



UKRAINIAN
CLUSTER
ALLIANCE

Industry 5.0 in
Ukraine

Driven by **APPAU**

SHAPING RESILIENT FUTURE

Mobilizing clusters
for common secure
and
sustainable future

Executive summary

The Association of Industrial Automation of Ukraine (APPAU) is a key Ukrainian association in the field of industrial technologies, automation, and Industry 4.0–5.0, founded in 2011. Bringing together more than 60 member organisations and over 500 in the Industry 4.0–5.0 ecosystem, APPAU is a driver of innovative transformation in Ukrainian industry and co-coordinator of the development of the Ukrainian Cluster Alliance (UCA).

By 2030, the APPAU aims to make Ukraine a high-tech player in Eastern Europe, focused on sustainable development, digitalisation and partnership. Our mission is to consolidate the innovative ecosystem of industrial high-tech sectors, promote the transformation of SMEs, the development of clusters, integration into European markets and institutional modernisation.

The document presents five strategic directions for APPAU projects for 2026–2030:

1. **Twin transition: digital + green transformation** – 7 projects aimed at implementing Industry 4.0 technologies in areas such as Industrial AI, Industrial Data Space, Circular Economy, asset management through digital twins and IIoT, robotics and autonomous systems.
2. **Innovation, education, R&D infrastructure development** – 5 projects covering the Digital Maturity Academy, a mass reskilling/upskilling programme (Re-Up), digital innovation hubs (EDIH), campaigns to promote engineering professions, and the development of a network of prototyping centres.
3. **Defence and security** – 4 projects within Clusters4Defense, engineering hubs (CAD/CAM/CAE – PDM/PLM), OT/IT cybersecurity and automation centres for defence industry enterprises, prototyping in the dual-use technology sector.
4. **Integration and international cooperation** – 4 projects to strengthen external presence and collaboration: joint participation in exhibitions (Hannover Messe, Promforum), Industry 5.0 forum, demonstrations and exchanges of best practices, etc.
5. **Institutional initiatives and cluster development** – 4 projects aimed at shaping Industry 5.0 public policy, building win-win models of cooperation with clusters, strengthening internal coordination and management, and developing cluster infrastructure.

The APPAU offers a number of cooperation benefits for international partners, including a ready-made project structure **for implementation with the participation of European donors and agencies**, synergy with UCA clusters, opportunities for technology transfer, creation of test beds, involvement in consortia (Horizon Europe, Interreg, Digital Europe), integration of Ukrainian SMEs into European supply chains – from contractors to scientific partners and start-ups, scaling solutions through networks of universities, competence centres, industrial hubs, etc.

APPAU is a strategic partner for the deep modernisation of Ukrainian industry through international cooperation, technology transfer, human resources development and the implementation of Industry 5.0 best practices.

2. About APPAU

The vision of the APPAU is to bring Ukraine into the circle of high-tech, industrially developed countries of Eastern Europe and the EU by 2030, making it one of the Eastern European leaders in the field of Industry 4.0-5.0. We see Ukraine as a **sustainable, innovative and competitive economy** where industrial technologies, automation and digitalisation are creating a new industrial culture focused on people, efficiency and partnership.

The mission of APPAU is to consolidate and orchestrate Ukraine's innovative industrial high-tech ecosystem, creating conditions for sustainable growth, digital transformation, and international integration of Ukrainian industry. Areas of focus for implementing the mission

- **Strategic coordination** – initiation of the Industry 4.0 in Ukraine movement, development of the National Strategy for the Development of Industry 4.0 and the Manifesto on the Transition to Industry 5.0.
- **Standardisation** – Technical Committee (TC) 185 "Industrial Automation" and, within the framework of the UCA, active promotion of cluster management standards.
- **Innovative ecosystem** – initiation of the Industry 4.0 Centres network, and today contributes to the deployment of the European Digital Innovation Hubs (EDIH) network. In the field of Industry 4.0-5.0, APPAU brings together clusters and other SME associations.
- **International integration** – partner of European programmes Horizon Europe, Interreg, GIZ, UNIDO, EEN, UCORD; founder of the EIF and Professionals4Ukraine initiatives.
- **Economic stability** – support for critical industries and economic recovery through collective projects with the UCA and international donors.

On the Ukrainian market, APPAU acts as a **platform for the development of industrial high-tech sectors**, with distinct functions as a discussion forum, a consolidator of science, government, business and the expert community, a catalyst and ideological inspirer of strategic initiatives in development, and also a "window" for entry and partnerships with foreign organisations.

