Sustainable Entrepreneurship in the Nordic and Baltic region

Examples of sustainable entrepreneurship courses and initiatives at higher education institutions
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INTRODUCTION

In recent decades, sustainable development has moved further and further up the global agenda. Engagement with climate issues, especially amongst young people, has seen explosive growth, and the UN's launch of the 17 Sustainable Development Goals (SDGs) in 2015 marked a clear global shift, leading foundations and investors to begin demanding a clear focus on sustainability.

The climate challenges call for new solutions, and this opens up opportunities for innovation and entrepreneurship. Sustainability and innovation have become important agendas at higher education institutions, who are currently in the process of designing and improving teaching and student support in this area, and green startups and sustainable entrepreneurship can make a huge impact. Already now, entrepreneurs working with sustainable solutions are in demand and can contribute to the green transition.

The emerging concern of how best to support this development in the Nordic and Baltic region has been the focus of the NordSEnt project. The NordSEnt project is a partnership between higher education institutions (HEIs) and partners in Sweden, Norway, Denmark, and Estonia, which has looked at the rapidly growing theme of sustainability in combination with entrepreneurship, having as a specific focus sustainable entrepreneurship education at HEIs in the Nordic and Estonia regions.

The NordSEnt project is funded by the Nordplus programme in the Nordic Council of Ministers.

For more information about the network, partners, the events and material, see https://nordsent.com

This guidebook has been produced by the NordSEnt project. The guidebook shows the work that has already been undertaken in our region to work with SDGs and green transition within entrepreneurship education and hubs. It aims to inspire other HEIs about different educational initiatives within sustainable entrepreneurship and provides a model for how to map best practice initiatives and share their learnings.

NordSEnt

The NordSEnt project has been running from August 2021 to July 2022. During this time, NordSEnt has organised three public events and shared information on how to support sustainable entrepreneurship education and hub activities at HEIs and how best to integrate the UN sustainable development goals, the SDGs, into start-up and entrepreneurship activities. The guidebook is the final product of the project. We hope it can help inspire the development of new educational initiatives across the Nordic and Baltic region and in wider Europe so that even more young people can acquire competences in sustainable entrepreneurship.

The partners in the project are: Estonian Business School (EBS), Norwegian University of Science and Technology (NTNU), Royal Swedish Academy of Engineering Sciences (IVA), Copenhagen Business School (CBS), Aarhus University (AU) and the Danish Foundation for Entrepreneurship (FFE).

Creating strong eco-systems for student entrepreneurs in the Nordics

Sustainability as a subject is generally in very high demand among students and within organisations in the university innovation ecosystem in the Nordics. These days, many universities and HEIs also have a sustainability strategy or have sustainability as part of their strategies. There has been a distinct shift and today entrepreneurship is, to a far greater extent than in the past, regarded as a career path for students. In order to support strong entrepreneurship skills within the green transition, it is important to strengthen new types of collaborations between the educational institutions, the business community, interest groups, etc. There are many stakeholders in the business community and in the educational institutions who wish to collaborate and who are interested in an overview of green innovation and sustainable entrepreneurship initiatives in order to form partnerships and develop new initiatives. In 2020, the Danish Foundation for Entrepreneurship elaborated an extensive mapping of sustainable entrepreneurship initiatives at Danish HEIs1.

1 The Danish mapping “Entreprenørrskab med formål” resulted in the first major comprehensive overview of initiatives that combine entrepreneurship, green transformation and sustainability in higher education in Denmark. The various initiatives were grouped under three categories: 1) Education, 2) Strategy and 3) Other initiatives such as events and arrangements, workshops, networks, general projects, student initiatives, etc. In total it highlighted over 125 initiatives in the field of education, 28 initiatives in the strategic area and 100 other initiatives across the Danish HEIs. An overview of the current Danish initiatives is provided in an appendix to this guidebook, and the full report from the Danish Foundation for Entrepreneurship can be found at the Foundation’s website: https://ffefonden.dk/viden/vidensbank/entreprenorskab-med-formal/. In the case section of this guidebook, a selection of recent initiatives from the Danish partners in NordSEnt is provided.
However, such a mapping does not exist for the wider Nordic and Baltic region but with the growing interest in sustainable entrepreneurship as a new arena for innovation, growth, and impact, an overview of good practices is needed. This guidebook is an attempt to address this need. It presents a total of 17 best practices from HEIs across the NordSEnt partnership, representing Sweden, Norway, Denmark and Estonia. Additional courses and initiatives are listed in the appendix.

The publication contains a comprehensive overview of the many new initiatives, educational programmes and courses within sustainable entrepreneurship at the higher education institutions. It shows with great clarity that the institutions are well on their way to anchoring innovation, the green transition and the UN’s development goals as part of their entrepreneurship efforts. The many different initiatives across the institutions also show that both opportunities and innovation are created when working in this area.

The SDGs are popular themes for start-ups
An increasing number of new companies in the Nordics are working with the UN’s Sustainable Development Goals and among investors there is also a growing interest in investing in impact startups - i.e. startup companies that deal with one or more of the UN’s global goals and have scaling potential. At the same time, a great deal of climate commitment has emerged amongst young people as well as a desire to be able to make a difference. Entrepreneurship with impact is therefore attractive to a new type of young entrepreneurs. Many of these young entrepreneurs come from the education system. If we look at impact start-ups in the Nordic countries to see what are the most common SDG goal to work with, + impact² shows the distribution of SDG focus areas in start-up companies. The biggest focus is on SDG 3 (health and well-being) and SDG 12 (responsible consumption and production). The top 4 categories of SDGs are the same for the four Nordic countries, Denmark, Sweden, Norway and Finland. The distribution of SDG focus areas in Nordic impact startups can be seen in the figure below.

![Distribution of the Nordic impact start-ups' SDG focus area](image)

*Figure 1: Reference: Danske Bank. 2020. “State of Nordic Impact Start-ups 2020”. +Impact*

+ Impact has also made a quantitative analysis of these more than 1000 impact startups.
SUSTAINABLE ENTREPRENEURSHIP – THE CONCEPT

Sustainable entrepreneurship, green innovation, transformational entrepreneurship, purposeful entrepreneurship - there are many terms for educational and research initiatives that in one way or another deal with creating change and new ways of doing things towards a sustainable world and within the framework of the United Nations Sustainable Development Goals (SDGs). It is a very broad field, but common to the initiatives included in this publication is that they include the need to create new green solutions through entrepreneurship and/or innovation. Because the field is so new, many educational institutions are currently developing their initiatives and efforts in the field.

Below, we clarify the definitions of entrepreneurship and sustainability – as well as the combination of the two – which our work in the project, as well as in this report, has been based on.

A Taxonomy for Entrepreneurship Education\(^3\) by the Danish Foundation for Entrepreneurship Education provides the below definitions of “Entrepreneurship” and “Entrepreneurship education”. In 1987, the Brundtland Commission defined “Sustainability”.

The new focus area “Sustainable entrepreneurship” combines the two concepts “Entrepreneurship” and “Sustainability”, which in many ways complement and strengthen one another. We use the below definition of “Sustainable entrepreneurship”.

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**Entrepreneurship** is when actions take place on the basis of opportunities and good ideas, and these are translated into value for others. The value thus created can be of an economic, social or cultural nature.

It is central to entrepreneurship that there is some form of value creation, and that the value is not understood exclusively in economic terms. It is moreover essential that the activities and the translation of ideas must lead to value for others. Action and Outward orientation thus make up a large part of the Foundation’s understanding of entrepreneurship.

**Sustainability**

In the United Nations Brundtland Commission sustainability is defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs”.

**Sustainable entrepreneurship** is the combination of entrepreneurship and sustainability, is defined as follows:

Sustainable entrepreneurship is when innovative skills, business skills and entrepreneurial competences go hand in hand with green and sustainable values.

Sustainability is based on the three parameters: economy, society and environment (triple bottom line), which means that there must be a balance between the economy, society and the environment (also called Triple P: Profit, People, Planet). The UN SDGs are divided into these three parameters. A sustainable initiative or start-up may focus on one or more of the SDGs.

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\(^3\) https://ffefonden.dk/viden/vidensbank/taxonomy-2nd-edition/
Sustainable entrepreneurship competences

In order to create educational initiatives with a clear focus on sustainable entrepreneurship, it is not only important to define its boundaries with clear conceptual definitions, but also that students understand and are able to articulate what they learn. Taxonomical competence framework plays an important role here. This is especially true for new disciplines since they typically lack clearly articulated educational goals (Barber, 2016; O’Byrne et al. 2015).

Sustainable entrepreneurship is a combination of two fields which have struggled with clear taxonomical frameworks. The EntreComp taxonomical framework (Bacigalupo et al., 2016) has solved many issues within the field of entrepreneurship, but it only included one competence focusing on sustainability. Within the field of sustainability, ever since the influential work by Wiek et al. (2011), the focus has been on broad and transversal key competences related to both social and environmental issues, but a focus on execution and implementation has just recently been added (Bianchi, 2020; Brundiers et al., 2020).

The newly published taxonomical framework “GreenComp” (Bianchi et al., 2022) is an attempt to structure the different competence frameworks in the sustainability field more clearly, and to include a clear focus on action, agency, and implementation. It covers the four competence areas: “Embodying sustainability values”, “Embracing complexity in sustainability”, “Envisioning sustainable futures”, and “Acting for sustainability”. Each area includes three competences.

![GreenComp framework metaphor]( Bianchi et al., 2022).](image)

To make the framework more accessible, a metaphor for the different competence areas was created. From an entrepreneurship perspective, it is noticeable that “Acting for sustainability” is portraited as the bees. All other competences shape the context and create the conditions for sustainable development, but without the bees, no flowers will get pollinated. In the same way, the institutional system just defines and shapes the problems, it is up to the actors to come up with the solutions (Blok et al., 2016; Weber, 2003).

The GreenComp is definitely a step closer to creating consensus of what to focus on within the field of sustainability, and it pinpoints a clear role for sustainable entrepreneurs. However, given its title, the structure of the metaphor, and selection of competence areas and competences, it also creates further separation between social and environmental sustainability. These two fields have traditionally been covered by the concept of sustainability, and they both receive significant focus in the SDG framework. So, by just signaling a strong focus on the environmental part, the EU is beginning to make a clearer delineation between the two aspects of sustainability.
RECOMMENDATIONS

It is clear from the various initiatives collected in this guidebook, supported by the work undertaken in the NordSEnt project by the partnership as well as shown by general research in sustainable entrepreneurship, that many educational institutions have developed valuable educational courses and initiatives within sustainable entrepreneurship. It shows that educational institutions see this theme as critical for their innovation offerings and research. The results and trends point to areas where we can accelerate the positive process that is already underway as well as to areas where more work is needed.

For higher education institutions that want to accelerate this focus on sustainability and integrate it into courses, teachings and hub activities, the NordSEnt project has formulated the following points of attention and recommendations:

AT THE INSTITUTIONAL LEVEL

MOMENTUM

Many educational institutions, especially the vocational colleges, are in the process of developing or revising their strategies for the coming years. Therefore, there is a momentum to include sustainable entrepreneurship in the new strategies and objectives. Young people are very interested in sustainability, and with a growing demand for the development of solutions to environmental and climate problems, it is important to offer educations that equip young people from different disciplines to solve these societal tasks.

COMMUNICATION AND VISIBILITY

Many institutions have strategic focus areas, education and other initiatives with elements of sustainable entrepreneurship that are not immediately apparent from the course descriptions or on their websites. There is a need for sustainable entrepreneurship initiatives to be communicated more clearly for greater visibility of sustainable entrepreneurship initiatives.

STRATEGIC FOCUS

There is a need to make the strategic focus on sustainability more action-oriented / practice-oriented, so that real innovation is created within the UN’s global goals.

COLLABORATION AND PARTNERSHIPS

Increased focus on knowledge sharing and collaboration between institutions and student greenhouses, as well as with external stakeholders.

PARTNERING WITH THE PRIVATE SECTOR AND LOCAL INDUSTRIES

Through partnerships with local industries and the private sector who focus on the business potential of the green transition, students have the opportunity to become involved in running projects that are clearly defined, to access relevant case studies and to integrate their own innovative ideas. They also get access to mentors outside of academia. For instance, Swedish HEIs emphasize the value of initiating partnerships with local industries and businesses and aligning activities at universities with local conditions and needs.

INTERDISCIPLINARITY / MULTIDISCIPLINARITY

Consider switching from knowledge-based teaching to team-based teaching. Team-based teaching enables the possibility for multi-disciplinary assignments which are engaging and challenging for the students. This creates new learning connections and a holistic view of the module of the story. This kind of curriculum requires coordination and cooperation between instructors from different academic fields.

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4 These recommendations include insight from Sweden’s universities, obtained through IVA’s interviews with representatives from the university’s ecosystems, and set up meetings with various officials from the government, government agencies, non-profit organisations and the private sector. At the universities, IVA has held digital meetings with researchers, educators, vice-chancellors, incubators and holding companies. This provided valuable information about how entrepreneurship with a focus on sustainability can be promoted and integrated at the various universities.

