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Evidence-Based Profiling of Innovation Actors for Regional Development in Central Europe*

Mateusz MOLASY [0000-0001-6390-9711], Mariusz CHOLEWA [0000-0002-7263-4454],
Joanna HELMAN [0000-0002-4239-674X] and Maria ROSIENKIEWICZ [0000-0002-6976-352X]

Wroclaw University of Science and Technology, Wroclaw, Poland

Correspondence should be addressed to: Mateusz MOLASY, mateusz.molasy@pwr.edu.pl

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Abstract

Regional innovation depends on effective collaboration among firms, universities, intermediaries, and policymakers. Traditional profiling methods, however, rely on self-reported information that is often unreliable or outdated. This paper presents the profiling methodology developed in the Interreg Central Europe SYNERGY project (2017–2020), which characterizes innovation actors through verifiable project achievements rather than declarations. Based on exploratory research in additive manufacturing & 3D printing, micro- and nanotechnologies and Industry 4.0, the study identifies two key outputs: (1) project assessment criteria (e.g. technological domain, outputs, TRLs, consortium composition, competence keywords) and (2) actor profiling categories (organization type, specialization, competences, outputs, infrastructure, and location). These elements form a structured framework for evidence-based profiling. The approach provides a more credible, 360-degree view of innovation actors, enabling differentiation between active and passive participants and generating insights for policy and matchmaking. Although limited to formal R&D projects, it offers a foundation for further development and practical application.

Keywords: Regional Development, Innovation Profiling, Transnational Cooperation

Introduction

Regional innovation and economic development increasingly depend on effective collaboration among diverse actors, including firms, universities, R&D institutes, intermediaries, and policymakers (López-Rubio et al., 2020). One key challenge is matchmaking: identifying the right partners for long-term, trust-based cooperation that yields true synergies. Traditional approaches often rely on self-declarative profiles or directories where organizations describe their expertise. However, such descriptions can be non-binding declarations, which may exaggerate capabilities or become outdated (Caloffi et al., 2023; Holzmann et al., 2014; Keinz and Marhold, 2021). This paper addresses a novel approach emerging from the SYNERGY project (08.2017–10.2020), financed under the Interreg Central Europe programme, aimed to strengthen innovation capacity in Central European regions by fostering transnational linkages and cooperation among SMEs, industry, research, intermediaries, and policymakers ("SYNERGY - Interreg," n.d.). Rooted in the Triple Helix Innovation Model (Linton, 2024), the consortium included universities and research institutions (from Poland, Slovenia, Germany), a high-tech SME (from Austria) and business support organizations (from Croatia and Italy). Moreover, governmental agencies were included as associated partners. Addressing challenges such as weak technology transfer and low participation of new EU Member States in R&D, SYNERGY focused on advanced manufacturing with three priority areas: Additive Manufacturing & 3D Printing, Micro- and Nanotechnology-related Processes & Materials and Industry 4.0 (Rosienkiewicz et al., 2019). By profiling innovation actors and building sustainable networks

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across borders, the project sought to enhance innovativeness and competitiveness of Central Europe through matchmaking and synergy creation. In the following sections, we present a structured overview of evidence-based profiling methodology and its context.

Innovation Actor Profiling Methods

Profiling of innovation actors (such as firms, research institutes, startups, and intermediaries) is commonly performed through databases and platforms that rely on self-reported information. For example, the European Cluster Collaboration Platform (ECCP) profiles hundreds of cluster organizations and innovation actors by *type of actor, industry, region,* and other attributes ("Homepage | European Cluster Collaboration Platform," n.d.). Such directories allow organizations to declare their areas of expertise, partnership interests, and capacities. Similarly, networks like the Enterprise Europe Network ("Enterprise Europe Network | Enterprise Europe Network," n.d.) and various national innovation portals maintain catalogs of actors where each fills out a profile describing its competencies and offerings. These approaches often rely on self-declarative profiles or directories, but such profiling methods may exaggerate capabilities or contain unverified claims, making it difficult for collaborators to distinguish substantial experience from mere statements. Studies of open innovation organizations have highlighted this risk of divergence between narrative claims and real capacity (Abhari et al., 2022) and the role of intermediaries is often to validate or mediate such claims in regional systems (Martins and Hukampal Singh, 2023).