The APPAU team is a **catalyst and coordinator for the development of the Ukrainian Cluster Alliance (UCA)**, which today brings together more than 44 clusters in 20 regions.

We provide **methodological, analytical and project support**, form a joint portfolio of international initiatives and train cluster teams to work according to European standards.

Key achievements of the APPAU over the last 10 years

Topic	Results
International projects	17 projects implemented with the support of the EU, GIZ, UNDP, UNIDO.
Partnerships	10+ international organisations and programmes (EC, EEN, ECCP, FPPP, Horizon, Interreg).
Clusters	20+ partner clusters in 20 regions of Ukraine.

Topic	Results
Network of participants	500+ organisations in the ecosystem – large enterprises, SMEs, universities, government structures and agencies.
Grants and funding	Over €1.5 million in funds raised for association members.
Thematic platforms	Industry4Ukraine, Professionals4Ukraine, Clusters4Defense, EIF.
Sectoral coverage	Machine building, metallurgy, oil and gas, engineering, thermal power engineering, IT, agriculture, defence.

According to the APPAU strategy until 2030, the strategic directions for development are as follows

1. **Policies and advocacy** – developing strategies and policies in the field of Industry 4.0-5.0.
2. **Innovation and R&D** – developing competence centres, industrial DIHs and accelerators.
3. **Twin transition** – supporting the digital and green transformation of SMEs.
4. **Internationalisation** – promoting Ukrainian SMEs and technologies in EU markets, with integration into single chains and ecosystems.
5. **Human capital** – educational programmes, retraining and reskilling of personnel.

In international cooperation, APPAU strives to develop long-term, transparent and mutually beneficial (win-win) relationships.

APPAU's vision for the transition from Industry 4.0 to 5.0

The APPAU is the initiator of adapting the European concept of Industry 5.0 to Ukrainian realities. [The manifesto for the transition to Industry 5.0](#) considers 5.0 as a new paradigm for the development of Ukraine's economy — not just technological modernisation, but a people-centred, sustainable and inclusive transformation of industry. The APPAU (document approved at the level of the Ukrainian Cluster Alliance) is aligned with the basic concept of the European Commission – a change in the model of thinking: from "digitalisation for efficiency" (Industry 4.0) to rethinking the role of people, sustainable development, cooperation and innovative synergy. Similarly, the position of the APPAU (UCA) coincides with the European concept in terms of

- a new industrial policy focused on intelligence, innovation and integration into European value chains;
- the development of innovative ecosystems and clusters that combine business, education, science and government;
- human-centred governance (Governance 5.0) – transparent, decentralised, with strong state coordination;
- transition of SMEs and industry to twin transition – both digital and green;



At the same time, the document proposes certain differences, namely priority support for Deep-Tech sectors and dual-use technologies as drivers of the defence and civil industries.

The document essentially declares a **"triple"** (rather than double) transition for SMEs, taking into account the geopolitical and military realities of Ukraine.

Since 2018-2019, the APPAU has traditionally emphasised the need to create effective instruments of state support, such as:

- stimulating demand for innovation among industrial enterprises (not just start-ups)
- targeted programmes for the development of networks of innovation clusters and digital innovation hubs (DIHs)
- networks of independent experts
- improving R&D infrastructure
- creating industry accelerators
- Large-scale reskilling and upskilling programmes for industrial SMEs
- Introduction of Industry 4.0 and 5.0 technical standards.

Much more attention should also be paid to the development of relevant institutions, where the state agency Industry 4.0-5.0 (Advanced Manufacturing) and clusters would play a much greater role in the modernisation of industry. Unfortunately, these instruments and institutions relevant to the development of Industry 4.0-5.0 are still absent in Ukraine or are in their infancy.

