



EuroTeQ Engineering University

Taking responsibility for the next generation

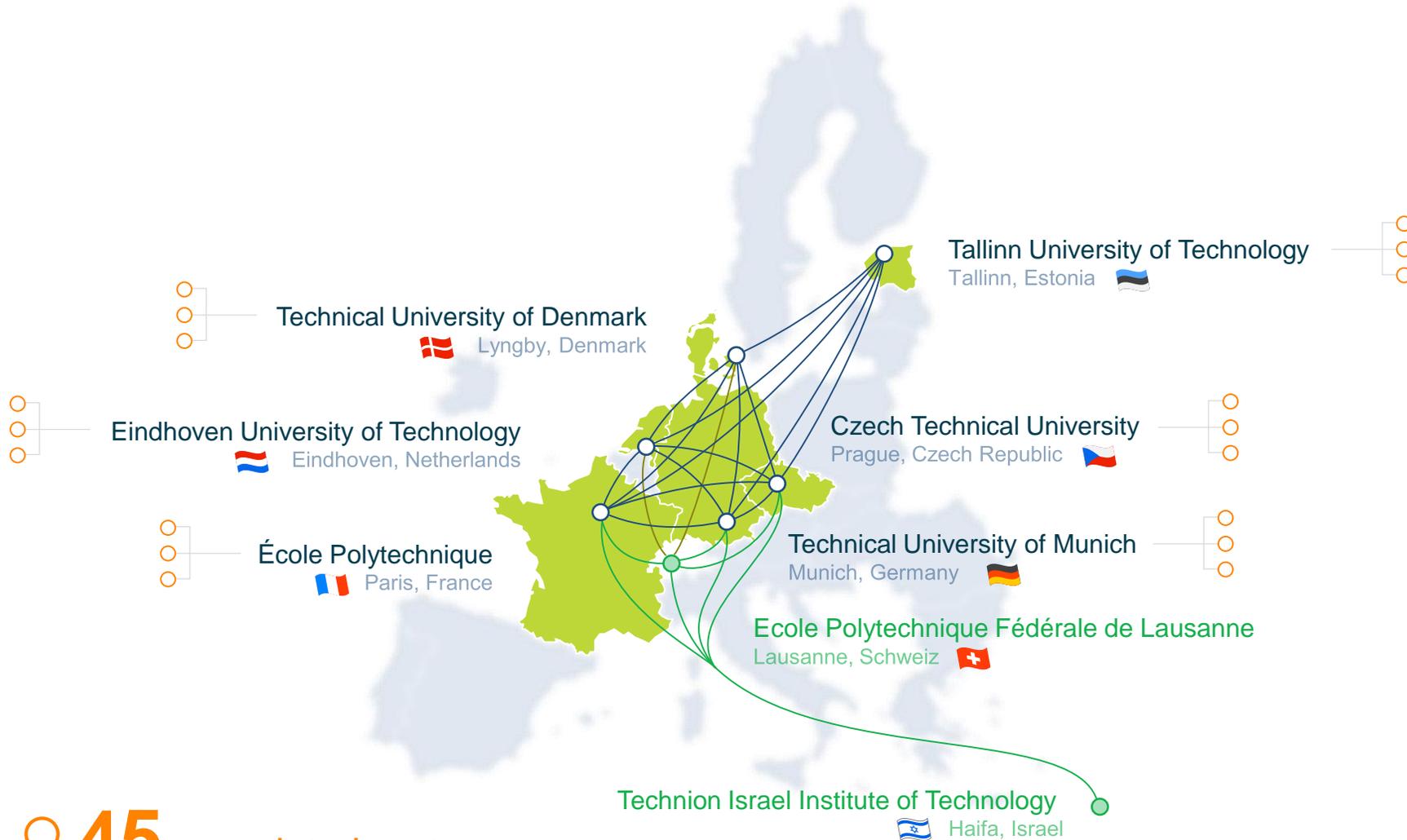
European engineering education of the future



01

Welcome

Local roots with an impact throughout Europe



Six strong Universities of Technology and 45 associated partners together form the EuroTeQ Engineering University.

Emerging from the EuroTech Universities Alliance, taking on board two excellent partners TalTech from Estonia and CTU from the Czech Republic.

Anchored in diverse geographical and cultural contexts, each partner with their corresponding eco-system provides added value and a competitive advantage to the EuroTeQ cooperation.

EPFL in Switzerland and Technion in Israel contribute to these efforts.

The goal is to ensure a strong integrative link with different cultures and traditions of engineering education across Europe.

○ 45 associated partners

The EuroTeQ Advisory Board N°2 (EAB)

Nomination of industry partners to the EAB

TUM: Rainer Schmidt-Rudloff, Infineon, HR Director University Relations

DTU: Danielle Bjerre Lyndgaard, Director of DI Global Talent & Mobility, DI - Confederation of Danish Industry

TU/e: Dirk van Meer (start up Core)

L'X: Geoffrey Bouquot, CTO and VP Strategy at Valeo

CTU: Dipl.-Ing. Thomas Merker, GasNet, Chief Financial Officer

TalTech: Skeleton Technologies, Taavi Madiberk CEO Co-founder

Nomination of other EQF partners to the EAB, proposals

TU/e: Nienke Fabries (EQF5 and 4)

Other Members

- ❑ FEANI - Federation of professional engineers that unites national engineering associations – Dirk Bochar
- ❑ EYE – European Young Engineers – Nadja Yang
- ❑ SEFI – European Society for Engineer Education – Yolande Berbers
- ❑ ECEC – European Council of Engineers Chambers - Hansjörg Letzner
- ❑ Our associated partners EPFL and Technion - Pierre Dillenburg/ Antoine Fromentin, Oded Rabinovitch
- ❑ EuroTeQ Student Council – Jürgen Schiffer, Koen de Nooij



45 associated partners

Agenda

Time	Topic
15.00	Welcome and Agenda Gerhard Müller
15.10	Project status, achievements and next steps
15:25	Microcredentials – Existing short-term learning formats and the EuroTeQ approach
16:25	Wrap-up
16:30	End of the Meetings

02

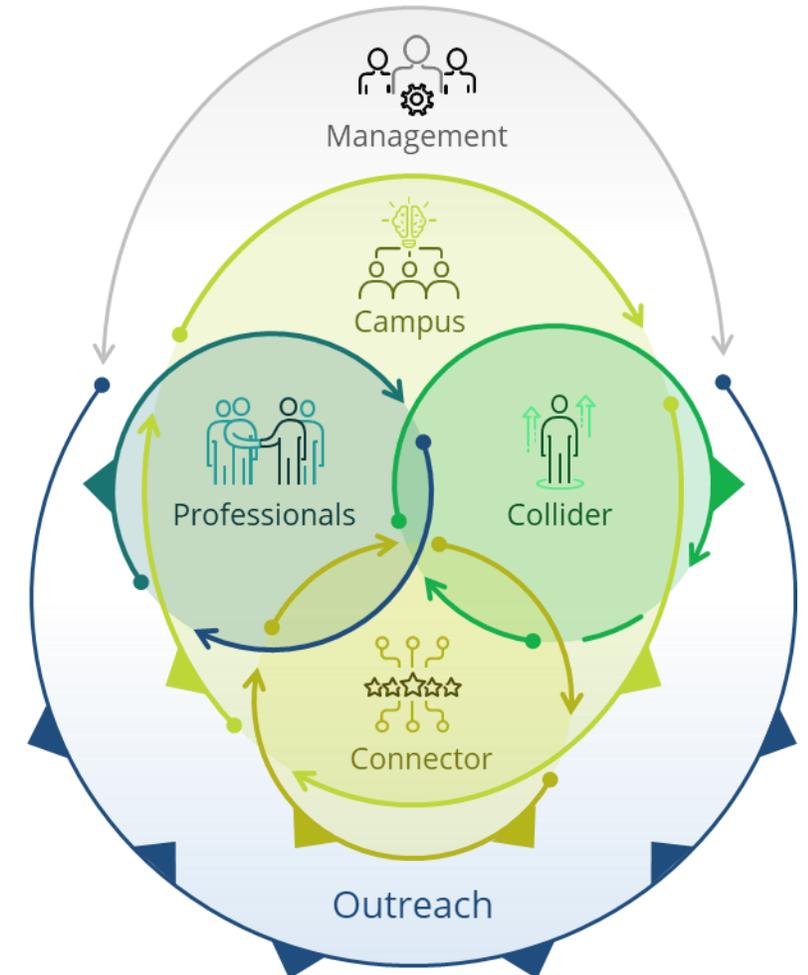
EuroTeQ Project Status: Achievements and Next Steps

Recap: EuroTeQ Engineering University

A modern engineering education must provide students with in-depth technical knowledge, an extended interdisciplinary horizon, an entrepreneurial mindset and socio-political sensitivity.

