# TECHSTER: Tech students, entrepreneurial routes

## TechSter Road Map

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# TechSter Road Map

*Final version*



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*With the assistance of the TECHSTER Project partners.*

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## The goal of TechSter Road Map

TechSter Road Map aims to provide universities with guidance to embed a proactive approach to teaching and learning soft and entrepreneurial skills throughout the organisation(s) so that they become part of the organisation's policies.

## TechSter Road Map development - main assumptions

TechSter Road Map authors acknowledge that revolutionising existing curricula in higher educational institutes overnight is not realistic for several practical and policy reasons. Therefore, we have chosen to gradually implement entrepreneurial tools and materials into the existing curricula. It is therefore proposed to progressively implement entrepreneurship and soft skills tools and materials into existing curricula. As part of the TechSter project, a Road Map has been defined, which defines a comprehensive approach in this direction and includes a set of suggested actions.
Other TechSter elements - TechSter Toobox and TechSter Teachers Guide - ensure the use of modern, interactive tools and materials to promote entrepreneurial behaviour and the development of soft skills in the classroom. The role of the TechSter Road map is to secure the implementation of an organisation-wide approach to teaching and learning by reaching out to direct higher education stakeholders who influence curricula and technical subject teachers. Potential stakeholders inside university are e.g.:

- Rector office
- Dean offices
- Professors and university teachers at tech faculties
- Faculty commissions for education procedures
- University incubator or technology transfer office
- Others

With this strategic roadmap in place, universities can refer to their current educational activities as a starting point. These activities will be able to be reviewed and analysed to see how the most relevant elements of TechSter can be incorporated into their organisation.

The TechSter Road Map will make it easier for universities to evaluate and formulate action plans that include proposed improvements to the curriculum and the learning environment

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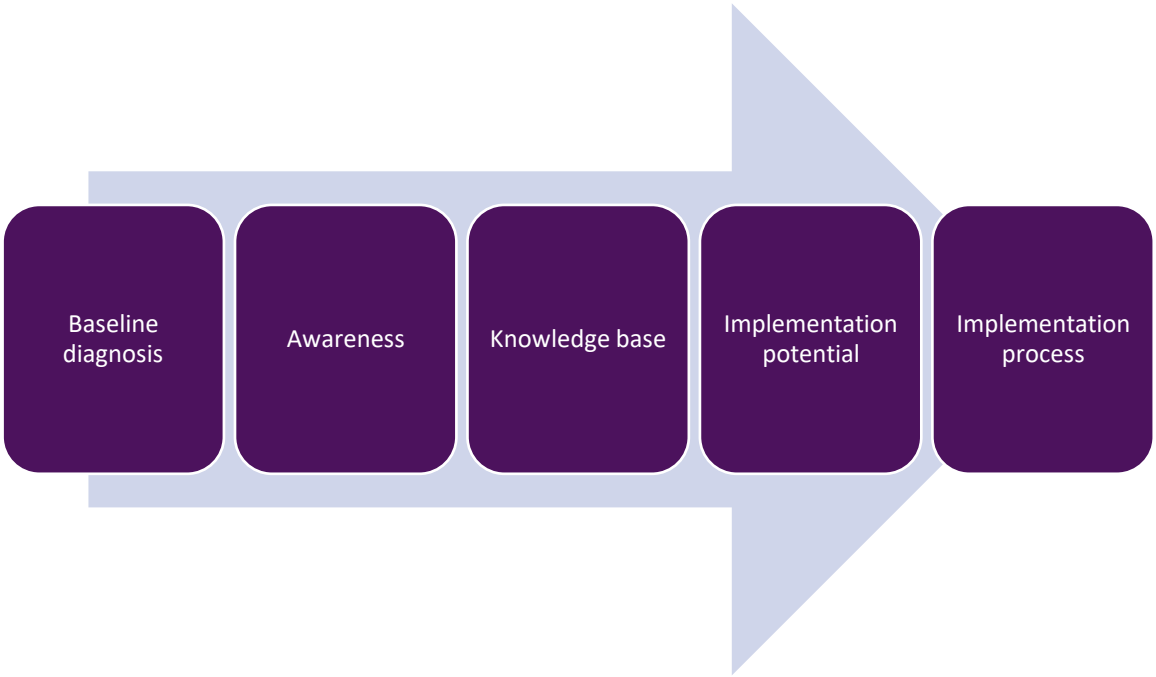
(new or revised courses, major subjects, modules and even lessons, etc.). We are aware that this is a long-term goal and immediate actions are not possible in such large, complex and formalised organisations as universities.

