also to form a competitive, environmentally sustainable and socially oriented economic system that will meet modern global trends of decarbonization and circular transformation.

Strategic Adaptation of Business Logistics in High-Risk Environments: Evidence from Wartime Ukraine

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Topic: Circular economy: supply chains, resource efficiency, innovation, education and awareness

The full-scale invasion of Ukraine by the Russian Federation has caused immense destruction to national infrastructure, resulting in the collapse of many established logistics chains. As of late 2024, nearly 30% of Ukraine's transport infrastructure—including critical roads, railways, and bridges—has been damaged or destroyed, disrupting both internal distribution and international exports (GMK Center, 2023). For Ukrainian businesses, the strategic redesign of logistics processes became not a matter of efficiency but a matter of survival.

Agribusiness companies were among the first to implement large-scale adaptive strategies. NIBULON, one of Ukraine's largest grain exporters, had relied heavily on Black Sea ports prior to the war. After the blockade of major ports such as Mykolaiv and Kherson, the company swiftly redirected its operations to the Danube River via the Izmail and Reni terminals, restoring partial export capacity and preserving critical trade flows (UNCTAD, 2023). Similarly, MHP, a leading poultry producer, not only rerouted its supply lines to alternative European markets but also sustained its operations through in-house power generation and logistics hubs in western Ukraine. Despite damage to warehouses and production facilities, MHP managed to donate over 11,000 tonnes of poultry as humanitarian aid in 2022 alone, showcasing a hybrid model of crisis logistics and corporate responsibility (MHP, 2023).

Ukrainian Railways (Ukrzaliznytsia), as the country's largest state logistics operator, played a critical role in preserving internal connectivity. Despite facing over 5,000 kilometers of damaged or destroyed railway lines and frequent attacks on infrastructure, the company rapidly restored essential routes in safer regions and transformed its freight logistics by shifting cargo from blocked southern ports to western border crossings with Poland, Romania, and Hungary (Deloitte, 2023). Moreover, Ukrzaliznytsia expanded its coordination with the government and international partners to enable the evacuation of civilians and the delivery of humanitarian and military goods. These adaptations were supported by rapid digitization of schedules, cargo tracking systems, and energy resilience measures, such as relocating operations away from frontline areas.

Meanwhile, UkrAVTO, one of Ukraine's largest car dealers, faced the collapse of traditional supplier relationships. In response, the company established flexible procurement chains with European partners and invested in backup energy sources to ensure uninterrupted service at repair centers and dealerships across central Ukraine (Forbes Ukraine, 2023).

These cases highlight several critical dimensions of logistics adaptation: diversification of

transport corridors, digital and energy infrastructure resilience, cross-border decentralization of inventory, and strategic public-private partnerships. Such transformations were not theoretical strategies; they were implemented rapidly, often under fire, to prevent total business paralysis.

Lessons from Ukraine's wartime logistics response have clear implications for companies operating in high-risk areas, such as Israel, Kashmir, or regions prone to earthquakes and flooding. These businesses must anticipate infrastructure disruption as a central risk and respond by building redundancy into logistics routes, securing energy autonomy, decentralizing physical assets, and digitalizing decision-making processes. Embedding logistical flexibility into the organizational culture can reduce reaction time during future crises.

In conclusion, the Ukrainian experience demonstrates that logistics in war transcends supply and demand management—it becomes the backbone of national and corporate resilience.

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INNOVATIVE TECHNOLOGIES IN ENSURING SUSTAINABLE DEVELOPMENT OF COMMUNITIES: INVESTMENT SUPPORT AND EFFICIENCY ASSESSMENT

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Topic: Innovation for a Sustainable Future

This research addresses the critical role of innovative technologies in creating sustainable communities through the smart city paradigm, with a specific focus on investment support mechanisms and efficiency assessment methodologies. As urbanization accelerates globally, cities face mounting challenges related to climate change and resource depletion, necessitating transformative approaches to community development that integrate social, economic, and environmental considerations.

Smart cities represent a comprehensive ecosystem where information and communication technologies (ICT) enhance quality of life, improve operational efficiency, and foster competitiveness while meeting intergenerational needs. According to the International Telecommunication Union's definition, a sustainable smart city leverages ICT and other tools to address current and future requirements across economic, social, and environmental dimensions.

Our analysis reveals that current climate finance for urban development is predominantly provided in the form of loans. However, this falls significantly short of the estimated amounts required to transform cities' infrastructure systems. The financing gap is particularly pronounced in developing countries, with the vast majority of available finance directed toward mitigation rather than adaptation efforts.

The research identifies the three essential characteristics of successful smart city projects: innovation, integration, and inclusion. We conceptualize smart city development initiatives as innovative investment projects requiring coordinated efforts across multiple stakeholders, including local governments, property developers, technology providers, business owners, and citizens.

To enhance investment support for smart city development, we propose five strategic approaches:

1. Establishing national programs based on an integrated approach that accommodates the interests of all ecosystem participants
2. Expanding bank financing mechanisms through specialized evaluation methodologies

for smart city projects

3. Improving both the quantity and strategic distribution of financing to address underlying inequalities
4. Rapidly scaling up adaptation financing, particularly in developing regions
5. Enhancing data tracking systems for financial flows and transformation needs

The research concludes that sustainable smart city development requires a programmatic approach that engages stakeholders across the ecosystem to deliver key outcomes including enhanced quality of life, increased operational efficiency, data-driven decision making, reduced environmental impact, improved public safety, economic growth through innovation, greater social inclusion, improved mobility, resilience to various challenges, enhanced citizen engagement, optimized energy consumption, and more effective public services.

By adopting these investment support mechanisms and comprehensive efficiency assessment frameworks, cities can bridge the gap between technological innovation, sustainable financing models, and measurable outcomes in community development initiatives, ultimately contributing to the achievement of UN Sustainable Development Goal 11 for sustainable cities and communities.

Prospects for the use of alternative energy sources in farms

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Topic: Innovation for a Sustainable Future

Modern agriculture faces numerous challenges, the key ones being the rising cost of traditional energy sources, the need to decarbonize production, and the need to minimize the negative impact of agricultural activities on the environment. In the context of global energy transformation, more and more farms are looking for ways to introduce alternative energy sources. The use of renewable resources not only helps reduce costs, but also increases energy independence, ensures sustainable development of the agricultural sector, and promotes the integration of environmentally friendly technologies.

Alternative energy sources that can be effectively used on farms include solar and wind energy, biogas technologies, geothermal systems, and innovative solutions for managing energy flows. One of the most common options is the installation of solar panels, which reduce the dependence of agricultural enterprises on centralized energy networks and stabilize electricity costs. Solar installations are widely used to supply electricity to farms, as well as to power irrigation systems, heating, lighting, and automated technological processes.

An important direction of farm development is the use of biogas plants that convert organic waste into environmentally friendly fuel. Biogas is obtained by anaerobic fermentation of manure, plant residues and other biowaste, which contributes not only to energy production, but also to reducing environmental pollution. An additional advantage is the production of organic fertilizers in the process of biogas fermentation, which ensures a sustainable cycle of substances in agriculture.

Wind energy also has significant potential in the agricultural sector, especially in regions with appropriate climatic conditions. The use of small wind turbines for autonomous energy supply of farms allows you to effectively supplement solar power plants, creating combined or hybrid energy systems. Such solutions ensure stable energy supply even in cases of temporary lack of solar radiation or a decrease in wind speed.

Geothermal energy can be used in farms for heating livestock complexes, greenhouses, residential and utility premises. Heat pumps operating on the basis of geothermal energy allow to effectively accumulate the heat of the earth and convert it into the energy necessary to maintain an optimal microclimate. The implementation of such systems contributes to the reduction of the use of traditional energy sources, which has a positive

effect on both the economic indicators of the farm and the environment.

The economic aspects of the implementation of alternative energy sources are of decisive importance for farmers' decisions to invest in the latest technologies. Although the initial costs of installing such systems can be quite significant, their long-term effectiveness, combined with state subsidies and tax preferences, significantly increases the feasibility of switching to renewable energy.

The growing interest in alternative energy among farmers indicates the need for support for the industry from governments, financial institutions and scientific organizations. State programs to promote the introduction of "green" technologies in agriculture, funding scientific research and increasing the availability of energy innovations can significantly accelerate the transition of the agricultural sector to more sustainable production models. Thus, the prospects for the use of alternative energy sources in farms cover not only technological and economic aspects, but also the environmental and social sphere. The mass introduction of renewable energy in the agricultural sector is a strategically important step to ensure food security, rational use of natural resources and preservation of the environment for future generations.

CROSS-SECTORAL AND COMMUNICATION ASPECTS OF CREATING SHARED VALUE AMONG THE STATE, BUSINESS, AND SOCIETY

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Topic: Cross-sector partnerships and community engagement for sustainability: interdisciplinary approaches

In the context of global transformations and increasing challenges to sustainable development, the creation of shared value among the state, business, and civil society is gaining particular relevance. The integration of social needs into business models and public policy is evolving from a corporate option into a strategic tool for national competitiveness, social cohesion, and resilience.

An innovative approach to cross-sectoral collaboration requires rethinking traditional governance models with a focus on mutually beneficial cooperation. The essence of the shared value concept lies in combining economic efficiency with the resolution of social problems, which calls for coordinated efforts by key stakeholders — the public sector, private enterprises, and civil society organizations.

The successful implementation of this model requires institutional and regulatory support that promotes trust, accountability, and inclusiveness. In particular, this includes the improvement of public-private partnership mechanisms, elimination of regulatory barriers, introduction of tax incentives for socially oriented investments, and the development of innovation infrastructure at the local level.

Cross-sectoral communication plays a crucial role in this process. Innovative communication practices should aim to enhance transparency, openness, and interaction among the sectors. In this regard, the development of government relations (GR) strategies becomes essential as a tool for public dialogue and for representing the interests of businesses and citizens in decision-making processes. These strategies must be grounded in the principles of ethics, legal certainty, and mutual responsibility.

At the same time, digital transformation opens new opportunities for citizen participation in co-creating public policies. E-governance tools, digital platforms for public engagement, and transparent information sharing contribute to fostering a culture of openness and innovative interaction between the government, business, and society. Successful cases of innovative partnerships in EU countries demonstrate the effectiveness of integrated approaches to cross-sectoral governance based on the principles of sustainable development.

Thus, cross-sectoral and communication aspects of creating shared value must be reinterpreted within the framework of innovative public governance. They should be considered key prerequisites for building a capable, resilient, and inclusive society. In the context of ongoing reforms and external threats, Ukraine urgently needs to implement effective institutional and communication mechanisms that can unite the efforts of all sectors based on trust, transparency, and mutual benefit.

