



Scaling up the commercialization of R&D

**The methodology for implementation,
including the train-the-trainer**

Output: Activity 2.3

Statement of originality

This deliverable contains original unpublished work, except where clearly indicated otherwise. Acknowledgement of previously published material and of the work of others has been made through appropriate citation, quotation, or both.

Disclaimer

This methodology contains material which is the copyright of SUCReD Consortium Parties. All SUCReD Consortium Parties have agreed that the content of the report is licensed under a Creative Commons Attribution Non-Commercial Share Alike 4.0 International License. SUCReD Consortium Parties does not warrant that the information contained in the Deliverable is capable of use, or that use of the information is free from risk, and accept no liability for loss or damage suffered by any person or any entity using the information. Copyright notice © 2024 SUCReD Consortium Parties



**Co-funded by
the European Union**

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 Foundation for the Development of Education System (FRSE). Neither the European Union nor the grant-awarding body accepts any responsibility for them.

Contents

1. Purpose of the Course within the SUCReD Initiative	5
1.1. Context and Rationale: Bridging the R&D Commercialization Gap	5
1.2. Addressing Educational Gaps through a Standardized Curriculum	5
1.3. Multilingual Digital Delivery for Inclusivity and Scale	6
1.4. Integration into the Innovation Ecosystem	7
1.5. Scalability, Open Access, and Sustainability	7
1.6. Transformative Potential and Expected Outcomes	8
2. Analysis of audience needs and learning challenges	9
2.1. Target Audience and Key Needs	9
2.2. Primary Target Group: Postgraduate Students (PhD and MSc)	9
2.3. Secondary Target Group: Researchers, Innovators, and Entrepreneurs	10
2.4. Tertiary Target Group: Trainers, Mentors, and Technology Transfer Professionals	11
2.5. Learning Outcomes: Skills, Knowledge, and Competencies	12
3. Pedagogical Framework.....	14
3.1. Learner-Centered Progressive Learning Approach	14
3.2. Accessibility and Inclusion	14
3.3. Learner Autonomy and Self-Direction	15
3.4. Mastery Orientation and Feedback-Driven Learning.....	16
3.5. Integration of Digital Multimedia and Modular Content.....	17
3.6. Transferability and Conceptual Application of Learning.....	18
4. Theoretical Foundations of the SUCReD Pedagogical Design.....	20
4.1. Constructivism and Meaningful Knowledge Building	20
4.2. Andragogy and Adult Learning Principles	21
4.3. Bloom's Taxonomy and the Progressive Learning Trajectory	21
4.4. Kolb's Experiential Learning Cycle.....	22
4.5. Zone of Proximal Development and Scaffolding.....	23
4.6. Mastery Learning and Continuous Feedback.....	23
4.7. Alignment with Erasmus+ Pedagogical Priorities.....	23
5. Overview of the methodology	24
5.1. Course Structure	25

5.2.	Delivery method and tools.....	29
	Learning Management and Navigation.....	30
5.3.	Description of the platform.....	30
5.4.	Support and Learner Autonomy	30
5.5.	Assessment and Evaluation.....	31
5.6.	Progress Tracking and Analytics.....	31
5.7.	Quality review process.....	32
5.8.	Certification and Completion Criteria	32
6.	Future Development and Scalability Plan	34
6.1.	Sustaining Open Access and the OER Ecosystem	34
6.2.	Pathways for Micro-Credentialing and ECTS Integration.....	34
6.3.	Localization and Contextual Adaptation	35
6.4.	Integration with European Innovation and Digital Education Frameworks	35
6.5.	Continuous Innovation and Technological Scalability	36
6.6.	Long-Term Vision: Toward a Sustainable Learning Ecosystem.....	36

1. Purpose of the Course within the SUCReD Initiative

1.1. Context and Rationale: Bridging the R&D Commercialization Gap

The SUCReD project (“Scaling up the Commercialization of R&D”) was conceived to address a persistent innovation gap in Central and Southeastern Europe, where translating research into market innovation has lagged behind Western European benchmarks. Countries like Poland and Greece remain “moderate innovators” with only modest improvements, while others such as Romania rank at the bottom of EU innovation metrics. These rankings reflect deeper systemic issues: low investment in research and development (R&D), limited patent outputs, and weak engagement in knowledge-intensive industries. Crucially, the region faces barriers to commercializing innovation, including fragmented university–industry collaboration and a shortage of venture financing for spin-offs (eib.org, wbj.pl). Universities in Central and Eastern Europe have traditionally focused on fundamental research and teaching, with far less emphasis on entrepreneurial skill-building or technology transfer. This has led to a skills gap: many students and researchers lack formal training in how to bring innovative ideas from the lab to the marketplace. Early attempts to introduce entrepreneurship and commercialization topics into post-socialist university curricula were often ad hoc and met with criticism (mdpi.com). Nonetheless, experts have long argued that universities in the region hold untapped potential to foster innovation-driven growth through dedicated entrepreneurship education (mdpi.com). The SUCReD course is a direct response to these challenges – it is designed to systematically build commercialization competencies and, in doing so, help bridge the gap between academic research and economic impact in Central and Southeastern Europe.

1.2. Addressing Educational Gaps through a Standardized Curriculum

A core premise of the SUCReD initiative is that the lack of commercialization skills among graduates and researchers is not due to a lack of talent, but a lack of structured training opportunities. Prior to SUCReD, training in research commercialization and tech transfer in the region was often fragmented – limited to isolated workshops, one-off incubator programs, or individual mentorship, without an overarching curriculum. This fragmentation meant that only a small subset of academics and innovators (often those with access to international programs or urban startup hubs) received adequate preparation in how to navigate IP protection, market analysis, business planning, or industry collaboration. To tackle this inequity, the SUCReD course establishes a comprehensive, standardized curriculum on research commercialization that can be

adopted across institutions. Rather than being an extracurricular afterthought, commercialization training is structured as a coherent academic offering, ensuring that all participants acquire a common baseline of knowledge and skills. The course content was developed collaboratively by an international partnership of universities and innovation experts, drawing on global best practices and tailoring them to the context of Central and Southeastern Europe. By standardizing the curriculum, SUCReD not only raises the quality of training but also facilitates credit recognition and integration of the course into various education programs. In essence, the course creates a shared language and framework for commercialization – from intellectual property management to business model development – that can be disseminated widely, thereby remedying the prior patchwork of training initiatives.

1.3. Multilingual Digital Delivery for Inclusivity and Scale

To maximize its reach and impact, the SUCReD course is delivered as a multilingual e-learning program. All core materials and modules are available in four languages – English, Polish, Romanian, and Greek – reflecting the project’s target regions and ensuring that language is not a barrier to participation. This multilingual approach is pivotal in promoting inclusion: it opens the curriculum to learners who may be less comfortable with English (the typical language of entrepreneurship content), thereby extending opportunities to a broader population of students and researchers. Moreover, the choice of a digital platform for course delivery speaks to the project’s emphasis on scalability and flexibility. A traditional in-person course could only train a limited cohort at one institution, whereas the online format allows potentially unlimited enrollment across different countries. Participants from urban centers to remote areas can access the same high-quality content simultaneously, which is particularly valuable in regions where access to specialized training might be uneven. The e-learning model also supports self-paced learning – busy graduate students, faculty, or working innovators can engage with modules on their own schedule, accommodating diverse needs. Such flexibility is known to improve learner satisfaction and retention in professional skills courses, as individuals can balance training with their ongoing research or work commitments. By offering the course through an open e-learning platform, SUCReD widely disseminates knowledge and skills related to implementing innovative solutions into practical applications. This mode of delivery not only aligns with contemporary trends in digital education but also enhances the digital readiness of participants: as learners navigate the online platform and interactive content, they simultaneously strengthen their digital literacy and ability to learn independently – competencies that are increasingly important in the modern R&D and business environment.