That is why the APPAU, together with the UCA clusters, has developed its own vision for the transition to Industry 5.0, which takes these challenges into account. Fig. 2 reflects the main elements of the framework policy on the necessary tools and development programmes to support SMEs in the

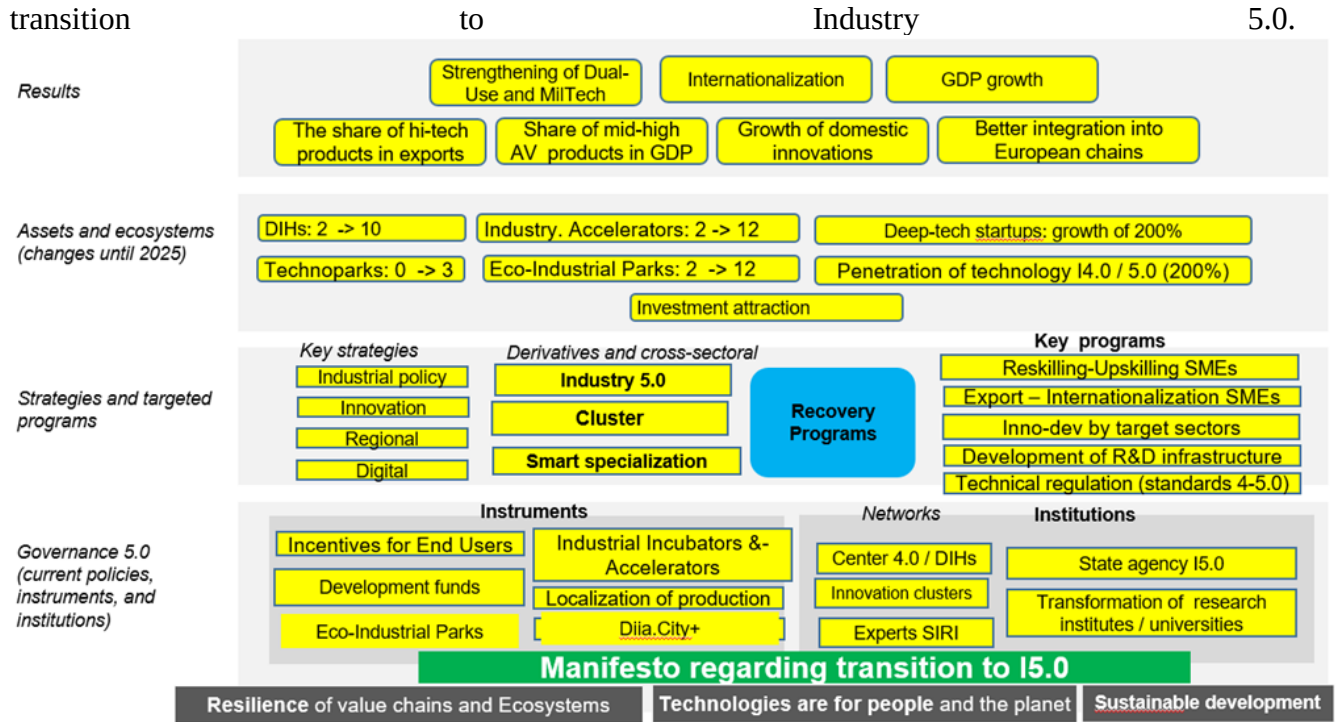


Fig. 1 Industry 5.0 policy framework proposed by the UCA

Most of the projects proposed later in this document are directly related to this strategic approach.

APPAU project portfolio for 2026-30

The APPAU project portfolio for 2026-30 is in line with the main directions of the organisation's development, as well as the development priorities of the Ukrainian Cluster Alliance (UCA). In particular, the APPAU supports the UCA Resilience Framework and the UCA programme portfolio, as reflected in the [Shaping Resilient Future](#) document.

The APPAU project portfolio for 2026-30 is at the core of the UCA's Clusters4Industry programme, which the APPAU is implementing in cooperation with other UCA clusters.

Figure 3 shows the project portfolio for this programme.



Fig. 3. Overview of the APPAU project portfolio for 2026-30.

Brief description by area

1. Double (digital and green) transition

Market challenges under consideration: 1) low level of technology penetration and low customer culture, 2) lack of pilots and use cases, 3) lack of targeted support programmes for I4.0-5.0.

Solutions: accelerate the implementation of 4.0 technologies in target market segments, which are cross-sectoral sectors such as asset management, cybersecurity and industrial AI, circular production, etc. (Fig. 3).

Projects: 7 projects covering the above sectors and creating the conditions for rapid development.

2. Innovation, development of educational and research infrastructure

Market challenges under consideration: 1) growing shortage of personnel, 2) insufficient level of training, 3) lack or scarcity of retraining and reskilling programmes in the field of industrial IT-OT, 4) lack of relevant support agencies or institutions.