Rural Crafts in the Age of Digital Transformation: Challenges of Inclusion and Justice.

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Topic: Ethics, Equity, and Inclusion in the Age of Deep Tech

Ukrainian villages have long been centers of preservation of traditional culture and crafts. However, modern challenges such as war, urbanization, labor migration, and digital inequality threaten the existence of local intangible heritage. At the same time, the digital age opens up new opportunities for preserving and popularizing peasant crafts, provided that inclusive and equitable access to technology is ensured. Peculiarities of the Ukrainian context:

- The war with Russia has intensified cultural and identity processes, resulting in increased interest in authenticity, crafts, and national symbolism.
- In many villages in eastern and southern Ukraine affected by the fighting, craft traditions have been interrupted or lost their carriers.
- At the same time, internally displaced persons from rural communities often retain this knowledge - but need access to digital resources, platforms, and opportunities for implementation.

In the process of digital transformation, rural communities in Ukraine often find themselves on the periphery of technological progress. Despite the growing interest in authentic crafts, access to digital opportunities remains limited for a significant number of rural craftspeople. This creates new social and cultural barriers, deepens economic inequality, and jeopardizes the principles of inclusiveness and equitable development. The following key issues arise in this context:

- Digital inequality between urban and rural areas: lack of quality internet, gadgets, skills for online sales, visual content, etc.
- Fairness to the bearers of traditions: many craftsmen do not have intellectual property protection, their cultural product is used without consent or payment.
- Exclusion from the market: artisans rarely get to large online platforms due to the complexity of their use, language barriers, and technical illiteracy.

Despite the significant challenges, digital transformation also opens up new prospects for the development of peasant crafts in Ukraine. Given proper support at the national,

regional, and community levels, traditional crafts can take on new significance-not only as a cultural heritage, but as an active driver of economic growth, social inclusion, and national identity. Potential areas of action include:

- Creation of state and public programs to support artisans: digital skills training, access to online platforms, microgrants.
- Development of Ukrainian local brands based on traditions but operating through modern channels (Instagram, Etsy, YouTube).
- Creation of digital archives, virtual museums, and intangible heritage markets.
- Include crafts in postwar rural reconstruction programs as a social and cultural resource.

Peasant crafts in Ukraine are not only the past, but also the potential of the future. If the state and civil society ensure inclusiveness and equity in digital transformation, rural communities will be able to preserve and develop their unique cultural identity and become active participants in the modern cultural and economic process.

Emerging technologies in radio broadcasting: impact on organizational practices and consumers perception

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Event: CloudEARTH Conference 2025

Topic: Human-centric tech-enabled innovation for sustainable society and inclusive growth

The rapid development of emerging technologies is reshaping the media landscape, challenging traditional practices and prompting new organisational strategies across all sectors. In particular, artificial intelligence (AI) and large language models (LLMs) are gaining momentum in journalism for their potential to automate content creation, streamline production workflows, and support editorial decision-making. In radio broadcasting, long valued for its immediacy, human voice, and editorial integrity, these technologies introduce both promising innovations and complex dilemmas.

This study explores the anticipated impact of AI and LLMs on radio broadcasting, with a particular focus on their role in editorial production, content delivery, and newsroom organisation. It examines how these technologies may alter work routines, shift professional responsibilities, and transform the relationship between human creators and machine-generated outputs. Ethical, technical, and organisational considerations are central to the inquiry, especially regarding transparency, editorial accountability, and how editorial teams adapt to AI integration. The research follows a mixed-methods approach. Qualitative interviews with radio professionals—including journalists, producers, and managers—aim to capture industry insights, expectations, and concerns related to the adoption of AI and LLMs. In parallel, quantitative surveys among radio listeners are conducted to investigate public awareness and acceptance of AI-driven changes in radio. The survey focuses on how listeners perceive the presence of AI in content production and whether they consider such integration acceptable, beneficial, or problematic from the perspective of media trust and engagement. By combining both professional and audience perspectives, this study offers a comprehensive view of the shifts in radio broadcasting as it intersects with AI innovation.

Preliminary results indicate a notable disconnect: while listeners recognise the potential benefits of AI technologies in radio, they express limited trust and reluctance towards their broader implementation. This gap between acknowledging AI's promise and intending to adopt it appears to stem from concerns about the reliability of AI-generated content, but also a resistance to automation within a medium strongly associated with personal connection with the host, their voice and personal connection with the community of listeners.

Wavelinks: A Platform for Collaboration in the Blue Economy – A Case from the BlueMissionAA Project

by Tania Montoto Martínez | Oceanic Platform of the Canary Islands (PLOCAN)

Abstract ID: 136

Submitted: May 12, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Innovation ecosystems and technology transfer

Transitioning to a sustainable, fair, and competitive society requires innovation ecosystems that are digitally connected, socially inclusive, and environmentally responsible. This presentation introduces **Wavelinks** (<https://wavelinks.eu/>), a multi-actor platform developed within the **BlueMissionAA** project to support systemic collaboration in the blue economy, particularly marine restoration in the Atlantic-Arctic basin.

Wavelinks is a web-based mapping and intelligence tool designed to foster synergies across science, business, government, and civil society. It integrates geospatial information, research and policy databases, and user contributions to help identify actors, initiatives, gaps, and collaboration opportunities in the context of the EU Mission “Restore our Ocean and Waters.” It is designed to be usable by a wide range of stakeholders, from researchers and local governments to educators and citizens.

The platform directly supports several strategic priorities, enabling alignment of restoration actions within the blue economy. Wavelinks is built with inclusivity in mind, prioritizing usability for a broad audience—from researchers and SMEs to public authorities and educators. By improving the visibility of actors and initiatives, Wavelinks facilitates knowledge transfer, ecosystem-building, and access to emerging opportunities in education, capacity-building, and restoration initiatives and solutions to be replicated.

This presentation will reflect on the platform’s design, current usage, and future potential, highlighting its relevance for stakeholders seeking practical tools to support mission-oriented collaboration. It also offers insights into the governance challenges of such platforms and their role in enabling more connected, adaptive, and inclusive innovation systems.

Multivariate Analysis of Regional Environmental and Economic Conditions in Ukraine: A Taxonomic Approach

by Larysa Zomchak | Oleksandr Vladyha
Ivan Franko National University of Lviv

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Submitted: May 12, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Innovation for a Sustainable Future

This research presents a taxonomic analysis of the regions of Ukraine aimed at a comprehensive assessment of their ecological and economic conditions. The analysis integrates a set of indicators reflecting environmental pollution levels, waste utilization and disposal volumes, and key socio-economic parameters such as environmental protection investments and regional unemployment rates.

The selected variables were standardized and aggregated into a synthetic taxonomic index, enabling the ranking of regions based on their proximity to an ideal (reference) state. The method involved calculating the normalized values of each indicator using z-scores, forming an ideal vector composed of optimal values for stimulators and minimal values for de-stimulators. The Euclidean distance of each region from this ideal vector was determined, and these distances were then transformed into a relative index ranging from 0 to 1, where higher values indicate closer conformity to the reference condition.

The analysis revealed substantial disparities in the ecological and economic profiles of Ukrainian regions. Kyiv city demonstrated the highest taxonomic index, driven by significant environmental expenditures, high gross regional product, and low unemployment, despite relatively high emission levels. It was followed by the Kharkiv and Kyiv regions, both of which exhibited a balanced ratio between environmental impact and economic performance. Conversely, Donetsk and Luhansk regions were positioned at the lower end of the ranking, reflecting the war and the resulting disruption in both environmental management and economic activity.

The study also includes a critical reflection on the limitations of the taxonomic approach when applied to heterogeneous data sets, particularly regarding the influence of extreme values and scale differences among indicators. Overall, the use of a multidimensional statistical method for integrated regional assessment offers valuable insights for regional policy planning, especially in the context of Ukraine's sustainable development and alignment with EU environmental standards.

FAIR-AI: Fostering Austria's Innovative Strength and Research Excellence in Artificial Intelligence

by Franz Knipp | Verena Liszt-Rohlf | Friedrich Seeber
University of Applied Sciences Burgenland

Abstract ID: 138

Submitted: May 12, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Data economy (AI, ML, Big Data, Cybersecurity)

The FAIR-AI flagship project, funded by FFG - the Austrian Research Promotion Agency, addresses a critical gap in AI research: the management of societal risks in the application of artificial intelligence. As the European AI Act, which came into force last year, introduces new legal obligations, FAIR-AI examines the challenges of operationalizing these requirements in the development and deployment of AI systems. These challenges range from technical issues, such as data transfer in non-stationary environments, to socio-technical and organizational risks, such as skills shortages, high initial project costs, and cognitive biases in human-AI decision making.

FAIR-AI's methodological approach focuses on identifying, monitoring and, where possible, anticipating risks throughout the AI lifecycle. Rather than seeking a one-size-fits-all solution, the project adopts a bottom-up strategy, building a collection of instructive, domain-specific use cases developed within research modules to highlight typical pitfalls. These efforts contribute to a novel risk disentanglement and prediction framework, embedded in a recommendation system that provides actionable guidance to AI practitioners.

A core element of the FAIR-AI project is the close collaboration between universities and industry partners, ensuring that research is grounded in real-world challenges. The University of Applied Sciences Burgenland is working closely with "Mein Dienstplan" to address the legal aspects of handling human resources data, such as time tracking and scheduling preferences. Other universities are working with their industrial partners on generating synthetic data for process optimization, exploring the trustworthiness of Large Language Models (LLMs), handling personal data in waste collection, and predicting microgrids.

Based on the insights gained from the use cases, the project will also examine the current state of AI-related education at Austrian universities, with the aim of developing new approaches to embed legal and ethical considerations in teaching practice. At the University of Applied Sciences Burgenland, for example, the European AI Act and risk assessment for AI applications are already integrated into the curriculum. Students actively engage with their own use cases to explore potential societal risks and consequences of AI systems.

Recycle - a platform for inclusive recycling

by Anton Ustimenko | Recycle

Abstract ID: 139

Submitted: May 15, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Green economy

Recycle is a digital platform that enables efficient, transparent, and inclusive recycling services by connecting households, condominiums, and small businesses with certified recycling and waste collection partners.

Our solution consists of a mobile and web application that allows users to:

- Schedule pickups of sorted recyclables (paper, plastic, glass, metals, etc.) on-demand or on a recurring basis;
- Track collection status and get digital confirmation that waste was delivered to a certified processor;
- Receive compensation for valuable secondary raw materials (e.g. cardboard, PET bottles, scrap metal) via integrated payment systems;
- Access educational content on proper waste sorting and the environmental impact of recycling.