## TechSter Road Map – key points

The TechSter Road Map assumes that the University needs to implement activities in five areas. Their implementation will enable to increase the potential to teach soft skills and entrepreneurial skills among students. These are (Figure 1):

1. Baseline diagnosis
2. Awareness
3. Knowledge base
4. Implementation potential
5. Implementation process

*Figure 1: The five areas of TechSter Road Map.*




The authors of the TechSter Road Map document are aware of the great diversity of universities, and their structures, legal conditions and socio-economic environment. Thus, the assumptions of the TechSter Road Map have been formulated at a level of generality that makes it possible to consider their application in different settings.

An important part of the TechSter Road Map is the combination of the document's assumptions with the presentation of existing good practices in European universities. The good practices are tailored to local/regional conditions and do not represent ready-made solutions, but they are an important source of inspiration regarding tools that are already in

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operation within different universities. They are therefore also to some extent an authentication of the solutions proposed within the TechSter Road Map.

## TechSter Road Map – AREA 1 – BASELINE DIAGNOSIS

The baseline diagnosis is the starting point for the TechSter Road Map. It provides a kind of analysis of the university's starting point for taking further steps. Baseline diagnosis refers to the need to analyse:

1. existing resources within the university which can be used in further activities
2. current processes within the university which are related to the teaching of soft skills and entrepreneurial skills (see good practice A1-1)

The baseline assessment should cover in particular:

1. Human potential including academic staff, especially in terms of competence in teaching soft skills and entrepreneurial skills among students
    a. formal education - field education, but also postgraduate studies, courses
    b. graduates of the training courses for teachers in this field carried out at the university
2. University organisational potential
    a. university centres for entrepreneurial education, e.g. Centre for Entrepreneurship at University of Lodz,
    b. university departments which coordinate of entrepreneurial education etc.
    c. university departments which focus on university teachers education.
3. Didactic and extracurricular activities for students
    a. existing courses,
    b. business plan contests for tech students,
    c. business ideas contests.
4. Training activities for teachers
    a. existing or past internal trainings
    b. existing online training internal resources
5. Cooperation with the external partners, which may be part of the:
    a. didactic processes
    b. research cooperation
    c. business relationships.

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## Good practice:

A1-1. Institution: **University of Lodz (Poland)**

The authorities of the University of Lodz from 2021 onwards, at a central management level, maintain and complete a comprehensive **database** that includes all **entrepreneurship teaching courses** offered within the university and the lecturers who teach them. This requires monitoring of the activities undertaken by the university's 12 diverse faculties which have partial autonomy and employ a total of more than 2,500 academic staff. These faculties undertake initiatives to educate entrepreneurial behaviour within, among others, humanities, life sciences or technical faculties.

The database provides a starting point for the processes of academic staff resource management in the area. It makes it possible not only to diagnose the scale of activities, but also the needs for supporting teaching processes. Consequently, it enables the building of teacher networking processes, the provision of information and support for teaching processes or the initiation of inter-faculty teaching projects.

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# TechSter Road Map – AREA 2 – AWARENESS

An important element of TechSter Road Map is to create awareness among students and academic staff of the importance of having and developing soft skills and entrepreneurial skills. Activities in this field shall relate to the dissemination of general information and practical examples.