We will in three years (Nov 2020 – Oct 2023):

- **Build the EuroTeQ Campus** to give students, vocational and lifelong learners access to our six partners universities.
- **Run the EuroTeQ Collider** where students, vocational and lifelong learners are brought together to identify, and co-create solutions to challenges of the 21 century
- **Define the EuroTeQ Professional:** Together with stakeholders from industry, trade associations etc. we will discuss future engineering competencies and develop new lifelong formats
- **Create the EuroTeQ Connector:** analyze, document and publish our observations to further develop the EuroTeQ Engineering University
- **Reach out continuously** to make the EuroTeQ Engineering University open and accessible, promoting lifelong learning.



Status, results & next activities

Build the EuroTeQ Campus

- EuroTeQ Course Catalogue launched on 6 July: 59 courses in Autumn/Winter 2021, 375 virtual mobilities
- Spring/summer semester 2022, 89 course offers, around 500 virtual mobilities
- First **EuroTeQ Teaching Fund**, to develop virtual collaborative educational formats
- Mapping the Executive and Professional Education offers and Continuing Learning Paths
- EuroTeQ Diversity and International Classroom policy

Run the EuroTeQ Collider

- Design of first challenge-based Collider project weeks at the six partner campuses in progress
- Open Call for Ideas in Oct-Nov 2021, Ideation workshops for students. **Cooperation with ecosystem and companies** to provide ideas, promote and engage professionals and vocational trainers.

Ideate the EuroTeQ Professional

- Comparability analysis of partners' Bachelor and Master programmes undertaken, Mapping of National Qualification Frameworks undertaken,
- Next: **Competence profiles for future engineers to be identified in dialogue with Local Advisory Boards and companies**

Create the EuroTeQ Connector

- Key performance indicators have been defined, six joint research projects have been outlined
- First Lobbying for Change event on 7 July, online (169 participants), **speakers from LAB**

Ensure EuroTeQ Sustainability & Outreach

- Student Gaming App Hackathon 11-12 June,
- EuroTeQ LinkedIn Account and Website launched in summer 2021 (euroteq.eurotech-universities.eu)





Collider - Call for Ideas – Challenges – Project weeks

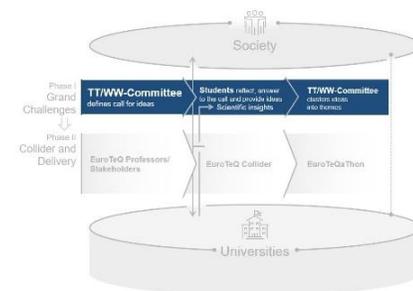
Swarm intelligence

- Open call for ideas launched in beginning of October 2021
- Theme 2021/2022: **Leave no waste behind!**
- Students, staff, as well as vocational and professional learners invited to participate
- Promotion at each university + eco-system through Associated Partners of Local Advisory Boards
- Approx. **170 feedbacks collected** by end of October, imbalance between locations and target groups
- Clustering of Ideas in three topical groups

Cities | Energy | Consumption

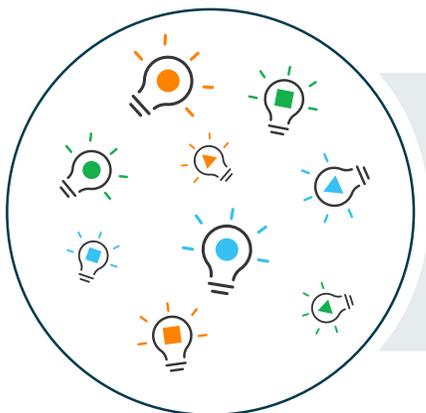
Transformed into Challenges

- Feedback will be clustered by topic and approach
- Together with departments and industry partners, challenges will be formed for **project weeks in Spring 2022**
- Students, vocational and professional learners apply for these challenges, which will take part at each location
- Collider is complemented with a research agenda, analysing different solution strategies per location and team composition, coaching and mentoring activities
- Kick-off event 10 February 2022

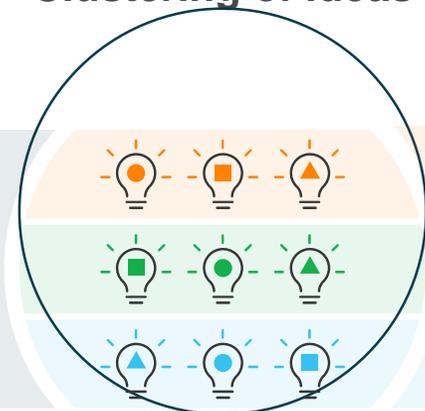


Pool of ideas

from all over Europe



Clustering of ideas



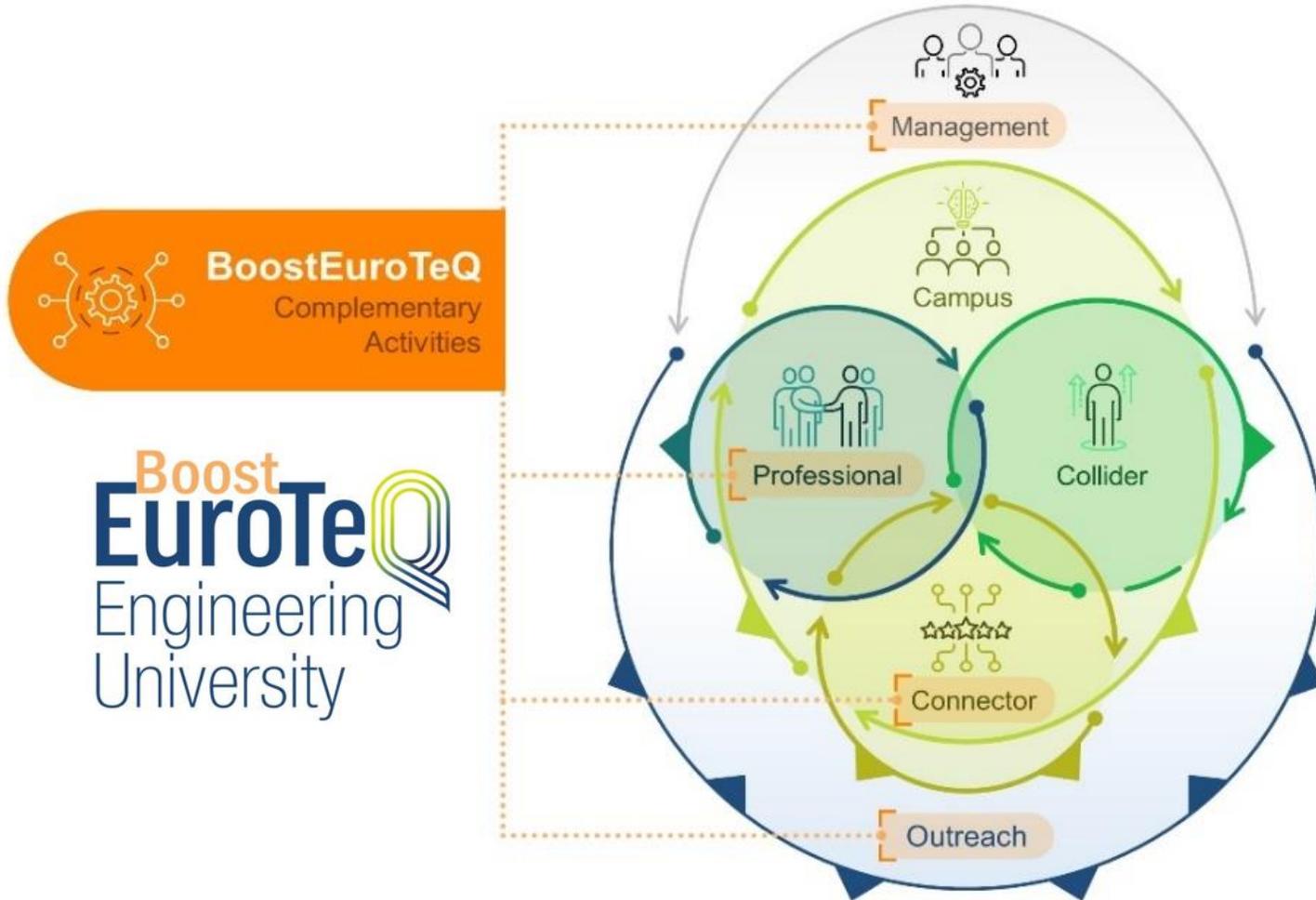
Challenge 1

Challenge 2

Challenge 3

EuroTeQ
COLLIDER

Boost EuroTeQ



Boost EuroTeQ project started 1. September 2021

- Coordinated at TUM Institute for Lifelong Learning and TUM Munich Center for Technology in Society (MCTS)

With BoostEuroTeQ we aim at strengthening the **research and innovation realm** of our partnership. It strongly builds on synergies to reinforce institutional change towards responsible research and innovation.