1.4. Integration into the Innovation Ecosystem

Another distinguishing purpose of the SUCReD course is its deliberate integration with the broader innovation ecosystem, including universities, incubators, and technology transfer hubs. The curriculum is directly linked to university activities and research pipelines, meaning it is tailored to complement what students and early-career researchers are doing in their labs and academic projects. For example, participants are encouraged to apply course concepts to their own research ideas – evaluating the market potential of a thesis project or developing a basic commercialization plan for a lab discovery. This bridges the often-cited gap between academic theory and practical application. In addition, the course content was developed in consultation with incubator managers and technology transfer offices, ensuring relevance to real-world innovation processes (such as patent filing procedures, startup incubation stages, and investor pitching). By fostering this university–industry link, the program prepares learners for collaboration with incubators and technology transfer centers. It effectively pipelines talent and ideas from universities into the innovation ecosystem: students and researchers who complete the course will be better equipped to engage with incubator programs, seek mentorship, or even launch startups. Likewise, incubators and innovation hubs benefit by receiving candidates who have a foundational understanding of commercialization, thereby increasing the efficiency of subsequent support programs. The SUCReD course thereby functions as a linchpin, connecting educational institutions with the entrepreneurship ecosystem in a standardized way. This systemic approach addresses one of the region’s critical bottlenecks – the historically low level of university–business collaboration – by cultivating a new generation of academics who are fluent in the language of both research and industry. Over time, this integration is expected to contribute to more robust local innovation ecosystems, where universities become active engines of regional economic development rather than isolated knowledge silos.

1.5. Scalability, Open Access, and Sustainability

The design of the SUCReD course emphasizes scalability and long-term sustainability, aligning with the project’s mission to effect widespread change in commercialization capacities. Scalability is achieved not only through digital delivery, as noted, but also through a “train-the-trainer” model embedded in the project’s methodology. In its pilot phase, the project is training 18 educators and facilitators (across the partner countries) who will become certified trainers in the curriculum. By empowering local instructors – from university lecturers to incubator mentors – the project ensures that knowledge can continue to multiply even after the initial EU-funded phase concludes. These trainers can offer the course repeatedly, adapt it to new contexts, or integrate elements into their regular teaching. Additionally, all digital

training and teaching materials are to be made freely available to the public as open educational resources (OER). This open-access approach means any university or organization in the region (and beyond) can adopt or adapt the curriculum without licensing barriers, greatly amplifying the project's reach. In terms of flexibility, the modular structure of the course allows it to be delivered in full as a standalone program or in parts to complement existing courses (for instance, a university might embed certain modules into a graduate seminar, or an incubator might use specific case studies from the course in their workshops). Such adaptability ensures that the curriculum can fit various educational settings and learning needs. The digital platform also enables continuous updates and localization – as the innovation landscape evolves or as feedback is collected, content can be refreshed and new case examples from Central and Southeastern Europe can be incorporated, keeping the course current and contextually relevant.

1.6. Transformative Potential and Expected Outcomes

Ultimately, the SUCReD course is designed to yield transformative outcomes both for individual learners and the wider socio-economic landscape. At the individual level, students, researchers, and aspiring entrepreneurs who take part in this training will strengthen their ability to innovate. This means they will not only learn how to come up with new ideas, but also how to turn those ideas into real products or services that can succeed in the market. Graduates of the course will have a clearer understanding of how to assess the commercial viability of research results, how to protect and valorize intellectual property, how to develop business models around technological innovations, and how to engage stakeholders (from investors to industry partners) effectively. These competencies directly address the skill deficits that have been identified as limiting innovation in the region. As a result, we expect an increase in research projects being translated into prototypes, startup ventures, or licensing deals, rather than stagnating as unpublished papers or shelved lab results.

At the institutional and regional level, if adopted widely, the course can help standardize how universities approach innovation and entrepreneurship education, embedding a culture that values application and impact alongside pure research. This cultural shift can contribute to higher rates of university–industry collaboration (e.g. more joint research projects, consulting, and student internships with companies), which in turn supports a more vibrant innovation ecosystem. Over the long term, such capacity-building feeds into macro-level indicators: digital readiness and inclusion, and enhanced innovation performance. The course's digital nature inherently improves digital readiness in that it familiarizes a generation of learners with online collaboration tools, digital content navigation, and remote teamwork – skills that are essential in a modern, digitized economy. Meanwhile, the open, multilingual design of the curriculum promotes inclusion, ensuring that opportunities to develop commercialization skills are

not confined to elite institutions or English-speaking audiences, but rather shared across diverse communities and regions. This democratization of skill development aligns with the European Union's broader goals of digital inclusion and equal access to quality education. By bringing more people into the fold of innovation activities, the project contributes to social inclusion as well – empowering researchers from peripheral regions or less advantaged backgrounds to participate in entrepreneurial ventures and digital innovation on equal footing with their peers.

In summary, the SUCReD course serves a critical and multifaceted purpose: it is not merely an academic program, but a strategic intervention to enhance the capacity for innovation and commercialization in Central and Southeastern Europe. By addressing educational gaps with a standardized, high-quality curriculum, delivered through a scalable digital platform, the course directly tackles the systemic weaknesses that have hindered the region's R&D commercialization efforts. Its emphasis on flexibility, ecosystem integration, and open access ensures that the knowledge gains are widely diffused and sustained. The transformative potential of this course lies in creating a virtuous cycle: better-trained innovators will drive more successful commercialization outcomes, which will, in turn, demonstrate the value of such education and encourage its further uptake. In the long run, initiatives like SUCReD can help the region move from being a follower in European innovation rankings to a generator of impactful innovations, boosting both economic competitiveness and societal well-being.

2. Analysis of audience needs and learning challenges

2.1. Target Audience and Key Needs

The SUCReD course is designed to address a clearly defined set of target groups whose professional roles, educational paths, or entrepreneurial ambitions place them at the intersection of research, innovation, and commercialization. These groups have been identified through institutional analysis, stakeholder consultations, and documented policy requirements at both national and institutional levels across the project's partner countries. The course aims to systematically build the capacity of these groups to engage in the commercialization of research and development (R&D) outcomes — a domain historically underserved in higher education and innovation training ecosystems, especially in Central and Southeastern Europe.

2.2. Primary Target Group: Postgraduate Students (PhD and MSc)

The most critical target group for the SUCReD course is comprised of postgraduate students — in particular, doctoral (PhD) candidates and master's (MSc) students —

who are actively involved in research activities but lack structured training in transferring their research into practical applications or marketable innovations.

Key Needs:

- **Regulatory requirements:** In many institutions (e.g., CUT and UoI), PhD students are now formally required to demonstrate basic competence in research commercialization as part of their academic program.
- **Lack of accessible training:** These students often do not have access to consistent, high-quality commercialization education, and existing offerings are fragmented, inconsistent, or not tailored to their research disciplines.
- **Time and scheduling constraints:** Many postgraduates are balancing research work, teaching duties, and publications, making it difficult to participate in rigid or time-intensive entrepreneurship programs.
- **Knowledge gaps:** Many struggle with fundamental concepts such as identifying intellectual property, understanding licensing mechanisms, evaluating market potential, or planning industry collaboration.

The SUCReD course responds to these needs by offering a self-paced, modular curriculum that integrates seamlessly into postgraduate research timelines, with content available in multiple languages and formats for flexible use.

2.3. Secondary Target Group: Researchers, Innovators, and Entrepreneurs

This group includes early-career researchers, innovation team members, start-up founders, and R&D professionals, both within and outside academic institutions. Many of these individuals are actively working on novel solutions but lack the tools to bring them to market or collaborate effectively with technology transfer entities.

Key Needs:

- **Applied skills in commercialization:** A common challenge is navigating the practical steps between research output and market introduction — including business modeling, IP management, and legal/regulatory considerations.
- **Understanding industry expectations:** Innovators often lack insight into how to engage external partners, including investors, incubators, and corporate collaborators.
- **Autonomous learning:** Professionals in this group often cannot commit to traditional in-person training and require a digital, on-demand format.

- **Real-world applicability:** They need examples, case studies, and tools grounded in real commercial scenarios that they can adapt to their work context.

SUCReD's lessons and digital delivery model meet these needs directly, making it possible to integrate learning into busy professional routines while aligning content with actual innovation lifecycle processes.

2.4. Tertiary Target Group: Trainers, Mentors, and Technology Transfer Professionals

Although smaller in number, trainers and mentors play a pivotal role in multiplying the impact of commercialization training. This includes staff at university Technology Transfer Centers (TTCs), innovation brokers, academic advisors, and external consultants who support entrepreneurial learning and tech transfer efforts.

Key Needs:

- **Standardized materials and frameworks:** Trainers often develop ad hoc content or rely on international materials not suited to local contexts. They need cohesive, high-quality teaching tools.
- **Train-the-trainer resources:** Many have deep expertise in one domain (e.g., law, business, or research) but require support in delivering educational content across commercialization topics.
- **Scalable solutions:** Institutions need a scalable model to train large numbers of students and researchers without overburdening a small pool of experts.