On the supply side, Recycle offers recycling companies and logistics partners:

- A dashboard to view available orders based on location and capacity;
- Tools for route optimization, pricing, and digital documentation (including EPR compliance);

A scalable marketplace for acquiring recyclables directly from verified sources.

The platform helps formalize and digitise the currently fragmented waste value chain in Ukraine. By enabling trust, traceability, and economic incentives (procurement companies pay for the sorted waste), we motivate more individuals and businesses to participate in recycling.

Recycle creates environmental impact by diverting waste from landfills and reducing greenhouse gas emissions, while generating economic value from recyclables and supporting green job creation.

Our model is designed to scale and adapt to urban and peri-urban areas, and is fully aligned with circular economy principles and the Sustainable Development Goals.

Recycle introduces an innovative marketplace model to the recycling sector, enabling

households and small businesses to not only dispose of waste, but also to sell recyclable materials in small quantities — something previously economically unfeasible.

Traditionally, the sale of secondary raw materials (such as cardboard, PET bottles, or metals) has been limited to large-scale suppliers due to the high logistical costs associated with collection and transport. Recycle disrupts this model by aggregating small-volume pickups through a digital order pool and intelligent routing system that allows recycling companies and haulers to optimize logistics, reduce operational costs, and efficiently serve distributed customers.

What makes Recycle truly innovative is:

- The creation of a two-sided marketplace where waste generators (condominiums, households, SMEs) can sell recyclables directly to recycling companies — with real-time pricing, digital documentation, and secure payments;
- An Uber-like platform for waste pickup, allowing recyclers to accept only the jobs that match their location, route, and vehicle capacity — maximizing efficiency;
- The ability to profitably collect and process small quantities of recyclables by aggregating orders, which creates economic incentives for both users and collectors;
- A transparent digital infrastructure supporting traceability, environmental reporting, and EPR compliance;
- And critically — this model does not currently exist at scale in Ukraine or in most Eastern European countries, where recycling infrastructure remains fragmented, analog, and inaccessible to small waste generators.

By bridging this gap, Recycle offers a scalable, tech-enabled solution that democratizes access to the circular economy, reduces landfill dependency, and strengthens local recycling ecosystems in regions where such models are urgently needed.

How to inspire the use of SDIEEGs to strengthen entrepreneurial mindset through constructive alignment framework

by ANTONIO JESUS ANTON BAEZA | University of Alicante

Abstract ID: 140

Submitted: May 16, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education for green and tech-driven jobs

The "Inspiring the Mind" program, conducted as part of the CloudEARTH*i* Initiative, aims to inspire students, foster collaboration, and equip them with the skills and knowledge necessary for their future careers. We argue that learning about Sustainability, Diversity, Inclusivity, Equality, and Equity Goals (SDIEEGs) plays a crucial role in nurturing an entrepreneurial mindset capable of succeeding in today's dynamic business environment.

Research and literature suggest that integrating SDIEEGs into entrepreneurial thinking leads to increased customer engagement, improved productivity, higher profitability, and the creation of more efficient and inclusive workplaces. To support this learning process, we applied the constructive alignment framework, developed by Professor John Biggs, to help students better integrate SDIEEGs into their entrepreneurial ideas by aligning course aims and learning outcomes with activities and assessments.

A total of 68 students participated in the intervention, out of the 77 enrolled in the course Creating Business, offered as part of the Business Administration and Management program, the School of Economics, the University of Alicante (Spain). The implementation of constructive alignment was as follows:

- Aims and Learning Outcomes: Students were assigned a review report to assess the feasibility of peer business ideas and evaluate the integration of SDIEEGs.
- Learning Activities: A dedicated workshop, titled "How to Include Sustainability, Diversity, Inclusivity, Equality and Equity in a Business Idea", was held on March 13, 2025.
- Assessment: Students submitted review reports focused on peer business ideas, specifically evaluating how SDIEEGs were incorporated. Feedback from the course instructor was based on the quality of SDIEEG integration.

Among the 68 participants, 100% identified sustainability, diversity, and inclusivity in peer business ideas; 47.1% recognized equality, and 53% identified equity.

Therefore, the integration of sustainability, diversity, inclusivity, equality, and equity goals (SDIEEGs) within entrepreneurial education has proven to be a valuable strategy for fostering an entrepreneurial mindset.

Through the "Inspiring the Mind" program and the application of the constructive alignment framework, students not only engaged critically with business ideas but also demonstrated an increased awareness of SDIEEGs.

Keywords: sustainability, diversity, inclusivity, equality, equity, entrepreneurial constructive

alignment, entrepreneurial mindset.

Empowering Female-Led Innovation in GreenTech, AgriTech, and ClimateTech: The WE-RISE Approach

by Joana Pereira & WE-RISE consortium | Fasttrack VC

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Submitted: May 16, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Ethics, Equity, and Inclusion in the Age of Deep Tech

WE-RISE is a pioneering European initiative designed to empower underrepresented female entrepreneurs in GreenTech, AgriTech, and ClimateTech, with a strategic focus on startups from emerging and moderate innovator countries. By combining targeted funding, tailored support, and investor matchmaking, WE-RISE aims to amplify the market presence and systemic impact of high-potential women-led startups.

At the core of the project is a two-phase support program. In Phase 1 ("Nurture"), 20 selected startups receive strategic mentorship and a €5,000 grant to strengthen their business models and engage with key stakeholders. Phase 2 ("Bloom") supports the 10 most promising startups with an intensive acceleration program and €50,000 in equityfree funding, focused on implementing growth strategies, expanding market reach, and securing investment.

WE-RISE goes beyond funding by offering a holistic growth journey, including personalized mentorship, investor and corporate matchmaking, specialized training, and visibility at top-tier industry events. By prioritizing inclusivity, sustainability, and cross-border collaboration, the project contributes to the advancement of the European innovation ecosystem and accelerates the green transition through gender-responsive innovation.

The initiative is delivered by a consortium of expert partners—Fasttrack Ventures, GForce, Toro Ventures, BPI France, and Suntech Park—each bringing deep experience in startup acceleration, investment, innovation ecosystems, and inclusive entrepreneurship. Together, they ensure that WE-RISE offers not just financial support, but a strategic platform for sustainable, long-term growth of women-led tech startups across Europe.

This project is funded by the European Union. Views and opinions expressed are however those of the author(s) only and do not necessarily reflect those of the European Union or European Innovation Council and SMEs Executive Agency (EISMEA). Neither the European Union nor the granting authority can be held responsible for them.

Business Model: CAROYAL

by Haseeb Ahmad | Ben Opara, Tromsø, Norway

Abstract ID: 142

Submitted: May 19, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Green economy

Caroyal is a modern B2B e-commerce platform founded on the principles of a sharing economy. On our website, communities of buyers collaborate to share the costs of owning products. Similarly, communities of sellers pull resources together to fulfill economic order quantities. The aim is to reduce product costs and to increase food security through market accessibility for producers and distributors. Our groupage model enables users to import or export parts of containerized products. This solution is adapted to the financial capacity of small distributors and producers in developing regions, where we hope to gradually remove unnecessary intermediaries in the critical supply chains.

Tomorrow's buyers will consider how and where raw materials are sourced. Driven by this reality, Caroyal will expand to incorporate the trading of commodities, especially those sourced from remote locations in developing regions. We will build a strong network of sustainability-driven buyers, who will offer better deals to the sellers. Hence we are exploring the potential of blockchain technology for improved transparency, and for decentralized tracing of the commodities to be traded on our platform.

Flood Resilience in Pakistan: Citizen Engagement, Government Initiatives, and Sustainable Development

by Haseeb Ahmad | Tamer Abu-Alam

UiT The Arctic University of Norway

Abstract ID: 143

Submitted: May 19, 2025

Event: CloudEARTH Conference 2025

Topic: Innovation for a Sustainable Future

This thesis analyses the impact of climate change, coupled with inadequate disaster management, on the rising frequency and severity of floods in Pakistan. The thesis focuses on the causes, socioeconomic impact, and government responses to floods by examining the interaction of natural and human elements. Due to the complexity of the research question, we have applied a multidisciplinary approach. The research draws on empirical climate data, community interviews, and policy analysis to propose a comprehensive strategy for effective flood mitigation in Pakistan.

The climate data analysis from Punjab province shows that rainfall is not the only cause of the floods; rather, it is accompanied by other factors like poor infrastructure, glacial melting, and upstream flow of water in the rivers. Citizen interviews highlight the severe social and economic repercussions of floods, including displacement, health risks, educational disruption, and agricultural loss. Women and children, in particular, face additional challenges, aggravated by cultural and economic constraints. The government's response, though well-intentioned, is often criticised for inadequate infrastructure, weak policy enforcement, and lack of public awareness campaigns.

The thesis findings highlight the need for a comprehensive flood management strategy. Stricter land-use regulations, the development of early warning systems, raising public awareness, and the improvement of infrastructure like dams and drainage systems are among the recommendations. Additionally, community-led initiatives and international collaborations are fundamental for building resilience. This study concludes that a multi-layered approach combining structural, policy-based, and community-centred strategies is vital for mitigating flood risks and adopting sustainable development in Pakistan.

UiT Innovation Hub – Shaping Innovation Culture within the University

by Håkon Gustafson Giæver | Norinnova, Norway

Abstract ID: 144

Submitted: May 19, 2025

Event: CloudEARTH*i* Conference 2025

Topic: *Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education for green and tech-driven jobs*

Research-based innovation is at the center of EUs ability to translate research and development into economic and societal benefits. Innovation projects and the commercialization of research are crucial to solving major societal challenges.

If Norway and the EU is to reach its goals for the green transition, improve and streamline public services, and create a large number of new private sector jobs by 2030, it must be able to increase the pace of innovation and improve the return on investment in publicly funded research and development.

To achieve this, the innovation culture must be strengthened, and researchers, clinicians, and students must be encouraged to further develop their ideas so they can benefit society in the form of new products and services.

As part of The Arctic University of Norways (UiT) strategic long-term plan and to strengthen innovation activity, an innovation hub will be established at UiT starting in autumn 2025 in collaboration with the TTO (Norinnova) and the University Hospital, funded by the county municipality.

The aim is to foster a strong culture of innovation and entrepreneurship within UiT's academic communities. The goal is for more knowledge from UiT to contribute to the development of new or significantly improved products, services, or processes that are implemented and lead to increased value creation and/or societal benefit.

