



Guidelines for Deep-Tech Project Incubation in Universities

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1. Summary

This deliverable is the lightweight version of the report on the design, implementation, and initial validation of the TECH2X incubation program developed under Work Package 3 (WP3), Phase 1.

WP3 builds directly on the outcomes of the preceding exploration and opportunity definition phases, implemented through program such as TechForward and TESI. These upstream activities focus on identifying potential market applications for research results and supporting early-stage validation. In this context, the TECH2X incubation program represents a downstream intervention, positioned within the broader technology-to-market process to further develop selected projects through intensive validation, prototyping, and business model definition, ultimately preparing them for spin-off creation.

The document presents the methodological approach adopted, combining expert interviews, secondary data analysis, and co-design activities with project partners to identify and operationalize best practices in academic entrepreneurship and technology transfer. It further describes the structure and content of the incubation program, including its integration within the university technology-to-market process.

In addition, the deliverable reports on the outcomes of the first implementation phase, highlighting key best practices, challenges encountered, and lessons learned. These findings inform recommendations for the refinement, scalability, and transferability of the TECH2X model across different institutional contexts within the consortium and beyond.

2. Aims

The aim of WP3 is to design, implement, and iteratively test the TECH2X incubation program, building on the outcomes of the preceding exploration and opportunity definition phases (e.g. TechForward and similar initiatives).

The objective is to validate an evidence-based incubation model that integrates existing best practices with ad hoc-designed programs, that address known challenges in the university technology-to-market process.

A central design principle of the program is to enable a **gradual commitment of researchers over time, while ensuring an increasing level of engagement and responsibility from committed students**, thereby supporting an effective transition from early validation to spin-off readiness across successive iterations.

3. Methodology

Co-definition of initial program draft. The initial TECH2X program was co-defined through a working session involving multiple institutions, including a Finnish university of technology, Spanish business schools and polytechnic universities, a U.S. university, and the University of Bologna together with Almacube. During this phase, the team defined the main objectives of the program in relation to deep-tech commercialization and spin-off creation, identified key stakeholders such as Knowledge Transfer Offices (KTOs), design factories, incubators, and entrepreneurship centers, and outlined the main program components, including core activities, expected outcomes, and target participants. The draft was subsequently validated with a commercialization specialist and the CEO of Almacube, ensuring alignment with existing services for research-based entrepreneurship and refining feasibility aspects before moving to empirical research.

Expert interviews and secondary data collection. The research relied on semi-structured interviews with practitioners from several institutions, including managers and specialists at Almacube, the head of the Design Factory at Riga Technical University, the manager for valorization and impact at Eindhoven University of Technology (TU/e), staff from ESADE Business School involved in entrepreneurship and venture-building programs, and the director of the PACE entrepreneurship center. These interviews explored program structures, tools, challenges, and effective practices in deep-tech commercialization. In parallel, secondary data were collected from institutional websites, brochures, and reports, including benchmark institutions such as the Massachusetts Institute of Technology (MIT), providing additional case studies and performance indicators. This combination enabled both methodological triangulation (interviews and documents) and data triangulation (multiple institutions and roles).

Consolidation and saturation of practices. All collected materials were analyzed to extract concrete practices supporting deep-tech commercialization, such as mentoring formats, evaluation gates, prototyping activities, and networking events. These practices were iteratively grouped into categories and compared across institutions to identify recurring patterns. The analysis continued until saturation was reached, meaning that additional interviews and documents no longer generated new categories but instead reinforced existing ones. This process resulted in a consolidated set of practices considered relevant and transferable across different institutional contexts.

Development of process model and best-practice cards. Based on the consolidated practices, the research team developed a structured process model describing the stages of deep-tech commercialization in academia and positioned TECH2X programs within this broader pathway. A subset of the most relevant practices—those frequently mentioned and strongly endorsed—was selected and translated into best-practice cards. Each card specifies the practice, the challenge it addresses, the stage of the process where it applies, and the roles and resources required. Examples of such practices include KPI-driven hypothesis testing, mentor-team matchmaking, and structured IP management support. The model and cards were iteratively compared with existing literature on technology transfer and academic entrepreneurship to ensure robustness and generalizability.

Validation interviews with international experts. A second round of interviews was conducted with experts not previously involved, including the head of the Design Factory at the Singapore Institute of Technology (DF@SIT) and a representative from the Mafinex start-up center in Mannheim. These experts were presented with the process model and best-practice cards and asked to evaluate their clarity, completeness, and applicability. The discussions focused on whether the defined stages reflected real spin-off development processes, whether any steps were missing, and whether practices were appropriately positioned. Feedback from these interviews led to adjustments in both the structure of the stages and the formulation and positioning of certain practices.