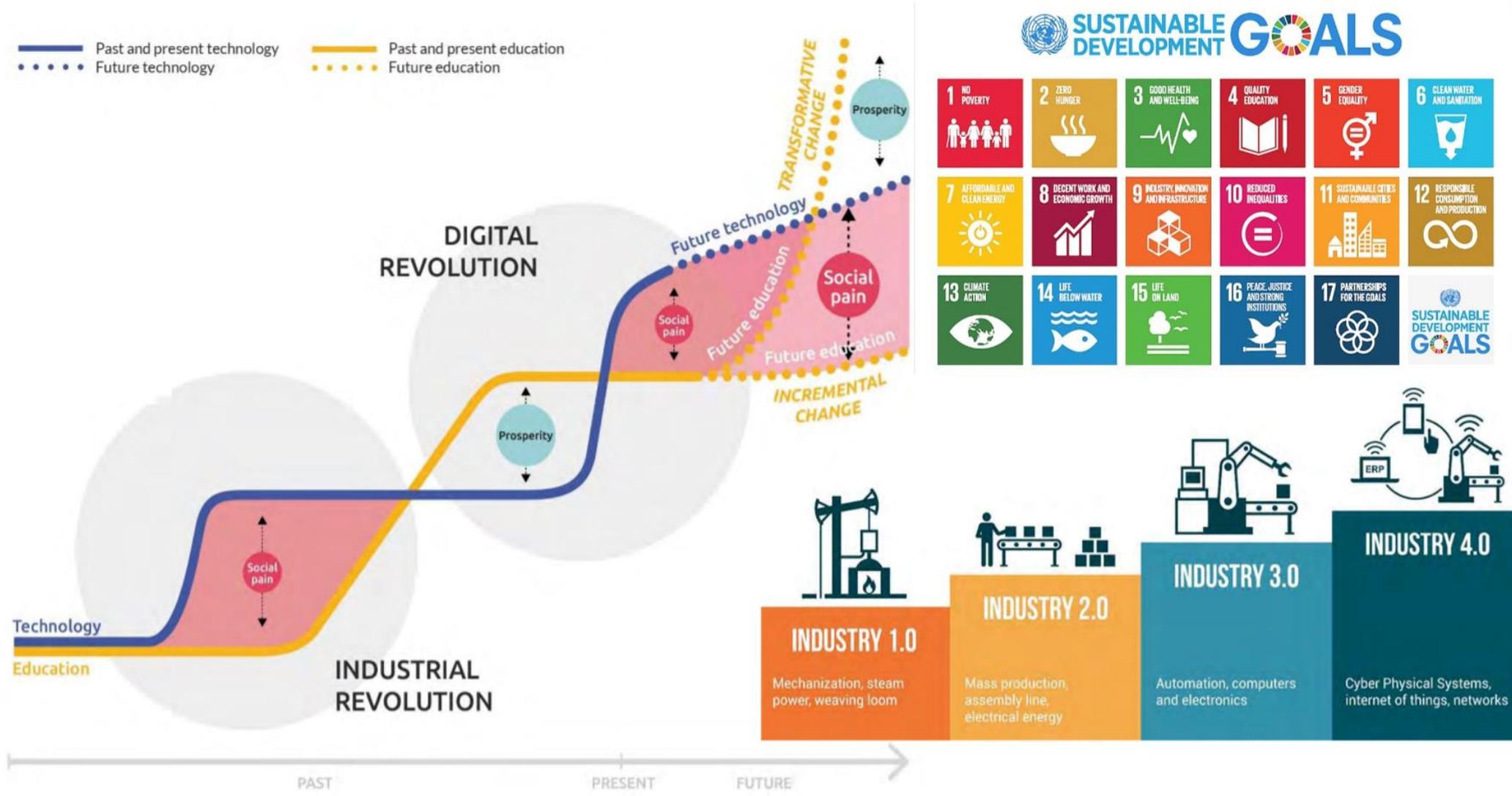
We seek to enable individuals in technology value creation to interact with stakeholders of the wider society ensuring desirable and socially robust pathways for societal transformation.

The work plan set out in BoostEuroTeQ strengthens and complements the **EuroTeQ Professional** and boosts and broadens the impact of the **EuroTeQ Connector and Outreach**.

03

Inventory of already existing short-term learning formats at the partner universities

Gap between technology development and education



Aus: Goldin, C. and Katz, L.F., 2010. The race between education and technology. Harvard University Press.

Inventory of non-standard learning formats & programs: Bachelor & Master Students

Bachelor

- Certificates
- Honors Degrees
- Open-/Plug-In Courses
- Student Programs (Xtra-Curr.)
- MOOCs
- Open (Virtual) University

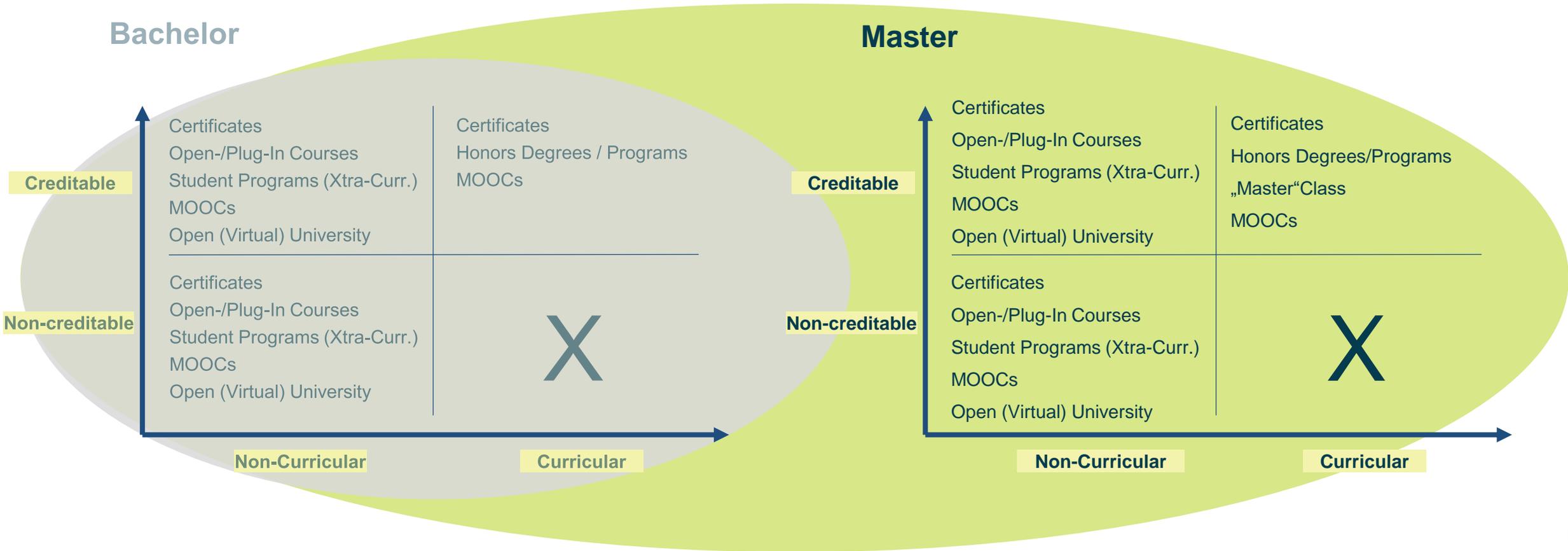
Master

- Certificates
- Honors Degrees
- „Master“Class
- Special Study Programs
- Open-/Plug-In Courses
- Student Programs (Xtra-Curr.)
- MOOCs
- Open (Virtual) University

