

SYN BEE



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1. EXECUTIVE SUMMARY

The field of synthetic biology has enabled the development of disruptive biotechnologies by developing the tools that enable us to understand, manipulate, and reprogram the genetic code inside living cells. Over the past decade, these tools have become increasingly robust and easy to apply such that their use has become the status-quo across a wide range of industries. This has not only changed the industrial landscape, but also what is possible in terms of new and improved products and analytic services that can be developed.

The SYNBEE project – SYNthetic Biology Entrepreneurial Ecosystem, funded under the European Commission’s Horizon Europe Research and Innovation Programme, aims to address this challenge by expanding the entrepreneurial ecosystems built around academic research related to synthetic biology with commercial potential. In particular, the SYNBEE initiative focuses on enhancing the entrepreneurial education of young professionals in fields related to synthetic biology and its application across European innovation ecosystems. Thus, in addition to improving overall employability of young professionals, providing this education will empower those who choose the path of entrepreneurship to build businesses in Europe.

This document represents a draft of the entrepreneurship training and recruitment roadmap. It is based on a preliminary literature review and SWOT analysis that was conducted earlier in the project. This draft of roadmap focuses on increasing and strengthening entrepreneurial skills and fostering a culture that encourages entrepreneurship. The aim is to provide key actors and stakeholders with elements and ideas on how to strengthen the capacity of experts and researchers to start businesses and organise successful entrepreneurial activities.

This version of the roadmap contains two alternative proposals for a vision for entrepreneurship education in 2035, as well as proposed measures and policy recommendations to implement the vision. The key policy recommendations for the entrepreneurship vision are grouped below under four main themes:

- Building entrepreneurial mindset for students in synthetic biology: Entrepreneurship skills for all students according to their needs
- From a research career to becoming an entrepreneur: Entrepreneurship training tailored to the individual’s needs and situation



- Strengthening HEI's capabilities to support entrepreneurship especially in synthetic biology
- Comprehensive support through collaboration: involving all stakeholders to support the development of entrepreneurial skills

The proposals for the vision and the measures to implement it are preliminary and will be widely discussed with all relevant stakeholders. The draft roadmap will be refined based on feedback and a final version will be prepared by the end of the project.



2. INTRODUCTION

The field of synthetic biology has enabled the development of disruptive biotechnologies by developing the tools that enable us to understand, manipulate, and reprogram the genetic code inside living cells. Over the past decade, these tools have become increasingly robust and easy to apply such that their use has become the status-quo across a wide range of industries. This has not only changed the industrial landscape, but also what is possible in terms of new and improved products and analytic services that can be developed. Already, microorganisms are routinely reprogrammed to produce key molecules from renewable biobased feedstocks. In doing so, this quickly maturing sector, referred to as precision fermentation, is paving the way for a chemical industry decoupled from the use of fossil-fuel based chemical precursors. In countries such as the United States, the genetic modification of plants and vegetables grown for food is routinely applied across the agricultural industry: their genetic codes are modified to confer features such as drought-resistance, pest & disease resistance, or even improve their nutritional profiles. Another more recent example that has impacted all our lives is offered by the pharmaceutical industry: without the tools developed by synthetic biology the mRNA vaccine platform deployed during the pandemic would have remained in the realm of science fiction.

It is clear that advances in the fields of biotechnology that apply the tools of synthetic biology has stimulated entrepreneurship across the globe. The rate at which scientific advances are successfully commercialized, however, varies greatly between countries and regions of the world. While leading European research organizations have a proven scientific track record of excellence, science generated in these fields remain largely under-exploited commercially.

The SYNBEE project – SYNthetic Biology Entrepreneurial Ecosystem, funded under the European Commission’s Horizon Europe Research and Innovation Programme, aims to address this challenge by expanding the entrepreneurial ecosystems built around academic research related to synthetic biology with commercial potential. In particular, the SYNBEE initiative focuses on enhancing the entrepreneurial education of young professionals in fields related to synthetic biology and its application across European innovation ecosystems. Thus, in addition to improving overall employability of young professionals, providing this education will empower those who choose the path of entrepreneurship to build businesses in Europe. As a first step in boosting this entrepreneurial education, the SYNBEE project aims to bring



together key players. These include academic centres of excellence and their accelerators, incubators, and technology transfer offices, as well as industry partners and investors from 25 European countries who share this common goal.