In principle, activities related to development of awareness of the need for training in soft skills and entrepreneurial skills should be targeted at three types of groups:

1. Awareness development activities for **teachers** on the need for soft skills and entrepreneurial skills education (see good practices A2-1 and A2-2)
2. Awareness raising activities for **students** on the need for soft skills and entrepreneurial skills education (see good practices A2-1 and A2-2)
3. Awareness-raising activities for **authorities/technical faculty structures** on the need for soft skills and entrepreneurial skills education

Creating understanding and awareness of the importance of soft skills and entrepreneurial skills is also important in the **business environment and among university stakeholders** (see good practices A2-1 and A2-3) In addition to fulfilling the social mission of the university, it has a practical significance. It is about having the effect of creating among regional enterprises a conscious demand for university graduates who possess the aforementioned skills.

Building awareness of the importance of using entrepreneurial competences in various forms of social activities can also be part of this (see good practices A2-4 and A2-5). Various forms of entrepreneurship and business activities are necessary to build capacity for these functions.

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## Good practices:

A2-1. Institution - The European University Cyprus (Cyprus)

**The Performance Enterprise Accelerator & Knowledge (PEAK)** Innovation Center research centre at The European University of Cyprus aims to explore, support and accelerate entrepreneurship, business innovation and knowledge transfer. Research in these areas addresses, among other things, the impact of entrepreneurship, business innovation and knowledge transfer in Cyprus and the immediate region. The results of the research are popularised among local SMEs, the industrial and manufacturing community, students in order to popularise the entrepreneurial mindset as well as entrepreneurial and innovative practices and skills.
The effect of PEAK's impact in the region and the country is enhanced by the prestige of The European University of Cyprus, which is the heir to the oldest academic unit in the country.

A2-2. Institution - The University of Cyprus (Cyprus)

The activities of the **Centre for Entrepreneurship (C4E)** of the University of Cyprus are directed towards, among other things, fostering a culture of innovative entrepreneurship within the University and developing relevant internal knowledge. C4E serves the entire University of Cyprus community, i.e. undergraduate, postgraduate and doctoral students, researchers and young scientists, faculty and staff.
The Centre works in providing the entire University community with the high quality services and networking required for entrepreneurial and innovative activities. C4E aspires to provide the training, knowledge, mentorship, support and connections that students of the University of Cyprus and young researchers need to become successful entrepreneurs.
These awareness activities for the entire University of Cyprus community raise the profile of entrepreneurial and innovative activities and the entrepreneurial achievements encourage interest in this skill area.

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A2-3. Institutions: EBILTEM Technology Transfer Office and EGE Technopark (Turkey)

The project Hack4Art: Art Technologies Workshop Series, Hackathon and Exhibition aimed to support and encourage artists, engineers, business developers and coders to create their art and technology-related work. The theme of the Hack4art project was 'Data Art: Visualisation of Scientific Data, Artistic Expression of Visualised Data'. The project built awareness of the diverse opportunities that face those creating works with modern artistic technologies. This included promotional activities in the form of workshops, a hackathon event and an exhibition of digital and physical art creations.
Trainings offered as part of the project included:

- Creating and Visualizing Sound from Data
- Intellectual Property and Protection in Art Technologies
- Visualizing Word Vectors with TensorBoard
- Enterprise Europe Network and International Cooperation
- Data Visualization: How Do You Present Data Visually?
- Protection of Data and Ideas in Works

A2-4. Institution: Coventry University Social Enterprise (UK)

CU Social Enterprises are the only UK example of a social enterprise set up by a university to promote social entrepreneurship and innovation. The mission is to help people realise their entrepreneurial potential. CU Social Enterprise focuses on maximizing Coventry University's role as an anchor institution by finding ways of benefiting the local community and achieving true social value. Their role as social innovators extends to supporting students, alumni and staff, at various stages of their entrepreneurial journey. CU Social Enterprises builds awareness among the students involved there of the importance of entrepreneurial activities, their use in different spheres of social life, including community activities. It exemplifies the importance of entrepreneurial competence by providing an example of its practical application.

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A2-5. Institution: Brunel University London (UK)

The Brunel Entrepreneur Hub is part of Brunel University London - it aims to provide support for students and graduates who need help turning their ideas into winning businesses. It offers expert advice for student (including graduate) start-ups. It is also possible to get support in obtaining funding.
The Brunel Entrepreneur Hub is also very active in activities to build awareness of the importance of entrepreneurial activities and provides training for students on entrepreneurial competences.