5 An example is Linköping University who is working in cooperation with Tekniska Verken AB, a regional group of companies owned by the municipality whose main areas are energy, water and waste management, with a particular focus on efficient energy solutions.

6 Estonian Business School is a very good example of this. The stream-based teaching means that, instead of giving separate courses for each academic field, the knowledge from different areas is intertwined and given when it is relevant for students in their entrepreneurial process.
FOR ACADEMIA AND EDUCATORS

PREVALENCE AND CROSS-DISCIPLINARITY
It is recommended that entrepreneurship and sustainability competences be enrolled in curricula, preferably in combination with each other.

INTEGRATE SUSTAINABILITY IN THE PROGRAMMES
One theme running across many HEIs is that it is not enough to have separate sustainability courses within education programmes. Instead, it is vital to integrate sustainability throughout the programmes. The optimal approach is for sustainability to be a focus in all of a university’s activities and to become a natural aspect of research and education. The academic focus should be on enrollment in the curricula and into ECTS-activities.

CLOSE TO PRACTICE
Make the strategic focus on sustainability more action-oriented / practice-oriented, so that real innovation is created within the UN’s global goals.

ADDRESS RESEARCH
Research funders today are requiring that sustainability be a clear element in research projects. Researchers often design course content based on the research being carried out at the university, and when there is a greater emphasis on sustainability in research, students gain a better understanding for and become more engaged in issues around sustainability.

NEW TEACHING MATERIAL
Development of new and more broad teaching material on sustainable entrepreneurship. There is a demand among teachers for teaching materials that combine sustainability and entrepreneurship, and for continuing education in teaching sustainable entrepreneurship.

QUALITY
Development of teaching material of high quality in subjects that combine entrepreneurship and sustainability.

LEARNING BY DOING
It is not enough to learn about what sustainability and entrepreneurship are: students need to work on practical assignments in projects or on case studies on these themes. Being able to test their ideas in a protected environment is essential in order for students to be unafraid to try out entrepreneurship. At a later stage, students can use what they learn to develop their original business concepts or other ideas. If they acquire the tools that they need to pursue entrepreneurship and sustainability, they can start a business with this focus later on in their career, even if they choose to initially take a job after graduating.

USE ROLE MODELS
Include the outside world into the teaching - invite guest lecturers, such as entrepreneurs or experts working in various areas of entrepreneurship and innovation, to share their expertise and hold workshops.

STUDENTS’ CLIMATE AWARENESS
Students today are in general very aware of the issues and often have climate anxiety. The majority of them are therefore looking to include sustainability in their course selections. Also, more and more students see entrepreneurship as a way in which to make a difference and they will bring their sustainability focus with them into their future careers. Few students today are, for example, actively choosing to pursue studies or work in fields involving fossil energy sources.

NEW COLLABORATION INTERNALLY FOR EDUCATORS AND TEACHERS
Giving educators the opportunity to work in teaching teams provides opportunities to take better advantage of the variety of skills and knowledge in those teams, and for complex topics to be explained in depth.
**DIVERSITY**

to maximise the potential of green teams, supporting diversity in teams is more important than ever. Diverse teams have higher likelihood of solving complex societal problems. Also, research by the Danish Foundation for Entrepreneurship show that several female students are interested in the UN SDGs and attracted to courses that focus on impact and societal changes. This is especially so when the focus is on entrepreneurship, and thus, it provides an opportunity to encourage more women to engage in start-up work, which is important when we still see significantly fewer female founders than male founders.

**BRIDGE-BUILDING ACROSS THE EDUCATION SYSTEMS**

For instance, IVA’s Entrepreneurship Academy is developing a strategy proposal to bring entrepreneurship into schools, from elementary to the upper secondary level. The vision for this initiative is as follows: “Entrepreneurship will be a common theme throughout the education system, supporting individuals and the development of society, business and industry.” The proposal is being developed in cooperation with a work group that incorporates the various skills of teachers, school authorities, entrepreneurs, researchers and government representatives. Discussions include the importance of students learning about, through and in preparation for entrepreneurship. A key theme throughout the education system should therefore be an emphasis on various ways of *doing* and *testing*. Integrating entrepreneurship in school education has proven to have positive effects on the students’ results in other subjects as well.
In order to understand how the field of sustainable entrepreneurship education and student hub activities have developed it is worth taking a closer look at the development in Sweden. Sweden is an inspiring case for how to support HEIs in becoming stronger eco-systems for green entrepreneurs.

Sustainable entrepreneurship is thriving in Sweden, and this is in no small part thanks to the work of higher education institutions in the country. This has become apparent after interviewing a large number of representatives from six Swedish universities, including programme supervisors, vice-chancellors, incubator and holding company managers and others. This opinion is also shared by other interviewees from relevant government ministries, public agencies working with elementary or higher education, business leaders and others.

Development in this area is also driven to a large extent by the younger generation – today’s students and tomorrow’s researchers. By focusing on sustainable development and societal challenges, the universities stay relevant in the eyes of the students, who in turn become highly attractive in the job market once they have graduated. However, other parts of society are also making a strong contribution to increased sustainability, as discussed in further detail below.

Challenges do exist, however, including a traditional overreliance on the big corporations of the past, a lack of institutional capital and to some extent a lack of coordination around entrepreneurship initiatives between different university departments.

THE POLITICAL LEVEL
The goal of Sweden’s economic policy is to strengthen the country’s competitiveness and create the right conditions for job creation and business growth. Sustainable entrepreneurship is a natural element of this policy. Sweden intends to implement the Agenda 2030 for Sustainable Development in three dimensions – economic, social and environmental, through harmonised policies, nationally and internationally. In this regard, sustainable entrepreneurship is seen as an issue of strategic importance in industry, as is improving and enhancing knowledge, research and innovation to meet the challenge of reaching the Agenda 2030 goals.

The entrepreneurship ecosystem is well developed in Sweden. The key actors include the Swedish Agency for Economic and Regional Growth (Tillväxtverket), the Swedish innovation agency Vinnova, Almi which is a network of regional business developer offices, incubators and science parks across the country and the organisation Drivhuset’s network for students interested in entrepreneurship. Many more such actors exist, especially at the local level.

THE HIGHER EDUCATION LEVEL AND YOUNG PEOPLE
Researchers and innovation managers representing various universities describe the well-functioning, innovative and relevant courses and programmes provided at their institutions. Sustainability as a subject is generally in very high demand among students, and within organisations in the university innovation ecosystem, such as incubators and holding companies. What may still need to be developed at some institutions is coordination at the faculty and university administration levels around entrepreneurship, as well as cooperation around these themes between different departments and projects. Also, according to some interviewees, the investor community does not always prioritise sustainability, which can be a problem.

Several university partnerships promoting entrepreneurship do exist, however, not least at the local level. Stockholm School of Entrepreneurship (SSES) is a platform for cross-disciplinary cooperation on entrepreneurship for several universities in the Stockholm region, the GöNN initiative aims to establish a coordinated innovation system in the west of Sweden and Öresundsuniversitetet (a consortium of Swedish and Danish universities) wants to increase cooperation for innovation in the south of the country and with neighbouring Denmark.

Sustainable entrepreneurship is a big deal among young people, driven by an ambition to contribute to the greater global good and by climate anxiety and various fears. This interest is channelled and catalysed to a large extent by the non-profit organisation Ung Företagsamhet – Junior Achievement Sweden, which works to promote entrepreneurship among Swedish upper secondary school students and to facilitate relationships between industry and the Swedish school system. The organisation has reported a significant increase in interest in sustainable entrepreneurship in recent years, in contrast to the traditional “buy and sell” type of business model.
It is, however, important that this student interest is not only channelled through Ung Företagsamhet but is also embraced in other avenues and tools in the school system. Greater agility is also required at relevant government agencies to increase the number of places at higher education institutions and to ensure the future supply of talent.

THE BUSINESS AND INDUSTRY LEVEL, AND INVESTORS

Sweden has a sizeable heavy industry sector, which includes large plants for processing wood and pulp, and manufacturing steel, cars and trucks etc. This sector is now rapidly moving in a more sustainable direction, and this will have big implications for all of society, including among the vast number of suppliers, subcontractors and other businesses in the value chain. Many new enterprises are, in turn, likely to spring up as a result of bigger companies shifting towards sustainable solutions.

Examples of this transition include the steel company SSAB's project Hybrit, which will start producing steel with hydrogen as a reducing agent instead of coal and coke, and Northvolt, which will set up huge plants to produce and recycle electric car batteries.

In recent years, the start-up scene in Sweden has become very hot, with companies such as Spotify, Klarna and King taking off and hitting the world stage. In fact, Sweden is second only to Silicon Valley in terms of "unicorns" (start-ups valued at more than USD 1 billion) per capita. Several private investors and family trusts have also started financing sustainable solutions, such as Hybrit challenger H2 Green Steel, the start-up hub Norrsken, the Wallenberg Initiative Material Science for Sustainability and others. Some investment funds are also focusing on green investments. The big pension funds are, however, considered to be lagging behind in supporting the green transition and in buying shares in promising new sustainable companies.

There are several financing tools available to start-up companies. Mature and growing companies with proofs of sales generally also have access to investors that specialise in specific sectors. The area in between – the "Valley of Death" – is however insufficiently funded. More institutional capital is needed to support growing sustainable companies.

SCALABLE BEST PRACTICE

The interviews carried out at the Swedish HEIS show that Chalmers School of Entrepreneurship is highly suited for scaling up and is a concept that can be introduced at other universities. The programme started in 1997 and has been focusing on sustainable entrepreneurship for a long time. It offers a Master's degree through Chalmers University of Technology and the University of Gothenburg School of Business, Economics and Law. All students and projects at Chalmers School of Entrepreneurship are specifically required to include a focus on both entrepreneurship and sustainability, and the School stresses that without technology it is hard for sustainability aspects to be applied in practice.

One of the Master's programme's main success factors has been integrating sustainability in all of its courses and projects. A commitment all the way up to the university administration level is necessary for this to be possible. Support for this approach at all levels is very valuable, as is involving administration and management, incubators and other parts of the university ecosystem.

It is also important to have committed faculty members so that students can work on their activities and projects with educators outside the classroom. More and more educators and researchers want to work in a more project-based way with students and this approach has great potential. In general, we see a strong focus on individual activity in academia, but there is significant value in shifting teaching towards a more team-based approach.

Among the tools that are being used are lifecycle analysis and backcasting, taking into account the impact of products and services throughout the manufacturing process and user phase. Lean start-ups and design thinking are also concepts that are being widely used. Around 40 percent of the students are women and, according to Mats Lundqvist, Professor and Vice President of Utilisation at Chalmers. This is largely thanks to sustainability being one of the cornerstones in education programmes.

The Chalmers model is not only suitable for ideas in engineering and technology; it can be applied in all types of ideas with the potential to have a positive impact in terms of societal, customer and commercial benefits. Sometimes a promising idea stems from a technical possibility; sometimes a new concept comes from understanding a need. The School produced a report in 2016 to provide inspiration for similar initiatives in Europe – Sustainable Business Development: Frameworks for Idea Evaluation and Cases of Realized Ideas, by Sverker Alänge and Mats Lundqvist – which could also be useful to other universities.
COUNTRY CASES

In this section we provide selected cases and initiatives from across the NordSEnt partnership. Individually and especially as a collection of initiatives and learnings, the initiatives show a high level of innovation and can be used as inspiration for how to design courses and initiatives that support students in becoming green entrepreneurs.

Method: The cases have been collected individually as part of a mapping in the four countries and what the HEIs offer. They are not described entirely in the same way but most of the cases provide the outline of the course/initiative and then address its impact, its success factor, and the scalability.

It is important to note that this overview does not provide a 100% entirety of what is offered in each partner country, or on the level of each partner institution, but this cross-country compilation of sustainable entrepreneurship education practices is the first of its kind in the Nordic-Baltic region.
Students at Chalmers School of Entrepreneurship.

SWEDEN

CHALMERS UNIVERSITY OF TECHNOLOGY

Best practice: Chalmers School of Entrepreneurship

Story

Chalmers School of Entrepreneurship was started in 1997, but plans for the initiative date back to the 1980s. Even before this, the Torkel Wallmark Centre for Innovation was set up in 1978-79, and chair in innovation technology was established, with Wallmark being the first professor in this subject ever in Sweden.

The School of Entrepreneurship was subsequently set up to offer an academic environment and resources around entrepreneurship. Academic companies were, in general, not seeing much growth at the time, but it was hoped that the new school would improve opportunities to set up and build growing companies.

Several incubators have used this model as an example, and ten years ago Chalmers’ hub was the most successful one.