Areas of focus: creation of networks of experts capable of conducting digital maturity audits and prototyping centres; educational platforms: promotion of engineering professions among young people – increasing demand and prestige of work in industrial enterprises.

Projects: 5 projects related to the implementation of the above objectives.

3. Defence and security

Market challenges under consideration: 1) compliance with EU standards (and trends), 3) low level of participation in grant programmes aimed at green transition (= loss of opportunities).

Objective: to raise awareness among target audiences about the benefits of the green transition; to introduce platforms for recording and sharing knowledge and best practices.

Projects: 2 projects in line with the objectives.

4. Integration and collaboration

Market challenges under consideration: 1) insufficient promotion and representation of Ukrainian OT-IT solutions and Industry 4.0 on the Ukrainian and international arena, 2) search for new partnerships and customers.

Objective: to raise awareness among target foreign audiences about Ukraine's potential in the field of I4.0-5.0 - to improve integration and cooperation.

Projects: 4 projects in line with the objectives.

5. Institutional and organisational initiatives

Market challenges under consideration: 1) creation of state support mechanisms, 2) improvement of cooperation within the organisation and with UCA clusters.

Objective: advocacy of development policies at the state level; improvement of cooperation with UCA clusters.

Projects: 4 projects in line with the objectives.

Proposals for cooperation with international partners

The APPAU seeks to develop partnerships with many countries in the Euro-Atlantic bloc.

Our proposals concern the following areas

1. **Development of joint projects in Ukraine.** The portfolio of projects presented in this document is designed with the possible involvement of international partners in mind. For example, Ukrainian universities or EDIH cannot launch a modern network of prototyping centres without the help of European institutions, as Ukraine does not have modern test beds or laboratories in the field of Industry 4.0. Instead, the transition to distributed, shared models may be the answer to such challenges.
2. **Transfer of new technologies to Ukraine.** Most modern automation technologies are imported into Ukraine from developed countries. The post-war recovery period will require the mass import of new technologies. Accordingly, the APPAU could be a point of entry into the Ukrainian market for many foreign partners.
3. **Integration of Ukrainian enterprises into European chains and ecosystems.** APPAU community members are interested in better integration into European and global chains and ecosystems, for example:
 - a. System integrators and engineering companies can be subcontractors for large contractors in the implementation of projects both in Ukraine and abroad.
 - b. Many universities have TRL4-7, but need partners for further stages.
 - c. Startups are similarly looking for investors.
4. **Participation in joint European consortia.** APPAU members already have experience participating in numerous European programmes such as Horizon / Digital Europe, Interregm, SMP, etc. We are interested in expanding such partnerships and attracting more participants from Ukraine.
5. **Other international cooperation projects.** APPAU welcomes other international cooperation projects, in particular, bilateral and multilateral cooperation agreements with EU countries.

Appendix 1. APPAU project portfolio for 2026

C1. Digital and green (dual) transition projects

№	Project name	Brief description	Key results / KPIs 2026-27	Estimated budget (€)	Potential donors/partners
1	Industrial AI development	Development of AI pilot projects for industrial segments	National framework and DC for industrial AI development; at least 20 pilots	100 000	Ministry of Digital Transformation, Industrial AI Working Group, UCA clusters
2	Industrial Data Space Ukraine (IDS-UA)	Industrial data exchange platform (Manufacturing-X node) – integration with Gaia-X.	National framework and Data Space development roadmap; 5 industry data hubs; participation in GAIA-X / Manufacturing-X.	200 000.	Ministry of Digital Transformation, Federated Data Space Working Group, GAIA-X, and other associations
3	Circular Manufacturing Accelerator	DPP platform, secondary materials, clean production.	20 enterprises with DPP; 3 circularity hubs; public register "Clean Materials UA".	300 000	Circular Economy Cluster
4	ESG Reporting Platform	Digital sustainability reporting tool.	200 users; integration with Green Deal.	150 000	Ministry of Economy, UNDP, UNIDO

APPAU

5	Asset Performance & Safety 5.0 (APSM)	IIoT + Digital Twin + AI for asset management, failure prediction, equipment safety.	5 PredMaintenance/DT pilots; 30 APM maturity audits; APM Academy.	150 000	APM Working Group, Vendors, EDIH Kyiv Hitech
6	Green & Circular Hub Ukraine	Single ESG + Circular centre: green metrics, DPP, training.	Training (50+); 20 companies report under CSRD/CBAM; ESG database created.	300 000	482.Solutions, UNIDO, UCA clusters
7	Robotics & Autonomous Systems 5.0	Robotics development: testing grounds, R&D, component localisation, autonomous systems.	2 test beds; 5 industrial pilots; integrator certification programme.	200 000	WG Robotics, CSIA, Horizon Europe, UCA