This document represents another key task of the SynBEE-project: a draft of the entrepreneurship training and recruitment roadmap. It is based on a preliminary literature review and SWOT analysis that was conducted earlier in the project. The entrepreneurship training and recruitment roadmap includes the matrix of best practices (completed by TU Delft) and identifies potential bottlenecks and areas of weakness that need to be improved.

Europe has played a strong role in biotechnology and synthetic biology research. However, Europe has lagged behind the United States and China in the commercialisation of research results. While synthetic biology research has expanded, the number of new companies based on research results has not grown at the same rate. Therefore, long-term efforts are needed in Europe, to increase the commercialisation of scientific research, in particular in the field of synthetic biology, given its very high potential.

This draft of roadmap focuses on increasing and strengthening entrepreneurial skills and fostering a culture that encourages entrepreneurship. The aim is to provide key actors and stakeholders with elements and ideas on how to strengthen the capacity of experts and researchers to start businesses and organise successful entrepreneurial activities.

The proposed actions in the Synbio Entrepreneurship and recruitment Roadmap are designed to be applicable at different levels from local to national and EU level. Implementing the proposals means different types of actions depending on the level at which they are applied.



3. SYNTHETIC BIOLOGY – POTENTIAL AND CHALLENGES

Synthetic biology is multidisciplinary science which applies engineering principles to develop new biological parts, devices, and systems or to redesign existing systems found in nature. The field of Synthetic Biology is rapidly evolving, offering transformative opportunities across various sectors. It aims to create and redesign biological systems, with applications in healthcare, agriculture, and energy by blending biology, engineering and computer science,

Synthetic biology has the potential to transform multiple industries, and Europe is seen as a key player in the field. However, the ecosystem is still in its early stages, and there are significant challenges that need to be addressed, including regulatory barriers and funding gaps. The EU has recognized the potential of synthetic biology and has taken steps to support its development. However, increased investment and collaboration are needed to drive innovation and create a robust innovation ecosystem.

4. ENTREPRENEURSHIP AND ENTREPRENEURIAL SKILLS IN SYNTHETIC BIOLOGY

Academic entrepreneurship is seen as playing key role in economic development. It can create jobs, foster innovation activities and strengthen the competitiveness of regions and countries. Academic entrepreneurship refers here as a process of transforming research results (both fundamental and applied knowledge) into innovative marketable products through the creation of an economic activity within the university or outside it (spin off).

There are known challenges for higher education organisations (HEI) in supporting academic entrepreneurship. Firstly, members of HEI's are typically driven by the pursuit of knowledge and the desire to contribute to their field, while entrepreneurs are oriented towards translating scientific research into successful businesses. It is thus important to bridge these two



approaches and foster the entrepreneurship culture in HEIs. Secondly, higher education institutions often face resource constraints that limit their ability to support entrepreneurial activities. Lack of dedicated staff, inadequate infrastructure and limited funding could pose challenges to supporting academic entrepreneurship.

Deep technology startups, like synthetic biology, have significant potential to disrupt entire industries. Even though research-based spin-off companies have been recognised key sources of innovation, their establishment faces significant challenges, such as low entrepreneurship culture among researchers and difficulty in translating research outcomes into viable business ideas. Recognising the importance of strengthening the spin-off ecosystem for sustainability and regional economic development is crucial.

Spin-off companies serve as significant sources of innovation, facilitating increased knowledge transfer among quadruple helix actors, including universities, research centres, and the public and private sectors. Moreover, spin-off companies can generate high-quality employment opportunities and offer high-value-added products and services, playing a crucial role in mobilising science, technology, and innovation and thereby driving regional cohesion and development.