Alternative methods for profiling and mapping innovation actors have emerged that attempt to use objective data. One approach involves analyzing *collaboration networks* and project participation. For instance, mapping initiatives under EU regional policy encourage using factual indicators, such as R&D project data, co-publications, patent collaborations, or shared research infrastructure usage, to identify innovation hotspots and actor networks. These data-driven maps provide an evidence-based view of who is actually working with whom and in what technological domains, complementing the self-reported information (Akçomak et al., 2023).

Early efforts in Central Europe have attempted to compile such evidence. For example, the NUCLEI project ("Network of Technology Transfer Nodes for Enhanced Open Innovation in the Central Europe advanced manufacturing and processing industry") focused on profiling existing technology transfer services and company requirements across seven manufacturing regions. By aggregating inputs from clusters, technology brokers, R&D institutions, and companies, NUCLEI sought to create a transnational pool of knowledge to foster advanced manufacturing innovation beyond regional borders. However, this approach still largely relied on manual data collection and self-reported contributions from participants, rather than a systematic assessment of project outcomes (Cholewa et al., 2019).

Recent research highlights the value of network-based profiling rather than viewing innovation actors in isolation. In this view, relational data (such as co-participation in innovation projects or shared collaborations) is used to infer actors' functional roles and capabilities. For example, studies on entrepreneurial ecosystems advocate leveraging network structure and connectivity metrics to reveal which organizations act as hubs, bridges, or peripheral nodes (Ancona et al., 2023). Empirical work has also shown that by examining actual collaboration links, one can detect clusters of complementary know-how and trust that would not emerge from self-reported profiles alone (Mohammadparast Tabas et al., 2023). This relational approach aligns closely with the concept of innovation ecosystems, where an actor's role is shaped as much by its connections (suppliers, collaborators, intermediaries) as by its declared competencies.

In summary, existing approaches to profiling innovation actors range from self-declarative directories, which are simple to establish but often misaligned with reality, to evidence-based mappings that draw on project data, collaboration networks, and other objective indicators, though these require more intensive collection and analysis. The methodology developed in the SYNERGY project belongs firmly to the latter category, profiling actors on the basis of verified project achievements rather than claims. Recent research emphasizes that innovation ecosystems should be understood through relational data and collaboration patterns, as an actor's role is defined as much by its network connections as by its internal competences (Silva et al., 2024; Wulfert, 2023). Such achievement-based profiling serves multiple strategic purposes: it provides policymakers with a clear picture of the ecosystem's active capabilities, enabling better targeting of investment and support instruments; it enhances trust and credibility among actors, since potential partners can see proven project outcomes rather than unverified statements; and it supports the implementation of matchmaking services and digital innovation platforms at larger scales. This responds to recent calls for more trustworthy, evidence-based tools to support innovation partnerships and provides a robust basis for identifying who has collaborated, in which domains, and with what outcomes in regional innovation ecosystems.

Identification of Research Gaps

Despite agreement on the importance of connecting innovation actors across regions, several gaps have been identified in practice prior to SYNERGY's initiative. First, profiles were unreliable, often based on generic self-descriptions without evidence of real capabilities. Second, information was fragmented, scattered across national and EU databases, leaving no comprehensive overview of projects or actors. Third, outcomes were rarely captured, meaning profiles seldom showed whether projects produced patents, prototypes, or reached high TRLs. Fourth, cross-regional and multi-sectoral linkages were weak, as most initiatives remained confined to single regions or sectors. Finally, directories were static, offering listings but little support for dynamic matchmaking or long-term cooperation. The SYNERGY project responded by creating a unified, credible, and dynamic profiling system. It aims to build profiles on verified project achievements rather than declarations. Aggregated data from projects into one accessible database and included project outcomes will better reflect innovation capacity. By covering multiple countries and technology areas, it supports cross-border and cross-sector linkages.