Chalmers School of Entrepreneurship focuses on sustainability. Without technology, it is hard to make sustainability work in practice, and without sustainability on the curriculum, the courses will, in general, not be as attractive to female students. Both research and entrepreneurial creativity are needed, but to find solutions, entrepreneurial creativity is essential. Sustainability and technology go hand in hand; for example, there are not many students working on petrol engines for Volvo these days.
Impact
Today, 40 percent of the students at the school are women. Chalmers alumni from 10–15 years ago are now working in various positions where they are contributing to sustainability. IKEA’s CEO is a former Chalmers student, and the company is extremely focused on sustainability.

Tools and methods
Among the tools that are frequently used are life-cycle analysis and backcasting.

Life cycle analysis is a method used to evaluate the environmental impact of a product through its life cycle from its raw materials to disposal or recycling. The various stages considered in assessing the environmental impacts start from the extraction of raw materials and move toward material processing, manufacture, distribution, use, repair, maintenance, and disposal or recycling.

Backcasting is a method used in planning. It begins with outlining a desired goal or object in the future and then working backwards to identify programs and policies needed to connect that desired future back to the present. Backcasting works particularly well where there are no ready-made solutions and where the goal is ambitious and requires innovative options and new ideas.

The university also participates in EU projects on e-creation, sustainability and innovation. Lean start-ups and design thinking are other methods that Chalmers School of Entrepreneurship uses a lot. However, many of the methods being used were not developed with a focus on sustainability and will therefore rely on potential customers actively caring about sustainability for them to really work as sustainability tools.

Special activities
All the projects at the school should have an entrepreneurial and sustainability focus. Some good examples of projects are Viable Cities, Makerspace prototype creation projects and Challenge Lab. Moreover, educators who want to start project courses (75 ECTS) can receive funding for this.

Framework
Students at Chalmers are passionate about Scandinavian entrepreneurship and management. Today’s students are not willing to work for companies that have a negative impact on the environment; they want to contribute and feel proud of their work. Topics being discussed are areas where technology can intersect with values relating to the environmental and human rights. It is important for students to be engaged in a discussion about risk, such as when Facebook interferes with democracy.

Assessment
In addition to its standard evaluation of all courses, Chalmers School of Entrepreneurship has ongoing partnerships focusing on research and evaluation with similar programmes in Trondheim, Norway (NTNU) and Lund, Sweden (Lund University). The school’s partnerships with large corporations and with the Chalmers Ventures Incubator provide a built-in learning and assessment tool. The school also conducts interviews with “e-lumni” (former students of Chalmers School of Entrepreneurship) about what they are currently working on.

Success factors
The main success factors have been the ability to incorporate sustainability into all programmes and courses. It has also been valuable to involve all levels of the university in this effort – including administration and management, incubators etc.

Tips and strategies
We need to allow students to learn from other countries in Europe, and to some extent also Africa. It is necessary to have a committed faculty so that students have opportunities to carry out activities with their professors, and to work on projects outside the classroom. More and more professors and researchers want to work in a more project-based way with their students. There is a great potential here and it will be part of the strategy going forward.
The promotion system is also important. It should not just be about publishing; it is important to promote education activities as well. Other factors include gender equality and working in teams. Many female academics want to be part of a larger context. Today there is too much emphasis on the individual in academia – there needs to be more team activity.

Needs
“Dull and technical” is a communication challenge. Those who are not academics find it difficult to see the benefits of collaborating with a technical university. Meeting places like Entrepreneurship and Small Business Research Institute (ESBRI) are needed, as well as better communication. The City of Gothenburg (where Chalmers is located) needs to show interest in collaboration with various actors, in Stockholm and elsewhere.

Scalability
Chalmers School of Entrepreneurship has several projects that work well to scale up. The school has written a paper (mentioned on page 16) which is intended to inspire other higher education institutions in Europe to work in the same way. Communication is important here, with the surrounding community as well as within the various layers of Chalmers University itself, since it is sometimes difficult for one hand to know what the other one is doing.

KARLSTAD UNIVERSITY

Best practice: Sustainable Business and Leadership
https://www.kau.se/en/education/programmes-and-courses/courses/FEAD47

Story
The course deals with economic, social and ecological sustainability and the leadership and management required for organisations to have sustainable operations. Achieving a sustainable business often involves extensive restructuring of an individual organisation. Many businesses today lack a basic knowledge of what is required. The course provides a broad understanding of how ethics, core values, corporate social responsibility and sustainable development influence and create new scenarios for business development and leadership. Corporate governance involves specifying the rights and obligations of members of an organisation or those who have influence over it, i.e. management, department heads, shareholders and other stakeholders. Corporate governance relies on a blend of expertise in financing, economics, accountancy, law, leadership and the corporate culture. From a management perspective, it also addresses sustainable leadership, managing service enterprises, human resources, diversity and leadership styles (including authentic/ethical leadership). Students are required to holistically analyse, identify and formulate a problem, or a current event or phenomenon related to course content.

Impact
Upon completion of the course, students should, among other things, be able to demonstrate insight into economic, social and environmental sustainability in a business enterprise. They should also demonstrate how business ethics is a critical component in an organisation’s long-term potential to operate in a sustainable way, and to show a deeper understanding of an organisation’s potential to operate in and for a sustainable society. Students should receive a greater understanding of various perspectives on corporate governance, with respect to value creation for shareholders and other stakeholders, and analyse matters relating to CSR, sustainable development and leadership.

The Service Research Center (CTF) at Karlstad University provides numerous advanced and short courses that focus on professional development, and many of the students/participants witness the importance of sustainability in their work roles. The environment, climate and Agenda 2030 are almost always in focus.

The course coordinators have also witnessed a remarkable difference between business students today and 20 years ago. Today’s students envision totally different success factors and ideals than their predecessors. For instance, students today are far more concerned with being an entrepreneur in order to make a difference in the world. Work that involves striving for a greener planet also appears to be attractive from a student perspective.
Tools and methods
The university carries out interviews with companies and organises focus groups. There are groups providing strategic advice with representatives from companies and banks, and consultants with a focus on the climate. They also visit various companies, for example IKEA – a company that strongly emphasises sustainability.

Special activities
CTF successfully provides courses for professionals in both the private and the public sector. One public sector example is a division within the local municipality that is focusing on the transition towards a greener society. In the private sector, IKEA, Volvo Group and other companies are driving the same agenda.

Framework
Through a greater focus on sustainability, research is influencing education. The researchers determine their own education with a stronger emphasis on sustainability, creating a greater understanding and commitment to various areas of sustainability.

Assessment
The course coordinator receives feedback from companies and students who have completed the course.

Success factors
It is important to determine the wants and needs of the target group: students, companies, municipalities and, in some cases, non-profit organisations. It is also important to understand strategic areas with a five-year perspective, with a focus on sustainability.

Tips and strategies
The starting point is the situation at the university and in surrounding industries. Karlstad University, for instance, focuses on forest-based bioeconomy. It is also noteworthy how several of the university’s initiatives around digitalisation are contributing to Agenda 2030 (i.e. inclusiveness, less travel, etc.).

Needs
More education and knowledge about sustainability is always needed. Academia is often organised in silos, with different reward systems for different specialisations. This makes it difficult to invite lecturers from other universities and other disciplines. Course coordinators would like to collaborate more with the energy sector.

Scalability
There is a need to find out what the strategic energy supply of the future will look like and to focus on topics related to this. In terms of courses for professionals, other universities could make an important contribution.

LINKÖPING UNIVERSITY (LiU)

Best practice: InGenious Cross-Disciplinary Project
https://liu.se/en/education/course/799g52

Story
In collaboration with the international development platform InGenious and ECIU (European Consortium of Innovative Universities), Linköping University is arranging an interdisciplinary project course that is unique in the Swedish education system.

The course provides opportunities for collaboration with students from all faculties in interdisciplinary project groups, to tackle business innovation projects and societal challenges. The course is based on challenge-driven learning, which means that the groups work on real challenges provided by external actors.
Interdisciplinary communication is an important part of the course and takes place in group assignments and through "pitches" – presentations within the course and to external companies or organisations.

The course provides an opportunity to create networks and develop personal and professional skills – all in an international environment characterised by creativity and entrepreneurship.

Entrepreneurial idea creation and innovation development are core elements in the course. Students develop cases within the framework of sustainable development, with a triple bottom line: social, economic and environmental.

Impact
Students are engaged in the initiative. Many students are working on a challenge to improve agriculture. One example is students using drones to combat bark beetles and next year they will launch a start-up based on this product.

Tools and methods
The course is not an entrepreneurship course as such, but one that strengthens entrepreneurial skills. Students develop their solutions based on the NABC model (Need, Approach, Benefit, Competition).

To initiate the creative ideation process and to get the groups started in team-building, they use "Shitty Prototyping" as a tool, where groups of students and their "challenge provider" visualize their challenge and, in a limited timeframe, build a prototype with simple mock-ups. This stimulates creative thinking and gives the project group a clearer picture of the project they will be working on.

Through the Value Creation Forum (VCF) the students (and the challenge providers) are encouraged to give each other feedback and constructive criticism. This helps project groups to develop their pitches, but VCF also helps them to develop the idea and the actual solution. As a result, individual students grow, become more confident in public speaking and more aware of what makes a presentation effective and interesting.

As mentioned above, the approach used is challenge-based learning (CBL), which originated in previous courses in 2003. The students work with real cases – to find an opportunity to launch a venture and to get financing. Entrepreneurship theory is used in the entrepreneurial process and then the theories become tools. Students are meant to assume the mantle of an entrepreneur and learn from real-life situations.

In challenge-based learning, students work with external partners or companies/public agencies, and thereby gain a broad range of experience. If the partners like the idea, they can buy it from the university or hire the student. If the partners do not proceed with the students’ idea, the group can still continue to develop it with support from LiU Student Innovation and other actors within the regional support system (such as ESBR, East Sweden Business Region).
Special activities
The combination of theory and practice puts students in the shoes of an entrepreneur. The courses need to be as real as possible and also adapted to the target groups. The university arranges sizeable courses with 150 students in each class. These large student groups do not study an excessive amount of theory, but instead obtain their own cases and work on projects in groups of eight people. They also need to think about how they can commercialise the products they are working on.

The course coordinators also want the students to go the extra mile. As mentioned above, one student invented a solution to combat bark beetles, which has attracted a lot of interest among numerous external companies and parties.

The courses are for different types of students, including physicians etc., and should be adapted to their target groups. An internship can be combined with a theoretical component or a theoretical course with an internship.

Framework
The university works in a multidisciplinary way, with courses made up of different types of students. The InGenious course gathers students from four different faculties to avoid having all the technology students in the same groups. It also works in cooperation with the regional public energy provider, Tekniska verken, and offers an international course with cases and student ideas. There is also a sustainable social development component and problems are approached from different perspectives.

Assessment
It is difficult to measure the effects of education. If we look at what graduates are contributing to the business sphere, we see companies that are still small but successful, including in terms of sustainability. Some of the companies may experience growth a decade later, making the results even more difficult to measure.

Students at Chalmers School of Entrepreneurship.
Success factors

One success factor is ensuring that students actively apply for the InGenious course, as it is an independent course and an elective for anyone with at least 90 credits. The students can then propose projects and motivate and rank their proposals. Projects are then put together based on an assessment of the proposals and of a personal letter from the student. This makes it possible to create the right conditions for dynamic, interdisciplinary teams.

Facilitators are continually in contact with the project groups allowing them to work more actively on group processes and prevent possible exclusion or conflict. Challenge providers have highlighted the benefits of participating in a project where students have actively chosen to work on their particular project as it guarantees commitment and curiosity among group members.

Another success factor is the importance of students not regarding themselves as consultants for their challenge provider. This approach has definitely resulted in more creative solutions. In addition, students have been encouraged to take a more entrepreneurial approach during the course – their solution may be interesting to many stakeholders and be of value to many more actors than the just their challenge provider. This has resulted in the student groups seeing themselves as start-ups/enterprises that need to pitch their solution to sell it in a market. It has also resulted in one or more solutions being purchased each semester. Also, it is not uncommon for a student group – all or some of the group members – to want to continue working on their solution. There are examples of students who have been offered co-ownership of a company or fixed-term employment to implement the project group’s solution. Students develop professional skills and can add these to their CV, and companies get help with their challenges and new thinking around sustainability.

Tips and strategies

Live as you learn. Continuously improve, test and try different methods. Keep what works and get rid of what doesn’t. Also, credibility is key – it is important to show that you are a true entrepreneur in a practice situation. Educators also need to allow students to question what they are telling them.

Some students have reported that they wish they had known earlier on how strong the focus on the entrepreneurial aspect and pitching techniques would be. It is therefore important to be clear about why these elements are emphasised and significant – that a solution must have value in order to be useful, that pitching training enables everyone to become more self-confident in their presentations, and that they need to find out what gets a solution noticed in the market.

The teachers are not only educators but are also active in business to a large extent. They have various connections to the business community, which gives them credibility – they know what they are talking about. The business programme is also a source of knowledge for the regionally active business development company Almi and examines applications for innovation financing.