Creation of start-ups faces substantial challenges related to research commercialisation. Firstly, entrepreneurship culture is not very high among researchers, where career orientation favours research and academic careers. Secondly, there are often difficulties in identifying relevant research results that can be turned into successful business ideas. Also, on hinder is that there is lack of adequate business skills among researchers and experts. Especially in synthetic biology/engineering biology, regulations does not always support knowledge transfer through spin-off companies. For instance, getting necessary licences for scaling up production in industrial level might take a very long time. This is difficult for small start-ups, because they often don't have resources for that. Significant problem could also be limited access to funding due to a lack of tangible evidence for securing financing as well as market uncertainty due to the disruptive nature of products or services.

According to the views of those who responded to the SWOT survey, the most effective ways to enhance students' entrepreneurial skills were collaboration with companies and mentoring, entrepreneurship training, and strengthening interdisciplinary cooperation for skill development. The emphasis on these approaches varied based on the type of ecosystem.



Respondents from Emerging, Strong and Lead Ecosystems highlighted the importance of mentorship and networking from entrepreneurs. Respondents from Moderate Ecosystem showed a focus on interdisciplinary collaboration for skills development and university-company cooperation. Emerging ecosystems also highlighted entrepreneurship courses as the most important means for enhancing entrepreneurship skills of students.

According to the respondents, the key themes for developing entrepreneurial skills include business planning, finance-related questions, intellectual property matters, and regulatory issues. Respondents believe that entrepreneurship studies should be practical and linked to mentoring. Additionally, internships with companies were considered important for students' learning.

5. STRENGTHENING ENTREPRENEURIAL SKILLS AND ENTREPRENEURIAL CULTURE IN THE SYNBIO INDUSTRY

5.1. THE VISION – WHERE WE WOULD LIKE TO BE IN 2035

Strengthening Europe's position in the field of synthetic biology research and commercialisation of research results requires a broad and sustained effort for the key players (HEIs, research organisations, incubators and accelerators, policymakers, companies) in different levels from local to European level. Strengthening entrepreneurial skills and fostering entrepreneurial culture are important part of these measures. These activities will target both researchers and experts with an interest in commercialisation of research results, as well as students in synthetic biology.

Many higher education institutions offer a range of entrepreneurship-related education and training amongst other services to support the commercialisation of research results and the creation of businesses. The content, scope and delivery of the entrepreneurship training vary between HEIs. Students' access to entrepreneurship education that is relevant to their needs and situations and easy to use therefore varies widely.



HEIs have long been working to promote the commercialisation of research results and strengthen their capabilities to support academic entrepreneurship. To increase the commercialisation of research results, particularly in disruptive technologies such as synthetic biology, the provision, content and delivery of entrepreneurship education and training services must be developed and reformed in a determined and long-term manner. It enables the content of training to be tailored to needs and training services to be seamlessly integrated into the overall framework of forms of academic entrepreneurship promotion.

This work requires an ambitious but achievable vision to which all stakeholders can commit. We therefore propose the following draft vision for strengthening entrepreneurial skills:

Option 1: In 2035, European Higher Education Institutions will strongly support academic entrepreneurship and an entrepreneurial culture related to synthetic biology. All researchers, experts and students interested in synthetic biology entrepreneurship will have the opportunity to participate in entrepreneurship education and training responding to their needs.

Option 2: By 2035, Europe is the leading continent in promoting entrepreneurship related to synthetic biology. All synthetic biology students and researchers interested in entrepreneurship have access to comprehensive and diverse educational services and other forms of support needed.

According to the vision

- there will be comprehensive opportunities for synthetic biology students, researchers and experts interested in entrepreneurship, to develop their entrepreneurship skills and competencies.
- All students, researchers and experts in synthetic biology interested in entrepreneurship have access to entrepreneurship education in Europe.
- The content and delivery of entrepreneurship training will meet the diverse needs of those working in the field of synthetic biology and will offer a wide range of opportunities for participation. A significant part of the training is open and free of charge.