Through tailored competence-building measures, the various student and research communities will be better equipped to independently identify and drive innovation. This will lead to a greater variety and number of successful research-driven innovation projects. These projects may, for example, originate from student communities, basic research, collaborative projects with industry, or innovative solutions from primary healthcare services. By advancing a larger share of such projects from within the institutions, more people will be able to succeed in creating value for society.

Furthermore, our presence at the CloudEARTH*i* conference reflects our interest in exploring international cooperation and knowledge exchange. As many of today's challenges are global, so too must be our approach to innovation. We are eager to connect with other TTOs, universities, businesses, and innovation actors to share lessons, co-develop projects, and explore joint funding opportunities.

In this talk, we invite you to consider how fostering for innovative culture can serve as catalysts for long-term innovation culture — not just as commercial engines, but as enablers

of collaboration, creativity, and impact across sectors and borders

From Research to Market: Building a Culture of Innovation Through TTOs

by Håkon Gustafson Giæver | Norinnova, Norway

Abstract ID: 145

Submitted: May 19, 2025

Event: CloudEARTH*i* Conference 2025

Topic: *Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education for green and tech-driven jobs*

At the heart of every university lies a vast reservoir of knowledge, research, and creativity. However, unlocking the societal and economic value of this knowledge requires more than academic excellence — it demands a structured approach to innovation, entrepreneurship, and cross-sectoral collaboration. This presentation explores how our Technology Transfer Office (TTO) Norinnova plays a central role in transforming research into real-world impact, and how it supports the development of a robust culture of innovation at UiT – The Arctic University of Norway.

As part of UiT's strategic long-term plan, a renewed focus has been placed on innovation and commercialization, including the establishment of a physical innovation hub in autumn 2025. The TTO is central in this ecosystem, acting as a bridge between academia, industry, and society. Our work is driven by the belief that knowledge created within the university should contribute to the development of new or significantly improved products, services, or processes that address real challenges and generate lasting value.

Through tailored competence-building measures and support services, the TTO empowers students, researchers, and staff to recognize the innovative potential in their work. Whether it is basic research, applied science, collaborative projects with industry, or user-driven innovation in healthcare and the public sector, our goal is to help ideas evolve into sustainable solutions.

This presentation will highlight our practical approach to fostering innovation readiness within academic environments — including IP management, innovation coaching, and project matchmaking. It will also showcase examples of successful innovation pathways, including projects that originated at UiT, grew from fundamental research, or were developed in close dialogue with local industries and public sector partners.

The TTO's role is not only to facilitate the transfer of technology and knowledge to the market but to contribute to a broader cultural shift — where innovation is seen as a natural and valued part of academic life. We aim to create low-threshold entry points for those unfamiliar with innovation processes, while also offering targeted guidance for high-potential projects. By building innovation capacity at the institutional level, we enable a larger share of research to translate into tangible societal benefits.

Furthermore, our presence at the CloudEARTH*i* conference reflects our interest in exploring international cooperation and knowledge exchange. As many of today's challenges are global, so too must be our approach to innovation. We are eager to connect with other TTOs,

universities, businesses, and innovation actors to share lessons, co-develop projects, and explore joint funding opportunities.

In this talk, we invite you to consider how TTOs can serve as catalysts for long-term innovation culture — not just as commercial engines, but as enablers of collaboration, creativity, and impact across sectors and borders

Revealing Regional Ripple Effects: A Novel Input-Output Approach to Green Transition Planning in Northern Norway

by Sarah Schmidt | Elisabeth Fugger | Cristina-Maria Iordan

SINTEF Ocean AS, Norway

Abstract ID: 146

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Event: CloudEARTH*i* Conference 2025

Topic: Green economy

The green transition necessitates transformative change across traditional economic sectors to achieve sustainable, low-carbon societies. This study explores the potential in more adequate value chain impact assessment through regionalisation of national input-output tables, based on a novel hybrid approach of combining generic sector splitting with statistical county data. The method is showcased through a regionalized Input-Output (IO) analysis to examine the socio-economic and environmental impacts of some of the most important sectors for the Northern Norway economy. By developing a two-region Norwegian IO model that separates Northern Norway, the study assesses sectoral dynamics, carbon emissions, and ripple effects of the different sectors. Results underscore the interplay between regional characteristics and economic restructuring, highlighting opportunities in the blue food sector while addressing key challenges such as energy stability, workforce requirements, and infrastructure development. The findings provide valuable insights into how regionalisation can yield an understanding of otherwise hidden interdependencies and hence provide a better representation of the ripple effects of sector changes. In the case of Northern Norway, we conclude that balancing economic growth and environmental sustainability in remote regions needs to be carefully addressed and offer a pilot framework for targeted policy interventions in the green transition.

Bridging the Gap: Unlocking the Potential of Academic Deep Tech Innovations

by Oleksandra Pravdyva | Lidiia Hladchenko | Maria Kravtsova
Kyiv Academic University

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Submitted: May 19, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education
for green and tech-driven jobs

As innovative entrepreneurship gains momentum across Europe, academic startups and spinoffs remain one of the most underutilized sources of transformative innovations. Emerging from the intersection of advanced research, societal needs and entrepreneurship, these ventures face a unique set of challenges.

A lot of promising academic startups and spinoffs remain at early stages in R&I ecosystem in Ukraine. The study identified barriers that hinder commercialization of deeptech innovations.

Despite growing interest in technology-based solutions for sustainability, climate action, and circular economy goals, there is a mismatch between the potential of academic ventures and their investment readiness.

Interviews conducted under the EU-funded SEEDplus project revealed several key tensions between academic founders and investors. While researchers are motivated and technically skilled, they lack knowledge and skills in commercialization, business management, and attracting investment. Hence, they often face difficulties in establishing relationships with early-stage investors. Moreover, the Ukrainian innovation ecosystem isn't able to provide access to venture-oriented business support, investor networks, and targeted financing.

At the same time, investors express hesitation due to unclear rules for investors, lack of transparent intellectual property policy, limited availability of specialized financial programs and instruments, and weakness of the financial market in Ukraine. Another weak point, considered by investors, concerns structural gaps in university policies regarding early-stage science-driven startups.

A comprehensive response to this issue involves developing an ecosystem that aligns with the specific context of academic innovations. Additionally, there is a need to examine appropriate models, including hybrid venture approaches, public-private co-investment schemes, and mission-driven funds that balance impact with profitability.

Stakeholders' Landscape and Their Impact on the University Venture Capital Fund

by Olga Voropai | Oleksandra Antoniouk

Wroclaw University of Science and Technology | Kyiv Academic University

Abstract ID: 148

Submitted: May 19, 2025

Event: CloudEARTH Conference 2025

Topic: Innovation ecosystems and technology transfer

The establishment and success of a venture fund within a university-based deep tech innovation ecosystem is dependent on the intricate interplay of numerous stakeholder groups. This abstract provides a comprehensive overview of these key players and their respective roles, highlighting the dynamic relationships that underpin the fund's operations and impact.

Government and regulatory bodies (e.g., Ministry of education or National intellectual property agencies), establish the overarching policy landscape, provide crucial funding support mechanisms, and define the legal and tax regulations that govern venture capital activities and startup formation. Universities and research institutions serve as the fundamental wellspring of cutting-edge research, intellectual property, and the innovative deep tech startups that form the fund's investment pipeline. The academic startups and spin-offs operating in the ecosystems' key sectors represent the core target investment recipients, driving technological advancement and potential for significant market disruption. These three groups form the ground for venture funding for academic startups.

The ecosystem further benefits from the participation of existing VC and angel investors, who act as potential co-investors, bringing not only additional capital but also invaluable expertise in scaling ventures and navigating market complexities. Accelerators and incubators play a critical pre-investment role by nurturing early-stage ventures, refining their business models, and preparing them for the rigorous demands of venture capital investment, effectively acting as crucial referral sources for promising startups. Corporate partners and industry players offer potential avenues for corporate investment, provide crucial market access for portfolio companies, and facilitate valuable pilot testing opportunities, bridging the gap between academic innovation and real-world application. International investment, public funding, and ecosystem development organisations, including the EBRD, Horizon Europe, and EIT, contribute additional funding sources, often with a strategic focus on fostering innovation and economic development, and provide valuable policy recommendations based on international best practices. Finally, legal and financial experts, encompassing law firms, tax advisors, and financial analysts, provide essential guidance on fund structuring, ensuring regulatory compliance, optimising tax

incentives, and creating a robust operational framework for the Venture Fund.

Understanding the nuanced influence and interest of each stakeholder group is paramount for the University Venture Fund's strategic development and operational efficiency. The Stakeholder Influence-Interest Matrix serves as a crucial tool in categorising these groups and informing tailored engagement strategies. Key Players, characterised by high influence and high interest, necessitate active engagement, including their integration into the strategy co-creation process through regular meetings, joint decision-making opportunities via advisory boards, customised incentives such as co-investment structures and regulatory input, and consistent feedback loops to ensure alignment and continuous improvement of the fund's strategy. Potential Gamechangers, possessing high influence but currently lower interest, require targeted efforts to cultivate their interest through policy briefings highlighting the economic impact of deep tech investments, customised engagement opportunities in adjacent sectors, and showcasing international success stories to underscore the potential benefits of involvement, alongside periodic updates and strategic reports to keep them informed. Supporters and Advocates, exhibiting high interest but potentially lower influence, should be nurtured through focus groups and interviews to understand their needs, provision of educational resources on VC funding and commercialisation, offering mentorship and capacity-building programs, and encouraging their public endorsement of the initiative through success stories and testimonials. Passive observers, with lower influence and interest, require consistent yet less intensive communication through press releases, newsletters, and awareness events like innovation expos, ensuring transparent information dissemination and providing on-demand engagement should their interest evolve.

Marketing 5.0 in Action: How AI, Empathy, and Responsibility Drive Values

by Ievgeniia Golysheva | Wroclaw University of Science and Technology

Abstract ID: 149

Submitted: May 19, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Leadership for Industry 5.0

Technological advancement is reshaping the rules of the game across most industries, and marketing is no exception.

Emerging technologies such as artificial intelligence are not only speeding up workflows and improving task efficiency; they are transforming how marketing is done. From content creation and graphic design to video production and data analysis, AI has evolved from a tool into a full-fledged assistant for modern marketers.

Mastering AI-based technologies can offer a significant competitive edge in the short term. In the long term, they will become essential to any effective marketing strategy.

AI enables marketers to go beyond segmenting by target groups – it allows them to tailor their offer to the needs of each individual customer. One of the defining trends of Marketing 5.0 is hyper-personalisation. Technologies now enable tracking consumer behaviour in real time and adjusting communication dynamically to meet highly specific needs. Businesses can anticipate what customers want and think one step ahead.