Needs

Courses like this one are extremely demanding to provide as the process of creating challenges requires a lot of work. On the other hand, they provide the 21st century skills that many future employers are looking for.

A comprehensive, mandatory entrepreneurship course for all engineers would be very beneficial but challenging to provide because it would require significant resources and many teachers and would depend on available funding.

More short films presenting various concepts and areas of study would be helpful to increase student awareness of aspects such as a circular economy, entrepreneurship, design thinking, Susan Wheelan’s group process etc.

Susan Wheelan’s Integrated Model of Group Development (IMGD) is a model that can help leaders understand group dynamics. IMGD helps them to identify the right opportunities to introduce activities into their work group that can drive the group forward, both in terms of efficiency and performance.
This could also help to spark interest and willingness among students to expand their knowledge by looking for courses in a related area.

Students have also reported that they would like to know more about hands-on entrepreneurship and how to launch a start-up. Voluntary seminars with speakers from business development organisations could be a potential way to address this.

**Scalability**

Courses need resources. If a new course is established, another course will need to be removed. Linköping University has some substantial and successful courses in, for example, engineering that need to remain in place. However, a mandatory entrepreneurship course for all engineering students would be a great addition.

It would be interesting to try to scale the course up to a bigger project course of, for example, 15 credits to provide enough time for implementation – perhaps an InGenious course 2.0?

This type of course could be provided within a specific faculty, but this would probably not provide many different perspectives for a specific challenge. It is important for students to be able to encounter other professional areas and disciplines, so that they can prepare projects with others that have a very different educational background. This would promote mutual respect and understanding of the importance of everyone’s collective skills and knowledge.

**LULEÅ UNIVERSITY OF TECHNOLOGY (LTU)**

**Best practice: Master’s Programme in Industrial and Management Engineering**

https://www.ltu.se/edu/program/tciea/tciea-civilingenjor-industriell-ekonomi-1.76864?l=en

**Story**

After completing this programme, the students can, for example, work as project managers, as technology, management or IT consultants, as products or logistics managers, as sustainability managers or as strategic procurement officers. Some start their careers as trainees, often in larger companies, while others work in the service industry or start their own businesses.

The programme began 20 years ago. A major transformation is under way and the first semester with the new concept started in autumn 2021. The programme’s primary sustainability focus is based on the Sustainable Development Goals: SDG 9: Industry, Innovation and Infrastructure, SDG 12: Responsible Consumption and Production, and SDG 13: Climate Action.

**Impact**

More and more students are discovering the opportunity to become an entrepreneur after graduating and many have side projects under way. These projects may involve working on a start-up or launching their own business. Students are more interested in sustainability than before, as is the case in the whole of society. Three avenues are common among students completing the course: technology or management consultants, working for big corporations and setting up their own business. There are, however, still relatively few students opting for the third avenue.

Talent supply in the region is an important factor – many companies are recruiting students for summer jobs or alongside their education. Many students gain strong networks and qualifications and feel more confident in their working roles based on their previous experience working for companies.

**Tools and methods**

The programme runs for five years, has different specialisations and uses different types of educational models. Sustainability is specifically highlighted in the first course. After that, all students take a course in sustainable development. They also study law for engineers to learn about regulatory aspects. They can choose a technical profile in sustainability in year 3 (with four courses in total), and a specialisation in years 4–5 in sustainable industrial business, consisting of 6–7 courses in total.
The university arranges workshops for idea creation and produces templates that the students can use if they want to start a business. The regional business development company Almi has budget templates that make it easier to create a business plan. Overall, Sweden has good infrastructure for those who want to start a business.

**Special activities**
This is the only Swedish master’s programme in industrial engineering and management that has a sustainability focus and where entrepreneurship is consistent throughout the programme.

Partnerships are established with local companies with the goal of developing projects together with the companies. Students can work in similar ways within an incubator and with NorrlandsNavet (a centre for business development in northern Sweden). The use of available resources is discussed and students are encouraged to write their master’s thesis together. Many Swedish companies participate by providing guest lecturers, offering case studies and taking part in the programme council.

**Framework**
Locality is important for students at this university in the far north of Sweden. Companies in the area have pointed out that they started their business in the region and can explain to the students how this works in real life and what effects it has on sustainability. The companies are often active in mining, forest industries and natural resources. Real knowledge is emphasised throughout the programme and not only with respect to sustainability.

**Assessment**
Standard methods are used and the number of students that start a sustainable business after graduation is monitored.

**Success factors**
One important success factor is that the students are to a large extent getting involved with local businesses and NorrlandsNavet. These form role models for the students, including in the area of sustainability.

**Tips and strategies**
The university has a focus on entrepreneurship, although this is not always reflected in the various courses that it offers. It is important to analyse the business models of larger companies with a sustainability perspective. This is a way to make more students focus on sustainability.

**Needs**
It is important to highlight how to develop as a student and/or a business based on a variety of perspectives. Students need to understand the basis for the assignments included in their course. It is a good idea to take advantage of the tools being used by other individuals and universities, for example those relating to management in innovation environments.

**Scalability**
It is possible to scale up courses by partnering with companies, but they need to be adapted to the regional environment. The university offers an online course in entrepreneurship and business planning, and it would be beneficial to make this available to more students. Last year 1,000 students applied for the course but only 90 were admitted. In order to grow the course, however, more funding is needed, especially for faculty recruitment. It is also important to continue to ensure good student outcomes.

The knowledge that the university and the lecturers have of entrepreneurship is a valuable asset and is often brought into the courses. Businesses also have a strong impact, since many of the projects that the university wants to fund are co-funded with companies and therefore need to be relevant to them. Research and education are both closely aligned with the businesses.

Although scaling up works well in general, the master’s thesis process can be a challenge.
LUND UNIVERSITY

Best practice: Master’s programme in Entrepreneurship and Innovation
https://www.lusem.lu.se/staff-pages/media/studies/msc/curriculum/eagei.pdf

Story
In the master’s programme students learn how to create, develop and exploit business opportunities by starting up and managing new ventures. The programme offers an opportunity to be fully involved as an entrepreneur in the start-up process – from idea selection and team composition to venture formation. This enables students to gain real experience in starting up a new business. In addition, students take part in a mentorship programme where they are matched with an experienced mentor.

Impact
Interest has grown and today 80 percent of start-up projects have a social or sustainability focus. A number of the mentors also work in the area of sustainability.

Tools and methods
Idea creation and student projects are the starting points for much of the instruction provided. In addition to gaining knowledge and experience in the programme, students can use the knowledge and skills that they bring with them from their previous education and activities. Students from various disciplines are accepted to the programme.

The Lund University collaboration with International Institute for Industrial Environmental Economics (IIIEE) is a win-win partnership. Students from the master’s programme in entrepreneurship and innovation are working together with students from the IIIEE master’s programme, sharing knowledge from their respective fields.

Special activities
The master’s programme was launched in 2007, and right from the start there were elements of sustainability integrated into the curriculum. The master’s programme in entrepreneurship and innovation has collaborated with the master’s programme run by the IIIEE.

Business model development includes environmental aspects.

Guest lectures form an important part of the programme – experts working in various areas of entrepreneurship and innovation are regularly invited to share their expertise and hold workshops.

The programme works in cooperation with Lund University’s VentureLab student incubator and graduates of the programme can enjoy a fast-track application process to join the Incubator.

The programme also offers students the opportunity to participate in the Dragons at the University pitching competition, in Venture Cup, to attend the Trendspotting at Lund University seminar series, and also to go on various field trips and study visits to companies in the surrounding area.

Framework
To ensure a mixed profile of knowledge and skills, Swedish and international students with various backgrounds are invited to take part in the master’s programme. Topics covered by lecturers include what students should think about to ensure that business models incorporate more sustainability aspects. Much of the work in the programme is quite hands-on; through practical experience, students learn to become entrepreneurs.

Evaluation
The course has no specific assessment models or criteria for the sustainability content. For the most part standard course evaluations are made, supplemented by individual assessments in order to develop courses and programmes. There is also a focus on the career paths of the students. The goal is for sustainability thinking to be integrated into students’ work, rather than having students working directly on sustainability.
Success factors

In the master’s programme the students get into contact with other students who are involved in sustainability in various ways, and they continue to stay in touch after concluding the programme. Most of the students are aware of the importance of sustainability, which is in itself often enough to inspire them to use the tools for learning and action that the course provides.

Tips and strategies

In the words of a programme alum turned beauty entrepreneur: “Identifying the ‘gaps in the market’ and finding ways to make money is one thing, but understanding the hard work behind successful entrepreneurship is another. Just focusing on finding the gaps won’t bring fortune, it’s important to find one’s inner power and ambition.”

Needs

It is important that sustainability becomes a part of the whole – always integrated into the education package as a part of the learning plan to bring the necessary skills to the students. Educators provide knowledge and students pursue practical tasks and work on their projects.

Scalability

Business models are discussed and problematised from a sustainability perspective. Models for this exist and can be scaled up. The collaboration with IIIEE will require a similar organisation/department offering a master’s programme in sustainability.

ROYAL INSTITUTE OF TECHNOLOGY (KTH)

Best practice: Master of Science in Industrial Engineering and Management

https://www.kth.se/utbildning/civilingenjor/industriell-ekonomi/industriell-ekonomi-civilingenjor-300-hp-1.4891

Story

The Master of Science in Industrial Management also provides business development skills. In their technical education, students gain an understanding of how to develop sustainable innovations. While studying industrial engineering, students learn about the interaction between technology, people and the market. The ability to understand the connection between technology, business strategy and the surrounding community enables students to evaluate the economic, social and environmental consequences of new technological solutions. The five-year Industrial Engineering and Management programme is divided into a Bachelor’s degree (first three years) and a Master’s degree (final two years). The first three years all students are studying the same Bachelor’s programme. Throughout the programme students take courses in business and management alongside their courses in mathematics, science, and a specialisation in one field (applied mathematics, computer science, energy systems or product and production development).

The goal of the MSc in Industrial Management is to train engineers to understand several fields, industry as well as management-related ones. Students build teams, work with actual cases and analyse cases from different perspectives. An example of a case is one focusing on road electrification. How does it work and what effects does it have on the environment? Another example is based on the recent discussion in Sweden about cement production. What options are available etc.? Students need to have real examples to relate to as this increases their understanding of how to integrate sustainability.

Impact

The programme has traditionally had a stronger emphasis on large industries rather than start-ups, but a focus on smaller enterprises has been gradually introduced, as well as entrepreneurship, the public sector and other fields. Students often start their own businesses, and through the skills they gain in their education, they are well equipped to do so. Many students want to make a difference in the world. They are driving development and want to work on a sustainable transition and towards the UN SDGs.

When developing their own innovations, they need to include sustainability as an area of focus. Young people experience more stress today as they witness the changing threats to society.
Tools and methods
The entire content of the programme has recently been redesigned – from learning about sustainability to training engineers for sustainability. When teaching about sustainability a lecturer can be invited to describe what it is all about. But when teaching for sustainability, the concept must be integrated throughout the programme. This enables students to understand how their actions and choices affect their own work and career and can lead to a more sustainable world. The aim is to give students the tools to act in a sustainable world. They can, for example, use different perspectives to reflect on the consequences when choosing between aluminium and steel. It is much better to integrate sustainability into all programmes than to have a separate course on sustainability.

To do this, engaged teachers are needed, as well as professional development resources. More complex targets and more discussion around e.g. profit maximisation are also needed. The focus needs to be shifted more towards long-term sustainable development.

Special activities
Uniqueness was built into the programme from the beginning through a combined focus on management and technology. Having these two perspectives has made it easier to incorporate sustainability into the programme. There is a culture among the students where they want to understand both technology and society, and it is crucial to understand the role of technology in a sustainable transition. The programme integrates societal perspectives and a sustainable transition. Teachers with different areas of expertise work in teams, which strengthens and increases credibility in the classroom. This way of working makes it easier to integrate sustainability in various areas of the programme.

Framework
As mentioned above, it is crucial to focus on teaching for instead of about sustainability. This in turn increases the students’ understanding of how they can work for a sustainable world.

Assessment
When courses contain objectives related to the UN SDGs, KTH has its own processes to measure outcomes. There is no formal evaluation, but rather a programme analysis. It has not been a priority to measure outcomes with respect to sustainability and entrepreneurship, but teachers have a discussion with students at the end of the programme to get their view of how they have navigated these aspects. This provides teachers with valuable knowledge of what the students have taken away with them from the programme.

Success factors
The most important thing is to integrate sustainability throughout the programme and not just in one course. Students can then see sustainability in their own context and realise how innovation, products and choices are connected to real change and sustainable transition.

Tips and strategies
It is very important to work in teaching teams at universities so that teachers have colleagues to ask or to switch with when teaching difficult subjects. This resembles the process of writing research articles. If there is more than one person in the process, it becomes easier and everyone benefits from having different skills in a team.