SUCReD provides an end-to-end solution, including dedicated train-the-trainer modules, reusable course content, and implementation guidelines that help trainers integrate the course into their own offerings or institutional workflows.

Each of the three target groups addressed by SUCReD shares a common challenge: they are actively involved in generating or supporting research and innovation, but they lack the structured, accessible, and scalable tools to transform ideas into impactful outcomes. By tailoring content and delivery to the distinct needs of each audience — and by removing traditional barriers related to cost, language, scheduling, and curriculum integration — the SUCReD course offers a transformative opportunity to strengthen the commercialization culture in university ecosystems and beyond.

2.5. Learning Outcomes: Skills, Knowledge, and Competencies

Upon completing the SUCReD course, participants across all groups – students, academic researchers, industry innovators, and professional trainers – experience a comprehensive transformation in their capabilities. The program’s methodology interweaves deep theoretical understanding with applied practical training and strategic insight. As a result, all learners emerge equipped to bridge the gap between research and market application, confident in their ability to move ideas from the laboratory to the real world. This holistic outcome reflects the widely recognized need for researchers and commercialization professionals to be “equipped with the necessary skills, knowledge and engagement to turn fundamental scientific discoveries and insights into practical applications that have societal and commercial impact” (wipo.int).

In terms of theoretical knowledge, participants develop a rigorous understanding of the frameworks and principles underpinning research commercialization. They study how knowledge and technology transfer operate, learning how scientific findings progress from initial discovery to market-ready innovation through stages such as intellectual property protection, prototyping, and licensing. A strong emphasis is placed on intellectual property (IP) literacy: participants learn why securing IP rights is pivotal, as it assures ownership of research outcomes and provides a strategic tool to attract partners or investment for further development (wipo.int). Indeed, understanding the role of IP is highlighted as a crucial first step in managing technology transfer processes effectively. Beyond IP, learners also explore innovation strategy and policy, gaining insight into aligning research-driven innovations with market needs and societal challenges. By the end of the course, they have a firm grasp of key domains – from patent law and regulatory considerations to market analysis techniques – that form the theoretical foundation of successful commercialization efforts.

The applied skills cultivated in SUCReD are equally robust. Through case studies, simulations, and project-based work, participants practice the real-world tasks of research commercialization. They conduct market assessments to evaluate the demand and competitive landscape for novel technologies, and they develop commercialization plans or business models that can guide a research-based product to market. Engaging directly with the technology transfer process, participants become adept at tasks like preparing invention disclosures, strategizing IP protection, and identifying pathways for commercialization (such as licensing deals or startup formation). In doing so, they acquire the ability to manage the legal and technical dimensions of bringing research to market. For example, participants learn to navigate the legal and contractual issues inherent in commercialization – from understanding patent filings and licensing agreements to ensuring compliance with regulations – reflecting a level of know-how that allows them to effectively transfer knowledge into practice. By working through these practical exercises, they learn to evaluate the

commercial potential of research objectively, to protect and package intellectual assets, and to initiate collaboration with industry partners for technology development. This hands-on experience means that graduates can not only devise commercialization strategies but also implement them, having tested their skills in real or simulated scenarios during the course.

Equally important, the SUCReD course fosters strategic competencies and leadership qualities that are critical for navigating the innovation landscape. Participants learn to think strategically about how an innovation can reach its intended impact, developing the foresight to align scientific projects with market opportunities and business objectives. They practice formulating innovation strategies – for instance, deciding whether a given technology is best brought to market via licensing, partnerships, or entrepreneurship – and learn to anticipate and manage the risks involved in these pathways. The program also emphasizes building an entrepreneurial mindset and effective collaboration skills. Participants engage in interdisciplinary teamwork, where they collaborate with peers from different backgrounds (science, engineering, business, law), mirroring the multi-faceted teams required in real commercialization projects. Through these collaborations, they refine their communication and negotiation skills, learning how to lead complex negotiations and reconcile diverse perspectives to achieve a common goal. They gain experience in networking and partnership-building, understanding how to broker relationships between research institutions and industry stakeholders. Many of these competencies mirror those expected of top technology transfer professionals – for example, the ability to integrate strategic thinking, market-led business acumen, and commercial skill in decision-making. By the end of the course, participants have internalized these strategic and collaborative competencies, enabling them to take on leadership roles in innovation projects and drive them forward effectively.

Ultimately, these learning outcomes are profoundly relevant to participants' professional development and their ability to contribute to the broader innovation ecosystem. Whether an individual entered the program as a student, a laboratory scientist, an aspiring entrepreneur, or a trainer, they leave with an enriched professional toolkit. They are prepared to navigate the intersection of academia and industry with confidence – for example, a researcher who completes SUCReD will be capable of engaging with business partners and investors, just as an industry innovator will better understand academic research processes. The emphasis on interdisciplinary teamwork means that graduates can collaborate effectively across disciplines, an essential skill for tackling complex real-world innovation challenges. Moreover, participants come to appreciate the bigger picture of how research commercialization operates within a dynamic innovation ecosystem. They understand that successful innovation is not a solitary endeavor but one that thrives on collaboration among universities, industries, and even government partners. Armed

with this understanding and their newly honed competencies, SUCReD graduates are well positioned to act as change-makers who bridge gaps between sectors. They can mentor others, lead multi-sector projects, and contribute meaningfully to initiatives that drive economic and social progress. In sum, the course envisions and achieves a holistic transformation of its learners: they not only master the theoretical and practical aspects of research commercialization but also grow into professionals capable of strategically steering innovations from concept to impact, thereby strengthening the innovation ecosystem as a whole.

3. Pedagogical Framework

3.1. Learner-Centered Progressive Learning Approach

The SUCReD course is built on a progressive, scaffolded learning trajectory that guides learners from fundamental concepts to advanced application and evaluation. Content is structured so that learners first establish a solid understanding of basic principles and terminology, then gradually tackle more complex tasks and analytical challenges. This deliberate sequencing ensures that foundational knowledge is in place before higher-level competencies are introduced, fostering deeper comprehension and preparing learners for subsequent, more demanding chapters. The progression reflects a gradual learning trajectory, guiding learners from foundational comprehension toward more complex forms of engagement with the material. Learning activities are sequenced in a way that each new element draws on prior knowledge and provides opportunities for consolidation, ensuring that learners advance with clarity and confidence. By the final stages of the course, participants are not only recalling information but synthesizing ideas, solving real-world problems, and critically evaluating outcomes, demonstrating the full spectrum of competence. This graduated approach makes the learning experience coherent and cumulative, enabling students to integrate new knowledge with existing understanding and ultimately to transfer their learning to practical contexts. Such a design reflects a learner-centered philosophy: the curriculum meets learners at their current level of understanding and supports their development toward expertise, rather than overwhelming them with unstructured complexity.

3.2. Accessibility and Inclusion

Accessibility and inclusivity are foundational pillars of the SUCReD pedagogical framework. The course adopts a *universal design for learning* mindset, ensuring that content is usable and engaging for learners with diverse needs, backgrounds, and

learning preferences. All instructional materials are provided in multiple languages – the course is delivered in English, Polish, Romanian, and Greek – to widen participation across linguistic groups. This multilingual approach lowers barriers for non-native English speakers and reflects the project’s international scope. Equally important, the digital platform is designed for cross-device accessibility and responsiveness: learners can seamlessly access the curriculum on desktops, tablets, or smartphones, with layouts adapting to different screen sizes and assistive technologies. This cross-device compatibility means that whether a learner is in a university computer lab or using a mobile phone at home, they encounter an optimized, easy-to-navigate interface.

By offering multiple ways of engaging with material – textual explanations, infographics, audio narration, video demonstrations – the program ensures that no learner is left behind due to a singular mode of instruction. This multi-modal delivery recognizes that students have varied learning styles and needs: for instance, a visual learner can benefit from diagrams and videos, while an auditory learner might prefer podcasts or narrated lectures. Providing content in diverse formats not only aids those with disabilities but enhances the learning experience for all participants. Moreover, the platform’s commitment to inclusion extends to flexible pacing and entry points, which benefit learners who may have differing schedules, prior knowledge levels, or cognitive needs. In summary, accessibility and inclusion are proactively built into the course design, creating an equitable learning environment where learners of all abilities and backgrounds can fully participate and succeed. This emphasis on universal access supports a diverse learner base – including graduate students and early-career researchers from various disciplines – by removing unnecessary hurdles and focusing on content mastery.