- The opportunities and prerequisites for developing entrepreneurship skills have been significantly improved especially in emerging and developing ecosystems.
- **Foundation of Entrepreneurship:** The foundation of entrepreneurship has been strengthened by ensuring that all students studying in the field of synthetic biology acquire the basic skills required for becoming an entrepreneur and engaging in entrepreneurial activities as part of their education. They also could acquire the fundamental expertise necessary for entrepreneurship.
- **Close Collaboration Between Companies, Universities, and Other Educational Organizations:** Through close collaboration between companies, universities, and other educational organizations, the availability of top experts in the field is ensured to meet the needs of companies. This collaboration also ensures that students develop an up-to-date, comprehensive, and realistic understanding of business activities related to synthetic biology, as well as job roles and development prospects.
- **Comprehensive Entrepreneurship Education offered by Higher Education Institutions:** The entrepreneurship education offered by higher education institutions comprehensively addresses the skill requirements of individuals at different stages of the entrepreneurship process and strengthens the prerequisites for entrepreneurship
- The entrepreneurship education and other support measures for entrepreneurship provided by HEI's and their partners form a whole, within which service combinations suitable for each student, graduate, and researcher can be built according to their needs
- The cooperation between companies and HEIs' related to synthetic biology is strong, goal-oriented, intensive, and diverse.
- Synbio-companies/start-ups have access to talented labour force due improved cooperation with HEI's. Also, Synbio-graduates have good awareness and updated information available about employment opportunities offered by companies in all types of ecosystems
- All HEIs' involving in synbio research and education provides entrepreneurship education to their students. HEIs' develop and provide entrepreneurship education in cooperation.



5.2. THE KEY MEASURES TO ACHIEVE THE VISION FOR ENTREPRENEURSHIP

The realisation of the draft vision described in chapter 5.1. requires long-term and broad-based work to develop entrepreneurial skills, involving all key stakeholders. The main role in this work will be played by higher education institutions (universities, universities of applied sciences) providing synthetic biology education and research. A significant role is also played by industry and business, investors, organisations providing entrepreneurial support services (incubators, accelerators) and public authorities.

The key policy recommendations for the entrepreneurship vision are grouped below under four main themes:

- Building entrepreneurial mindset for students in synthetic biology: Entrepreneurship skills for all students according to their needs
- From a research career to becoming an entrepreneur: Entrepreneurship training tailored to the individual's needs and situation
- Strengthening HEI's capabilities to support entrepreneurship especially in synthetic biology
- Comprehensive support through collaboration: involving all stakeholders to support the development of entrepreneurial skills

The proposed measures have been designed to be applicable across contexts and levels, regional ecosystems, national and EU level. Execution of these measures varies depending on the type of stakeholder and at what level they are implemented (e.g. local/regional level, national level, EU/European level).

5.2.1. BUILDING ENTREPRENEURIAL MINDSET FOR STUDENTS IN SYNTHETIC BIOLOGY: ENTREPRENEURSHIP SKILLS FOR ALL STUDENTS ACCORDING TO THEIR NEEDS

Commercialisation of synthetic biology research results and increasing entrepreneurial activity often requires long-term efforts. One key starting point is to build a long-term basis



for entrepreneurship and to develop the core competences involved. Students of synthetic biology are therefore an important target group. The strengthening of students' entrepreneurial skills and entrepreneurial orientation is a long-term process throughout their studies. This will help to build the foundations for new businesses. The impact of the activities will thus be felt over a longer period, often after students have completed their degrees and moved on to careers in the world of work, as researchers or experts.

A key element in strengthening entrepreneurship-related skills is to support the development of an entrepreneurial culture and mindset among students as well as amongst HEIs. In this way, entrepreneurship would be seen as a more attractive option to find employment and use their expertise in working life and society. In addition to acquiring expertise and skills in synthetic biology, students also need an understanding and insight into how scientific knowledge and expertise and research skills can be applied in the business world. Alongside this, students need knowledge and skills related to entrepreneurship.

However, an entrepreneurial mindset should be understood as a broader approach than just business, strongly including how scientific research and the application of research results and entrepreneurship can serve communities and society. This would train students to see entrepreneurship in a broader context, as a tool to find solutions to major societal and environmental problems and to strengthen social, economic, cultural, and environmental sustainability.