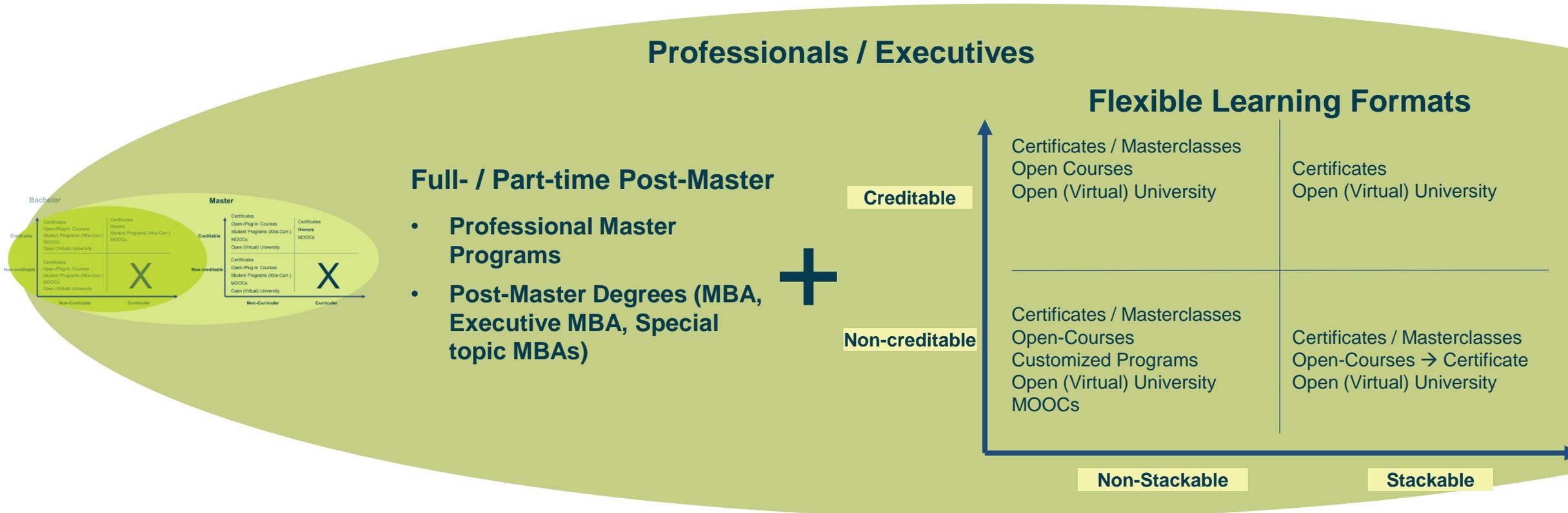
Professionals / Executives

- Certificates / Masterclasses
- Professional Master Programs
- Post-Master Degrees
- Open-Courses/Seminars/Workshops
- Customized Programs
- Open (Virtual) University
- MOOCs

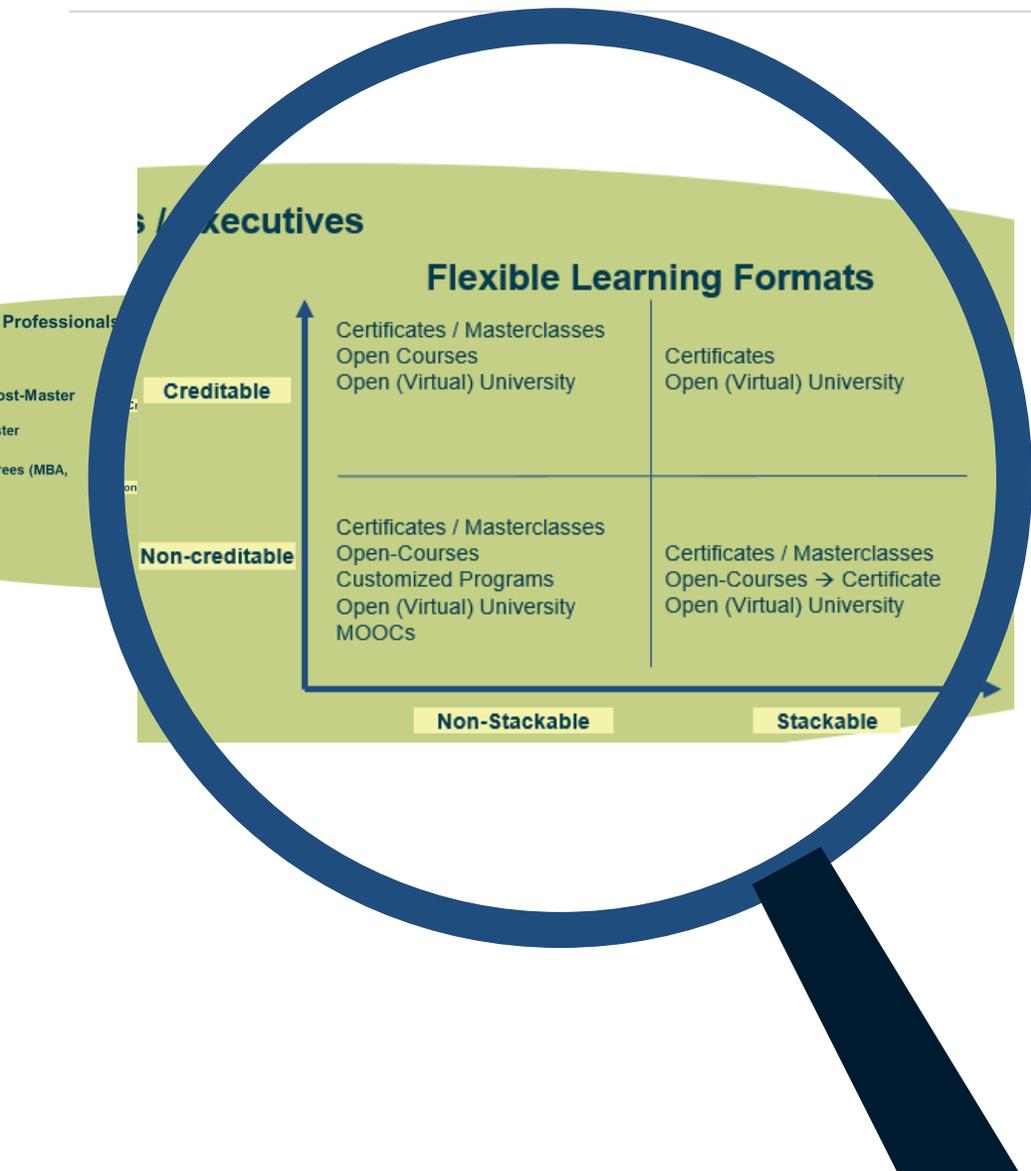
Inventory of non-standard learning formats & programs: Bachelor & Master Students



Inventory of non-standard learning formats & programs: Professionals & Executives



Inventory of non-standard learning formats & programs: Professionals & Executives



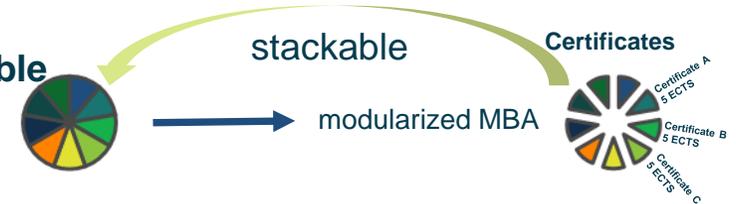
	What's special?	Subjects (examples)
Professional Certificates (creditable/non-creditable)	e.g. Individual coaching, modules can be booked separately (stackable), recognition for MBA programs if attended within a certain time frame	Digital Innovation, Blockchain, Data Mining, BIM, Digital Twins
Customized Programs	Custom-made / inhouse programs for corporates	Technology, Management, Leadership, Innovation
(Open) Courses in Professional Education	Short (open) courses @TalTech: some courses are also open to students	Data mining, Blockchain, Digital Transformation, Strategy, Leadership Dev., Finance, SCM, Change, HRM
Open University, Open Virtual University	Course offerings for students and lifelong learners; also, network of universities with offerings to students/professionals, partly restricted to registered students	Individual course selection (e.g. Business, Engineering, ICT)

Inventory of non-standard learning formats & programs: Professionals & Executives

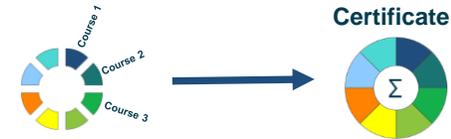
	What's special?	Subjects (examples)
Professional Certificates (creditable/non-creditable)	Specializations, Covid19-induced offerings to sharpen student profile even after graduation	Tech. Entrepreneurship, Philosophy, Molecular Systems, Circular Design
Customized Programs	Custom-made / inhouse programs for corporates	Technology, Management, Leadership, Innovation
(Open) Courses in Professional Education	Short (open) courses @TalTech: some courses are also open to students	Data mining, Blockchain, Digital Transformation, Strategy, Leadership Dev., Finance, SCM, Change, HRM
Open University, Open Virtual University	Course offerings for students and lifelong learners; also, network of universities with offerings to students/professionals, partly restricted to registered students;	Individual course selection (e.g. Business, Engineering, ICT)

Certificates

- Stackable / creditable**
e.g. conventional MBA



- Stackable / non-creditable**
Open courses can lead to certificates

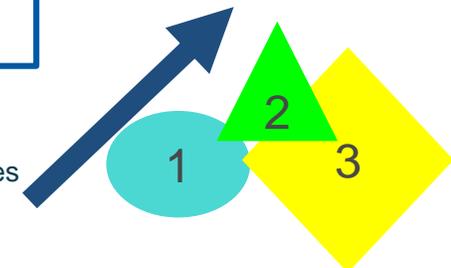


- Non-stackable / non-creditable**



Customized Programs

- Stackable / non-creditable**
Customized programs can lead to certificates



Examples for non-standard learning formats and programs (1/2)