Observation during program implementation. During the incubation program, a non-participant observer, specifically an International Management master's student at the University of Bologna, systematically tracked the program's implementation. The observation focused on team dynamics, how activities influenced entrepreneurial learning, how coaches interacted with researchers, and how effectively learning was implemented. Data were collected using structured feedback grids capturing positive aspects, improvement potential, open questions, and new ideas, and were complemented by follow-up interviews when necessary.

Coach feedback and internal iteration. Throughout the program, coaches held periodic meetings to discuss both team-level and program-level issues. These meetings were used to identify necessary adjustments, share insights across teams, and evaluate the effectiveness of activities and tools. Almacube systematically collected highlights and feedback emerging from these sessions, contributing to iterative refinement of the program structure and delivery.

Co-design workshop with partners. A co-design workshop was organized involving researchers, KTO staff, and incubation practitioners from the consortium. The session began with a presentation of the TECH2X model as implemented at the University of Bologna and Almacube, followed by a discussion of constraints in transferring the model to other institutional contexts, such as differences in governance structures, resources, and existing support schemes. Participants then worked in breakout groups, each focusing on specific best-practice cards, to explore how these practices could be integrated into the TECH2X structure. This resulted in concrete proposals for modifying and enriching the program while maintaining its applicability across diverse contexts.

Final validation of the TECH2X model. In the final phase, the revised TECH2X model was validated through interviews with knowledge transfer office managers and specialists from non-partner universities. The interviews assessed the clarity, internal coherence, feasibility, and added value of the program compared to existing support schemes. Participants were also asked to identify implementation risks and necessary adaptations for their institutional environments. The feedback collected was used to finalize the program design and to formulate recommendations for implementation, monitoring outcomes, and scaling the model across different academic contexts.

4. Main Challenges

The analysis organizes the identified challenges along three key phases of the university technology-to-market process addressed by the program. The first phase, awareness, focuses on promoting a commercialization mindset among researchers and initiating engagement with the idea of translating research into market applications. The second phase, opportunity definition and early validation, involves clarifying the technological concept, exploring potential applications, and testing initial assumptions to define a viable proof of concept and commercialization strategy. The third phase, technology development and prototyping, is dedicated to advancing the technology through experimentation and prototyping, while progressively aligning it with a specific application and preparing it for subsequent commercialization steps.

Challenges in Phase 1 – Awareness. The awareness phase is characterized by a motivation gap, as many academics prioritize research activities and are not inherently interested in commercialization. This is reinforced by a lack of entrepreneurial mindset, with researchers often feeling uncomfortable with economic risk. Additionally, the complexity of the university ecosystem, involving multiple stakeholders with differing perspectives, makes navigation difficult. Finally, the absence of structured pathways for commercialization leads to

fragmented and ad hoc approaches, making it difficult to institutionalize awareness activities across faculties.

Challenges in Phase 2 – Opportunity Definition and Early Validation. In this phase, several barriers emerge, including IP constraints that limit flexibility before market validation is achieved. Researchers often hesitate to engage with customers early, preferring to remain focused on technical research. Limited time and cognitive resources allocated to commercialization further hinder progress, while a lack of business decision-making skills makes it difficult to evaluate opportunities effectively. Talent scarcity complicates team formation, and existing TTO/KTO support is sometimes perceived as misaligned with business development needs. Additional challenges include mismatched incentives between research and commercialization goals and concerns among researchers about losing value when sharing ownership of a company.

Challenges in Phase 3 – Technology Development (Prototyping and Piloting). During the prototyping phase, teams often struggle to focus on a single application, preferring to continue exploring multiple possibilities. The involvement of numerous stakeholders, such as investors and support organizations, increases coordination complexity. Teams frequently lack the competence to translate technological capabilities into concrete market needs, and they require additional support and funding to raise the Technology Readiness Level (TRL). Moreover, insufficient rigor in legal and financial aspects can hinder the ability to attract investment and move toward commercialization.

5. Best Practices Identified

Best practices in Phase 1 – Awareness. In the awareness phase, institutions focus on commercialization sensitization by engaging researchers and students to promote the idea that commercialization is possible and supported. This includes structured awareness activities and dedicated researcher-focused programs, as implemented by institutions such as Eindhoven and Paris Saclay. A key role is played by the Business Developer function, which actively explores technological fields and approaches research groups to identify promising innovations and initiate the commercialization process.

Best practices in Phase 2 – Opportunity Definition and Early Validation. In this phase, best practices include structured technology selection supported by Knowledge Transfer Offices (KTOs), which apply defined criteria to identify suitable technologies and provide assistance in IP exploration. Validation activities are emphasized, focusing on identifying applications and collecting real user feedback. IP strategy management begins early through dedicated roles such as IP managers, who support researchers from the invention disclosure stage. Team building is addressed through matchmaking practices (e.g. workshops or “expools”) to assemble complementary teams, while KPI-driven hypothesis testing introduces a scientific

approach to decision-making. Additionally, technological tools such as AI or chatbots are emerging to support market-related decisions.