C2. Innovation, development of educational and R&D infrastructure

№	Project name	Brief description	Key results / KPIs 2026-27	Estimated budget (€)	Potential donors/partners
1	Digital Maturity Academy (SIRI-OPERI)	Digital Maturity Academy: auditor training, certification.	10 certified experts; 50 company audits.	200 000	EDIH Kyiv Hitech, donor
2	EDIH Kyiv Hitech	EDIH services: consulting, training, pilot projects for 150+ SMEs.	150 enterprises served; 10 pilots; 10 service providers; EDIH service platform.	500 000	UCA, KPI, KAU + all consortium members
3	Re-Up National Platform	Uniform reskilling/upskilling programmes for industrial markets in the field of industrial automation.	200 specialists trained; 5 regional Re-Up schools.	300 000	Ministry of Education and Science, donors
4	Youth & Talent for Industry 5.0	Campaign to promote industrial professions among young people.	2 national campaigns; 200 bootcamp participants; 100 internships.	200 000	Ministry of Education and Science, Ministry of Digital Transformation, FRU, UCA clusters, donors

C3. Security and defence (under the Clusters4Defence programme)

№	Project name	Brief description	Key results / KPIs 2026-27	Estimated budget (€)	Potential donors/partners
1	E2E Engineering Hub	CAD/CAE/PLM expertise centre, training + consulting for enterprises.	10 PLM pilots in various industries; 100 trained engineers; PLM-UA framework.	200	KPI, Siemens, WG E2E Engineering
2	CyberResilience for Industry	OT/IT cybersecurity competence centre: training, auditing, ISO 62443 certification.	20 enterprises certified; 200 specialists trained; 10 best practices for CCSO implementation recorded	200	Ukrainian Cybersecurity Cluster, KPI-KAI, State Special Communications Service
3	Network of prototyping centres	Creation of a network of prototyping centres for the needs of I4.0-5.0 - Dual-use based on universities	50 new prototypes in the dual-use sector; 50 SMEs involved; new projects between universities	200	EDIH Kyiv Hitech, 5 universities. Donor
4	Centre of expertise in automation technologies for the defence industry	Centres of expertise for the creation and scaling of best practices in industrial automation for defence industry enterprises	Implementation of flexible manufacturing; best practices in production scaling; I4.0 pilot projects	200	Vendors, APPAU, UCA Clusters, donors

C4. Integration initiatives – international cooperation

№	Project name	Brief description	Key results / KPIs 2026-27	Estimated budget (€)	Potential donors/partners
1	Stand at Hannover Messe	Joint stand at Hannover Messe.	10 participants – 2 agreements, 5 memoranda	80 000	Members of APPAU, UCA clusters, donor
2	Digital Factory Ukraine	Joint stand of EDIH, APPAU members and UCA clusters at Promforum.	I4.0 innovators catalogue, involving 20 companies	50 000	Members of APPAU, UCA clusters, donor
2	Industry 5.0 Leadership Forum	Annual conference/forum of Industry 5.0 leaders.	200 participants; policy papers 5.0 for the government.	10 000	Ministry of Economy
3	Community & Showcase Program	Visits by "Practice Leaders", demonstrations of best cases.	10 experience exchanges; “Best Practices UA” database.	10 000	Members of APPAU, UCA clusters

C5. Institutional initiatives and cooperation with clusters

№	Project name	Brief description	Key results / KPIs 2026-27	Estimated budget (€)	Potential donors/partners
1	National-level strategies	Developing and advocating initiatives in government programmes	Industry 5.0 strategy, dual transition roadmaps – industry and sectoral, etc.	20 000	APPAU members, UCA clusters, donors
2	Win-Win Mechanism Implementation	Formalising and implementing mutually beneficial agreements between the APPAU and clusters.	5 agreements signed; 10 APPAU members involved; 100% transparency of contributions/results.	5 000	APPAU members, UCA clusters
3	Cluster Collaboration Toolkit	Methods for building effective committees and working groups	10 active working groups; series of training sessions for RC managers	100 000	APPAU, donor