Needs
The programme is in the midst of a transformation where it will be reorganised to incorporate more teaching teams. In the past, teachers generally held their own courses. Having a variety of teaching teams in the programme makes it possible to take advantage of different skills and knowledge, and to explain complex topics in depth.

A strategic approach from management is needed to bring this way of working into all entire education programmes.

Scalability
Teachers have typically created their own courses, but there is a lot to gain from teachers working in teams. This programme has 110 compulsory courses within various departments. This makes it difficult to create general teaching teams. Instead, the idea is to create teams for the courses that are common to all students.
ESTONIA

ESTONIAN BUSINESS SCHOOL (EBS)

Best practice: Entrepreneurship in the Digital Era

Title and story
This international bachelor programme (180 ECTS) is specifically designed to unlock the entrepreneurial and innovative mindset of its students. Throughout the curriculum students follow the life cycle of an enterprise from its “birth” to its “after life”. One of the main aims of this programme is to inspire the students to solve global challenges through entrepreneurship.

Impact
As a graduate of the “Entrepreneurship in the Digital Era” curriculum, the student has learned to:

• create links between entrepreneurial theories and practices in the context of the digital era and societal and environmental challenges on a global level.
• develop sustainable and/or digital solutions to problems that arise during different life stages of the enterprise.
• act as a consultant who helps enterprises solve their challenges.
• improve the performance of his or her entrepreneurial team, either as team member or team leader.
• develop a plan for her or his personal development as an entrepreneur or entrepreneurial employee.
• develop transferable competences (knowledge, skills and attitudes) needed in his/her future career.
Tools and methods

The curriculum consists of six semesters:

1. Seeding & Starting up
   Goal: At the end of the first module, students navigate the entrepreneurial ecosystem and develop an initial business concept considering ethical and sustainability aspects in the digital era.

2. Launching
   Goal: At the end of the second module, the students present a plan of a functioning enterprise integrating essential aspects of law, responsible business, finances, management, etc. in the digital era.

3. Calibrating
   Goal: At the end of the third module, the students present a justified improvement plan for an enterprise to enhance its efficiency, productivity and sustainability in the digital era.

4. Expanding & Growing
   Goal: At the end of the fourth module, the students present a justified growth and expansion plan for an enterprise in the digital era.

5. Maturing & Exiting
   Goal: At the end of the fifth module, the students present a justified exit plan and/or successful re-entry strategy for an enterprise in the digital era.

6. Bridging & Graduating (18 ECTS) and Final Thesis (6 ECTS)
   Goal: At the end of the sixth module, the students create links between entrepreneurial theories and practices in the digital era in order to apply their learnings beyond the university.

Special activities

Team-based
We work in teams and create a learning environment in which we learn from each other (both teachers and students).

Story-based
We follow the life cycle and process of a business from "birth to afterlife".

Problem-based
We solve real challenges and encourage our students to start their own business.

Frameworks
The curriculum follows the logic of academic stream-based teaching rather than subject-based teaching. From 2022/2023, the curriculum also includes a separate "sustainability stream". Students are introduced to the relevant topics related to sustainability, green economy, and social entrepreneurship depending on where they are in the story.
Streams and stream leaders

The students go through an entrepreneurial process to solve actual and real challenges. In the process, they are supported by necessary content (knowledge, tools and frameworks). All the content is divided on eight academic fields – called Streams. Each Stream is responsible for its specific topics – topics that future entrepreneurs will need for success. The stream-based approach creates a coherent and interdisciplinary learning process both for learners and tutors. In other words, stream-based teaching does not mean giving separate courses for each academic field, but rather intertwining the knowledge relevant to the specific parts of the story.

1. Entrepreneurship stream
2. Law & Ethics stream
3. Marketing stream
4. Finance stream
5. Leadership & Organisation stream
6. Team stream
7-8. Individual & Transferable stream

In the academic year 2022/2023, a sustainability stream will be added.

The responsibilities of the stream leaders are:

• Providing relevant academic knowledge.
• Ensuring consistency with the story and between the streams.
• Inviting guest lecturers and involving them systematically in the learning experience of learners and tutors.

The main difference from traditional higher education is that instead of offering specific courses, the programme is designed around the entrepreneurial processes.

The creation of a separate stream for sustainability enables teachers to connect the sustainability topics to the wider (entrepreneurial) topics within the programme. Additionally, connections are created between the sustainability stream and other academic streams in order to establish important knowledge intersections such as greenwashing (e.g. marketing and sustainability streams), green/sustainable financing (e.g. finance, law and sustainability streams), etc.

Assessment

To complete each module of the curriculum, the students have to:

• Pass monthly self-evaluation tests (20%)
• Present homework and in-class assignments (40%)
• Pass the complex exam at the end of each module (40%)

In the end of the first and second study year, students have to do an internship.

In the final module (6. semester), students additionally have to present the final thesis.

Success factors

The success factors of the curriculum are:

• Management support (necessary, because the programme requires a different approach when it comes to planning, administration and workload calculation).
• Teachers and administrative staff members working in teams and continuously contributing to the improvement of the processes. Setting an example for the students by teamwork and openness is a significant success factor in disseminating the programme.
• All parties learning to use agile techniques and constant feedback (weekly retrospect meetings for planning and student feedback). Extra time is spent working consciously in this direction.
• Having a network of practitioners and entrepreneurs willing to contribute to both programme development and teaching/learning activities.

Tips and tricks
In order to deliver this type of curriculum, or a separate module, we recommend the following:

Switching from knowledge-based teaching to team-based teaching. The curriculum requires coordination and cooperation between instructors from different academic fields. In our case, weekly meetings are used to synchronise the different sessions between the different instructors. Moreover, team-based teaching enables the possibility for multi-disciplinary assignments which are engaging and challenging for the students. This creates new learning connections and a holistic view of the module of the story.

From the students’ side, we recommend implementing weekly feedback checkpoints as well as individual learning diaries. This ensures that the desired weekly topics and their connections have actually been taken in by the students.

In connection with the above-mentioned team-based teaching and weekly student check-ins, flexible planning is required. Both the weekly meeting of instructors as well as the student feedback form the basis for repeating certain topics and/or clarifying learning connections.

Needs
Based on student and instructor feedback, we have pinpointed the following areas of improvement:

• More consistency between academic faculty and guest lecturers requires constant work and learning.
• Better aligned reading tasks between and within the streams
• Continuous development of interdisciplinary homeworks, in-class exercises and real-life problems to be solved.

Scalability
Although the modules are designed for an academic curriculum, they can easily be transferred to a training context for any organisation. By identifying where the organisation is in the enterprise life cycle, the content as well as the sessions can be adjusted to meet the needs of the learners. Moreover, an extra emphasis can be placed upon the topic of sustainability by replacing other academic streams’ topics.

Best practice: Hackatons for sustainable business ideas

Title and story
Hackathons provide an innovative way of brainstorming business ideas and creating corresponding business models that aim at tackling global challenges. Hackathons are fast-paced environments in which students are expected to use their creativity, teamwork and time-management competences, and entrepreneurial mindset. The solutions offered as the outcome of the hackathons can serve as the platform for further development and initial implementation sustainable business ideas. In our experience, using hackathons for global challenges provide out-of-the-box solutions to complicated issues. We have also witnessed that after hackathons student teams transfer the sustainability aspects to their existing business ideas, and this serves as a positive starting point for the discussions of how to apply sustainability aspects into business processes.

Impact
After hackathons learners:

• cooperate in teams
• develop business ideas in a short period of time
• link their business idea to a business model
• develop business ideas around a certain topic
Tools and methods
Hackathons are short sprint-like sessions that enable students to use their creativity. In our best practice, we provide two 36-hour hackathons within one work week (Hackathon I: Monday-Tuesday / Hackathon II: Thursday-Friday). Both hackathons have a specific topic (e.g., sustainability, social and regional inequality, sharing economy, etc.) and the students must design their own business idea and corresponding business model. At the end of the hackathons students present their results in a pitch-like competition.

Special activities
The model of our hackathons is adopted from the real-life hackathons. It is suitable for entrepreneurship students and inspires them to come up with innovative solutions in a short time frame.

Frameworks:
As each hackathon has a separate theme, thorough introduction sessions to these themes are provided. Additionally, students are required to prepare by reading relevant literature (including research reports).

Assessment
As each hackathon has a separate theme, we invite relevant stakeholders to participate in the hackathons, for example as subject matter experts during the introduction session, as mentors throughout the hackathon, and as judges during the pitch competition.
Success factors
The success factors of our hackathons are:

- Business ideas and underlying business models that are relevant to the theme and tackle a specific problem. Other success factors are the ease of implementation and the potential impact of these solutions.
- By combining students from different cohorts, we create diverse hackathon teams that enable peer-to-peer learning. Both direct and indirect feedback from the participating students has taught us that the learning experience enriched their studies. Additionally, in several cases the particular theme of the hackathon inspired the team to continue their business idea and further develop their underlying business model. On top of that students have requested more hackathons to be included in the programme.
- By involving stakeholders, we can connect the hackathon to a real-life challenge. Stakeholders have mentioned that the solutions provided by the hackathon teams inspired them to actually implement these solutions or parts of them. Moreover, stakeholders have expressed their interest to be included in future hackathons.

Tips and tricks
Hackathons require preparation as well as mentoring throughout the journey. In other words, it is important to provide the students with a toolkit in which you explain: how hackathons work, how to make use of the limited time, how to work in teams, how to critically assess potential business ideas, how to pitch their results, and how to evaluate information.

In our experience, the inclusion of two check points for the teams is highly recommended: one at the end of day 1 and the other at the start of day 2. Furthermore, a group of mentors with different backgrounds should be available throughout the hackathon.

When hackathons are organised as business competitions with prizes and/or offer credit points as elective activities, they are extra motivating for students to participate in, and they give the students more value.

Needs
Based on student feedback we pinpointed the following areas of improvement:

- More mentors with subject matter knowledge
- More freedom in selecting hackathon team members (in the initial setup we assigned the teams and teams changed in each hackathon)
- Inviting additional judges to the pitch competition to provide a wider range of feedback (e.g. potential investors, governmental stakeholders, etc.)

Scalability
Currently, we have been working with groups of around 35 students. However, for next year’s hackathon we would like to increase this group size. The one identified obstacle in scaling this setup is the number of mentors available.

Additionally, we plan to grant students credit points for the Hackathon week and to start each spring semester with a Hackathon week.
TALLINN UNIVERSITY

Best practice: EXU = Enterprise x University
(read about EXU Academy in the appendix)

Story
Tallinn University’s Development and Cooperation brand EXU brings together companies and organisations with university researchers to work together to develop future-proof solutions to practical problems and societal challenges. EXU involves nearly 400 researchers and lecturers, among whom entrepreneurs can find like-minded people to implement their ambitious ideas.

Collaboration can result in a new product or service as well as getting faster on the market, a better user experience, digital creative solutions, as well as more capable employees, a more productive work environment, better public sector services, faster adaptation of new employees, and other results.

Impact
With the activities of EXU, Tallinn University aims at creating a wider societal impact through:

- more science-based decision-making and regulations
- more cohesive society
- more science-based products and services and improvement of companies’ competitiveness
- more knowledgeable and effective workforce.

Tools and methods
The main working tools and methods can be divided into four main groups:

1) increasing commercialisation and societal impact of university’s R&D (service development, market research, etc.).
   To achieve that, Tallinn University recently started the initiative of cooperation clusters in order to promote cooperation between the private and public sectors. The aim of the clusters is to create more strategic and long-term focus on how to build up partnerships with non-university partners and to create value for and with them to strengthen knowledge transfer.

2) responding to companies and other organisations’ requests and initiating new (international) (partnership) projects.

3) developing (strategic) partnerships with various companies and public sector organisations, especially in thematic focus areas.

4) increasing the visibility of university knowledge through various marketing activities such as being present at various events, organising various events, being visible social media. Among various activities it is important to highlight the two following:
   - establishing an EXU showroom at the university premises to showcase the best examples of university-industry cooperation and show the value proposition of universities’ main focus fields.
   - Monthly talk-show EXU Academy - hosted by Külliki Tafel-Via, head of knowledge transfer at Tallinn University, and produced by Ermo Säks, junior research fellow at Baltic Film, Media and Art School.

This series is about topics that are researched and developed at Tallinn University and especially those that are developed in cooperation with companies, the public and the third sector. Examples of recently discussed topics include circular economy, digital waste, the digital maturity of an organisation, service design, storytelling, robotized future, measurement of company performance and societal impact, how to learn, the usability of everyday smart solutions, the value of nature (tourism), employee satisfaction, the value of data etc.

Each show presents a representative from Tallinn University and from the public and/or third sector. EXU Academy is produced in cooperation with the Tallinn Strategy Centre. All shows are available at: https://www.exu.tlu.ee/exu-akadeemia-salvestused (in Estonian).
Special activities
The approach to EXU activities is two-sided:

- For outside partners EXU serves as a one-stop-shop-approach based contact platform to facilitate cooperation for private, public and third sector partners.
- For inside university EXU aims at leveraging the commercialisation of R&D results and increasing societal impact. EXU also aims at fostering interdisciplinary cooperation, supporting team-based working modes and assessing intellectual assets and bringing them closer to the market. Increasing the in-house capacity improves the cooperation opportunities with external partners.