The educational activities should be designed to increase students' knowledge of business and companies in the sector, their activities, and their prospects for development. It is important that students have an up-to-date and positive, but realistic, view of synthetic biology and related business and the prospects for the sector. This will provide a basis for strengthening students' interest in synthetic biology and related business as a career option. This interest in the field provides the basis for motivating students to acquire entrepreneurial skills as part of their studies. These competences should be systematically reinforced at different stages of their studies. The aim is to ensure that all students have sufficient basic skills in business and entrepreneurship. In addition, higher education institutions should offer students a wide range of opportunities to deepen and strengthen their entrepreneurial skills during their studies. This requires higher education institutions to offer a wide range of options



for acquiring entrepreneurial skills in ways that are attractive to students and easy enough to integrate into their studies.

Entrepreneurship skills can be strengthened through various measures, for example, guided studies and courses, mentoring, peer-learning, open badges, and independent studies, which can be delivered both virtually online and through traditional face-to-face learning. In developing entrepreneurship skills, it is important to make use of pedagogical methods that allow for the personal needs, requirements, and life circumstances of students to be considered in the delivery of studies (e.g., online learning at any time and place, competence tokens, collaborative learning methods, practical orientation).

Proposal for action:

- *HEI's engaged in synthetic biology should ensure that their entrepreneurship education provision enable all students acquire sufficient basic knowledge about entrepreneurship as well as deepen/expand knowledge in entrepreneurship for those interested in starting up business, e.g.*
 - Identify critical competencies together with the companies in the start-up ecosystem and define the target state for entrepreneurship competence?
 - Prepare and implement an action plan for developing entrepreneurship education offer that it responds the identified skills needs (existing provision + creation of new provision).
 - Incorporate entrepreneurship competences into the curricula in an appropriate way, so that every student receives basic knowledge and skills related to entrepreneurship, according to the minimum level defined by the higher education institution.
 - Utilizing the European entrepreneurship competence framework (EntreComp) framework in the development of entrepreneurship education content.
- *Multi/transdisciplinary approach in enhancing entrepreneurial capabilities for students in synbio:*
 - *As part of developing entrepreneurial skills, students should be provided with a broad range of knowledge on the skills and abilities required for successful*



entrepreneurship in addition to synthetic biology-related skills and research results (e.g. technical skills, IP issues, financial issues, product development, marketing).

- *Higher education organisations should work together in national and in European level, to develop the content and delivery of entrepreneurship education so that they have a common understanding of what kind of educational content is needed to promote synthetic biology entrepreneurship. This would also enable cooperation in the organisation of training provision and thus improve accessibility.*
 - HEIs should identify the potential and the need to develop a common framework for entrepreneurship competences related to synbio (project?)

- *The pedagogical methods for entrepreneurship education provided by HEIs should be student-oriented, competence based and situational.*
 - Pedagogical methods should be chosen in such a way that they are closely linked to the real problems and contexts of entrepreneurship and that they provide knowledge and skills applicable in these contexts.
 - The needs, situations and conditions of the student should be the starting point for the implementation of the training.
 - The development of entrepreneurial skills can be incorporated as a meaningful part of the process of becoming an entrepreneur
 - The way education is delivered should be collaborative and should allow students from different disciplines to work together, as in the world of work.
 - Versatile and flexible implementation forms: e.g. training/courses, projects, competence badges, hackathons and development challenges, internships
 - Open innovation activity as an integral part of entrepreneurship education - synthetic biology product development - together with students from other fields



5.2.2. FROM A RESEARCH CAREER TO BECOMING AN ENTREPRENEUR: ENTREPRENEURSHIP EDUCATION RESPONDING TO THE INDIVIDUAL'S NEEDS AND CONTEXT

Researchers have a key role in commercialization of research results. Therefore, it is essential to integrate entrepreneurship as a natural option within a researcher's career path. This requires methods and approaches to enhance researchers' entrepreneurial skills among other measures supporting academic entrepreneurship. Additionally, networking initiatives are needed to connect researchers interested in entrepreneurship with the business community. In many ways, the forms of developing entrepreneurial skills can be similar to those for students.

For researchers and experts working in synthetic biology, the path to entrepreneurship is shorter than for students because they already possess relevant expertise and insights into commercializing research results. Therefore, developing entrepreneurial skills for researchers and experts should be tailored through educational solutions that align with their individual entrepreneurial processes. These educational efforts should be based on the identified skill needs of each person and the specific stage of the business establishment process. The methods for skill development should directly support solving challenges and addressing open questions related to commercializing research results and starting a business. The implementation of entrepreneurship education should allow for learning alongside work, as well as balancing work, entrepreneurship, and personal life.