3.3. Learner Autonomy and Self-Direction

The SUCReD framework strongly emphasizes autonomy and self-directed learning, recognizing that adult learners thrive when given agency over their educational journey. The course is delivered in a self-paced format: participants have control over the timing and tempo of their progress through the chapters. Rather than being bound to a fixed class schedule or cohort pace, each learner can move through the curriculum at their own speed, spending extra time on challenging topics and accelerating through familiar material as appropriate. This flexibility acknowledges the heterogeneous backgrounds of the target audience (for example, some learners might already have entrepreneurial experience while others are new to commercialization concepts) and allows for a personalized pacing that fits individual needs and busy schedules. Research shows that giving learners control over pace and timing increases their engagement and motivation, as they can integrate study with their personal and professional responsibilities. Indeed, self-paced learning embodies learner control – it

empowers participants to decide when and how intensively to engage with each unit, which can lead to a more meaningful and invested learning experience.

The modular structure of the course further supports learner autonomy. The curriculum is divided into self-contained chapters, each focusing on a specific competency or theme, which enables learners to tackle one concept at a time and master it before moving on. Chapters are designed with clear learning objectives and can stand alone, so learners have the freedom to choose the sequence of chapters or revisit them as needed without confusion. For example, a learner might decide to review an earlier chapter on intellectual property if they feel uncertain or skip ahead to a chapter if they have already grasped the preceding theory – the platform permits such non-linear navigation when pedagogically sensible. This personalized learning path approach means that students can tailor the course to their interests and prior knowledge, fostering a sense of ownership over their learning. In practice, while the course recommends an optimal pathway (from basics of R&D commercialization to advanced project implementation), the framework remains flexible to accommodate different starting points and learning strategies. By allowing learners to direct their progress – selecting chapters, controlling the pace, and revisiting content for reinforcement – the SUCReD course nurtures self-directed learning habits. Learners effectively practice managing their own education, a critical skill for researchers and professionals who must often learn independently. This autonomy-supportive environment is grounded in adult learning theory, treating learners as active agents rather than passive recipients, which in turn can increase intrinsic motivation and persistence in the course. Overall, the pedagogical design respects and encourages the maturity and self-direction of graduate students and early-career researchers, aligning with their need for flexibility and control in balancing the course with research or work commitments.

3.4. Mastery Orientation and Feedback-Driven Learning

To ensure that learners achieve true competence (and not just superficial knowledge), the SUCReD methodology adopts a mastery-based learning orientation. In this framework, progress is contingent on mastery: learners are expected to demonstrate a sufficient level of understanding and skill in each lesson's outcomes before advancing to the next. Instead of the traditional model where a cohort marches through content regardless of individual proficiency, here a learner may pause, practice, or review until they reach competence in the current topic. This approach is inspired by educational research on mastery learning, which argues that given enough time and the right support, most learners can attain a high level of achievement. Concretely, each module contains formative assessments (quizzes) that gauge the learner's grasp of the material. If the assessment indicates that key concepts have not yet been mastered, the course provides instant feedback. Learners can then revisit that

module's lessons or attempt supplementary exercises to address their gaps. Only when they feel confident and the assessments reflect mastery do they proceed to new material. This ensures that competency builds layer by layer without significant gaps, aligning with the course's progressive structure.

A structured assessment system supports the course's mastery-oriented design. Learners are expected to demonstrate complete achievement of the intended outcomes before progressing. If an assessment is not successfully completed, the learner receives guidance to revisit the relevant learning material, ensuring that gaps in understanding can be addressed directly. Since assessments may be retaken as many times as needed, this process emphasizes improvement and consolidation rather than penalization. In this way, feedback functions as a supportive mechanism: it highlights areas for review, directs learners back to specific content, and reinforces mastery step by step.

The course platform supports immediate feedback delivery (e.g. automated quiz feedback), which is critical for reinforcing learning. Immediate feedback helps learners draw a clear connection between their actions (such as an answer given) and the outcome, reinforcing correct understanding or correcting misconceptions right away. Over the duration of the course, this cycle of attempt → feedback → refinement cultivates a mastery mindset: learners routinely reflect on their learning strategies, seek help when needed, and persist until they achieve proficiency in each area. Studies of mastery learning suggest that such an approach can significantly improve retention and performance, as learners do not advance with shaky understanding but rather consolidate each level of knowledge thoroughly. By the end of the course, participants have had multiple opportunities to get things right through practice and feedback, which bolsters their confidence and competence in applying the course concepts. This mastery-through-feedback strategy is especially important for skill-based outcomes like research commercialization, where simply knowing facts is not enough – one must be able to apply principles effectively. SUCReD's pedagogical framework, therefore, embeds numerous formative checkpoints and feedback mechanisms to ensure that learning is an iterative, supported journey toward expertise, rather than a one-shot evaluation at the end.

3.5. Integration of Digital Multimedia and Modular Content

Underpinning the pedagogical strategies is a digital learning design that combines modular organization with carefully selected multimedia elements to enhance comprehension and engagement. The online platform is not a static collection of texts but a structured learning environment where content is presented through varied media. The modular format divides the course into clear, manageable units, each enriched with video-based explanations and concise knowledge checks to reinforce

understanding. This integration of visual and auditory materials supports different learning preferences and helps illustrate key ideas more vividly than text alone. By presenting concepts through multiple channels and pacing the material in structured segments, the platform sustains learner attention and facilitates gradual, cumulative learning. Complex or abstract topics become more accessible through visual demonstrations and spoken explanation, allowing learners to build understanding step by step.

The engaging nature of digital content further enhances learner involvement. Each module integrates multimedia elements that combine visual and auditory modes of delivery, such as concise video presentations supported by clear textual explanations. This multimedia approach sustains attention and reinforces understanding by presenting key concepts through multiple channels. Rather than relying on complex simulations or interactive exercises, engagement is achieved through structured progression, purposeful sequencing, and opportunities for self-assessment. Learners are consistently invited to reflect on what they have learned and to check their comprehension through short formative quizzes, which provide immediate feedback and encourage mastery before moving forward. In this way, the platform fosters active mental engagement with the material and promotes better retention of knowledge. The modular, media-rich design also supports flexible, focused learning sessions, allowing learners to progress at their own pace while maintaining a sense of achievement at the completion of each unit.

In addition, the platform has been designed with accessibility and flexibility in mind, ensuring that learners can engage with the content across different devices. Its responsive layout allows videos and assessments to function smoothly on smartphones, tablets, and desktop computers alike. This adaptability acknowledges the varied circumstances of modern learners, who may wish to review lessons or complete quizzes while on the move. By maintaining readability and ease of navigation across devices, the course supports autonomous, self-paced engagement and makes learning possible anytime and anywhere. In this sense, the platform's digital infrastructure reinforces its pedagogical goals: it offers modular, multimedia-supported content in a format that is both flexible and learner-centered, aligning with contemporary expectations for accessible online education.

3.6. Transferability and Conceptual Application of Learning

A key aim of the SUCReD pedagogical framework is to ensure that learning remains meaningful and conceptually transferable beyond the course itself. Because the content focuses on research and innovation processes, the emphasis lies on understanding principles and strategies that can inform real-world academic or entrepreneurial contexts. The course's progression and structure are designed to help

learners build a coherent understanding of how research outcomes can be positioned for broader impact. Rather than memorizing isolated facts, participants are encouraged to connect concepts and recognize their potential applications in diverse professional situations. In this way, the learning experience promotes awareness and readiness to engage with the challenges of research commercialization, fostering knowledge that can inform future decision-making and practice.

The progressive structure of the course draws inspiration from established cognitive development models, ensuring that learning moves gradually from foundational comprehension toward more complex levels of understanding and application. As learners advance, they are encouraged to make connections across topics and to think critically about the broader processes involved in research commercialization. This structured progression fosters transferable cognitive skills – such as analysis, interpretation, and informed judgment – which can be applied to new or evolving contexts beyond the course itself. The feedback-oriented design further reinforces this development, allowing learners to refine their understanding through repeated engagement and correction. In doing so, the course cultivates durable, conceptually grounded knowledge that supports continued learning and adaptability in professional practice.