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# TechSter Road Map – AREA 3 – KNOWLEDGE BASE

An important element of building the capacity of the university to be able to teach soft skills and entrepreneurial skills to students is to build a knowledge base in this area. A knowledge base that will be available particularly to teachers who wish to incorporate elements of soft skills and entrepreneurial skills into the subjects they teach.

The knowledge base should refer to the creation of:

1. a database of educational tools (see good practice A3-1 and A3-2)
2. a database of good educational practices - application of tools (see good practice A3-3)
3. a database of training courses on soft skills and entrepreneurial skills available to university teachers (see good practice A3-3, and to some extent – good practice A4-1)

## Good practices:

A3-1. Institution: ERASMUS+ project – TechSter (Europe)

**TechSter Online Community** developed within ERASMUS+ project TechSter aims to provide academic teachers of technical subjects with easy-to-practise educational tools. It includes a set of fifteen tools that can be used in technical education but at the same time help to teach soft skills and entrepreneurial skills. TechSter Online Community provides a comprehensive knowledge of each tool as well as its use in the teaching process. The knowledge base for each tool provides:

- a description of the tool and its basic features,
- a description of the educational benefits,
- suggestions for scenarios to use the tool in the classroom,
- a description of success stories - the effective use of the tool to solve problems in companies and organisations,
- links to further online resources.

The TechSter Online Community also offers the opportunity to discuss teachers' problems and good solutions in an online forum. Access to the resource is free and open to the public.

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A3-2. Institution: ERASMUS+ project – Emerge (Europe)

Emerge project (ERASMUS+) aims to increase the number of female entrepreneurs in engineering. The tools of the project are (1) building e-training resources, (2) access to training events. Training is delivered by entrepreneurship education, higher education and vocational institutions. The first step is to join the Emerge online community a community of engineers, lecturers, business advisors and education providers. This allows access to educational resources and training events, and consequently to expert knowledge and advice.

A3-3 Institution: Academia of Leon Kozminski in Warsaw, Center for Entrepreneurship (Poland)

**The SEIPA Educational Network for Innovative Academic Entrepreneurship,** run by Academia of Leon Kozminski in Warsaw, is a knowledge base and a platform for the exchange of experiences of lecturers and trainers initiating various educational, training and advisory programmes in the field of ambitious, innovative entrepreneurship. It is aimed at all types of universities.
Lecturers or candidates for entrepreneurship lecturers at universities through joining the Network can benefit from such forms of support as:

- Access to methodological guidance and materials for lecturers on the portal.
- Training and counselling for lecturers and consultants in the implementation of entrepreneurship subjects for students and academic staff
- Access to teaching materials for students (participants of training programmes) placed on the portal to support the teaching process within the basic courses "Innovative Entrepreneurship" and "Technological Entrepreneurship".
- Access to functional solutions of the SEIPA Portal, enabling the implementation of university programmes, taking into account the specificity of the university, field of study, etc. to a greater or lesser extent.
- Exchange of experience in the preparation and implementation of various projects, also with the use of EU funds.
- Exchange of information and cooperation regarding research in the field of broadly understood academic entrepreneurship.

Currently, more than 70 lecturers representing 35 Polish universities cooperate within the network.

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# TechSter Road Map – AREA 4 – IMPLEMENTATION POTENTIAL

Implementation potential is related to capability of introducing the soft skills and entrepreneurial skills tools to university curricula. It affects the practical applicability of the tools in the educational process. As part of the TechSter Road Map, we highlight two important elements in this area:

1. reducing formal barriers,
2. efforts to intensify the use of available resources.

Reducing formal barriers refers to reducing requirements within the organisational structures of universities that may constrain teachers or make it difficult for them to use tools that support the acquisition of entrepreneurial competencies and soft skills in the teaching process.

1. Lowering of formal barriers:
    a. enabling the easy and efficient introduction of soft skills and entrepreneurial skills teaching elements into existing courses,
    b. support the university in making small changes to the curriculum so that teachers can modify it by introducing tools for soft skills and entrepreneurial skills development.
2. Allowing minor curriculum changes – flexibility increase:
    a. allowing for elasticity in the tools used to teach soft skills and entrepreneurial skills so that they can be adapted to the dynamics of social processes within a given group.