	Examples
Cat. 1: Student Certificates	<ul style="list-style-type: none"> • Certificate Technology Entrepreneurship and Management (BSc, MSc) (CTEM) • Certificate Engineering Intelligent Lighting (BSc) • Certificate Philosophy (MSc) • MicroMasters Wireless Technologies • TUM Entrepreneurial Masterclass • TUM Skills Excellence Program
Cat. 2: Special Bachelor/Master (Doctoral) Programs	<ul style="list-style-type: none"> • Double Major programs (e.g. Mathematics + Computer Science/Economics) at L'X or Management&Technology at TUM • Design and Technology Future (D&TF) (TalTech) • Technology Governance and Digital Transformation (TalTech) • Joint Master Programs at DTU (1 year at DTU, 1 year at partner uni, e.g. TUM) • "Science and Technology Studies" (M.A. STS) at TUM's Munich Center for Technology in Society • Responsibility in Science, Engineering and Technology" (M.A. RESET) • Special Master's track EIT Digital Data Science (TU/e) • SPECIALTY: "Minor Specialties" at TalTech (min. 45 ECTS)
Cat. 3: Honors Programs	<ul style="list-style-type: none"> • Elite Master's Program in Software Engineering (M.Sc.) // EliteNetwork of Bavaria • TU/e Honors Academy • Honors Degree "Technology Management" at The Center for Digital Technology and Management (CDTM)
Cat. 4: Professional Master Programs	<ul style="list-style-type: none"> • Cyber Security, Wind Energy (DTU) • Innovation and Entrepreneurship (L'X) • Management and Innovation (TUM) • Double Degree: Master of Science (M.Sc.) by TUM & Master in Management Grande Ecole Degree by HEC Paris
Cat. 5: Professional Certificates (creditable/non-creditable)	<ul style="list-style-type: none"> • Public Courses at CTU • "Cyberops Associate" at TalTech • Certificate Programs at L'X (e.g. Advanced AI for Data Analysis, Entrepreneurship in Renewable Energy program, et. al.) • Certificate Programs at TUM (e.g. Certified Private Equity Analyst, Certified Blockchain & Distributed Ledger Technology Manager, et. al.) • Masterclass Global Supply Chain & Logistics at TU/e
Cat. 6: Post-Master Degrees	<ul style="list-style-type: none"> • Coporate Entrepreneurial Leadership (CEL), Executive MBA, Innovation Leadership Challenge (ILC) at DTU • Executive Master, Financial Engineering Degree at L'X • Post-Master programs for healthcare engineers at TU/e • Executive MBAs in.. General Management/Business & IT/Innovation & Business Creation at TUM
Cat. 7 : Customized Programs	<p>Almost all partners offer customized program for corporate clients, e.g. in Leadership Development, Technology, Innovation etc.</p>
Cat. 8: Courses in Professional Education	<p>Short courses at DTU (2-5 days), e.g. in AI, Machine Learning, Deep Learning Short courses at L'X (2-3 days), e.g. in Engineering, Digital Tech, Management, Leadership, Innovation</p>

Examples for non-standard learning formats and programs (2/2)

	Examples
Cat 9: Student programs (extra-curricular)	<ul style="list-style-type: none"> • Manage and More at UnternehmerTUM (3 semester of high-intense real-world project-based learning) • Pathways → tracks to boost your personal development (e.g. Team Leader, Entrepreneur, Educator, etc.)
Cat. 10.: Entrepreneurship Courses (partly creditable)	<ul style="list-style-type: none"> • Summer/Winter Schools at TalTech (e.g. EIT Digital Health, Practical Robotics with 3D printing (4 ECTS)) • EuroTech Summer school: From Smart Buildings to Smart Cities at CTU • Digital Product School at UnternehmerTUM (build innovative digital products with students and professionals) • TechTalents (8 different formats) at UnternehmerTUM • MedTech Bootcamp at UnternehmerTUM • Think.Make.Start (reminds of a collider)
Cat. 11: (open) standalone courses	<ul style="list-style-type: none"> • EuroTech/TeQ – TUM “Digital Learning Initiative 2020-21, e.g. Ethics, Robo Ethics,
Cat. 12: MOOCs	<ul style="list-style-type: none"> • Various MOOCs offered by partner universities
Cat. 13: Open University, Open Virtual University	<ul style="list-style-type: none"> • TalTech → Open Studies / Open University • Virtual University of Bavaria (“vhb”), incl. open virtual university of Bavaria → “OPEN vhb” and SMART vhb (blended learning); network of 32 Bavarian universities (of applied sciences)
Cat. 14: HR Development	<ul style="list-style-type: none"> • CareerDesign@TUM (esp. for Post-Docs to promote careers in Science Management)

Conclusions

Currently

- There is a need for extra-curricular and flexible learning offers for students on the one hand, and a need for stackable short-term learning formats for professionals on the other hand
- Due to highly heterogeneous and non-standardised offers, as well as wording and terms used, the quality and learning outcomes are difficult to understand and to compare

Towards...

- The award of micro-credentials for students and professionals may contribute to anchoring the idea of life-long learning since the beginning of university studies and encourage openness towards continuous education
- Acknowledgement of extra-curricular efforts for learners and making the learning outcome understandable and comparable for employers

The Bologna process has structured and standardised BA and MA study programmes in Europe.

The award of micro-credentials contributes to making extra-curricular and life-long learning formats and qualification levels comparable.

04

The European Approach to Micro-credentials and the impact of European University alliances

European Degrees vs. Micro-credentials

European Degrees

- Study programmes at the partner institutions are strongly regulated
- Changes in the courses very often lead to re-accreditation processes
- Might lead to institutionalisation processes at European University level
- Might lead to setting up a supra-structure, a European Accreditation Agency

Micro-credentials and Honours Degree

- Will allow agility and avoid heavily regulated processes and harmonisation needs in relation to accreditation processes in the Bologna areas
- Will allow to integrate innovative formats and contents
- Can address students and professionals (and vocationals)
- Stackable micro-credentials may lead to a Professional Certificate or Honours Degree

Key points

- ❑ Setting up formal European Degrees might be a longer-term project
- ❑ Micro-credentials is a temporary solution for setting up a joint programme at European University level
- ❑ Micro-credentials can address students and professionals

Quality Assurance for Higher Education

ESG

Standards and guidelines for quality assurance in the European Higher Education Area

„Quality Assurance“

Processes

Participation

ECTS Users Guide

Structuring

Modularisation

Lisbon Convention

Recognition of study and examination credits

Micro-credentials

A micro-credential is a certificate containing statements on

the **content of the learning unit** including

- Learning Outcomes
- Quality of Learning
- Level of Learning
- Workload of Learning
- Assessment of Learning Outcomes

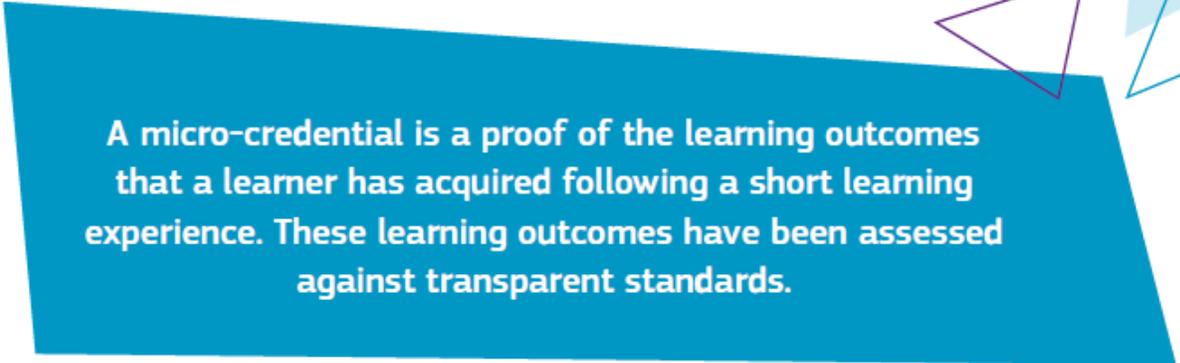
the **issuing body** including

- Information about the body guaranteeing quality of delivery
- Information about the issuer
- Information about the receiver