Frameworks
Our activities proceed from the knowledge transfer approach that we have been developing through adapting and redesigning traditional technology transfer approaches to be more suitable for Tallinn University as a social and humanitarian university.

We deal with knowledge transfer in the 4+1 category; the first two contain primarily economic added value for the university as well as for companies and other organisations. The third and fourth categories relate in particular to non-economic processes, where knowledge has an impact on social, cultural and educational challenges in society. The +1 category covers capacity building activities for these four categories.

The 4+1 categories are the following:

1) Solving societal challenges, contract research
2) Development of products and services, incl. licensing
3) Membership and participation; the partners and network
4) Science communication

+ 1) Development of work-related competences

Assessment
EXU is in the middle of the process of working out suitable KPIs for evaluating the progress of activities. EXU proceeds from the above-mentioned knowledge transfer framework of 4+1 categories for determining the indicators.

EXU follows the impact assessment framework: input -> output -> outcome -> impact. According to that, the aim is to achieve long-term impact (both for Tallinn University and from Tallinn University to society and the private and public sector) which is narrowed down to annual and mid-term indicators.

Success factors
- University management support – the increasing importance of knowledge-transfer-related activities represents the changed expectations towards university. Management level support is needed to recognize the importance of these activities, but also freeing time for these activities for academic staff.
- Suitable career model – this is needed to create the basis for motivating academic staff to contribute and deal with knowledge transfer. That knowledge transfer activities are of equal importance as scientific article writing and teaching.
- Consistency of activities – knowledge transfer activities cannot be project based. These are activities which need long-term commitment before the changes take place in real life.
- Inside capacity building together with outward brand building – you cannot deliver without increasing the cooperation and development capacity of researchers; but your R&D is not visible without constant value building to the outside.
In order to build up a university-industry cooperation brand we recommend the following:

• Involve an outside expert into the process. The expert should represent the industry viewpoint and ask the uncomfortable questions that will make you come out of the academic environment and consider why you do things the way you do.

• Talk with as many people as possible, inside as well as outside the university, to acquire support from inside, gather various viewpoints and validate the activities you plan to undertake. In this way you gain supporters inside the university and make partners outside the university.

• Involve management from the very beginning (if it’s not already their initiative),

• Start small and prioritise the activities (especially if you have a small team). Find the core competences at the university which should be the focus in university-industry cooperation – not all research areas and researchers have to be involved in knowledge transfer activities.

• Be ready for a long-term process where the results may not become visible until 5+ years. Therefore, it’s important to set milestones to understand whether and how you are making progress.

Taking account of the feedback of academic staff, partners outside university and the observations made, the main needs include:

• Consistency of activities – brand building and developing and supporting knowledge transfer cannot be project-based activities. The core activities have to be financed centrally and permanently.

• Investing time and money on communication and setting up clear messages and doing it consistently. Visibility and fame cannot be taken as granted and no one will take the effort to try to understand you; you have to make all efforts to make yourself understandable.

• The way in which mindsets change means that knowledge-transfer activities are not just nice to have but an important and inevitable part of research activities. This includes, among other things, adapting the academic career model in a way so that knowledge-transfer activities are valued to the same degree as research and teaching activities.

• Investing into ‘mediators’, ‘translators’ and ‘developers’ whose role it is to bring together academic and non-academic worlds and make them understandable to each other.
Scalability
Activities supporting knowledge commercialisation and transfer can be implemented in every university (and are indeed implemented in many universities), but building a holistic brand demands an extra effort which includes management support, taking account of the needs and peculiarities of a particular university, and aligning with other activities at the university.

Thus, the overall principles are transferable, but the specific activities have to take account of the peculiarities and needs of the specific university.

**ESTONIAN ENTREPRENEURSHIP UNIVERSITY OF APPLIED SCIENCES (EUAS)**

**Best practice: Study tours to Ülemiste Future City companies**

The difference between what has been taught in HEIs and what kind of skills employers actually need has been growing over time. The purpose of the Study tour project is to create a strong link between the modern educational system and future business, so that the studies can be directly related to the expectations on the job market. The project raises the quality of the education by supporting lecturers in the teaching process and by ensuring students a broader knowledge.

The project consists of three study tours. Each study tour involves at least two lecturers and five students and is based on the examples of Ülemiste Future City and combined with company visits. During the study tours, at least 26 enterprises in Ülemiste Future City are visited. Each study tour has a separate theme:

- **Study tour 1 - Challenges of maintaining the talents during Covid-19**
- **Study tour 2 - Challenges of environmental awareness**
- **Study tour 3 - Challenges of digitalization**

**Impact of the study tours**

- increase students’ knowledge of sustainable entrepreneurship through real-life examples
- create a basis for systematic and forward-looking action thinking in decision-making that supports the sustainable development of individuals’ and organizations’ balanced cooperation
- prepare students for future working life
- enable students to exchange ideas and to experience different working cultures and environments
- allow students to contribute to solving real cases
- prepare students for coping in international higher education or in the international work market.

**Tools and methods of the three tours**

**Study tour 1: Challenges of maintaining the talents during Covid-19**

Subjects: The impact of Covid-19 on human resource areas: the best practices of companies when it comes to the health of employees (mental, physical, social) and how to create a team spirit at the home office. Company visits in campus businesses, speed dates, open lectures.

**Study tour 2: Challenges of environmental awareness**

Ülemiste Future City has implemented various environmentally conscious projects and links the projects together into a systematic environmental strategy in cooperation with the Green Tiger project (https://rohetiiger.ee/en/).

The program of the study tour introduces environmentally conscious projects in Ülemiste Future City including company visits, workshops, seminars and open lectures.
Study tour 3: Challenges of digitalization

The study tour is aimed at organizing activities such as lectures, case studies, meetings, and sharing of experience and knowledge between students, partner universities and partner companies in Ülemiste City – improving cooperation, collaboration and communication skills.

Special activities

Real and close collaboration between universities and enterprises: companies open their doors to students to discuss the real challenges of entrepreneurship, including issues related to sustainable entrepreneurship.

Frameworks

Due to the constantly changing situation in the business environment, the needs and expectations in the labour market are also changing. Companies continuously need to adapt to new conditions to ensure the sustainability of their businesses and to achieve their economic, social and environmental goals. In the same way, educational institutions need to adapt to current trends and understand their environment.

The difference between what has been taught in higher educational institutions and what kind of skills employers actually need has been growing over time and has led to a situation where there is a lack of skillful workforce. The results of the study tours project are innovative ideas and better understanding of the mutual interests of educational institutions and entrepreneurs. The students participating in the project will gain real-life experience with the challenges facing companies, they will understand how to attack problems from different perspectives and gain an overview of the connections between solutions and sustainable social development.

Assessment

The Study tour project uses entrepreneurship and various companies / organizations to show the importance of sustainable entrepreneurship. It enables participants to experience different cultures and environments, to meet students and teachers/researchers from different countries who share their interests, and to get introduced to the most innovative companies by working with the companies’ real challenges and giving them feedback.

An example, which was mentioned above, is Ülemiste Future City which linked together various environmentally conscious projects and created a systematic environmental strategy in cooperation with the Green Tiger project (https://rohetiiger.ee/en/).

At the end of the study tours project, four articles, three thematic reports and a final report will be prepared based on the results of the activities, the gathered best practices, and study tours. Moreover, a cooperation with companies will provide input for research activities, because universities can offer research services to companies in future.

Success factors

The students meet companies who “struggle” with sustainability issues on a daily basis. Actual and real examples from companies provide an overview of the sustainability challenges and how to anticipate and mitigate the risks associated with these challenges. The students who participate will be well aware of the importance of sustainability and ready to implement the knowledge in an international labour market.

Tips and tricks

One of the prerequisites for the project is an understanding of students’ real knowledge of sustainable entrepreneurship, so that it can be further supported by practical examples.

Needs

It is important to increase companies’ own awareness of the basic principles of sustainable entrepreneurship and integrate this awareness into the curricula offered by universities. The higher education institution need to adapt to the current labour market trends and teach the skills that employers actually need. A strong link should be established between the modern education system and future entrepreneurship, so that studies can be directly linked to employers’ expectations and also provide an overview of the principles of sustainable entrepreneurship as the only possible form of future business.
Scalability

It is possible to scale this kind of project based on cooperation with companies. First of all, it requires raising companies’ awareness. Companies need to understand the value of the project and its impact on their future employees. For example, in cooperation with students and teachers, it is possible to find innovative solutions to the challenges of sustainable entrepreneurship.

Secondly, the scaling of a project will be easier if it is facilitated by a third party who is interested or willing to contribute to the establishment of connections between companies and universities.

**Best practice: Students’ voluntary internship in a non-profit association of their choice**

Today’s leader is expected to be entrepreneurial; willing to take the initiative, initiate activities, lead people, bring about change, be creative and self-leading, as well as to understand and care about sustainability. A large part of the students studying for a master’s degree at the Estonian Entrepreneurship University of Applied Sciences (EUAS) have work experience and most of them are also exposed to the management activities of a business organization. Thus, most of them will probably already have acquired normal management practices. How can these aspiring young leaders be challenged and learn something that can be useful to them in their professional career?

As part of the subject of Entrepreneurial Management, the master students undertake management internships in organizations where most of the work and goals are achieved through voluntary members such as various umbrella organizations, charities, professional associations, etc. Voluntary work means devoting one’s time, energy or skills based on free will without recompense. Volunteers help others or act mainly in the public interest and for the good of society. Voluntary activity must simultaneously meet three key criteria: it must be done out of free will, not because of an obligation or coercion, the volunteer does not receive monetary or material payment, although he or she may derive many other benefits, such as knowledge and skills or new acquaintances, and volunteers work for the good of someone else or of society more broadly.

Introduction to a study tour, organised by the Estonian Entrepreneurship University of Applied Sciences.
Only, such a practice - managing volunteers - is a real challenge. To be successful, a leader must be inspiring. It is not possible to manage volunteers by giving orders. An entrepreneurial trainee (future entrepreneurial leader) must be a visionary, using his or her initiative, positivity, commitment and caring. Only then will it become clear whether the leader is simply a good user of the organization's motivation system or a truly smart and entrepreneurial leader. Additionally, it is important to gain new knowledge and skills about sustainable entrepreneurship by actually participating in it.

Impact
Voluntary internship in a non-profit company:

- expands students' horizons about forms of entrepreneurship, including sustainable entrepreneurship
- develops students' sense of social responsibility
- emphasizes the importance of mutual cooperation
- is an opportunity to gain new knowledge and real-life experience that will help the student prepare for future work challenges
- enables students to exchange ideas and experience different working cultures and environments.

Tools and methods
As part of their homework, students need to justify their choice of non-profit organization and to give an overview of the work done and its impact on society as a whole. Today, non-profit companies are mostly companies that take into account environmental and social goals and that value the sustainable consumption of natural resources. Although this best practice is different from an entrepreneurship course, it is still a practice that helps strengthen entrepreneurial competences. By using their own knowledge and competences from previous education and activities to manage the internship, students gain valuable new skills through the internship.

Frameworks
Volunteering is one way to achieve the social goals of sustainable entrepreneurship. It is a good opportunity to see the business world from a different angle and to understand the importance of the contribution of each individual to the development of a sustainable business and thus a sustainable society. Entrepreneurship should also be based on the principle of using business strategies and activities that meet the expectations of the company and its stakeholders today, protecting, conserving and improving the human and natural resources needed in the future.

Over the three years during which this practice has existed, more than sixty entrepreneurial master students and more than thirty organizations have been involved, and dozens and dozens of great experiences have shown that this form of collaboration between organizations and university is necessary and sustainable. An increasing number of new organizations join every year and, once they have joined the initiative, remain there and attract new trainees.

Assessment
As a rule, a company internship is part of university studies. Internship mostly takes place in companies, only very rarely in non-profit organizations, including those that are active in researching the foundations of sustainable entrepreneurship. However, consciously directing students to volunteer for a non-profit organization is an innovative way to raise awareness of the potential of sustainable entrepreneurship.