At the same time, we must not forget the importance of empathy and our customers' human side. Not all communication should be automated or delegated entirely to artificial intelligence. Consumers still value feeling cared for by a real person and want the option of direct, human interaction when needed. AI offers great opportunities, but with them comes greater responsibility.

On another front, data security remains a growing concern. Online registrations and digital payments involve a high level of responsibility for protecting sensitive information. Recent studies show that consumers increasingly value their privacy, are concerned about how their data is used, and place their trust only in well-established brands with a strong reputation for security and transparency.

At the same time, consumer expectations are evolving. People are paying increasing attention to the responsibility demonstrated by the companies they choose, including their environmental impact, social engagement (such as employee wellbeing and community support), and transparency in governance and decision-making. For this reason, it is crucial that businesses not only take action towards sustainability but also communicate these efforts clearly and consistently as part of their marketing strategy.

Today, it's no longer just about profits - or even about placing the customer at the centre, as in previous marketing versions. Businesses are now expected to have a greater purpose - something greater that contributes, even in a small way, to making the world better. That's why more companies are stepping in to support communities in times of crisis or social need. Modern marketing is, above all, about doing business with a human face.

Marketing trends have continually evolved alongside technological progress, from newspaper ads and radio spots to artificial intelligence. Adapting to these changes is a core responsibility of today's marketing professionals. Ultimately, this flexibility and sensitivity to market dynamics will determine a company's long-term success.

Boosting Innovative and Knowledge-based Entrepreneurship of Higher Education Institutions: BIKE-HEI project

by Noelia López | University of Alicante

Abstract ID: 150

Submitted: May 20, 2025

Event: CloudEARTH*i* Conference 2025

Topic: *Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education for green and tech-driven jobs*

Artificial Intelligence and digital technologies are key to accelerating the transition to a Green Economy and a sustainable society. The usage we make of these technologies has an environmental dimension that must be integrated into our vision as emphasised with the Twin Transition concept. The integration of AI in the innovation cycle will facilitate the process of prototyping and concept verification of energy-efficient technologies with consequential reduction of carbon footprints. Integrating the use of AI by entrepreneurs and companies into the advanced stages of the innovation process when designing sustainability initiatives will optimise resources and minimise waste. Therefore, there is a need to expand the use of AI and digital technologies beyond their existing application and limitation to early stages of the innovation process, in order to foster an entrepreneurial academic-industry ecosystem in which AI-driven innovation can support the green transition.

According to the Digital Education Council's 2024 Global AI Student Survey, 86% of students already incorporate AI into their studies with 54% of students utilising AI on a weekly basis. However, the knowledge of diverse stakeholders about the correct use of the AI is still limited. Thus, HEIs must consider how to effectively boost AI literacy to equip both students and academics with the skills to succeed in an AI-driven world. In this context, knowledge-based entrepreneurs in Environmental Protection, Climate Action and Green Economy have the potential to enormously benefit from AI-driven innovation and can play a key role in helping society achieve sustainable development and the transition towards carbon neutrality and Green Deal's goals.

However, HEIs are slowly taking advantage of AI in teaching, learning and research. There is an identifiable need for AI-driven innovation tools, knowledge exchange and sharing best practices among HEIs to strengthen adoption capacity in this area. Furthermore, a closer collaboration between HEIs and knowledge entrepreneurs, businesses, innovation clusters, science parks and NGOs is necessary to foster the generation of academic spin-offs and students' start-ups, build innovation and entrepreneurship support services and establish long-term innovation-driven partnerships. The BIKE-HEI project, funded by the EIT Higher Education Institutions (HEI) Initiative, aims to achieve this with an integrated and multidisciplinary approach in exploring the AI potential in the domains of Environmental Protection, Climate Action and Green Economy.

BIKE-HEI is designed to achieve several key objectives: (a) Establish joint innovation and entrepreneurship structures, including the creation of a dedicated Joint Innovation & Entrepreneurship Hub, development of support mechanisms, and services such as mentoring, access to finance, intellectual property guidance, internationalisation, and matchmaking. A focus will be placed on generating academic spin-offs and start-ups from student research and ideas; (b) Enhance innovation and entrepreneurial capacity, by mapping regional innovation ecosystems, improving institutional strategies, delivering targeted training programmes, and establishing collaborative partnerships with industry, research organizations, and civil society. The project emphasizes social innovation and sustainable development.

Led by the University of Alicante in Spain, the consortium includes Universität des Saarlandes (Germany), University of Primorska (Slovenia), Mariupol State University (Ukraine), META Group Srl (Italy), CESIE ETS (Italy), and the Association of Balkan Eco-Innovation (Serbia). Associated partners include UiT the Arctic University of Norway and Alicante Science Park.

Keywords

Regional innovation ecosystems, knowledge-based entrepreneurship, Knowledge transfer, green innovation, AI-driven innovation, innovation-driven partnerships, innovative start-ups & academic spin-offs, entrepreneurial training & mentoring, Environmental Protection, Climate Action and Green Economy

Fostering Deep Tech for a Sustainable Future: The Innovation Ecosystem of Khalifa University

by Hamed Gamaleldien | Tamer Abu-Alam

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Topic: Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education for green and tech-driven jobs

Khalifa University plays a central role in the United Arab Emirates' efforts to build a sustainable, knowledge-based economy by advancing deep technology, entrepreneurship, and cross-sector collaboration. The university's innovation ecosystem is structured around specialized research centers, technology incubators, and strategic partnerships that enable the translation of cutting-edge research into impactful solutions.

Priority areas include clean energy, artificial intelligence, robotics, biotechnology, and aerospace, which align with national goals such as the UAE Net-Zero by 2050 initiative and the Sustainable Development Goals. Educational programs and entrepreneurial training foster a talent pipeline equipped to drive sustainable innovation, while collaborations with industry and government agencies ensure the relevance and scalability of emerging technologies.

The Khalifa University model demonstrates how academic institutions can serve as catalysts for sustainable economic transformation by integrating education, research, and entrepreneurship within a supportive policy framework. This ecosystem provides insights into building globally competitive innovation systems that are both technologically advanced and socially equitable.

Khalifa University (KU) stands at the forefront of the United Arab Emirates' (UAE) strategic vision to transition toward a sustainable, knowledge-driven economy by spearheading advancements in deep technology, cultivating entrepreneurship, and fostering cross-sector synergies. This presentation explores KU's structured innovation ecosystem, which integrates specialized research centers (e.g., the Advanced Materials Research Center, Robotics Institute, and Masdar Institute for clean energy), state-funded technology incubators (such as the KU Innovation Hub and Technology Advancement Program), and strategic alliances with global industry leaders (e.g., Siemens, ADNOC, and Mubadala) and government entities (e.g., the Department of Energy and Abu Dhabi Investment Office). These components collectively accelerate the translation of pioneering research into scalable, real-world solutions.

KU's innovation priorities directly align with the UAE's Net-Zero 2050 Strategic Initiative and the UN Sustainable Development Goals (SDGs), with a focus on breakthrough technologies in clean energy (green hydrogen, carbon capture, next-gen photovoltaics), AI and robotics (autonomous systems, predictive analytics for climate resilience), biotechnology (precision medicine, sustainable agriculture), and aerospace (lightweight

materials, satellite-enabled environmental monitoring). Complementing this research, KU's interdisciplinary academic programs—including STEM-focused curricula, industry-certified training, and entrepreneurial bootcamps—nurture a talent pipeline adept at merging technical expertise with sustainability-driven problem-solving.

The university's ecosystem emphasizes industry co-creation, exemplified by joint ventures such as the AIQ-KU Digital Transformation Lab and the TAQA-KU Smart Grid Consortium, which ensure market relevance and rapid commercialization of innovations. Simultaneously, KU's policy advocacy—through white papers, national R&D roadmaps, and participation in COP28—bridges technological advancement with equitable socio-economic outcomes.

This case study demonstrates how KU's model—integrating research, education, entrepreneurship, and policy—positions academic institutions as engines of sustainable economic transformation. Insights from KU's ecosystem offer actionable frameworks for building globally competitive innovation systems that harmonize technological leadership, environmental stewardship, and inclusive growth.

Scenarios for a Sustainable Blue Food System in North Norway 2040: Insights from the CoastShift Project

by Tamer Abu-Alam | Vera Helene Hausner | Sigrid Engen | Charlotte Teresa Weber | Lena Schønning | Alexandra Kate Abrahams | Cristina-Maria Iordan

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Event: CloudEARTH Conference 2025

Topic: Blue economy

As Northern Norway navigates the interdependencies between sustainable food production and environmental stewardship, including protecting biodiversity, future trajectories for its blue food systems offer critical insights into addressing food security challenges. This study explores four distinct scenarios for the North Norway region's blue food systems by 2040, highlighting how governance, technology, and community-driven initiatives can shape sustainable pathways under the influence of the EU Taxonomy.

The scenarios include: (1) Regenerative, Locally Focused Systems, prioritizing biodiversity restoration, circular economies, and decentralized governance; (2) Centralized High-Tech Industrial Production, emphasizing innovation, large-scale aquaculture, and global food trade; (3) Economic Growth Without Transition, focusing on market-driven strategies with limited environmental considerations; and (4) Conservation-Driven Approaches, centered on ecosystem restoration and environmental protection driven by environmental government.

The study utilizes participatory scenario planning, stakeholder engagement through Three Horizons and World Café workshops, and PESTLE analysis to critically evaluate these scenarios. It explores the impacts of climate change, resource governance, legal frameworks, and various drivers, barriers, and enablers, as well as the role of sustainable energy transitions.

This presentation aims to explore and discuss the different scenarios to identify which scenarios are most desirable and which are most likely to occur.

This work contributes to the session by providing a regional perspective on the future blue food security nexus, highlighting how interdisciplinary collaboration, governance reforms, and innovative solutions can strengthen resilience.

Co-creation of Flexible and Resilient Courses to Meet Stakeholder Needs

by Tamer Abu-Alam | SEEDplus project team | Inspiring the Minds project team
UiT The Arctic University of Norway | CloudEARTH*i* initiative

Abstract ID: 153

Submitted: May 20, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education
for green and tech-driven jobs

The rapid development of knowledge and evolving societal demands necessitate an education system that is both flexible and resilient. Such adaptability is crucial for fostering innovation and cultivating an entrepreneurial mindset, ultimately delivering a highly skilled workforce that drives a greener, more sustainable, and inclusive society.