Importantly, the course structure is designed to support a diverse audience in achieving meaningful learning outcomes. Graduate students can deepen their understanding of how research can translate into societal and economic impact, while early-career researchers gain broader insight into innovation and commercialization processes that complement their technical expertise. The inclusive, flexible design allows learners from different academic and cultural backgrounds to engage with the material at their own pace and to find relevance within their individual contexts. By combining clarity of structure, autonomy in progression, and continuous feedback, the course accommodates varied learning needs and supports the development of a transferable understanding of research commercialization. In this way, SUCReD equips participants with conceptual tools and perspectives that can inform their future academic, professional, or entrepreneurial endeavors.

In conclusion, the Pedagogical Framework of SUCReD is characterized by a coherent blend of progressive learning design, inclusivity, learner empowerment, and mastery-based progression. This combination is purposefully structured to foster meaningful and lasting learning experiences that extend beyond the course itself. By focusing on the learner's journey – how understanding develops, deepens, and becomes applicable in broader contexts – the framework ensures that the SUCReD course functions as more than a transfer of information: it is a guided process of conceptual growth. It supports a diverse range of learners, from graduate students to early-career researchers, in building knowledge and competencies that help bridge the gap

between academic research and innovation practice. The pedagogical principles underlying the course align with Erasmus+ priorities for innovative, learner-centered education, positioning SUCReD as a model of accessible, engaging, and purposeful digital learning.

4. Theoretical Foundations of the SUCReD Pedagogical Design

The SUCReD pedagogical framework is grounded in well-established educational theories that collectively inform its learner-centered, progressive, and mastery-oriented approach. While the methodology has been developed to address the specific challenges of research commercialization education in Central and Southeastern Europe, its structure is underpinned by universal principles of adult learning, constructivist pedagogy, and cognitive development. These theoretical foundations ensure that the SUCReD course not only transmits information but facilitates the deep, transferable learning necessary for innovation-driven practice.

4.1. Constructivism and Meaningful Knowledge Building

At the heart of SUCReD lies a constructivist philosophy of learning, which posits that learners actively construct meaning by integrating new information with their prior knowledge and experience. Constructivist learning theory emphasizes that "learners cannot systematically plan and strictly organize what they can learn and how much they can absorb," but rather that "learning is an active orientation that can refer to the full participation of learners using a constructive process". Commercialization training, in particular, requires learners to interpret new frameworks (e.g., intellectual property management, market analysis, or licensing) in relation to their disciplinary and research backgrounds. The course's scaffolded design—moving from foundational concepts to applied problem-solving—embodies this constructivist logic. Learners are not passive recipients of predefined answers but active participants who construct their own understanding of how innovation processes unfold within their context^{1, 2, 3}.

Furthermore, constructivism supports SUCReD's commitment to authentic learning. Each activity is designed to mirror real-world challenges of research commercialization, ensuring that knowledge acquisition is contextualized and personally relevant. This experiential quality enhances engagement and retention, helping participants to internalize abstract concepts by applying them to concrete research or entrepreneurial cases. The constructivist emphasis on learner agency also aligns closely with the SUCReD model of self-paced progression, which empowers learners to take responsibility for their own learning journey^{1, 2, 4}.

¹ Mcleod, S. (2023). Constructivism learning theory & philosophy of education. *Simply Psychology*, 1-15.

² Do, H. N., Do, B. N., & Nguyen, M. H. (2023). 3How do constructivism learning environments generate better motivation and learning strategies? The Design Science Approach. *Heliyon*, 9(12).

³ Nurhuda, A., Al Khoiron, M. F., Azami, Y. S. I., & Ni'mah, S. J. (2023). Constructivism learning theory in education: characteristics, steps and learning models. *Research in Education and Rehabilitation*, 6(2), 234-242.

⁴ Bada, S. O., & Olusegun, S. (2015). Constructivism learning theory: A paradigm for teaching and learning. *Journal of Research & Method in Education*, 5(6), 66-70.

4.2. Andragogy and Adult Learning Principles

Because the SUCReD audience primarily comprises postgraduate students, researchers, and professionals, the course design draws extensively on Malcolm Knowles's principles of andragogy—the theory of adult learning. Adults are self-directed, goal-oriented, and motivated by relevance to their professional and personal aspirations. Consequently, SUCReD presents content in ways that highlight immediate applicability: concepts such as intellectual property protection, market validation, and business model design are introduced not as abstract academic topics but as tools that can directly influence participants' research trajectories and career development ⁵.

Knowles's andragogy is built on five key assumptions about adult learners: they are self-directed, possess a rich reservoir of experience, are ready to learn when the need arises, are problem-centered in their orientation to learning, and are intrinsically motivated. The theory emphasizes that adult learning should involve learners in planning and evaluation, draw on their experience as a resource, focus on immediately relevant topics, and adopt a problem-centered approach. Knowles also underscores the need for respect and autonomy in adult education—principles reflected in SUCReD's flexible, asynchronous format that allows learners to control pace, sequence, and focus according to their needs ^{6, 7}.

⁵ Rusconi, G. (2023). *Malcolm Knowles Adult Learning Theory| Assumptions & Principles*. Cloud Assess.

⁶ Knowles, M. (2015). *The adult learning theory*.

⁷ https://www.floridaipdae.org/dfiles/resources/webinars/033022/Webinar_Handbook_033022.pdf

4.3. Bloom's Taxonomy and the Progressive Learning Trajectory

The SUCReD curriculum is explicitly structured according to the logic of Bloom's Revised Taxonomy, progressing from lower-order to higher-order cognitive skills. Anderson and Krathwohl's revision of Bloom's original taxonomy reorganized the levels as active verbs: Remember, Understand, Apply, Analyze, Evaluate, and Create.

Early chapters (such as "Intellectual Property" and "Market Potential Assessment") correspond to the foundational levels of Remembering and Understanding, where learners build essential conceptual literacy. Mid-level chapters (like "Commercialization Strategies" and "Science-to-Business Partnerships") develop Applying and Analyzing skills, requiring learners to engage critically with cases, assess opportunities, and formulate strategic approaches. Finally, the capstone chapter on "Research and Implementation Project Management" calls upon learners to Evaluate and Create—the highest cognitive levels—by designing commercialization strategies, managing risks, and synthesizing multidisciplinary insights into actionable plans ⁸.

This hierarchical alignment ensures that learning is cumulative, coherent, and cognitively demanding in a structured way. It also provides the foundation for SUCReD's mastery-based progression: learners advance only when they demonstrate competence at each cognitive level, mirroring the sequential development from comprehension to creation ⁸.

⁸ Adams, N. E. (2015). Bloom's taxonomy of cognitive learning objectives. *Journal of the Medical Library Association: JMLA*, 103(3), 152.

4.4. Kolb's Experiential Learning Cycle

The experiential nature of SUCReD is further articulated through David Kolb's Experiential Learning Cycle, which emphasizes learning as a process of continuous transformation through four stages: concrete experience, reflective observation, abstract conceptualization, and active experimentation. Kolb's theory, published in 1984, states that "learning is the process whereby knowledge is created through the transformation of experience". Each SUCReD lesson is intentionally designed to reflect this cyclical pattern. Learners begin by engaging with concrete experiences—for example, case studies of successful commercialization projects or scenarios describing intellectual property challenges. They then move to reflective observation through self-assessment quizzes or guided prompts that encourage them to consider how similar dynamics might appear in their own research contexts. Through abstract conceptualization, learners integrate these reflections into broader theoretical understanding, while active experimentation occurs when they apply insights to hypothetical or real commercialization tasks ^{9, 10}.

This experiential structure ensures that learning is dynamic and self-reinforcing: participants continuously test, evaluate, and refine their understanding, thus transforming theoretical knowledge into actionable competence. Kolb's model emphasizes that "effective learning only occurs when a learner can execute all four stages of the model" ⁹.

⁹ McLeod, S. (2017). Kolb's learning styles and experiential learning cycle. *Simply psychology*, 5.

¹⁰ Cloke, H. (2024). Kolb's Experiential Learning Cycle: A Complete Guide. *Growth Engineering*. Retrieved from <https://www.growthengineering.co.uk/kolbexperiential-learning-theory>.