In order to document the activity of volunteering, a forum has been created in the Moodle course, where students can post a weekly overview of what they did as a volunteer, what problems or successes they had, etc. In order to receive a grade, students must prepare an analysis of the organization, and overview of its activities, and proposals for how it should proceed. The assessment of students and their specific project takes into account the students' acquisition of knowledge about sustainable entrepreneurship, how they apply their acquired knowledge in entrepreneurship, and their contribution to society through their activities.
NORWAY

NORWEGIAN UNIVERSITY OF SCIENCE AND TECHNOLOGY (NTNU)

Best practice: NTNU School of Entrepreneurship

Story
The NTNU School of Entrepreneurship (NSE) is a two-year MSc-level venture creation programme (VCP) that has been in operation since 2003 (Sørheim et al., 2021). The program was inspired by similar efforts, such as for example Chalmers School of Entrepreneurship that was established in 1997 (Lackeus & Williams Middleton, 2015). As of 2022, many VCPs exist worldwide, and NSE and Chalmers School of Entrepreneurship are two of many participants in a global forum for VCPs; “VCP Forum” (Haneberg et al., 2019). The main idea of NSE and VCPs in general is that students learn entrepreneurship through being entrepreneurs. That means that students are starting and managing their own entrepreneurial ventures alongside a full academic curriculum. Being a full degree programme, NSE includes a multitude of educational approaches and activities, involving faculty and students but also external stakeholders such as private enterprises and public institutions. While NSE started out with no explicit strategy on sustainability as such, the last five years have seen an increased focus on how environmental and social sustainability is considered in different activities during the programme.

Impact
The vision of NSE is to develop “the world’s best business developers” through entrepreneurship. That means that the main goal is not to provide new ventures but rather entrepreneurial individuals to work in a broad range of sectors. Therefore, a key assessment metric is that graduates from NSE are attractive employees, which our alumni surveys confirm that they are. Nevertheless, around 50% of the graduates from NSE continue working with their new venture after graduation. Alumni from the programme also start new entrepreneurial ventures some years after they graduate. Sørheim et al. (2021) found that the average value creation per graduate from the programme increased from $2467 in 2005 to $170 000 in 2017. Since 2017, the addition of new ventures from recent graduates has increased these numbers significantly.
Tools and methods
The overall structure of NSE is provided in Table 1 below. As illustrated, there are several courses with their own approach to students’ learning of entrepreneurship and sustainability. In this regard, we will in this report focus mostly on the activities related to students’ new venture creation and the courses “Idea search and market assessment” and “Technology-based business development” since these are courses run entirely by NSE faculty and only open to NSE students.

<table>
<thead>
<tr>
<th>Students’ new venture creation</th>
<th>1st semester</th>
<th>2nd semester</th>
<th>3rd semester</th>
<th>4th semester</th>
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<tr>
<td>Evaluation of business ideas</td>
<td>Business planning</td>
<td>Business development</td>
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<tr>
<td>Academic courses and thesis</td>
<td>Idea search and market assessment</td>
<td>Technology-based business development</td>
<td>Entrepreneurship specialization course</td>
<td>Master’s thesis</td>
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<td></td>
<td>Strategic management</td>
<td>Industrial marketing and international business</td>
<td>Project thesis</td>
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<td>Specialization course</td>
<td>Experts in teamwork</td>
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Table 1: Overall structure of NSE (Sarheim et al., 2021)

Special activities
The “signature” course of NSE is “Idea search and market assessment” in the first semester of the programme. During this course, students get an introduction to entrepreneurship basics, but use the most of their time and energy on five feasibility studies throughout the semester.

The feasibility studies last for one week each where students work in predefined groups to evaluate the market potential of a business idea. The business idea may come from the students themselves, from an external company, a researcher or through other collaborators. To do the feasibility study, students must call external experts, potential customers, competitors, suppliers, etc. Students write a feasibility study report and present their findings on the last day of each feasibility study. They present in front of a panel consisting of faculty members, entrepreneurs and investors.

Although the format of the report and the presentation is relatively flexible, NSE faculty has defined some areas that should be covered such as a description of the innovation, market and customer characteristics, the required organization to start a company based on the innovation, economic forecasting, and so on. Additionally, a focus on sustainability is also asked for from faculty, and most students choose to cover sustainability explicitly in the report. This is a deliberate choice by faculty to show that sustainability has a natural place in the feasibility study and is not just a mandatory topic to “tick off” in a school exercise. Provided with the choice of how they want to comment on sustainability issues, students are also challenged to reflect on and decide how their specific business idea relates to sustainability issues. The overall practical goal of “Idea search and market assessment” is that the students identify a business idea that they will work on from the start of the second semester at NSE.

In the second semester, students at NSE take the course “Technology-based business development”. The course coincides with the first months of the students’ new ventures and introduces theoretical perspectives on the entrepreneurial process. Deliveries in the course follow the expected progress of students’ ventures, and in these deliveries students are also challenged with questions about sustainability.

Framework
As already mentioned, NSE lets students to a large degree adapt their sustainability focus to the business idea they are working on instead of adapting their business idea to a predefined sustainability framework. This is important since a major goal of most NSE students is to have a viable business at the time of graduation. Thus, faculty is careful not to create barriers to that. During the first year at NSE, the students will receive guest lectures about sustainability from both a more theoretical and a practical perspective. Also, some of the examples of actual new ventures that students are presented and work with during their education have an explicit focus on sustainability.
Assessment
As already mentioned, each of the feasibility study presentations are evaluated by a diverse group of faculty members, entrepre-
neurs and investors. The feasibility study reports are evaluated by two internal examiners at the university. Sustainability topics
are not assessed differently than any other aspect of students’ work at NSE.

Success factors
The main resource for NSE’s success is the students in the programme and followingly the alumni from the programme. A
well-organized recruitment and admissions process is therefore essential to get the most motivated and skilled students into the
programme. Over the years, NSE has developed a reputation as a programme that provides unique learning and unique oppor-
tunities to start a growing company or to get attractive jobs in established companies. The NSE faculty has given students the
main responsibility of recruiting new students into the programme.

Tips and tricks
NSE differs from many other VCPs and entrepreneurship educations in general by providing students with autonomy and ownership
of their learning process. Doing so is important for students’ experiential learning, but it has also enabled to manage the programme
with a limited budget and a limited number of faculty members. Students in the programme are hired as student assistants to
help with teaching tasks, for instance, in group exercises, guest lecturers and administrative tasks. Thus, faculty time is freed to
work with teaching, coaching, mentoring, supervision, psychosocial follow-ups and external relations.

Needs
Although NSE is an attractive and competitive programme as of now, it is important to continuously develop it according to what
new potential students want from it. The trends have pointed to a more “holistic” structuring of the education, also within areas
such as students’ psychosocial health, which was not previously considered a part of the programme itself. Moreover, students
increasingly ask for a sustainability focus in their education, both in terms of the theoretical focus and the types of business
ideas they wish to work with. Therefore, NSE faculty are focusing on how to develop the sustainability focus in the programme.

Scalability
Scalability in terms of the establishment of new programmes that resemble NSE are very good. In 2020, the University of Agder
in Kristiansand established a VCP which is nearly identical with NSE in its design (http://shift.uia.no). In 2022, both Nord University
in Bodø7 and OsloMet8 in Oslo will enroll their first cohorts of students in VCPs that also developed from NSE. Even though the
educational model of NSE has proven successful at NTNU in Trondheim, it is very dependent on and integrated with the local,
regional and national ecosystem for entrepreneurship. Similar initiatives must therefore account for the strengths and weaknesses
of their specific local and regional context.

Today NSE enrolls about 40 students in each cohort. Since each student team has its own office space at campus and is followed
closely by faculty, the programme is restricted in terms of scalability of the number of students in the programme. An important
factor to consider here is that students should all be part of the same cohort, and our experience from other study programmes
is that larger cohorts result in split social environments where students form more isolated sub-groups.

Best practice: Babson Challenge & Sustainability Day

Story
For over two decades, student organizations have provided extracurricular activities related to entrepreneurship at NTNU. Initially,
we had Start NTNU that works to trigger students’ interest in entrepreneurship and innovation, mainly through large events at
campus or in the city of Trondheim. Later on, an increasing number of students started to want support for developing specific
business ideas. The student-driven mentoring service Spark* NTNU was launched in 2014 and has now supported hundreds of
teams of student entrepreneurs (Faucauld et al., 2022; Haneberg & Aaboen, 2020).

7 https://www.nord.no/no/studier/master-i-entreprenorskap-og-forretningsutvikling#
8 https://www.oslomet.no/studier/sam/entreprenorskap
Hence, such extracurricular activities are a complement to specialized curricular programmes such as the NTNU School of Entrepreneurship (NSE) by making student entrepreneurship accessible to all students at NTNU. A core activity in the extracurricular initiatives are networking events and competitions. Following the increased focus on sustainability and sustainable entrepreneurship at NTNU, Engage – Centre for engaged education through entrepreneurship⁹ - adopted the Babson Collaborative Annual Global Challenge¹⁰ ("Babson Challenge") through its membership in the Babson Collaborative.

Babson Challenge involves a feasibility analysis of a new business concept that addresses one or more of the UN Sustainable Development Goals. NTNU students will then first participate in a local competition at NTNU, and the winner continues to the global competition. In 2021, a team from NTNU won the Babson Challenge globally. At NTNU, Babson Challenge is now organized in relation with an open event focusing on sustainable entrepreneurship: The Sustainability Day (Norwegian: "Bærekraftsdagen").

**Impact**

The combined Babson Challenge and Sustainability Day creates impact in at least two ways: First, it supports, celebrates, and further motivates student teams that are already working with promising sustainable entrepreneurship projects. This promotes the second type of impact which is to show students who are less familiar with sustainable entrepreneurship that it could be an attractive endeavor to pursue. Events such as the Sustainability Day is thus a way to support both the smaller group of existing entrepreneurs as well as recruiting upcoming entrepreneurs from the student population.

**Tools and methods**

Competitions and the local support and guidance provided as a preparation to competitions are a well-known type of extracurricular offering to promote entrepreneurship at universities (Pittaway et al., 2011). The tools and methods used in the implementation of Babson Challenge and the Sustainability Day at NTNU are not unique as such but are rather a deliberate combination of activities (competition, pitching, panel discussions, project expo, etc.) that together promote different aspects of sustainable entrepreneurship.

**Special activities**

As mentioned, the Babson Challenge involves mentoring of the participating teams in addition to the competition itself. Also, the Sustainability Day includes different activities throughout the day such as a broadcasted panel discussion involving students, entrepreneurs, and academics. In 2022, the topic of the panel discussion was circular economy and the challenges of circular value chains. An expo of products and services offered by student entrepreneurs was also held, which was open to the public.

**Framework**

Babson Challenge defines sustainability through the UN Sustainable Development Goals, and the NTNU implementation followingly uses the same definition. Hence, the initiative is open to a diverse set of sustainable entrepreneurship projects, whether it is to address environmental challenges, human rights, poverty, or social issues. A core goal of the Sustainability Day is also to promote and celebrate the broader range of student projects addressing sustainability.

**Assessment**

Being a competition, the core assessment in Babson Challenge is the jury evaluation and feedback in both the local and global competition. The students are evaluated based on a rather traditional and well-defined start-up pitch.

**Success factors**

Accessibility, flexibility, and openness are success factors for recruiting NTNU students to participate in Babson Challenge locally. However, it has been a challenge to increase the number of participants since many students prioritize other competitions and grants and/or do not identify themselves as “sustainable entrepreneurs”. Therefore, it is still important that the faculty motivates students to participate in Babson Challenge and the Sustainability Day. An important motivational factor for new participants was that the NTNU team won the global competition in 2021.

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⁹ https://engage-centre.no

¹⁰ https://www.babsoncollaborative.org/student-challenge.html
Tips and tricks

Human resources are needed to administer and carry out the activities related to Babson Challenge and the Sustainability Day. At NTNU, this is partly resolved by hiring student assistants in part-time positions to work on the project. The student assistants are given freedom and ownership of the project but are supervised by faculty members. Therefore, the time required from university faculty members should nevertheless be considered when planning such events.

Needs

The next iterations of Babson Challenge and the Sustainability Day should ideally see more participants, both start-up teams and visitors to the events. Therefore, we must work to increase the attraction and the awareness of the initiative. To do so, we need more knowledge about what motivates students to work with sustainable entrepreneurship. Also, we need champions with available time resources among faculty and students to bring Babson Challenge and the Sustainability Day further.

Scalability

Babson Challenge is a global initiative by Babson College and involves many universities in different countries. Thus, it has proven to be very scalable. However, adaptations must be made in the local competitions to adjust to the local ecosystem and the existing sustainable entrepreneurship projects in that ecosystem. The same goes for Sustainability Day.

Best practice: Boost Henne

Story

Boost Henne is a student-run project located at NTNU, aimed to reach female students who want to explore what it means to work with entrepreneurship or start their own business.

The project started as “kvinne-prosjektet” and has existed since 2017. One year ago, the name was changed to Boost Henne and the project is currently in the process of becoming an actual organization.

Boost Henne is setting up an annual cycle of activities throughout the semester that aims to engage female students to explore entrepreneurship, develop or pursue their business idea. They also build a network of female entrepreneurs, so that girls with an interest in entrepreneurship can make connections across organizations.

Impact

Boost Henne has a goal of creating better gender balance among students who act on their idea of starting their own business. A way of seeing Boost Henne's impact is by looking at the percentage of women who apply for the guidance service at Spark* NTNU, a student driven mentor organization for startups. In 2018, it was 14 percent. In 2021, it had increased to 40 percent, which indicates that the project Boost Henne works!