This contribution introduces a novel co-creation method for course development, where stakeholders take an active role in shaping course objectives, content, assessment, and even participating in teaching and evaluation processes. This approach was piloted successfully in two phases, leading to the creation of a course focused on green transition and societal inclusion. Building on this success, the method was later applied to develop two additional courses related to business creation and entrepreneurship, demonstrating its versatility across a broad range of subjects.

In this contribution, we will present the co-creation method, showcase the outcomes of the courses developed using this approach, and discuss its potential to address diverse educational needs. We will also engage with the academic community to explore how this method can be refined and adapted for developing courses in geosciences and environmental studies, further supporting a future-ready education system.

Telemedicine for Inclusive and Sustainable Healthcare: Insights from Patient Satisfaction in Private Medcover Facilities

by *Malgorzata Fialkowska-Filipek | Emilia Steć*
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Topic: Deep tech for healthcare

The rapid digital transformation of healthcare during the COVID-19 pandemic accelerated the adoption of telemedicine solutions, redefining patient access and interaction with medical services. This study explores the level of patient satisfaction with telemedicine services—specifically mobile applications, teleconsultations, and chat-based consultations—offered by Medcover, a private healthcare provider in Wrocław, Poland. Drawing on a structured survey conducted after the pandemic, the research offers empirical insights into how technology-mediated care is perceived in terms of quality, accessibility, and user experience. The findings indicate a generally high level of satisfaction but reveal key challenges to long-term adoption, such as limited access to in-person appointments via the app, long wait times for chat consultations, and a perceived lack of engagement from some medical professionals. These insights underscore the importance of embedding human-centric design, trust, and responsiveness into telehealth systems. The study contributes to the ongoing conversation on how deep tech can enhance healthcare delivery by aligning digital solutions with user needs and sustainability goals. It also supports the broader mission of building resilient and equitable health systems through technology-enabled innovation in line with the European Innovation Agenda.

Feasibility Study for establishing a SEED Fund at the University of Tromsø (UiT)

by Piotr Wozniakowski | UiT The Arctic University of Norway

Abstract ID: 155

Submitted: May 20, 2025

Event: CloudEARTH*i* Conference 2025

Topic: *Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education for green and tech-driven jobs*

This feasibility study investigates the establishment of a SEED Fund at the University of Tromsø (UiT) to address the critical lack of early-stage funding and support for student-led startups in Northern Norway. Despite growing interest in entrepreneurship among students, existing financial and institutional mechanisms remain fragmented and insufficiently coordinated to meet their needs. The study evaluates the legal, institutional, and financial frameworks necessary to create a sustainable and compliant funding mechanism aligned with UiT's innovation strategy.

A multi-pronged methodological approach was used, including legal and regulatory analysis under Norwegian and EU law, stakeholder interviews with students, faculty, and external partners, and a review of existing programs like Norinnova's incubators and UiT's Talent Start-Up Grant. Strategic benchmarking and gap analyses were conducted to assess UiT's capacity to support student entrepreneurship through mentorship, infrastructure, and interdisciplinary collaboration.

The study proposes a hybrid SEED Fund model, governed collaboratively by UiT, Norinnova, private investors, and industry partners. This model would offer both financial (grants and equity) and non-financial (mentorship, workspace, training) support, while ensuring compliance with relevant laws. A phased implementation is recommended, starting with a pilot program integrated into UiT's Innovation HUB and Norinnova's ecosystem, followed by a long-term strategy emphasizing diversified funding, strong governance, and continuous impact assessment. The SEED Fund is envisioned as a key enabler of regional innovation, bridging academia and industry, and accelerating the commercialization of student innovations.

knowledge Rise: Advancing Sustainable Blue-Green Economies via Deep Tech-Innovation Capacity Building in Higher Education

by Tamer Abu-Alam | *The partners of Knowledge Rise Project*
UiT The Arctic University of Norway | *CloudEARTH initiative*

Abstract ID: 156

Submitted: May 20, 2025

Event: CloudEARTH Conference 2025

Topic: *Cross-sector partnerships and community engagement for sustainability: interdisciplinary approaches*

The “Knowledge Rise” project unites a consortium of eight higher education institutions, three businesses, one governmental organization, and one NGO from seven European countries and one non-European country to advance and build capacity for institutional innovation and entrepreneurship in Deep Tech. The project aims to empower HEIs, students, and businesses in transformative fields like artificial intelligence, machine learning, advanced materials, sustainable energy, clean technologies, and cybersecurity, fostering the transition to sustainable blue and green economies. With a vision for 2030, the consortium seeks to strengthen partnerships among businesses, academia, NGOs, and governments to foster innovation, align educational programs with industry needs, and develop robust entrepreneurial ecosystems.

Aligned with the strategic goals of the Deep Tech Talent Initiative, Climate-KIC, EIT Digital, EIT RawMaterials, and the Smart Specialisation Strategies (S3) of the participating countries, the project also contributes to the European Green Deal and the New European Innovation Agenda. Leveraging institutional support and a successful track record in academic-industry collaboration, the project uses the EIT Knowledge Triangle Model to integrate education, research, and business to accelerate Deep Tech applications in advancing blue and green economies.

The consortium has identified five key challenges hindering Europe’s leadership in Deep Tech and its transition to sustainable blue and green economies. These challenges are: 1) mismatches between industry needs, Deep Tech and related business education, 2) not fully matching educational curriculum, 3) a weak start-up ecosystem, 4) limited engagement from HEIs and research centers in bringing science to market, and 5) misalignment between societal needs and stakeholder actions in innovations development and engagement. To address these challenges, the project positions HEIs as engines of change, fostering partnerships with businesses and enhancing their capacity to lead advancements in Deep Tech. Guided by HEInnovate self-assessments, the consortium has defined seven strategic actions to strengthen capacity, align with the objectives of the three EIT KICs, and meet the S3 goals of the participating countries. The project sets a list of KPIs, milestones and measures to track progress, quality and includes a robust plan meeting their own strategic goals to secure financial sustainability beyond the project’s conclusion.

The Knowledge Rise project benefits a wide range of stakeholders, including academic and non-academic staff, students, start-ups, and society. Through its outreach, dissemination, and engagement plan, the project establishes HEIs as central drivers of impact in blue and green economies while paving the way for long-term collaboration. It helps to position Europe as a global leader in Deep Tech innovation and entrepreneurship, creating a foundation for sustainable growth and resilience.

Mind the Gap: Linking Academic Research with Entrepreneurial Success

by Tamer Abu-Alam | *Mind the Gap consortium partners*
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Event: CloudEARTH Conference 2025

Topic: *Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education for green and tech-driven jobs*

The Mind the Gap project addresses a critical challenge within the European innovation ecosystem: the persistent disconnect between academic research excellence and successful entrepreneurial outcomes, particularly in high-potential fields such as artificial intelligence, biotechnology, and robotics. Despite Europe's global leadership in scientific research, structural barriers such as limited entrepreneurial education, fragmented support systems, and institutional inertia prevent this knowledge from effectively translating into innovation-driven startups—especially in emerging or moderate innovation regions. This research-innovation divide not only hampers the full utilisation of Europe's intellectual capital but also undermines its competitiveness and resilience in responding to societal and environmental challenges.

To tackle this issue, the project applies a holistic and transdisciplinary methodology grounded in the 4Cs framework—Collaboration, Culture, Capacity, and Competence. Through seven integrated work packages, Mind the Gap co-develops new entrepreneurship-oriented curricula and PhD programmes tailored to local and regional needs. The project fosters startup acceleration and scale-up activities for early-career researchers and students, enhances cross-sector mentorship, and deploys digital tools such as MOOCs and AI-driven chatbots to support entrepreneurial learning. Participatory needs assessments, diversity mapping, and stakeholder co-design ensure the model remains inclusive, equitable, and responsive to the demands of underrepresented regions and groups. The project also builds on the experience and infrastructure of previous EU-funded initiatives such as CloudEARTH, SEEDplus, and BOOSTalent, reinforcing the transferability and scalability of its results.

The expected outcomes of Mind the Gap include training at least 72 students in entrepreneurial skills, engaging over 20 participants in targeted acceleration programmes, and launching at least two startups or spin-offs during the project period. It will establish two PhD programmes in innovation and entrepreneurship and produce open-access learning modules for broader institutional adoption. These activities are anticipated to spark a cultural and structural shift within participating higher education institutions (HEIs), enabling them to become more active drivers of regional innovation. The project's methods and tools will be shared with over 15 HEIs across Europe to extend the impact beyond the consortium.

Ultimately, Mind the Gap aims to strengthen Europe's capacity for sustainable and inclusive

innovation. By embedding principles of the European Green Deal, ESG frameworks, and diversity targets into entrepreneurship education and ecosystem development, the project contributes to economic resilience, social cohesion, and climate-smart innovation. It supports the transformation of HEIs into engaged, entrepreneurial institutions that can bridge the research-to-market divide, particularly in regions that have been historically underrepresented in Europe's innovation landscape.

Expanding Skills2Scale alliance to enhance the academia-enterprise collaborations for deep tech innovation

by Christina Skoubridou | Yehia Eltemsah | Envolve Entrepreneurship | Octa Insight AS, Norway

Abstract ID: 158

Event: CloudEARTH*i* Conference 2025

Topic: Innovation ecosystems and technology transfer

Scale2Connect aims to enhance Europe's innovation ecosystems by expanding and adapting the successful Skills2Scale model to new regions, with a particular focus on deep tech fields. The project aims to bridge the gap between well-connected innovation hubs and emerging ecosystems, fostering balanced regional development and strengthening academia-enterprise collaborations across Europe and beyond.

The genesis of Scale2Connect lies in the recognition of the growing disparities in innovation capacities across European regions, particularly in the realm of deep tech. While some areas boast flourishing innovation hubs with strong academia-industry links, others struggle to build the necessary ecosystem to support deep tech innovation and entrepreneurship. This imbalance not only hinders the overall competitiveness of Europe in the global innovation landscape but also exacerbates regional economic disparities. The project builds upon the achievements of Skills2Scale, which has demonstrated significant impact in empowering Higher Education Institutions (HEIs) in the field of deep tech and Beyond 5G technologies. Skills2Scale successfully established a model for enhancing the innovation and entrepreneurial capacities of HEIs, fostering closer ties with industry, and supporting the development of cutting-edge technologies. Scale2Connect seeks to extend this success to other regions and deep tech domains, recognizing the potential for transformative impact across a broader European landscape.