Reducing formal barriers also refers to efforts to support university teachers in the efficient implementation of necessary procedures. Support can be provided through the effective cooperation of teachers with the university units responsible for course programmes. It can also be realised through IT instruments that enable the smooth transfer of information to the university units responsible for course programmes and the approval of changes (see good practice A4-1).

An important element that can strengthen the use of the potential held by the university for the development of entrepreneurship skills and soft skills is to ensure a certain level of flexibility in students' decisions with regard to the courses they take (see good practice A4-3). Allowing the selection of courses relating to entrepreneurship skills and soft skills by students of different specialisations enables the gathering of an audience with a high degree of curiosity about the content presented. On the other hand, it makes it possible to dispose of the university's knowledge resources efficiently.

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The development of a university knowledge base should be complemented by activities aimed at facilitating the use of its resources and its promotion among university staff:

1. networking activities for the exchange of good practices (see good practice A4-2)
2. networking activities for learning tools
3. in-house training
4. development of IT infrastructure enabling efficient use of the external tools:
    a. databases,
    b. facilitating access to external educational tools.

**Good practices:**

A4-1. Institution: University of Lodz (Poland)

'Minerwa' **software** designed to **support the documentation of teaching courses** at the Faculty of Management of the University of Łódź. It was created to streamline the process of managing course documentation and content. Within this software, formal course data is stored and the consistency and completeness of the documentation is also checked.
Thanks to the functions of this software, it is possible to make corrections to course content efficiently and quickly. No paper documentation is required. The software informs the teacher what kind of changes can be made independently and which require the approval of the teaching supervisors.
Within the software is a database through which every teacher at the University has access to descriptions of all courses taught within the faculty.

A4-2. Institution: University of Utrecht (The Netherlands)

**SIG Entrepreneurship Education** is the Utrecht University project group, open to teachers who want to weave entrepreneurship into their classes. It is aimed at teachers at Utrecht University. It is based on the exchange of good practice between teachers. The knowledge of experienced teachers is used to extend the knowledge of other lecturers who are not specialised in the topic of entrepreneurship.

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A4-3. Institution: EGE University (Turkey)

Courses on entrepreneurship offered by the Department of Innovation and Entrepreneurship at the University of EGE are available to any student at the university. They are offered **outside the set of compulsory courses** for a particular major and can be **chosen by students with different specialisations**.

In this way, the university provide an interdisciplinary environment in which students who are enthusiastic about entrepreneurship and look for soft skills development, can be equipped with various knowledge and skills and develop innovative solutions to problems they encounter, with the support of EGE University's research infrastructure, academic and expert staff. Courses offered by the Department of Innovation and Entrepreneurship include: (1) Innovation, Technology and Entrepreneurship, (2) Entrepreneurship and Introduction to IPR, (3) Entrepreneurship and Preparation of Business Plan, (4) Commercialization of Innovation and Entrepreneurship, (5) The Art of Creative Thinking, (6) Investment Decision Analysis in Entrepreneurship, (7) Emerging Topics in Entrepreneurship.

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# TechSter Road Map – AREA 5 – IMPLEMENTATION PROCESS

For the implementation of the TechSter Road Map implementation process, it is important to provide governance mechanisms that monitor the process and allow for the implementation of corrections (see good practice A5-1). In particular, this concerns:

1. Assessing the scale of implementation of the tools for soft skills and entrepreneurial skills development.
2. Evaluation of the effects of the implementation of the tools for soft skills and entrepreneurial skills development.

**Good practices:**

A5-1 Institution: University of Lodz (Poland)

**The Centre for Didactic Development** of the Faculty of Management at the University of Łódź is a unit that is focused on providing support for the development of teaching competences to the academic staff of the Faculty. The Centre monitors problems encountered by teachers, e.g. those related to the use of new software or the application of new working methodologies, e.g. through staff surveys and individual interviews.
When problems or needs are identified, focused thematic training courses are organised and available to teachers from the Faculty of Management. The training courses can be on-site or online.

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