Best practices in Phase 3 – Technology Development (Prototyping and Piloting). This phase emphasizes prototyping and validation of the proof of concept through experiments and the development of functional prototypes. A critical practice is the shift from broad exploration to focusing on a single, well-defined application. Teams are encouraged to interact with the ecosystem, including investors and infrastructure providers, and to integrate potential customers into product development decisions. Tailored training and deep-tech-specific mentoring are also provided to support teams in navigating the technical and commercial challenges of this phase.

Best practices in Phase 4 – Commercial Deployment. In the final phase, best practices focus on formalizing the transition to market by defining a business model suitable for commercialization and finalizing the founding team structure. Launch support is provided through access to alumni networks, capital, and institutional resources. Interaction with investors is a key element, often culminating in a final pitch and a go/no-go decision for company creation. At this stage, formal engagement with TTO/KTO offices ensures alignment with the chosen commercialization strategy.

6. Designed and Run Program

The Tech2X incubation program was designed as a structured 12-week validation process aimed at supporting the transition from research-based proof of value to a validated business concept, a tested MVP, and a team ready for spin-off creation.

Each team comprised a combination of researchers, students, and coaching support.

The program combines weekly workshops, independent teamwork, and regular coaching checkpoints, and is based on methodologies such as Lean Startup, Customer Discovery, Value Proposition Canvas, and MVP development. It is preceded by a pre-phase focused on team formation and alignment and followed by a post-phase addressing incorporation aspects such as finance, legal, and intellectual property. The program is implemented through multidisciplinary teams composed of researchers acting as technology originators or advisors, students or alumni responsible for business and operational development, and supported by dedicated startup coaches and, where relevant, technical project managers and expert mentors.

In its first implementation, the program involved teams from the University of Bologna and ESADE. From Bologna, we had projects such as DRIVE (medical device for ovarian tissue positioning), IntelliSense (ultrasonic sensing systems for infrastructure monitoring), Sensing

Piezoelectric Damper (smart vibration-damping device), and we had a project developed within ESADE's TESI program focused on converting waste heat into electrical energy.

7. Key Learnings from Phase 1 Pilot

The first implementation of the incubation program across UniBo and Esade with Almacube highlights several strengths, including the effectiveness of a structured and intensive approach, the strong focus on market validation through customer engagement and testing, the contribution of multidisciplinary teams combining researchers and students, and the role of dedicated coaching in guiding decision-making and progress. At the same time, some weaknesses emerged, notably the increased complexity of the innovation ecosystem due to multiple actors, the need for clearer involvement rules to ensure researcher engagement, the absence of formal mechanisms to support trust-building within teams, and difficulties in accessing timely funding to support technology adaptation and prototyping. We detail elements below.

Strength: Dedicated support and resource allocation. The program demonstrated that providing dedicated support through students and coaches helps address the issue of researchers having limited time and cognitive resources for commercialization activities. Students contribute to business development and operational tasks, allowing researchers to remain involved without needing to manage all aspects of the process, while coaches guide progress and ensure continuity.

Strength: Strong focus on market validation. The incubation program effectively addresses the common reluctance of researchers to engage with the market by enforcing a customer-centric and evidence-based approach. Teams are required to conduct interviews and validation activities, ensuring that decisions are based on real data rather than assumptions. This approach helps teams move from proof of value toward validated business concepts and reduces the risk of developing solutions without market demand.

Strength: Multidisciplinary team creation. The program actively supports the creation of multidisciplinary teams by combining researchers with students and alumni possessing business, design, or operational skills. Open calls are used to match candidates with missing competencies, and weekly interactions foster collaboration and a shared team identity among participants.

Improvement area: Ecosystem complexity. While the program introduces clear roles such as coaches and program directors, it also adds additional layers to an already complex university ecosystem involving KTOs, incubators and possible financing entities. This can make the overall process more difficult for researchers to navigate, especially when different phases involve

different reference points. Decide when to involve the different actors across the 12 weeks program and how to structure their role is central.

Improvement area: Researcher commitment and selection. It emerged that selecting technologies with multiple potential applications is more effective than focusing on highly specific solutions. Additionally, screening researchers beforehand to assess their entrepreneurial mindset and willingness to engage is critical to ensure commitment and productive collaboration throughout the program. The program highlights the importance of providing tangible incentives to researchers, such as recognition, impact, access to funding, or certification, to justify their involvement in commercialization activities. Without clear returns, researchers may be less motivated to engage fully in the process.

Improvement area: Team dynamics and trust-building. Although multidisciplinary teams are successfully formed, the program lacks formal mechanisms to build trust among team members, especially as teams evolve across different phases. This can affect collaboration and long-term team stability.

Improvement area: Access to funding for technology adaptation. While the program provides initial support for prototyping, larger financial needs for adapting technologies to specific market opportunities often arise later and are difficult to address within university systems. This highlights the need to better connect program outcomes with funding mechanisms and institutional support structures.

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