4.5. Zone of Proximal Development and Scaffolding

Another relevant theoretical pillar is Vygotsky's concept of the Zone of Proximal Development (ZPD), which highlights the space between what learners can achieve independently and what they can accomplish with appropriate guidance. Vygotsky defined the ZPD as "the distance between the actual developmental level as determined by independent problem solving and the level of potential development as determined through problem-solving under adult guidance, or in collaboration with more capable peers". The SUCReD course operationalizes this principle through scaffolded instructional design. Each lesson provides clear objectives, concise multimedia explanations, and formative feedback that act as scaffolds, supporting learners as they acquire new skills. Automated feedback in quizzes, chapter summaries, and the modular sequence together perform the function of the "more capable peer" envisioned by Vygotsky—helping learners move from assisted to autonomous performance. As mastery is demonstrated, these supports recede, allowing learners to function independently and apply knowledge to new contexts ¹¹.

¹¹ McLeod, S. A. (2012, July). *Zone of proximal development*.

4.6. Mastery Learning and Continuous Feedback

SUCReD's requirement for learners to achieve a 100% score on formative assessments before progressing is inspired by the mastery learning theory developed by Benjamin Bloom and later refined by Thomas Guskey. This approach asserts that, given sufficient time and corrective feedback, nearly all learners can reach a high level of competence. Benjamin Bloom believed that "if teachers could provide the necessary time and appropriate learning conditions, nearly all students could reach a high level of achievement". The feedback-driven cycle embedded in SUCReD—assessment, feedback, review, reassessment—reflects this pedagogical philosophy. It shifts the emphasis from time-bound performance to learning depth, ensuring that each participant attains genuine understanding before advancing. Research on mastery learning has consistently demonstrated improved retention, confidence, and motivation, making it particularly appropriate for the high-stakes, skill-based context of research commercialization training ¹².

¹² Guskey, T. R. (2010). Lessons of mastery learning. *Educational leadership*, 68(2), 52-57.

4.7. Alignment with Erasmus+ Pedagogical Priorities

Finally, the theoretical foundations of SUCReD align closely with the pedagogical objectives of Erasmus+ and the European Digital Education Action Plan. Its learner-centered design embodies principles of inclusivity, personalization, and digital competence development. The Digital Education Action Plan (2021-2027) aims to support "meaningful and purposeful use of technology which

ultimately lead to high quality and inclusive education and training". The combination of constructivist and mastery-based approaches ensures that learners not only acquire knowledge but also develop the capacity for lifelong learning—one of the core competences emphasized in the European Qualifications Framework (EQF) ^{13, 14}.

The EQF, as an instrument for promoting lifelong learning, "encompasses all levels of qualifications acquired in general, vocational as well as higher education". Its learning outcomes approach "supports a better match between the skills needs of the labour market and education and training provision, while also facilitating the validation of learning acquired in different settings". The framework's emphasis on knowledge, skills, and wider competences such as "autonomy and responsibility, learning competences, communication and social competences" directly corresponds to the holistic development goals of SUCReD ¹⁵.

By embedding these theories into its design, SUCReD provides a scientifically grounded model of digital pedagogy that is both innovative and transferable across institutional and national contexts. The framework draws from Piaget's insights that children "construct an understanding of the world around them, experience discrepancies between what they already know and what they discover in their environment, then adjust their ideas accordingly", extending these principles to adult learning contexts where professionals similarly construct new understandings of commercialization processes through guided experience and reflection ¹⁶.

¹³ <https://education.ec.europa.eu/focus-topics/digital-education/actions>

¹⁴ https://ehea.info/media.ehea.info/file/Framework_for_qualifications/69/0/EQF-LLL-2008_596690.pdf

¹⁵ https://ehea.info/Upload/TPG_A_QF_RO_MK_1_EQF_Brochure.pdf

¹⁶ Thompson, P. (2019). Cognitive development: The theory of Jean Piaget. *Foundations of educational technology*.

5. Overview of the methodology

The SUCReD methodology employs a learner-centered, progressive learning approach that systematically guides participants from fundamental concepts to advanced application in research commercialization. Built upon established cognitive development models, the framework emphasizes learner autonomy through self-paced progression while ensuring mastery at each stage through scaffolded content delivery and immediate feedback mechanisms. This pedagogical foundation recognizes the diverse backgrounds of the target audience (postgraduate students, researchers, and innovation professionals) by accommodating varying levels of prior knowledge and allowing personalized learning pathways through modular, sequential lesson structures.

The methodology integrates universal design for learning principles with digital accessibility standards to ensure inclusive participation across linguistic and cultural boundaries. Delivered entirely through a cloud-based Learning Management System, the approach combines concise multimedia content, comprehensive written materials, and formative assessments requiring mastery before progression. This mastery-oriented framework transforms traditional educational delivery by prioritizing deep conceptual understanding over passive information consumption, thereby preparing learners to effectively bridge the gap between academic research and practical market applications.

5.1. Course Structure

The SUCReD curriculum systematically addresses critical knowledge gaps in research commercialization education through five carefully sequenced chapters that progressively build learner competencies from foundational concepts to advanced implementation. Each topic was strategically selected based on comprehensive needs analysis across Central and Southeastern European universities, targeting the persistent challenges identified in translating academic research into viable market innovations.

Chapter I: Intellectual Property

Lesson 1: What is intellectual property

Provides clear definitions and classifications of IP types to correct fundamental misconceptions held by 50–70% of participants, ensuring a common conceptual foundation.

Lesson 2: Basic principles of IP management

Covers global and country-specific legal frameworks to address the lack of systematic knowledge about regulatory environments in different jurisdictions.

Lesson 3: Ways to protect IP

Presents protection mechanisms—patents, trademarks, copyrights, trade secrets—to resolve confusion over patentable versus non-patentable innovations.

Lesson 4: Dissemination of the developed IP

Teaches strategic communication of research outcomes without compromising IP rights, filling the critical skill gap where over 23% of participants struggle to balance openness with protection.

Lesson 5: IP management in the university environment

Details institutional procedures, stakeholder roles, and documentation workflows to bridge gaps in understanding how commercialization processes function within academic settings.

Chapter II: Market Potential Assessment

Lesson 1: State of the art

Introduces systematic literature review and technology landscape analysis to prevent assumptions of uniqueness and foster informed comparisons against existing solutions.

Lesson 2: Innovation of the project result

Guides articulation of technological advantages and differentiators to help researchers recognize and communicate true innovation potential.

Lesson 3: Competition analysis

Trains participants to identify direct, indirect, and substitute competitors, countering the common error of claiming “no competition” when alternatives exist.

Lesson 4: Analysis of the customer market

Covers market research methodologies and customer-needs assessment to validate demand and align research outcomes with real-world problems.

Lesson 5: Define the target segment

Introduces market segmentation and persona development frameworks to focus commercialization efforts on the most viable customer groups.

Lesson 6: Market restrictions and admission to trading

Examines regulatory barriers, certification requirements, and compliance issues often overlooked in feasibility assessments.

Chapter III: Commercialization Strategies

Lesson 1: Direct and indirect commercialization

Outlines various pathways—licensing, partnerships, startups—to broaden understanding beyond the narrow focus on entrepreneurship.

Lesson 2: Application of project results in scientists’ own business

Teaches fundamentals of entrepreneurship and startup development tailored to researchers entering direct commercial ventures.

Lesson 3: Sale of rights to the result

Covers mechanisms for outright transfer and valuation principles for immediate monetization without ongoing involvement.

Lesson 4: License contract

Provides guidance on drafting and negotiating licensing agreements, addressing key deficiencies in structuring revenue-sharing models.

Lesson 5: License types

Details exclusive, non-exclusive, field-of-use, and territorial licenses to optimize commercialization strategies based on research characteristics.

Chapter IV: Science-to-Business Partnerships

Lesson 1: SWOT analysis of the project result

Teaches structured evaluation of strengths, weaknesses, opportunities, and threats within commercial contexts to inform partnership strategies.

Lesson 2: Commercialization strategies with business partners

Explores collaboration models—joint ventures, co-development—to enable shared-risk approaches for market entry.

Lesson 3: Valuation of intellectual property

Introduces methodologies for fair market valuation of research outcomes, closing gaps in understanding IP pricing in commercial transactions.

Lesson 4: Constructing a technological offer

Guides creation of compelling proposals that effectively communicate value to partners while safeguarding sensitive details.

Lesson 5: Negotiations

Develops practical negotiation skills specific to research commercialization, addressing researchers' difficulties in formal industry engagements.

Chapter V: Research and Implementation Project Management

Lesson 1: TRL (Technology Readiness Levels)

Introduces the standard framework for assessing technological maturity, essential for communicating development status to partners and funders.

Lesson 2: Relation of research hypothesis and project results to state of the art

Teaches systematic positioning of research within existing technological landscapes to demonstrate novelty and relevance.