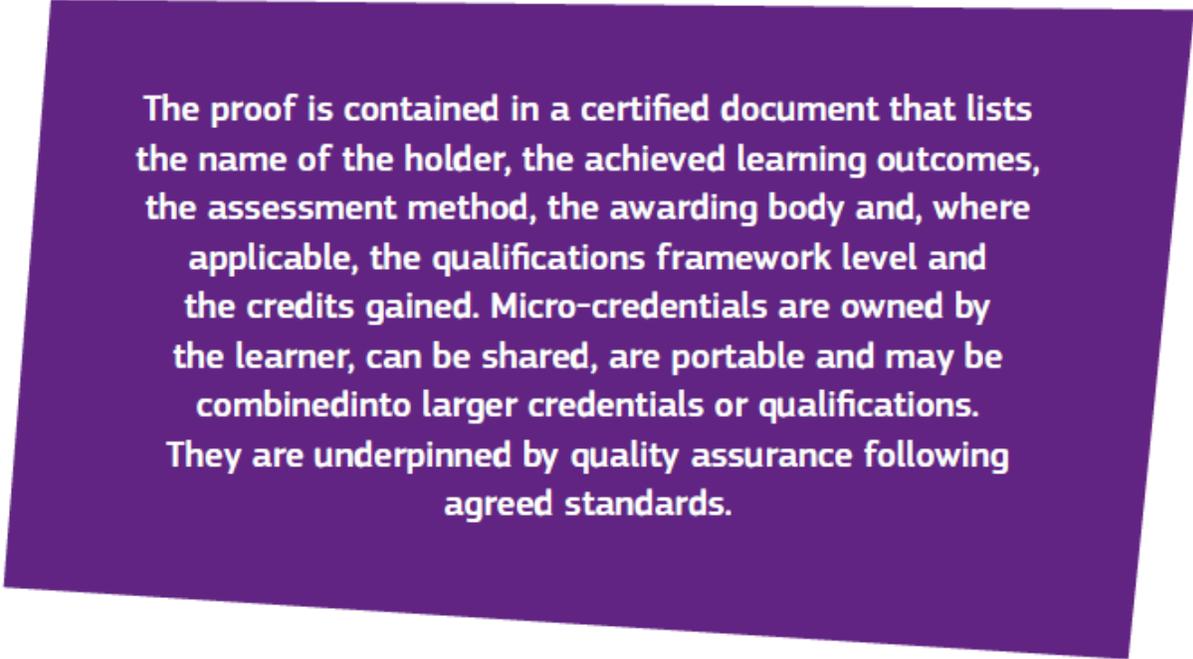
Key points

- ❑ For EuroTeQ and their students, the issuing body may be different from the home university
- ❑ A suitable digital format and platform is needed to create a professional CV and to help acknowledging the learning outcomes

The European Approach to micro-credentials



A micro-credential is a proof of the learning outcomes that a learner has acquired following a short learning experience. These learning outcomes have been assessed against transparent standards.



The proof is contained in a certified document that lists the name of the holder, the achieved learning outcomes, the assessment method, the awarding body and, where applicable, the qualifications framework level and the credits gained. Micro-credentials are owned by the learner, can be shared, are portable and may be combined into larger credentials or qualifications. They are underpinned by quality assurance following agreed standards.

Source: A European approach to micro-credentials - Output of the Micro-credentials higher education consultation group: executive summary; 21 Jan 2021

Micro-credentials Higher Education Consultation Group has lightened up relevant factors to be reflected in a general framework

General Goals

Micro-credentials Higher Education Consultation Group has lightened up relevant factors to be reflected in a general framework:

- In the “European Skills Agenda” it accounted the will to “*work towards the development of a European Approach to micro-credentials, to help widen learning opportunities and strengthen the role of higher education and vocational education and training institutions in lifelong learning by providing more flexible and modular learning opportunities*”.
- **Goal:** the European Approach will allow HE-institutions to offer such courses on a larger scale and in a comparable manner throughout Europe, ensuring agreed quality standards, and facilitating their recognition and portability across the EU.”

Box 3: Building blocks of a European approach to micro-credentials

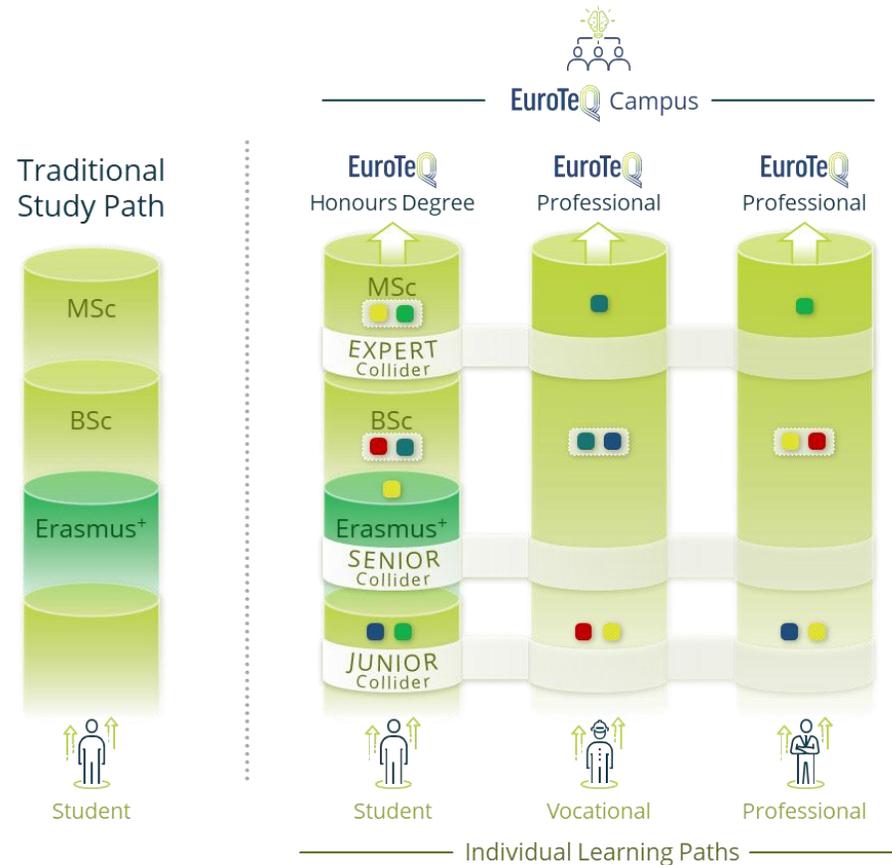
- > A common and transparent definition
- > A defined list of critical information elements to describe micro-credentials
- > Alignment to National Qualifications Frameworks (NQFs) and the European Qualifications Framework (EQF): defined levels, standards for describing learning outcomes
- > Quality assurance standards
- > Defined credits: European Credit Transfer and Accumulation System (ECTS), defined learning outcomes and notional workload
- > Recognition: for further studies and/or employment purposes
- > Portability: issuing, storage and sharing of micro-credentials
- > Platform solutions for the provision and promotion of courses leading to micro-credentials
- > Incentives to stimulate the uptake of micro-credentials

The background features a blurred classroom scene. On the left, a woman with long dark hair is smiling. In the center, a small, white, humanoid robot with a black visor is in a crouching position. On the right, a young child is also crouching. The entire scene is overlaid with a semi-transparent green and blue gradient. In the top right corner, there is a large, stylized white graphic consisting of several concentric, overlapping curved lines.

05

EuroTeQ Approach towards Micro-credentials

Building the EuroTeQ Campus



The interuniversity EuroTeQ Campus allows students, as well as vocational and lifelong learners to choose from the courses of six partners universities and participate in the EuroTeQ Colliders.

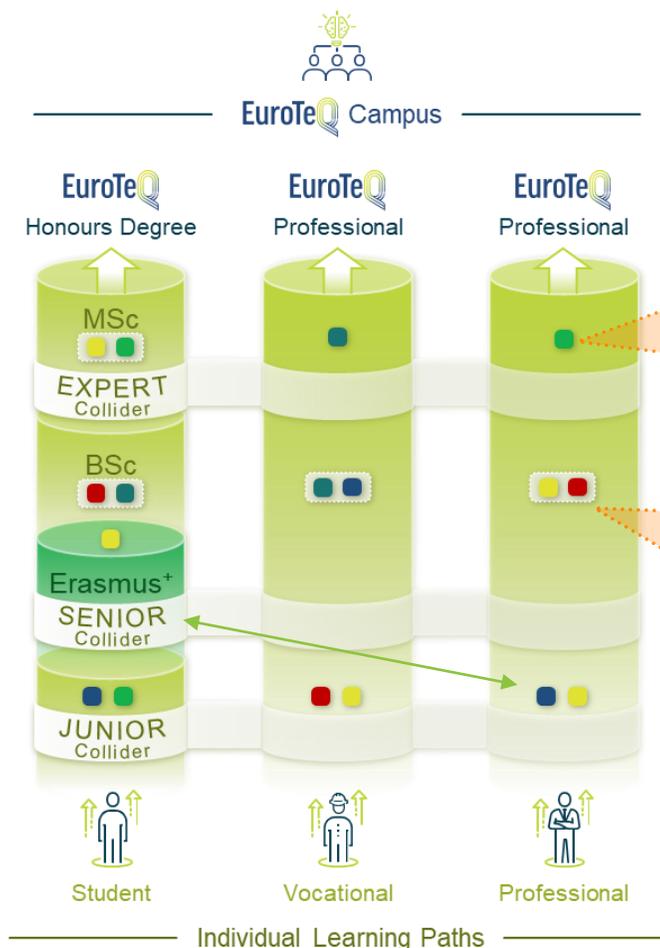
Individual learning paths enrich traditional study and career paths and can lead to a **EuroTeQ Honours degree** as well as the **EuroTeQ Professional** label.