Research Methodology

The methodological work in SYNERGY was conceived as exploratory research to investigate how innovation actors in Central Europe could be profiled in a more systematic and credible way. Rather than designing a matchmaking tool directly, the partners focused first on identifying the criteria and indicators that would make such profiling reliable and useful. The starting point was a review of existing practices in actor directories and innovation databases, which largely relied on self-declared information. These were assessed for their strengths (ease of use, broad coverage) and weaknesses (lack of verification, generic or outdated content). From this, the consortium derived a set of research questions:

- *Which indicators can best capture an organization's real innovation capacity?*
- *How can project-based evidence be used to distinguish active innovators from passive participants?*
- *What information is most valuable for policymakers, intermediaries, and potential collaborators?*

To answer these questions, partners carried out an exploratory mapping exercise. Across six Central European countries, they collected a sample of innovation projects in three technology areas: additive manufacturing & 3D printing, micro- and nanotechnologies, and Industry 4.0. Each project was examined for features that could serve as profiling criteria:

- Project outputs (e.g., prototypes, patents, services, infrastructure developed).
- Technology Readiness Levels (TRLs) to indicate maturity of results.
- Type of action (research, innovation, coordination, or industrial project).
- Consortium composition (SMEs, large companies, universities, research institutes, intermediaries).
- Competences and infrastructure of leading organizations.
- Sectoral and geographic attributes.

This research produces a conceptual framework and structured data set showing how actors could be described through project-based evidence. The exploratory results demonstrate that using real achievements as criteria, rather than declarative profiles, offers more credible picture of regional innovation capacity. This foundation laid the groundwork for designing future tools and methods for cross-border profiling and matchmaking.

Results

The exploratory research produced two main outcomes: a set of criteria for assessing projects and a set of categories for profiling innovation actors engaged in implementing these projects. Together, these elements aim to provide an evidence-based framework for capturing innovation capacity across Central European regions. Analysis of completed and ongoing projects identified several features that can be systematically recorded to reflect the innovative capacity of participating organizations. These features highlight not only the thematic focus of projects but also the level of maturity and type of collaboration involved. Table 1 summarizes the main assessment criteria recorded for projects and why they matter for profiling.

Table 1: Key project assessment criteria in the SYNERGY profiling methodology, and their importance for characterizing organizational competencies.

Project Feature	Description
Technological Domain (KPA)	The primary innovation domain(s) of the project: additive manufacturing & 3D Printing, micro-/nanotechnology, and/or Industry 4.0. This classification was fundamental for grouping projects and actors. Project can span multiple KPAs.
Objectives & Outputs	Highlights concrete achievements (prototypes, patents, infrastructure) as evidence of innovation.
Technology Readiness Level (TRL)	An estimate of the TRL achieved for the project's main innovation (if applicable). TRL is a scale from 1 (basic principles observed) to 9 (actual system proven in operational environment). Including TRL provides a measure of how close to market or application the project outcomes were. This helps profile organizations on a spectrum from research-oriented (low TRL outputs) to application-driven (high TRL outputs). It adds context to their competencies, for instance, an R&D institute might excel in TRL 3-5 developments in nanomaterials, whereas a company might be strong in TRL 7-9 deployment in Industry 4.0 solutions.
Consortium Composition	Key details on project participants: number of partners, types of partners (SMEs, large enterprises, universities, etc.) and countries involved. This criterion reflects the collaboration experience. An organization that has led a multinational consortium of 10 partners is profiled differently from one that only worked in a small local project. Leadership roles (lead partner vs. regular partner) were also noted, being a lead partner indicates project management and coordination competence.
Duration & Funding	Basic info such as project duration and funding program/source (e.g., Horizon 2020, national grant). While not a direct measure of competence, these give context, e.g. involvement in a highly competitive EU program adds credibility. Longer projects or larger budgets might correlate with more substantial efforts/results.
Keywords / Competence Tags	Specific thematic keywords extracted from project descriptions (e.g., robotics, bioprinting, sensor networks, nanoparticles). These fine-grained tags help in matchmaking by enabling searches beyond the broad KPAs. They effectively detail the competences and technologies used or developed in the project.

Building on project data, the research also defined categories of information that together form a comprehensive profile of innovation actors. These categories integrate organizational characteristics with verifiable achievements and resources. Table 2 outlines the key categories of information that define an innovation actor's profile in this system.

Table 2: Key categories of information in an innovation actor's profile under the SYNERGY methodology.