Governance as an Entry Point for Achieving Sustainable Development in the Sport Sector: A Sociological Study on Social Impact in Marsa Matrouh

by Hany M. Bahaa Eldin | Jassmin S. Abotabir
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Submitted: May 20, 2025

Event: CloudEARTH*i* Conference 2025

Topic: Innovation for a Sustainable Future

The sport sector in Egypt, as in many emerging contexts, faces increasing pressure to modernize and improve institutional performance. One of the main challenges hindering this development is the lack of effective governance practices within sport organizations. This governance deficit has led to a range of systemic problems including poor transparency, limited stakeholder engagement, inefficient resource allocation, and inadequate long-term planning. These constraints have limited the sector's ability to deliver broader social value and meet community needs.

This doctoral research investigates the social impacts of introducing governance principles into local sport organizations through a sociological case study focusing on the Marsa Matrouh region. The study aims to understand how applying governance—defined here in terms of accountability, participation, rule of law, and strategic direction—can transform the performance and social contributions of sport institutions. A mixed-methods approach was adopted, combining semi-structured interviews with stakeholders (such as club managers, local officials, and athletes) and surveys distributed to citizens to assess perceptions, expectations, and perceived social outcomes.

The study is situated within a broader sustainable development framework, specifically aligned with the United Nations Sustainable Development Goals (SDGs), notably Goal 16 (Peace, Justice and Strong Institutions), Goal 3 (Good Health and Well-being), and Goal 11 (Sustainable Cities and Communities). Promoting good governance in the sport sector is viewed as a pathway to building more effective, inclusive, and accountable institutions capable of enhancing social cohesion, empowering youth, and optimizing resource utilization. By strengthening the role of sports organizations in marginalized regions such as Marsa Matrouh, the research contributes to an integrated vision of community-based development.

Currently at the midpoint of the research, this paper focuses on the methodological framework and seeks constructive feedback from the academic community. Key discussion points include the operationalization of governance concepts in the sport context, the validity of selected data collection tools, and the potential to generalize the case study findings to other regions in Egypt or similar socio-political settings.

KEYWORDS: Governance, Sustainable Development, Sport Sector, Social Impact,

Transparency,

Integrating Artificial Intelligence in Teaching and Learning: A Case Study from Kosovo's Higher Education System

by Mjellma Carabregu Vokshi | Gentrit Berisha | Lura Rexhepi Mahmutaj

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Event: CloudEARTH*i* Conference 2025

Topic: Ethics, Equity, and Inclusion in the Age of Deep Tech

The integration of Artificial Intelligence (AI) into higher education represents a significant shift in how teaching and learning are conceptualized and delivered. This paper presents a case study of an institutional initiative aimed at embedding AI into the teaching and learning processes of Kosovo's higher education system. The project focuses on enhancing pedagogical methodologies, empowering academic staff, and enriching student experiences through strategic implementation of AI tools. The initiative is focused 3in the development of a comprehensive policy paper that provides a strategic framework for the ethical and effective implementation of AI, supported by practical guidelines to foster academic staff engagement and informed adoption. The project sets out to build foundational AI knowledge among academic staff and students, enhance educators' capacity to combine AI technologies with human-centered pedagogies, and promote the widespread use of innovative AI-based tools. A key focus is on empowering students through the integration of AI-supported chatbots in instructional activities, accompanied by pilot studies to assess their pedagogical impact. Additionally, the project emphasizes the development of digital literacy related to AI and the creation of institutional guidelines to ensure responsive and responsible AI use in education. By aligning technological innovation with ethical considerations and professional development, this initiative aims to improve educational outcomes and support sustainable AI adoption across Kosovo's academic institutions.

Research on the Entrepreneurial Capacity of Engineering Students in Bulgaria

by Senior Assist. Prof. Vesela Dicheva | Senior Assist. Prof. Svilen Simeonov | Assist. Prof. Ivet Fuchedzieva

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Topic: Innovation for a Sustainable Future

This article examines the entrepreneurial capacity of engineering students. The aim of the study is to determine to what extent students are ready to start their own technology business, what their attitudes are towards starting a business, and how oriented and prepared they are for it.

According to Looney high-tech entrepreneurs have a better chance for success than do other entrepreneurs, a high-tech entrepreneurs produce engineering sciences. The study among students aims to establish entrepreneurial attitudes and capacity towards starting their own business among students studying in the field of engineering sciences.

The potential payoff and risk of an opportunity must carefully considered before attempting to develop an innovative idea to capitalized on the opportunity. Karl Vesper, stated that engineering students have a fundamental advantage over other students in the area of entrepreneurship due to their exposure to technological innovation. Many times, entrepreneurs are able to reduce the perceived risk of a venture simply by using innovative thinking and implementation. Entrepreneurial abilities are significant for students in Electrical Engineering, Electronics, and Automation, which are industries experiencing rapid technological change.

The aim of this study is to determine the entrepreneurial capacity of students and their attitude towards creating their own business in the field of technology. To achieve this goal, a survey was conducted among students from engineering professional fields, and a subsequent analysis of the empirical data obtained from it was made. Due to the cluster nature of the study, it does not claim to be representative and does not cover the overall picture of the entrepreneurial capacity of students, as well as all aspects of the entrepreneurial process.

Keywords—Entrepreneurial Capacity, Engineering Students, Technological Entrepreneurship

Leveraging AI Conversational Agents to Enhance Student Entrepreneurship Education: Insights from the SEEN Project

by Angel Marinov | Technical University Varna, Bulgaria

Abstract ID: 162

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Event: CloudEARTH*i* Conference 2025

Topic: *Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education for green and tech-driven jobs*

This study explores the potential and strategic implementation of artificial intelligence (AI)-powered conversational agents to support entrepreneurship education in higher education institutions. Conducted within the context of the Social Entrepreneurship Ecosystems Network (SEEN) project, funded by the ERASMUS+ programme, this research seeks to address the pedagogical challenges associated with providing scalable and personalized mentorship to student entrepreneurs.

The primary purpose of the study was to investigate how advanced natural language processing technologies could be effectively integrated into educational frameworks to offer tailored guidance and feedback to students developing entrepreneurial ideas. This integration aims to overcome existing limitations related to mentor availability, standardized feedback processes, and resource accessibility, thereby enhancing educational outcomes and fostering a more inclusive and innovative entrepreneurial ecosystem.

To inform the system design, a mixed-methods approach was adopted, combining comprehensive surveys among students, educators, and practicing entrepreneurs, along with targeted evaluations conducted among participants of pilot entrepreneurship training. The findings reveal a substantial interest across stakeholder groups for institution-specific AI solutions that closely align with pedagogical methods and entrepreneurial competencies. Despite generally moderate levels of prior exposure to AI technologies, the stakeholders identified considerable practical value in integrating AI tools within entrepreneurship curricula, especially when personalized and institutionally managed.

Based on these insights, the study outlines two detailed implementation scenarios for AI-driven conversational platforms. The first scenario utilizes Retrieval-Augmented Generation (RAG) techniques employing OpenAI's language models to offer rapid, scalable deployment. The second scenario proposes developing a fully customized, self-hosted model based on open-source Mistral architecture, providing deeper pedagogical alignment and institutional control.

Overall, the SEEN project demonstrates how strategically designed AI systems can significantly augment entrepreneurship education, providing institutions with effective tools to nurture student innovation, critical thinking, and entrepreneurial confidence.

Advancing Entrepreneurial Education through Generative AI: Insights from the SEEN Project

by Angel Marinov | Technical University Varna, Bulgaria

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Event: CloudEARTH*i* Conference 2025

Topic: Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education for green and tech-driven jobs

The SEEN (Social Entrepreneurship Ecosystems Network) project addresses the critical need for innovative and inclusive entrepreneurial education in higher education institutions, leveraging generative artificial intelligence (AI) technologies. Situated within the ERASMUS+ programme framework, this initiative aims to empower students by offering personalized guidance, systematic mentorship, and targeted skill development for entrepreneurial endeavors.

Motivated by global economic shifts and increasing demands for digital competencies, the project's primary objective is to modernize entrepreneurial education, making it accessible to diverse student populations, including those from disadvantaged backgrounds. A systematic training methodology is introduced for educators to enhance their capacity to identify and nurture entrepreneurial talent effectively. Concurrently, a specialized AI-driven platform is developed, focusing on comprehensive analysis and evaluation of start-up ideas, facilitating students' practical application of entrepreneurial knowledge and skills.

Implementation activities are structured across dedicated work packages that include course design, AI platform deployment, ecosystem development for student-investor interactions, and extensive dissemination campaigns. The expected outcomes encompass pilot courses, a validated training database, a micro-credentials system, and strengthened innovation ecosystems connecting academic insights with practical entrepreneurial opportunities.

The SEEN project not only promotes the adoption of advanced AI solutions in entrepreneurship education but also aligns closely with European priorities of digital transformation, inclusivity, and innovation. Ultimately, this initiative aims to create sustainable and scalable educational impacts, fostering an entrepreneurial mindset and equipping students with essential competencies for thriving in the digital age.

EfxINNOS – an advanced approach to seagrass meadows preservation

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Topic: Innovation for a Sustainable Future

Seagrass is a marine flowering plant critically important to marine and coastal ecosystems. Growing primarily in shallow coastal waters, seagrasses form extensive underwater meadows that provide essential ecological services and sustain diverse marine life. These meadows play a pivotal role in mitigating climate change by sequestering substantial amounts of carbon dioxide and acting as significant carbon sinks. Additionally, they support marine biodiversity by serving as breeding grounds, nurseries, and habitats for a multitude of marine species.

Beyond their ecological role, seagrass meadows help to reduce coastal erosion by stabilizing sediments and mitigating the impacts of wave action, thereby protecting shorelines and coastal communities. They also contribute significantly to global oxygen production, enhancing both aquatic and terrestrial life. Despite their invaluable ecological, economic, and social importance, seagrass ecosystems remain among the world's least protected and most threatened habitats. Globally, seagrass meadows are in decline, diminishing at an alarming rate of approximately 7% annually due to human activities and environmental pressures. Thus, there is an urgent need for targeted and effective conservation action to prevent their continued loss.

Addressing these challenges, the project "EfxINNOS – Creating an innovative network for the transfer of marine technologies to improve the transition to a sustainable blue economy in the Black Sea Basin" aims to significantly advance efforts to protect seagrass habitats. The project will establish and manage a technologically sophisticated network of marine monitoring platforms designed to record critical marine environmental conditions, quantify human-induced pressures, and delineate and assess the health of key benthic ecosystems in the Black Sea and the North Aegean Sea regions. These advanced monitoring platforms will provide precise and continuous data to inform management strategies and support evidence-based decision-making.