Students, Vocational & Professional Learners can take Virtual Courses of all partners, complete Micro-credentials and participate in the Colliders.

■ ■ Virtual Courses offered at different Partner Universities
■ ■ Micro-Credentials



EuroTeQ Courses & Micro-Credentials



Students, Vocational & Professional Learners can take Virtual Courses of all partners, complete Micro-credentials and participate in the Colliders.

EuroTeQ Courses

- Each university opens a set of selected courses for EuroTeQ students each semester
- Courses are offered in English, online or hybrid
- Engineering Sciences, intercultural, language or interdisciplinary courses, and entrepreneurship offers

Micro-Credentials

- A combination of courses from different universities, offered through the course catalogue, or a combination of a course and the participation in the Collider, or a stand-alone courses, which teaches a specific competence that adds to a student's transcript or a professional CV
- Examples for EuroTeQ Micro-Credentials
 - “Founding a technology Start-up in Europe”: an engineering science course (e.g. Robotics)
 - “Responsible Engineering in Europe”: an engineering science course (e.g. Circular Economy)

Micro-credentials: suggestion for framework within EuroTeQ

A micro-credential is a qualification evidencing learning outcomes acquired through a short, transparently-assessed course or module. Micro-credentials may be completed on-site, online or in a blended format.

For students
For professionals
For vocational learners

EuroTeQ specific focus for micro-credentials

- Meet the **competencies needed by the ecosystems** of the partner institutions
- Are offered in an **hybrid modus** (online plus ideally one physical meeting per course)
- Are **taught in English**

Micro-credentials

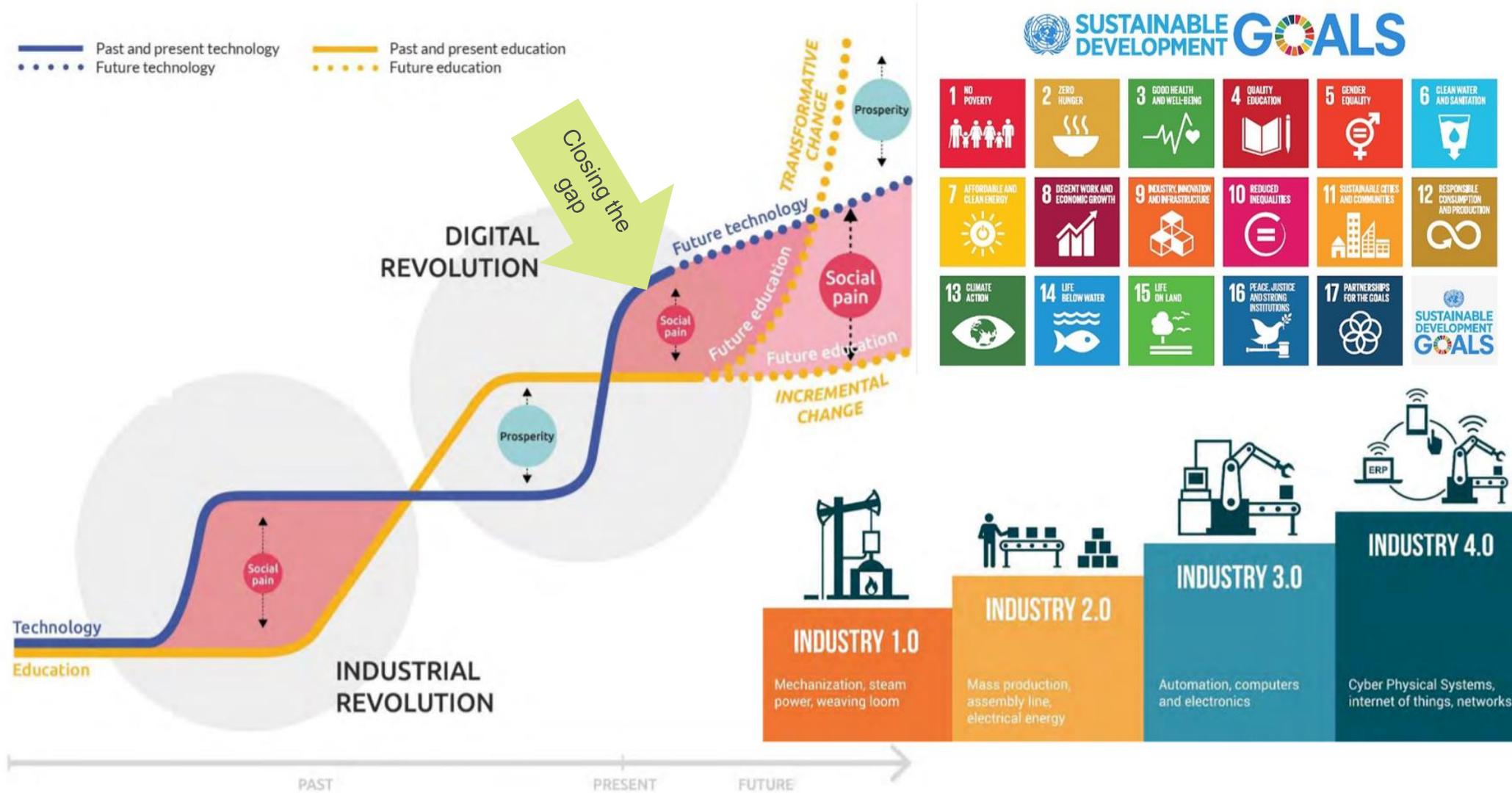
Awarding micro-credentials

- Courses are open for learners from all partner institutions and appear in the **EuroTeQ Course catalogue**.
- Is independent from the format, leading to **2-6 ECTS each**
- Micro-credentials are **stackable** and may in a specific combination lead to the **EuroTeQ Professional or Honours Degree**

06

Discussion

Closing the gap in order to activate new potentials



Aus: Goldin, C. and Katz, L.F., 2010. The race between education and technology. Harvard University Press.

EuroTeQ Professional

Leading questions for discussion

- Where do you see new potential which currently is not sufficiently addressed due to “educational silos“, insufficient preparation, lack of phantasy...?
- What is the role of “interface competencies” and transdisciplinarity?
- What kind of learning paths – with which kind of formats and stackability – do you deem relevant for professional learners?
- To which extent do you think co-creation between professionals and students feasible and fruitful?
- Which amount and form of workload for professionals would you advise us to take into consideration?
- Do we need different EuroTeQ certificates for students on the one hand and professionals on the other?

Key points

- ❑ EuroTeQ learning paths are not yet defined and shall meet the needs of the industry partners and the professional learners.
- ❑ The EuroTeQ Collider is a new format where professionals and students meet and work together.
- ❑ The EuroTeQ Course catalogue can react in a (more) agile manner on future needs and lay the basis for new solutions.

07

End of meeting

EuroTeQ

Engineering
University



Co-funded by the
Erasmus+ Programme
of the European Union



www.euroteq.eu



[@EuroTechUA](https://twitter.com/EuroTechUA)



[EuroTech Universities Alliance](https://www.linkedin.com/company/eurotech-universities-alliance)

Aristoteles (384 – 322 B.C.)



Cause analysis

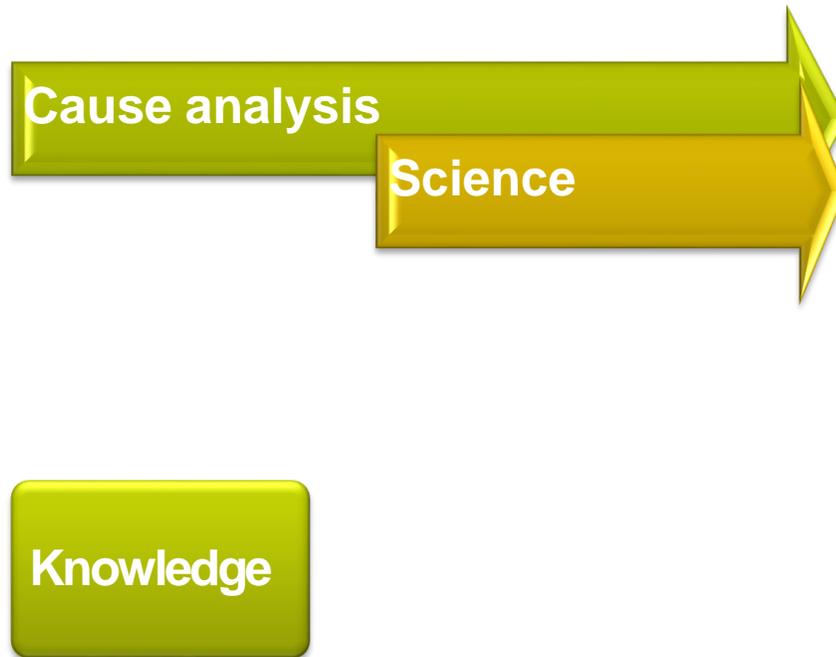


Knowledge

„ That is why the **leading artists** in each individual field are held in higher esteem ... and know more and **are wiser than the craftsmen** because they **know the cause of what is produced**, while the **craftsmen act like some of the unsubstantiated**, which indeed **produces something ... but without knowing what it produces.** ...