Profiling Category	Description
Organization Type	The category of the actor (e.g., SME, large enterprise, university, research institute, intermediary or public authority). This categorization helps ensure diversity and relevant role-play in networks. For instance, a balanced innovation network might need both industry and academia; thus knowing an actor's type is important.
KPA Domain Specialization	The key project area(s) in which the organization has proven experience, as evidenced by projects. An actor could be single-domain focused or multidisciplinary. For example, an organization might be marked as "primarily Industry 4.0" if most of its projects fall there, or "Industry 4.0 & additive manufacturing" if it straddles both. This immediately signals the fields of strength. It is based not on self-claim but on actual project tags.
Competences & Skills	Specific technical competences extracted from the content of the organization's projects. These appear as keywords or brief descriptors. They

	might include things like machine learning for predictive maintenance, metallic powder bed fusion (3D printing), nano-scale imaging, etc., depending on the actor. These competences are grounded in project work (e.g. a skill listed only if the organization's project deliverables or outputs demonstrated it). This part of the profile provides depth, allowing matchmaking at a granular skill level beyond broad domains.
Innovation Outputs & Track Record	A synopsis of the organization's innovation track record via projects: number of projects participated in, role in those projects (lead or partner), and notable outputs achieved. For instance, an organization's profile might note "lead partner in 2 transnational additive manufacturing projects, resulting in 1 patent and 2 prototypes" – concrete achievements that speak to its capacity. This category is crucial as it directly addresses the achievement-based profiling. It's where the "real achievements" are highlighted.
Infrastructure & Resources	Any research or innovation infrastructure the actor can offer or has utilized, as catalogued in the profile. Examples: specialized labs, pilot production facilities, testing equipment, computing resources. An actor's profile could include entries like "Nanomaterials characterization lab (open to external users)" or "Industrial robotics demonstration facility". This seems a valuable category for matchmaking because collaborations often require access to such infrastructure.
Geographic and Regional Info	The region/country of the actor and any regional attributes (like if it's part of a particular regional cluster or innovation hub). Although all profiled actors were from Central Europe, their specific locations matter for regional policy and proximity-based collaboration. This category allows analysis of regional representation (e.g. how many strong Industry 4.0 actors are in Slovenia vs. Poland) and helps ensure that all partner regions are involved.

By structuring profiles in this way, the methodology enables a 360-degree view of each actor: what type of organization they are, which domains they excel in, what they have actually delivered, what resources they possess, and where they are located. This contrasts sharply with conventional self-written profiles, which often remain generic. For example, while a company might typically describe itself as "a leading provider of advanced manufacturing solutions," under SYNERGY's profiling the same SME would instead be represented with specific, evidence-backed information: "SME (Automation sector); participated in three Industry 4.0 projects (one Horizon 2020, two regional); developed an AI-based quality control system (prototype) and a digital twin application; expertise in machine vision and robotics; based in Upper Austria." Such detail is far more useful for policymakers, intermediaries, and potential partners, as it allows them to distinguish active innovators from passive participants, highlight complementarities, and gain insights into regional innovation ecosystems.

Conclusions

This paper presented the profiling methodology developed in the SYNERGY project to provide a more reliable picture of innovation actors in Central Europe. Unlike conventional self-declarative profiles, the approach is grounded in verifiable project achievements. By defining structured project assessment criteria and actor profiling categories, the methodology offers a comprehensive framework for differentiating active innovators from passive participants, highlighting organizational complementarities, and informing regional innovation strategies.

Nevertheless, some limitations must be acknowledged. The methodology focuses on actors engaged in formal R&D and innovation projects, which means that organizations innovating outside such frameworks (e.g. startups with market-driven innovations) may be underrepresented. The data collection effort is resource-intensive and depends on the availability of consistent project information across regions. Furthermore, as an exploratory study, the methodology has not yet been fully tested across the entire innovation landscape of Central Europe.

These limitations point to avenues for further research. Future work should expand the dataset to include less formalized innovation activities and test the framework across different sectors beyond advanced manufacturing. Equally important is the implementation of the methodology within dedicated IT tools, which would enable automated data integration, continuous updating, and user-friendly access to profiles. Such tools could support

dynamic matchmaking, provide real-time monitoring of innovation ecosystems, and enhance the usability of achievement-based profiles for both policymakers and practitioners.

By shifting the focus from "what actors say they do" to "what actors have actually achieved" the SYNERGY profiling methodology provides a strong foundation for building more credible, connected, and trust-based regional innovation ecosystems and development in Central Europe and beyond.