However, developing entrepreneurial skills alone does not guarantee the successful initiation and execution of a business. Additional support measures are necessary depending on specific needs and circumstances. Educational efforts should also be integrated with these other support measures of academic entrepreneurship in a meaningful and impactful way for individuals embarking on entrepreneurship. From the perspective of higher education institutions, this means coordinating entrepreneurship education with other academic entrepreneurship support offered by the university to create a coherent and relevant framework for aspiring entrepreneurs. Compared to students, this places significantly greater



demands on the content and delivery methods of entrepreneurship education to tailor them to individual needs and situations

Proposal for action:

- *Entrepreneurship training and modules for researchers are similar in content to those offered to students. The training courses should be designed in such a way that they can be linked to support the entrepreneurial process of researchers. Easily approachable, low-threshold education solutions – awareness and basic knowledge of entrepreneurship*
- *Particular attention must be paid to the skills needed to commercialize research results. The related skills development and training should be easily linked to the individual career paths of researchers and the entrepreneurial process. Training should be organized in such a way as to strengthen the practical skills needed to set up a business.*
- *Operating models that can support the strengthening of entrepreneurial competence entrepreneurially and support the development of a business idea*
- *Open innovation activity as part of education – synthetic biology product development – together with students and experts from other relevant fields i.e. business, technology, product development, design, legal*
- *Supporting researchers to become entrepreneurs and strengthening their entrepreneurial skills requires close cooperation with businesses. It is important that HE-organizations actively build networks and cooperation between synthetic biology researchers and companies. Such cooperation can increase researchers' knowledge of entrepreneurship and increase opportunities for collaboration with companies in the field. In turn, companies will receive up-to-date information on research.*
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5.2.3. STRENGTHENING HIGHER EDUCATION INSTITUTIONS CAPABILITIES TO SUPPORT ENTREPRENEURSHIP ESPECIALLY IN SYNTHETIC BIOLOGY

Strengthening entrepreneurship skills and thereby entrepreneurship potential related to synthetic biology requires broad actions at the local/regional ecosystem level, national level, and international level (EU/Europe level). Higher education institutions play a significant role in influencing the entrepreneurial readiness with which students transition to working life and how researchers interested in commercializing research results can be helped to acquire the skills required for business operations. Focus of this roadmap is thus at the local/regional level and ecosystems.

Many higher education institutions have developed education and other services that promote the commercialization of research results and academic entrepreneurship. Each higher education institution essentially decides for itself what kind of services and what kind of education they offer to their students and other parties. There is also a great variation between higher education institutions in terms of how entrepreneurship skills can be developed or included as part of degrees. This naturally affects how students or researchers in synthetic biology can acquire skills to support becoming an entrepreneur.

In addition, it must be considered that entrepreneurship education and entrepreneurship skills are often such that they are not specifically tied to any industry or discipline. In this case, students from different fields can benefit from the same courses and study modules, and the application of study content to business operations in different fields will primarily be the responsibility of the students. This is also important because synthetic biology/bioengineering brings together many disciplines in addition to the life sciences, notably computing, AI, and data analytics as well as business, legal e.g. Therefore, entrepreneurship education should contribute to providing students and experts from different disciplines with the opportunity to study together and to acquire not only entrepreneurial skills but also the necessary networks and understanding of the complexity of commercialisation and business of synthetic biology research results.

Promoting academic entrepreneurship and strengthening entrepreneurial skills, especially related to synthetic biology, is ultimately linked to how higher education institutions see the importance of the task as part of their strategy and operations. Naturally, the discipline itself



also plays an important role in the task. It is therefore often a matter of broader strategic choices related to the role and approach of higher education institutions in promoting academic entrepreneurship.

Strengthening the role of higher education institutions in promoting academic entrepreneurship ultimately requires strategic choices concerning the entire higher education institution and the implementation of these, as well as the long-term construction of an entrepreneurship-friendly culture. Alongside this, a holistic vision is needed to develop entrepreneurial skills and an entrepreneurial culture across disciplines, while increasing interdisciplinary collaboration, for example on synthetic biology.