Lesson 3: Cooperation with the business environment

Covers engagement strategies before, during, and after projects to build sustainable industry relationships and ensure continuous market alignment.

Lesson 4: Technical cost of production

Introduces cost-analysis methodologies to assess commercial viability and inform pricing and investment decisions.

Lesson 5: Risk management in R&D projects

Teaches systematic identification, assessment, and mitigation of risks throughout the commercialization process to enhance project success rates.

Figure 1 illustrates the SUCReD asynchronous online course which is organized into five distinct chapters (presented previously), comprising a total of 53 video lessons. The course is designed for flexible, self-paced learning, underpinned by a clear pedagogical framework that emphasizes accessibility, autonomy, and mastery.

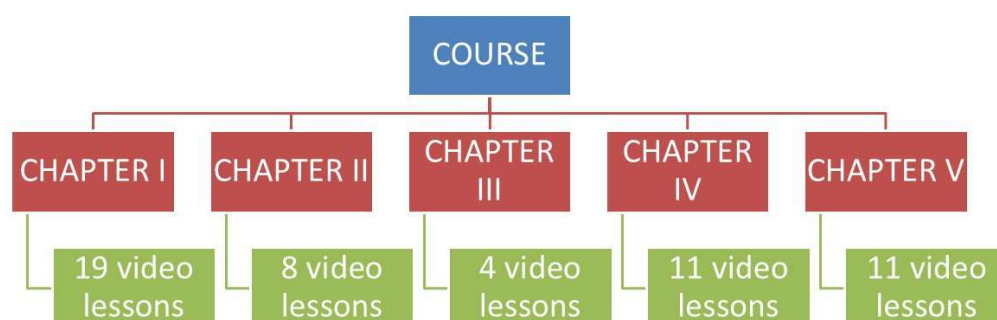


Figure 1: Course structure

Each chapter will include:

- An **introductory overview** providing a general description: This sets the context for the chapter and outlines the main topics covered.
- Clearly stated **learning outcomes/objectives**: These guide learners in understanding what they are expected to achieve by the end of the chapter.
- **Guidance** for learners on how to approach the content: Suggestions on sequencing, reviewing, or integrating the material help learners navigate the chapter independently.

- **A comprehensive PDF with written content:** Provides detailed explanations of concepts and serves as a reference for learners throughout the chapter.

Each **lesson** will follow a standardized structure to ensure consistency across the course:

- *Core content presented through one or more narrated **videos**:* Delivers the main concepts in a concise, engaging format. Lessons durations are intentionally concise, with each video lesson kept **under 10 minutes** to support focused engagement and accommodate learners' schedules.
- *A **self-evaluation quiz** (3–5 questions) in accordance with each lesson designed to provide formative feedback and support mastery-based progression:* Allows learners to check their understanding and revisit content until full mastery is achieved.

The combination of modular chapters, concise lesson durations, and structured formative assessments is designed to guide learners progressively through the content. The quizzes serve not only as self-checks but also as a mechanism to reinforce understanding, allowing learners to revisit lessons as needed to achieve full mastery before proceeding. This structure ensures that the course is both learner-centered and pedagogically coherent, fostering sustained engagement and conceptual development throughout the learning journey.

5.2. Delivery method and tools

The SUCReD course will be delivered fully **online** in an **asynchronous** format, enabling learners to progress at their own pace and according to their individual schedules. The core learning materials include comprehensive **narrated PowerPoint presentations** for each lesson, providing structured content and clear guidance. Narrated video lessons form the central mode of content delivery, allowing learners to engage with key concepts through concise multimedia presentations. Each video will be designed to be no longer than 10 minutes, supporting focused engagement and retention. While the platform will not include interactive simulations or collaborative tools, each lesson will incorporate a self-evaluation quiz with 3–5 questions, providing immediate formative feedback and allowing learners to consolidate their understanding before moving forward. These quizzes will reinforce a mastery-based approach, where learners can attempt questions multiple times until achieving full comprehension.

The development of course materials will be relied on commonly available digital tools. **PowerPoint and the Narakeet** platform will be used to create lesson slides and integrate audio narration, producing professional, concise video lessons. This combination of tools ensures that the course content is consistent, visually clear, and accessible across devices, including mobile platforms, supporting flexible and learner-centered engagement.

Learning Management and Navigation

The SUCReD course will be hosted on a **Learning Management System (LMS)** that provides structured and user-friendly access to all learning materials. Content will be organized in a modular format, allowing learners to choose the chapters they wish to engage with according to their interests or needs.

Within each chapter, however, lessons will be designed to be sequential, guiding learners through the content in a logical order to ensure comprehension and mastery before moving on. Each lesson will include a self-evaluation quiz that provides immediate formative feedback, allowing learners to consolidate understanding and revisit material as needed. This integration of sequential lesson progression with mastery-based assessment ensures that learners build knowledge step by step while maintaining flexibility across the broader course.

5.3. Description of the platform

The SUCReD course will be delivered via a cloud-based Learning Management System (LMS) that provides a flexible, intuitive, and learner-centered environment. The platform will enable structured access to chapters, lessons, and quizzes, while supporting mobile and desktop use to facilitate learning anytime, anywhere.

Key features of the LMS include:

- **Modular content organization:** Chapters, lessons, and quizzes are clearly structured for progressive, step-by-step learning.
- **Progress tracking:** Learners can monitor their advancement and identify areas for review.
- **Formative feedback:** Quizzes and assessments provide insights to reinforce understanding and support mastery.
- **Ease of navigation and usability:** A clean, intuitive interface allows learners to focus on learning rather than technical hurdles.
- **Scalable and adaptable design:** The platform can accommodate diverse learner needs and future content expansion.

Together, these features ensure a coherent and supportive online learning environment that promotes autonomy, engagement, and effective knowledge acquisition.

5.4. Support and Learner Autonomy

The SUCReD course will be designed to promote autonomous learning, providing learners with clear instructions, suggested study approaches, and access to additional

resources within each chapter. Participants will be encouraged to engage with the content in ways that align with their prior knowledge and individual learning preferences, fostering self-directed learning and personal responsibility for progress.

Additional support includes:

- **FAQs and technical resources:** The course will provide standard guidance and support materials to help learners navigate the platform and address common technical issues, supporting autonomous engagement with the content.

5.5. Assessment and Evaluation

Each lesson in the SUCReD course will include a **multiple-choice quiz** designed to reinforce key concepts, encourage review, and provide learners with **immediate feedback** on their understanding. These quizzes will be hosted directly within the LMS and are an integral part of the learning process.

To support mastery-based learning, **completion of each quiz will be required to progress to the next lesson**, and learners must achieve a **100% score** to pass. Lessons will remain locked until the quiz is successfully completed, ensuring that learners consolidate their knowledge before moving forward. If a learner does not pass a quiz, an automatic message will direct them to review the lesson content again, reinforcing understanding and promoting a structured, step-by-step learning approach.

Learners may attempt quizzes an unlimited number of times, enabling them to refine their knowledge iteratively and achieve full mastery. This formative assessment approach not only checks comprehension but also encourages repeated engagement with the material, supporting deeper conceptual learning and reinforcing the course's pedagogical goals.

By integrating these quizzes into the **sequential lesson structure**, the course ensures that learners build knowledge progressively, achieving mastery at each step before advancing, which aligns with the overall pedagogical framework and supports effective, self-paced learning.

5.6. Progress Tracking and Analytics

The SUCReD course will include tracking and analytics functionalities to monitor learner engagement and progression. Learners' completion of chapters, lessons, and quizzes will be recorded, providing clear insight into individual progress and supporting self-directed learning.

Visible progress indicators will allow learners to see which lessons have been completed and which remain, helping them manage their pace and reinforcing autonomy. Quiz attempts and outcomes will be tracked, enabling learners to assess their mastery and identify areas requiring further review.

From a course management perspective, analytics can inform ongoing course improvement by highlighting engagement trends, lesson completion rates, and assessment performance patterns. While personalized instructor feedback is not part of the current design, these insights will help ensure that learners are effectively guided through the sequential, mastery-based structure of the course.

By combining progress tracking with sequential lessons and formative assessments, the course offers a structured yet flexible learning framework that promotes both learner autonomy and the achievement of full comprehension before advancement.