The expected outcome of this initiative is the creation of a cost-effective and robust monitoring system that directly contributes to the preservation and restoration of vital seagrass habitats. By ensuring improved ecological status and sustainability, the project promotes clearer, cleaner oceans, stabilized coastlines, enhanced biodiversity, and sustained oxygen production. This paper discusses the contemporary ecological challenges facing seagrass ecosystems and examines integrated approaches and methodologies to preserve and restore these critical marine habitats, ensuring long-term environmental

sustainability and resilience.

SEEDplus – Strengthening Inclusive Innovation Ecosystems in Higher Education

by Tamer Abu-Alam | SEEDplus project team

UiT The Arctic University of Norway | CloudEARTH initiative

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Topic: Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education for green and tech-driven jobs

The SEEDplus project, funded by Horizon Europe, set out to close the gap between academic potential and entrepreneurial action by equipping higher education institutions (HEIs) with the tools, frameworks, and partnerships needed to support inclusive, sustainability-driven innovation. Building on the CloudEARTH ecosystem, SEEDplus focused on empowering universities in emerging and moderate innovation regions across Europe to activate entrepreneurial mindsets among students, researchers, and local communities.

Throughout its implementation, SEEDplus co-designed and launched the Venture Creation Course (VCC)—a transdisciplinary, hands-on model for nurturing early-stage entrepreneurial thinking, now embedded in several partner institutions. The project also delivered a transnational startup competition, offering student teams direct engagement with mentors, investors, and innovation hubs. Additionally, SEEDplus conducted feasibility studies to help HEIs identify pathways for implementing seed funding mechanisms and startup support structures, ensuring long-term sustainability of innovation initiatives.

SEEDplus contributed significantly to institutional transformation by promoting collaboration between academia and regional stakeholders, fostering innovation culture within universities, and laying the foundation for scalable, inclusive entrepreneurship. Its results demonstrate how HEIs can play a leading role in building resilient, sustainability-focused innovation ecosystems aligned with local needs and European priorities.

Inspiring the Minds – Embedding Inclusion and Climate Action into Higher Education

by Tamer Abu-Alam | *Inspiring the Minds* project team
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Topic: Academic Excellence, skill-building and innovation: future of work, entrepreneurship and education for green and tech-driven jobs

Inspiring the Minds, funded by the Erasmus+ programme, set out to integrate inclusion, diversity, and climate action into the very fabric of higher education. Operating across Norway, Spain, Slovakia, Turkey, and Italy, the project aimed to strengthen institutional capacity to co-design teaching and learning with societal actors—ensuring that academic knowledge is not only relevant, but also responsive to the needs of a just and sustainable future.

Over its duration, the project developed and tested a replicable methodology for inclusive course co-design, bringing together university staff, students, NGOs, and public and private sector stakeholders. Partners co-created new educational content that embeds sustainability and social responsibility, launched pilot courses, and delivered joint staff training programmes to build intercultural and interdisciplinary competencies. A key achievement was the establishment of a digital Knowledge Transfer Hub, supporting cross-border exchange and the long-term sharing of resources and best practices.

By directly engaging communities in shaping the academic experience, Inspiring the Minds helped reshape how universities approach both teaching and social impact. The project leaves behind a practical framework for participatory curriculum development, actionable policy recommendations, and a growing network of educators and institutions committed to inclusive, climate-conscious education across Europe.

Technological Trends for Sustainable Transformation in Innovation Ecosystem

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The innovation ecosystem is an open system that enables interaction among academia, government, business, and society, while incorporating the imperative of sustainable environmental development, as reflected in the Quintuple Helix Model. A central goal of this ecosystem is the generation of innovation. The innovation ecosystem experiences technological trends that focus on science, technology, and IT, which have a significant impact on society and the economy.

In this context, it is crucial to consider modern technological trends as guiding frameworks that influence the ecosystem's functioning, direction, tools, and innovative outputs. Consequently, the innovation ecosystem undergoes continuous evolution, adapting to the challenges of its surrounding environment.

Modern technological trends shape the design, functioning, and outcomes of innovation ecosystems. Specifically, green trends contribute to the ecosystem's sustainability, while digital trends enable data-driven technological transformation and platformization.

The research is based on an analysis and clustering of technological trends. The findings indicate that digital and green trends could significantly influence the innovation ecosystem, and their clustering provides a vector for ecosystem transformation direction.

The transition of innovation ecosystems from the Triple Helix model—University, Government, Business—to the Quadruple and Quintuple Helix—adding society and the environment—illustrates a shift toward a systemic paradigm [1]. This evolution emphasizes interdependence, platforms, adaptability, sustainability, and digitalization [2]. These developments support the hypothesis that monitoring and understanding technological trends, particularly digital and green ones, are essential for the successful operation of innovation ecosystems.

The analysis of modern technological trends reveals key patterns in both digital and green (eco) domains. Recognizing these trends and their developmental trajectories facilitates the formation of thematic clusters that support the ongoing evolution of the innovation ecosystem.

Based on the analysis and systematization of sources in the digital sphere, it is advisable to

form the following clusters that encompass digital trends and influence the development of the innovation ecosystem.

Digital Clusters Shaping Ecosystem Transformation - key directions of digital technologies that drive change in the structure, tools, and performance of innovation ecosystems are grouped into seven impact-oriented clusters for technological transformation: *Artificial Intelligence (AI), Advanced Connectivity, Next-Generation Software Development, Digital Trust and Cybersecurity, New Realities, Computing, Mobility, Robotics & Drones*

Analyzing global priorities and EU goals in sustainable development, together with trend analysis, allows us to form the following clusters, which encompass eco-trends and influence the development of the innovation ecosystem.

Green Clusters Shaping Ecosystem Transformation - thematic areas of ecological and climate-related trends that ensure long-term resilience and sustainability of innovation ecosystems are grouped into ten impact-oriented clusters representing distinct area of sustainability-focused innovation: *Ecosystem Management and Biodiversity, Climate Technologies and Decarbonization, Pollution Reduction Solutions, Green Digital Transformation and Intelligent Systems, Circular Economy and Resource Efficiency, Green Jobs and Skills Transformation, Biotechnologies and Agritech Innovation, Water Resources and Infrastructure, Sustainable Energy, Green Finance.*

The research confirms that modern technological trends—especially digital and green—are helpful in shaping the structure, function, and outcomes of innovation ecosystems. The progression from the Triple Helix to the Quintuple Helix models underscores the increasing relevance of sustainability and digitalization. For ecosystems to remain adaptive and resilient, ongoing monitoring of these trends is vital, aligning them with global environmental and technological priorities.

The systematization of current trends allows for the formation of two main groups of influence: digital transformation and ecological (green) transition. Identified clusters demonstrate that digital trends provide tools for increased efficiency, predictive capacity, and systemic optimization, while green trends ensure environmental resilience, sustainability, and long-term societal well-being. Their integration within innovation ecosystems fosters adaptability, future-readiness, and inclusive progress aligned with global sustainable development goals.

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Socioecological Dimension of Innovation

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Sustainable regional development increasingly depends on innovation ecosystems that integrate social, economic, and ecological priorities. These ecosystems are communities of actors—businesses, researchers, governments, civil society—interacting with infrastructure, resources, and enabling environments to generate and implement innovations that contribute to long-term resilience and prosperity.

The ecological dimension of innovation is no longer optional — it is essential. Innovation ecosystems must be understood as socioecological systems (SES), in which innovation is both driven and constrained by local environmental, social, and institutional conditions. This perspective aligns with the Quintuple Helix model, which expands the classic triple helix of university–industry–government to include society and the natural environment as equal partners. Such an integrated approach ensures that innovation contributes to both economic competitiveness and ecological regeneration.

Based on research [1] into local ecosystems, six key actor types are identified: businesses, community organizations and NGOs, research and education institutions, funders, local and regional governments, and formal and informal networks. These actors rely on five key types of resources:

1. Natural capital (biodiversity, raw materials, ecological resources);
2. Human capital (knowledge, skills and competencies);
3. Social capital (information, trust, and norms of reciprocity);
4. Infrastructure (physical and digital systems that support innovation);
5. Financial resources that fund experimentation, scaling, and diffusion.

The role of innovation ecosystems is particularly important in achieving the Sustainable Development Goals (SDGs). Innovations are needed to support inclusive economic growth (Goal 8), industrial transformation (Goal 9), reduced inequalities with sustain income growth (Goal 10), sustainable consumption and production (Goal 12), and global partnerships for green technologies (Goal 17). These goals require not only new technologies but also institutional innovation, behavioural change, and adaptive governance. In Europe, the Green Deal provides a strategic framework that implements the United Nation's 2030 Agenda for reorienting growth toward ecological balance. It promotes the

decoupling of economic activity from resource consumption, preservation of natural capital, and citizen well-being as core development objectives. Innovation ecosystems play a central role in this vision—by mobilizing digital infrastructure, fostering cross-sectoral collaboration, and enabling evidence-based decision-making with attention on potential trade-offs between economic, environmental and social objectives.

Innovation must be understood as a product of complex, adaptive SESs in which social and ecological processes co-evolve, where social, economic, ecological, cultural, political, technological, and other components are strongly linked [2]. SESs include biophysical systems and social actors (individuals, institutions, networks) whose behaviors, decisions, and strategies shape system dynamics. These systems are characterized by uncertainty, feedback loops, and non-linear change.

Innovative capacity in SESs depends on human behaviour. Agent-based simulations represent agents/actors with a set of behaviours (e.g. decision-making structures, actions/responses, goals and mental maps), and a set of constraints within types and roles [3]. A decision-making strategies include [4]: heuristics, bounded rationality, utility maximization and evolutionary processes.

Understanding what motivates human actions is crucial. Given the uncertainty and complexity of SESs, adaptive environmental management is needed with focus as much on institutional strategies as on scientific experimentation, covering multiple spatial and temporal scales. It requires flexibility, stakeholder engagement, and social learning, where communities negotiate shared interests and actions. Since institutions and goals evolve over time, ongoing monitoring, reassessment, and adaptation are essential as knowledge improves and learning occurs.

At the strategic level, planning for innovation in SESs requires the integration of multiple priorities. Local and regional authorities must balance economic development with environmental limits and social needs. Goal-setting should reflect the diverse values of ecosystem actors and align with sustainability criteria. Decision-support tools can help allocate limited resources among projects to maximize the achievement of both innovation and sustainability goals.

In conclusion, integrating SES thinking into innovation policy offers a powerful framework for designing more adaptive, inclusive, and sustainable innovation ecosystems. By embedding the natural environment as a core component—alongside science, business, government, and civil society — we align innovation with the urgent challenges of our time: biodiversity loss, climate change, inequality, and resource scarcity. Only through such integration can innovation serve its true purpose — shaping futures that are both prosperous and sustainable.

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