Proposal for action:

- *HEIs should make strategic decision how to foster entrepreneurial culture and trans-disciplinary collaboration together. This includes integrating entrepreneurship skills into all education and disciplines in appropriate way as well as encouraging trans-disciplinary research and educational collaboration between disciplines. The content and delivery modes of entrepreneurship education should also be integrated as a natural part of all forms of support activities of commercialization of research results in higher education.*
- *Similarly, solutions are needed to secure the supply and capacity of entrepreneurship education in the long term.*

The reality is that these actions most probably will have to be carried out mainly with the existing resources of the HEIs and their partners/stakeholders. Higher education institutions should allocate resources to entrepreneurship education that are appropriate in relation to the strategic objectives set. Active use should be made of national and EU development funding to develop education and training.

- *Higher Education Institutions should work together to develop entrepreneurial skills of students and researchers. This applies to the development of both the content and delivery of education and the provision of educational services. Cooperation will provide a stronger framework for higher education institutions to support the strengthening of students' and researchers' entrepreneurial skills with the available resources.*



- in terms of delivery modes - common approaches - greater cross-fertilisation of services provided by different actors
- Web-based, time- and place-independent training modules should be developed to strengthen basic entrepreneurial skills, which could be made widely available to students and researchers in the field. (also to ensure cost-efficiency)
- Peer learning and benchmarking between higher education institutions - with a synbio focus
- Peer learning programme around synbio entrepreneurship between leading and strong ecosystems and emerging and moderate ecosystems
- Entrepreneurship education benchmarking programme between universities - EU funding
- Entrepreneurship education delivery partnerships - open materials, web-based solutions - use of these, especially in early and emerging ecosystems

5.2.4. COMPREHENSIVE SUPPORT THROUGH COLLABORATION: INVOLVING ALL STAKEHOLDERS TO SUPPORT THE DEVELOPMENT OF ENTREPRENEURIAL SKILLS

Supporting academic entrepreneurship related to synthetic biology requires significant input from higher education institutions. Although their contribution is significant, it is not sufficient on its own. Becoming an entrepreneur and strengthening entrepreneurial skills also require networks and partnerships. Therefore, it is important that higher education institutions are actively involved in building and developing innovation ecosystems related to synthetic biology at the regional, national, and international levels. Transitioning from the academic world to the business world particularly requires the support of regional and local ecosystems. The most important thing is to build cooperation and partnership between higher education institutions and businesses. This benefits students, graduates, businesses, and higher education institutions.

Partnership networks are particularly important for those interested in entrepreneurship and those becoming entrepreneurs. During the process, various types of support, guidance, and advice may be needed to ensure the entrepreneurial process progresses successfully. Through network partnerships, various forms of support and services related to becoming an entrepreneur and setting up businesses can be made more visible and can be combined in



the most appropriate ways to support everyone's personal entrepreneurship path. Cooperation also helps increase students', researchers', and teachers' awareness of business and markets related to synthetic biology. This creates a stronger foundation for developing business ideas and evaluating their relevance, and thus helps make necessary decisions about becoming an entrepreneur.

Proposal for action:

- *Developing entrepreneurship skills and strengthening their entrepreneurial mindset for people at different stages of their studies or research careers requires a network to provide the necessary skills, networks and other support to meet individual needs.*

- *All actors involved in promoting entrepreneurship and strengthening entrepreneurial skills should be involved in cooperation – actively build regional, national and international cooperation networks between synbio companies, HEIs, researchers, students and other actors supporting entrepreneurship (funders, incubators, accelerators, public authorities).*
 - The networks should have common objectives, a shared vision of the key actions to strengthen entrepreneurial skills, as well as jointly defined roles and division of labor between the different actors in the ecosystem
 - Strengthen the understanding and knowledge of synthetic biology of the various actors in the ecosystem (financiers, authorities, intermediary organizations, etc.)
 - Designing and implementing together services and service concepts that support entrepreneurship and are suitable for people at different stages of their entrepreneurial career or start-up process.