Therefore we do not consider them wiser because they are **more skilful in trade**, but because they are **in possession of the concept and know the causes.**“ ...

Humboldt (1769 - 1894)

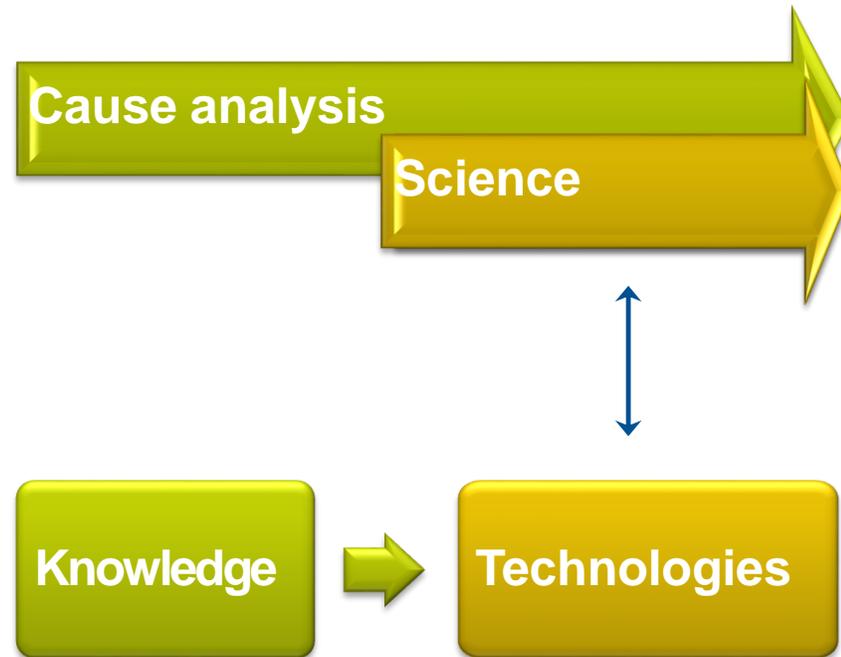


„ the internal organisation of these institutions must produce and maintain **an uninterrupted, constantly revitalising, but unconstrained and unintentional interaction. ...**“

„ **Connection of the practised, but therefore also more easily one-sided force with the weaker and still non-partisan force that strives courageously in all directions.**“

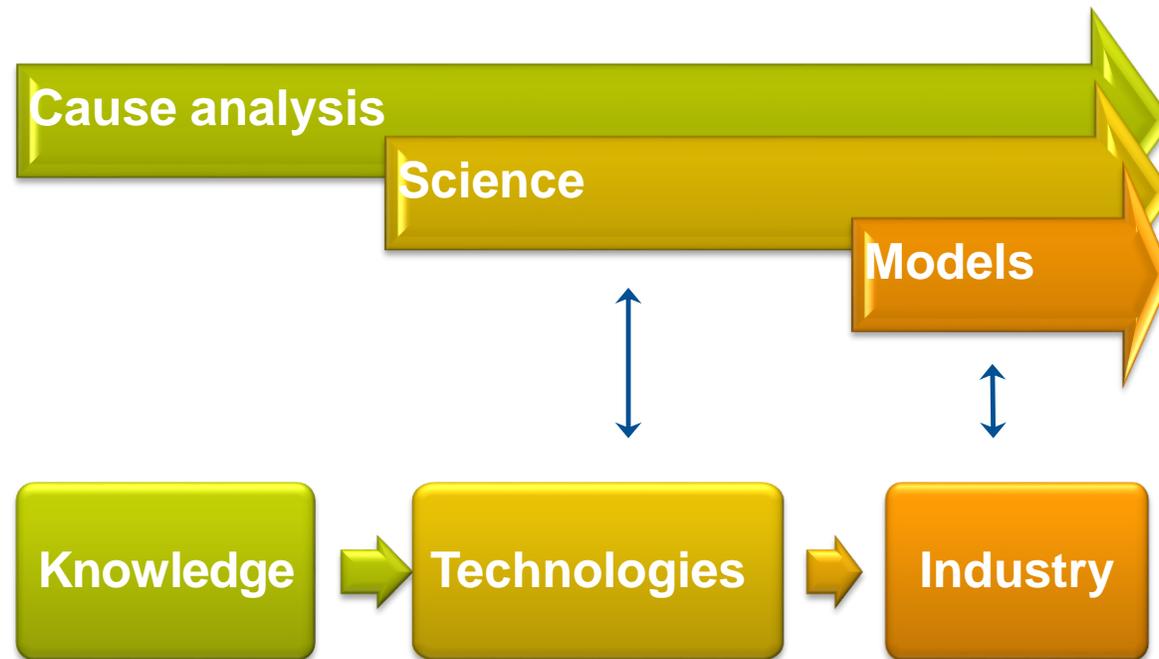
Wilhelm von Humboldt: Über die innere und äußere Organisation der höheren wissenschaftlichen Anstalten in Berlin

Karl Max von Bauernfeind (1818 – 1894)



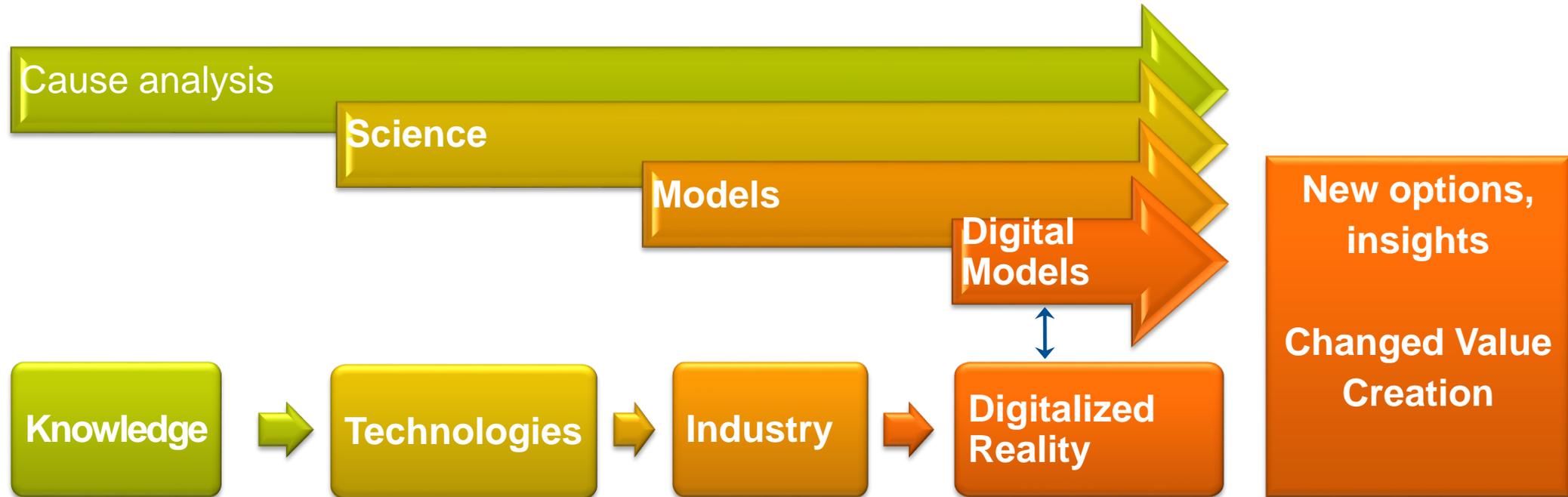
„ Giving the commercial and industrial world the igniting spark of science“

Engineering Disciplines today



- The sorting of engineering disciplines is oriented towards „**artefacts**“
- It is therefore **product- and production-oriented**
- The sorting is reflected in associations, chambers, in job titles, in qualification frameworks

Engineering Disciplines today?



„back to Humboldt?“

„... uninterrupted, constantly revitalising, but **unforced and unintentional interaction** ...“

„back to Aristoteles?“

„.... are **in possession of the term and know the causes**“