References

- Abhari, K., Davidson, E.J., Xiao, B., 2022. Modeling Social Product Development Process, Technology, and Governance. IEEE Trans. Eng. Manag. 69, 409–422. https://doi.org/10.1109/TEM.2020.2973234
- Akçomak, İ.S., Çetinkaya, U.Y., Erdil, E., Gossart, M.Ö., 2023. What drives network evolution? Comparing R&D project and patent networks in the EU. Ind. Corp. Change 32, 1109–1134. https://doi.org/10.1093/icc/dtad044
- Ancona, A., Cinelli, M., Ferraro, G., Iovanella, A., 2023. Network-based principles of entrepreneurial ecosystems: a case study of a start-up network. Small Bus. Econ. 61, 1497–1514. https://doi.org/10.1007/s11187-023-00738-6
- Caloffi, A., Colovic, A., Rizzoli, V., Rossi, F., 2023. Innovation intermediaries' types and functions: A computational analysis of the literature. Technol. Forecast. Soc. Change 189, 122351. https://doi.org/10.1016/j.techfore.2023.122351
- Cholewa, M., Helman, J., Molasy, M., Rosienkiewicz, M., 2019. Identification of Challenges to be Overcome in the Process of Enhancing Innovativeness Based on Implementation of Central European Projects Funded from Interreg Programme, in: Burduk, A., Chlebus, E., Nowakowski, T., Tubis, A. (Eds.), Intelligent Systems in Production Engineering and Maintenance, Advances in Intelligent Systems and Computing. Springer International Publishing, Cham, pp. 185–194. https://doi.org/10.1007/978-3-319-97490-3_18
- Enterprise Europe Network | Enterprise Europe Network [WWW Document], n.d. URL https://een.ec.europa.eu/ (accessed 9.28.25).
- Holzmann, T., Sailer, K., Katzy, B.R., 2014. Matchmaking as multi-sided market for open innovation. Technol. Anal. Strateg. Manag. 26, 601–615. https://doi.org/10.1080/09537325.2014.913786
- Homepage | European Cluster Collaboration Platform [WWW Document], n.d. URL https://www.clustercollaboration.eu/ (accessed 9.28.25).
- Keinz, P., Marhold, K., 2021. Technological competence leveraging projects via intermediaries: Viable means to outbound open innovation and mediated capability building? Int. J. Proj. Manag. 39, 196–208. https://doi.org/10.1016/j.ijproman.2020.10.006
- Linton, G., 2024. Triple Helix Dynamics and Hybrid Organizations: An Analysis of Value Creation Processes. J. Knowl. Econ. 15, 20797–20822. https://doi.org/10.1007/s13132-024-01911-2
- López-Rubio, P., Roig-Tierno, N., Mas-Tur, A., 2020. Regional innovation system research trends: toward knowledge management and entrepreneurial ecosystems. Int. J. Qual. Innov. 6, 4. https://doi.org/10.1186/s40887-020-00038-x
- Martins, J.T., Hukampal Singh, S., 2023. Boundary organisations in regional innovation systems: traversing knowledge boundaries for industry 4.0 regional transformations. RD Manag. 53, 364–390. https://doi.org/10.1111/radm.12573
- Mohammadparast Tabas, A., Komulainen, H., Nätti, S., 2023. Typology and dynamics of actors` roles and positions within entrepreneurial ecosystems: an exploratory study. Small Enterp. Res. 30, 71–88. https://doi.org/10.1080/13215906.2022.2086611
- Rosienkiewicz, M., Helman, J., Cholewa, M., Molasy, M., 2019. SYNERGY Project: Open Innovation Platform for Advanced Manufacturing in Central Europe, in: Burduk, A., Chlebus, E., Nowakowski, T., Tubis, A. (Eds.), Intelligent Systems in Production Engineering and Maintenance, Advances in Intelligent Systems and Computing. Springer International Publishing, Cham, pp. 306–315. https://doi.org/10.1007/978-3-319-97490-3_30
- Silva, L.E.N., Gomes, L.A.D.V., Faria, A.M.D., Borini, F.M., 2024. Innovation processes in ecosystem settings: An integrative framework and future directions. Technovation 132, 102984. https://doi.org/10.1016/j.technovation.2024.102984
- SYNERGY - Interreg [WWW Document], n.d. URL https://programme2014-20.interreg-central.eu/Content.Node/SYNERGY.html (accessed 3.11.25).
- Wulfert, T., 2023. Boundary resource management in innovation ecosystems: The case of e-commerce. Electron. Mark. 33, 27. https://doi.org/10.1007/s12525-023-00651-6