5.7. Quality review process

The SUCReD course will undergo a systematic quality review to ensure its effectiveness, usability, and alignment with the pedagogical objectives. This process includes multiple stages:

- **Feedback methodology:** Learner feedback will be collected through surveys, questionnaires, and evaluation forms, focusing on content clarity, accessibility, engagement, and perceived learning outcomes.
- **Pilot testing:** A preliminary version of the course will be delivered to a small, representative group of participants, allowing real-world testing of lesson structure, navigation, assessment, and overall user experience.
- **Analysis and refinement:** Feedback from the pilot will be carefully analyzed, identifying patterns, strengths, and areas for improvement. User comments and suggestions will inform targeted refinements to course content, delivery methods, and platform features.

This iterative approach ensures that the course is continuously enhanced based on authentic learner experiences, promoting high-quality, effective, and user-centered online learning.

5.8. Certification and Completion Criteria

Learners will receive a **PDF certificate of completion** upon successfully fulfilling all course requirements. To earn the certificate, participants must **pass all quizzes** embedded within each lesson. There is no additional final test or assignment; mastery is demonstrated through the successful completion of these formative assessments.

This structure reinforces the course's mastery-based approach, ensuring that learners have fully engaged with and understood all content before certification. The clear alignment between lesson progression, quiz completion, and certification provides a transparent and motivating pathway for learners.

A **training path diagram** visually summarizes the course structure, showing the sequential lesson progression within each chapter, the requirement to pass each quiz, and the final step of earning the certificate. This diagram (Figure 2) helps learners understand the steps needed to successfully complete the course and reinforces the structured, self-paced nature of the learning journey.



Figure 2: Training path diagram

6. Future Development and Scalability Plan

The long-term success of the SUCReD initiative depends not only on the immediate effectiveness of its e-learning course but also on its capacity to evolve, expand, and adapt to emerging educational and innovation landscapes. This Future Development and Scalability Plan outlines how the course and its associated resources will be sustained, extended, and continuously renewed in alignment with European digital education priorities. Building upon its open-access, modular, and multilingual foundation, the SUCReD methodology is deliberately designed to serve as a living framework—capable of supporting new educational models, institutional integrations, and region-specific adaptations long after the project’s formal completion.

6.1. Sustaining Open Access and the OER Ecosystem

Central to the scalability of SUCReD is its open-access philosophy. All course materials, including narrated presentations, written content, and quizzes, are made available as Open Educational Resources (OERs). This approach ensures that the curriculum can be freely reused, remixed, and redistributed by universities, innovation hubs, and policy stakeholders throughout Europe and beyond. The open licensing model directly supports the European Commission’s emphasis on resource sharing and interoperability under the Digital Education Action Plan (2021–2027).

To sustain this ecosystem, partner institutions will maintain a shared digital repository containing all course components and updates. This repository will serve as a collaborative platform where trainers can contribute new materials, case studies, or localized examples, ensuring that SUCReD remains dynamic and relevant. Through this collective stewardship model, the project encourages continuous community participation in improving and contextualizing the course—transforming it into a self-sustaining educational commons.

6.2. Pathways for Micro-Credentialing and ECTS Integration

Future iterations of SUCReD will explore the development of micro-credentials that formally recognize learners’ mastery of research commercialization competencies. Given that each chapter represents a distinct competence domain—from intellectual property to project management—the course structure lends itself naturally to modular certification. Learners could earn micro-credentials upon completing specific chapters or thematic clusters, allowing flexible accumulation of learning achievements over time.

These micro-credentials will be designed in accordance with the Council Recommendation on a European Approach to Micro-Credentials for Lifelong Learning and Employability (2022), ensuring recognition across higher education systems. The SUCReD partnership will also examine opportunities for ECTS credit integration, particularly at partner universities such as the University of Ioannina and CUT, where commercialization competencies are increasingly recognized as part of doctoral and

postgraduate curricula. Integrating SUCReD as an accredited elective or supplementary module would further institutionalize its pedagogical value and incentivize sustained learner participation.

In the long term, the project envisions establishing a “SUCReD Digital Badge” system, validated by partner institutions, as a verifiable digital credential aligned with the Europass framework. This step would formalize learners’ skills and enhance their employability within Europe’s innovation ecosystem.

6.3. Localization and Contextual Adaptation

A defining strength of SUCReD is its responsiveness to regional contexts. To ensure ongoing relevance, future development will focus on localization through context-specific case studies and examples. Each partner country—Poland, Greece, and Romania—will curate a growing collection of regional innovation success stories, public–private partnership models, and commercialization pathways. These locally sourced case studies will demonstrate how SUCReD principles apply within different policy, industrial, and academic settings, making the learning experience both authentic and relatable.

Localization will extend beyond language translation. It will include adapting materials to reflect national legal frameworks, intellectual property procedures, and funding schemes. Partner universities and technology transfer offices will collaborate in developing these localized modules, ensuring that SUCReD remains a flexible resource that accommodates varying institutional realities. Over time, this approach will allow the course to scale horizontally—serving as a model adaptable for other EU regions or associated countries seeking to strengthen their research commercialization ecosystems.

6.4. Integration with European Innovation and Digital Education Frameworks

SUCReD’s methodological design aligns naturally with key European frameworks for innovation and higher education transformation. The project’s learner-centered, digitally enabled structure supports the goals of the European Digital Education Action Plan, particularly its Priority 2: “Enhancing digital skills and competences for the digital transformation.” By equipping researchers and students with digital and entrepreneurial competences, SUCReD contributes directly to the EU’s vision of a digitally confident research community.

In parallel, SUCReD will explore strategic integration with the HEInnovate framework, the European Commission and OECD’s self-assessment tool for entrepreneurial higher education institutions. The SUCReD course can serve as a practical implementation instrument for HEInnovate dimensions such as “Developing Entrepreneurial Teaching and Learning,” “Preparing and Supporting Entrepreneurs,” and “Digital Transformation and Capability.” Future collaboration with HEInnovate networks could position SUCReD as a best-practice case, demonstrating how digital education and commercialization training can reinforce institutional entrepreneurship and innovation culture.

Furthermore, SUCReD’s open and modular model can support cross-institutional cooperation under the European University Alliances, enabling universities to adopt the course jointly, share learning

analytics, and co-develop new modules. Such inter-university collaboration aligns with Erasmus+ objectives to foster transnational learning ecosystems.

6.5. Continuous Innovation and Technological Scalability

SUCReD's cloud-based infrastructure offers significant potential for technological scalability. The platform architecture supports integration with future learning innovations such as AI-assisted learning analytics, adaptive feedback systems, and peer-to-peer collaboration tools. These technologies could personalize learning experiences, identifying where individual learners may need further reinforcement or recommending additional resources based on performance trends.

Additionally, future development may involve the creation of a mobile learning companion app, offering offline access to materials, micro-quizzes, and push notifications that guide learners through the sequential mastery structure. Such enhancements would increase accessibility and engagement, particularly for users in regions with limited internet connectivity.

From an institutional perspective, scalability also includes the capacity to train additional instructors and innovation mentors through the existing train-the-trainer model. Each new trainer certified in SUCReD methodology expands the network of facilitators capable of implementing or adapting the course, thereby multiplying its regional and international impact.

6.6. Long-Term Vision: Toward a Sustainable Learning Ecosystem

The ultimate goal of SUCReD's scalability strategy is to establish a sustainable learning ecosystem that transcends project boundaries. By combining open access, credential-based recognition, localized content, and alignment with European frameworks, SUCReD positions itself as a permanent, evolving instrument for advancing research commercialization competencies. Future collaborations may include partnerships with innovation agencies, regional development authorities, and EU-funded clusters seeking to integrate commercialization training into broader capacity-building programs.

In this way, the SUCReD methodology will continue to grow beyond its initial consortium, serving as both a model and a catalyst for the digital transformation of entrepreneurship education in Europe. Its adaptability ensures that it remains responsive to new technological, pedagogical, and policy developments—transforming a one-time project into a living infrastructure for innovation learning and impact.

Authors:

- Prof. Chrysostomos Stylios, Dimitra Tzouka (Panepistimio Ioanninon)

Lead Partner:

- Politechnika Krakowska (Poland)

Partners:

- Createhub Spółka Z Ograniczoną Odpowiedzialn Ością (Poland)
- Universitatea de Medicina, Farmacie, Stinte si Tehnologie George Emil Palade din Tirgu Mures (Romania)
- Iceberg Plus SRL (Romania)
- Panepistimio Ioanninon (Greece)
- KiNNO Innovation Intermediaries LTD (Greece)