This contributes to the overall vision of Boost Henne: that equally as many girls as boys dare to start their own business and develop their own product. A more gender-balanced society will contribute to increased equality, better product development and increased value creation.

Tools and methods

In collaboration with Spark* NTNU, Boost Henne offers guidance and assistance to idea owners who want to start their own companies. If students are in the idea phase or have come a long way, Boost Henne has experienced supervisors who can help them take the next step. Boost Henne wants to guide and help women that are in the very early phase of their startup. The supervisor poses as an experienced friend who can help with, for instance, support schemes, prototyping or how to get in touch with the market.

Special activities

Every year, Boost Henne hosts a business simulator, which is a three-day event where students at NTNU go from not having an idea to - after a week - presenting a business idea in front of a panel and potentially winning NOK 25,000.
The business simulator helps students, with a special focus on girls, to take the first step into entrepreneurship. This includes courses, guidance, brainstorming, market analysis, presentation and inspirational lectures. And what is important for such an event is that no prior knowledge is required. You only need to be motivated to test entrepreneurship, to participate! The business simulator has been arranged the last three years and is now one of Boost Henne’s traditions.

**Framework**
Boost Henne is working with the idea of creating a cycle of activities throughout the semester, that introduces, informs, engages and involves new students to the entrepreneurial mindset and network at NTNU. All of this with an increased focus on women, so the vision of gender equality within the entrepreneurial society can be reached.

**Assessment**
It is part of Boost Henne not to have any assessment of the students, as they wish to keep assessment at a low threshold. But with events such as the business simulator, the core assessment is the jury evaluation and the feedback after the final presentation. The students are evaluated based on a rather traditional and well-defined start-up pitch and concepts. In addition to this, Boost Henne wants to follow up on startups that have continued with their business idea.

**Success factors**
One of the main success factors is that Boost Henne lowers the threshold to become part of the entrepreneurial environment at NTNU.

One of the ways of participating in the Boost Henne network is through participating in some of their many events that include mingling with and listening to inspiring women/girls, and to become part of the Facebook group “Girls and entrepreneurship”. This is Boost Henne’s common communication channel through which they share both big and small news, tips, guides, articles, job postings, personal interviews, etc. There is also room to make connections with others across the network as well as to share heart issues.

Boost Henne is committed to being a low-threshold and inclusive environment, which is why no prior knowledge is required at any time or any event!

**Tips and tricks**
One of the reasons why Boost Henne is still a success is their low-threshold events. For example, they invited to celebrate the international Women’s Day on 8 March. This was an arrangement that had nothing to do with entrepreneurship but which mainly focused on connecting women so they could, and still can, empower each other.

**Needs**
To establish an organization, Boost Henne needs more resources in terms of employees and involved persons. They also search for an advisory board in addition to the now four employees and Spark+ as a collaboration partner to create more weight in the guidance and support.

**Scalability**
Boost Henne has developed very much during the last years and has intentions of scaling even more in the nearest future. For example, the organization is planning to arrange a “Boost Ham” event with an increased focus on gender equality.
DENMARK

COPENHAGEN BUSINESS SCHOOL (CBS)

Best practice: CBS Climate Club

Good practices for running a green student initiative
CBS Climate Club is a student organization currently made up of 40+ students from CBS working together to encourage sustainable innovation and business strategies to impact climate change.

Introduction & Motivations
CBS Climate Club was founded in early 2019 at Copenhagen Business School (CBS) with the vision of making CBS students the frontrunners of sustainable business management.

Today, the mission of CBS Climate Club is two-fold; we wish to 1) generate and train the leaders of tomorrow who can help deliver the green transition, and 2) push the frontiers of intellectual capital, punch above our weight and make a big impact in the world.

Not many years ago, in late 2018/early 2019, climate change and sustainability were seen as niche topics in business management. It was in this setting that students of international business and politics found it necessary to create an organization that would put climate change center stage in the future of business. Times have changed. Today climate change/sustainability has become the mainstream in business (note main stream, not mainstream).

The purpose of CBS Climate Club remains the same, but the means to the end have changed.
Activities & Actions
At CBS Climate Club, we undertake a range of activities to achieve our goals. A few examples of best practices:

- **Invest in the members:** The ones who join the organization make an active choice to spend their free time on the organization. They are excellent examples of the people you want to be leaders of tomorrow, because they are already pushing the green agenda. Investing in the members can be an educational effort such as offering courses in innovation frameworks that can support the green transition. It is also about developing leadership skills within the organization. The members of CBS Climate Club received a two-day training in the UNLEASH methodology of innovation along with Fresh.Land, Novozymes and Sustainary. The purpose was to structure innovative ideas and how to leverage them as entrepreneurs. Novozymes and Fresh.Land presented concrete challenges they needed us to solve through the innovation process. For instance, how you could decarbonize last-mile deliver service, and how you could find credible ways to offset hard-to-abate emissions. Another year we offered a carbon literacy course, and every year, members are offered specialized training in their dedicated teams. For instance, Communication teams will be trained by professionals in structured communication, SoMe etc. It requires good connections to establish such initiatives, you have to apply for funding and maintain partnerships to keep it going.

- **Other initiatives are big events at campus.** Here we attract a lot of people who want to hear about a certain topic. We have a speaker or a panel that discusses the theme, usually there will be between 100-300 students present. Such an initiative takes a long time to organise, a dedicated team of around five people work on it for around six months. It includes funding, planning, branding, coordinating and finding the right participants to present. Examples of CBS Climate Club arrangements are Nordea with Sustainable Investments, top executives and politicians discussing sustainable business practices and a start-up event called Do Your Part. Do Your Part was first and foremost about entrepreneurship. Five leading green Danish start-ups presented their business models to the audience, how they create value, what challenges they faced during their journey, and what challenges they face now and in the future.

- **Other events with entrepreneurship as the main theme are Green Impact Week and SDG Tech Awards.** They are annual events where CBS Climate Club honour some of the best green entrepreneurs and unique achievements. It’s a place to debate how to move business plans and society forward to drive more purposeful innovation. This creates a forum where diverse groups, business leaders and students from a wide range of academic fields can discuss how to leverage corporate activism, entrepreneurship and intrapreneurship to move towards a regenerative society. During the Covid-19 lockdown in Denmark, CBS Climate Club also hosted online events with CA (a Danish labour union) on how corporate activism is a crucial part of the green transition. This is a little cliffhanger, as some of these events are not public yet, but follow us and please join us in the conversation for more!

- **There are plenty of other activities you can do.** They range from niche events where specific sustainable practices are presented, over helping students find a sustainable career path, and making big conferences where important stakeholders are included, to building new knowledge on how the green transition should be pushed forward. We aim to support students to develop their entrepreneurial and innovative competences to empower and equip them to be part of the green transition. This is a little cliffhanger, as some of these events are not public yet, but follow us and please join us in the conversation for more!

Lessons learned from running a green student movement are many.

- **People join for social reasons.** Many people join to create a network and to socialize with people who think like they do. Spend your energy on facilitating this. The teams that are successful are always the teams that include social activities in their formal structure. For instance the ones who assign a “cake responsible” for their meetings or find the time to go and eat with each other after meetings. As a leader, you must really care about your team, and you have to dedicate the time to people.

- **Don’t tolerate free riding.** One thing that might be a bit controversial is that you also have to be a bit hard. People get a lot of credit and sometimes even formal points for joining your organization. Some people think they can find the time to be dedicated to the organization, but sometimes they can’t find the time when it comes down to it. A team will struggle if you accept that some people don’t participate, so you have to find a solution, either to get free riders to participate, or ask them to leave. Oftentimes this can be done smoothly, and people understand. Purpose-driven initiatives have a lot of applications, so you can easily explain to people that they are de facto taking someone else’s place, and if they can’t be dedicated, it’s fair to give it to someone else.

- **Big events are difficult.** In order to deliver something big and attractive, you must be ready to put in a lot of work. People often underestimate the workload necessary to do it, and then you end up overloading a few people or having too little time. Plan with a buffer in mind! Also, when making big events, do a pilot to test the format and collect feedback from stakeholders.
• **Direction:** People who join a green student initiative do so because they want to find a way to make a difference. If you have a clear portfolio of activities, people can join when they first start, it’s a lot easier for them to get on-boarded. Once they’re more senior/experienced you can ask them to come up with new initiatives.

• **Rewards:** It sounds like a lot of hard work for nothing, right? Indeed, it is hard work, but if you’re able to see the bigger picture, you’ll know that it’s worth it. Nothing beats the network you get. You work with people with similar interests as you, many of these people will likely be your future colleagues, you’ll have fun together, learn together, and the network and career opportunities that come with it are very much worth it, but only if you really invest in it. Luckily our members do, and most of them stick around for several years.

More about CBS Climate Club can be found here:

https://www.facebook.com/CBScclimateclub/

https://www.linkedin.com/company/cbs-climate-club

**Best practice: Green and sustainable themes in the management of higher education, and implications for future curriculum development**

**Introduction**

The Curriculum Development project at CBS aims to look at current themes and approaches regarding sustainability, green themes and student competences in all courses offered at the business school in order to identify their coverage in study programmes and give educators a better understanding of what is already included and what might be missing in their curriculum.

**Project Motivation**

In recent years, entrepreneurship and sustainable development have been frequently mentioned in higher education strategies and approaches to learning and teaching. However, a more concrete image of what and how it is taught and learnt in classes is still not easy to attain, especially in institutions with a high number of courses and programmes. In order to have a better understanding and an “as-is” picture of what is currently approached in curriculum at business schools regarding sustainability and green themes, the Curriculum Development project looked at key words and context encountered in all courses and presented the findings in such a way that study boards or faculty in programmes can easily identify the focus points in a study programme and what lacks in coverage. Knowing what we are already doing and what we still need to address regarding green themes and sustainability in education can foster development and innovation in the fields that still need to be covered.

**Actions**

The project is a long-term research on curriculum content. It involved all courses at all programme levels at CBS, thus indirectly, all students are taken into consideration (approx. 22,000).

The project had an initial phase, which ended in 2019 with the publication of reports for all Bachelor (undergraduate) programmes, and we are currently in the second phase, where data is gathered for all programmes and reports produced for all programmes. We have started with pilot programmes and are now preparing reports for all programmes.

The initial stage of the methodology is to gather data available on the course catalogue. The data is then separated into Course Descriptions (CD), Learning Objectives (LO) and Competency Profiles (CP). Both mandatory and elective courses were analysed.

The data is then analysed for key words and checked for context before it is coded to a specific code: Sustainable Development Goal, Green Themes, Nordic Competences.

Once results are extracted from the analysis tool, they are included in individual reports for study programmes, faculty, senior management and other stakeholders to review and use as a starting point for discussions on curriculum approach, content and development within the programme and within CBS as a whole. A better informed education practice would then inform policy and action at a broader level.
Results and future work

The pilot reports have so far been well received by study programme directors and other curriculum initiatives at CBS. We are constantly looking for ways to develop the methodology as well as the results and reports with qualitative data and information that would aid in further curriculum development. The aim is that study programme directors can use the reports to also see the red thread of green themes and sustainability within their programmes and develop the content. In developing the content of green themes and sustainability it is possible to further develop entrepreneurial knowledge that allows students to recognize humanity’s challenges and resolve them.

The same methodology and initiative can be replicated for other themes and focus points in the curriculum, should the study board directors decide to look into content on different themes relevant to their educational aims. For example, the methodology can be applied to specific courses within entrepreneurship education as well, in order to identify the key elements of green themes and sustainability which are already discussed or planned to be included in curriculum.

We are planning to replicate and expand the project to include Bachelor and Master thesis projects within the coming academic year. The project is replicated every year with the aim of analysing changes and trends in curriculum focus and content.
**Picture 1:** Green theme coverage shown by source type (CD, LO, CP)

**Picture 2:** Green theme coverage shown by course type: mandatory or elective
AARHUS UNIVERSITY (AU), THE KITCHEN

Best practice: Build a sustainable startup - workshop as part of the Toolbox-series

https://thekitchen.io/events/?posts=archive

The Kitchen is the biggest interdisciplinary incubator at Aarhus University. As such, we want to support existing and upcoming entrepreneurs in developing sustainable start-ups either by building the sustainability perspective into the very core of the business idea or by adding substantial sustainable elements into an existing business idea. This workshop is an initial attempt to inspire and support entrepreneurs and upcoming entrepreneurs associated with the incubator, but also externals.

Impact
Since the workshop has only been held once a few months ago with a small number of participants, it is very difficult to claim any impact. Short workshops (three hours) are typically able to create a limited impact. This is why we primarily want to spark interest and motivation for working with the sustainability perspective, even if this is not the primary motivation for starting up a business, among other things by showing why and how to start integrating this perspective in different aspects of a business.

Tools and methods
After a short introduction to the history of sustainability as well as to core concepts such as triple bottom line and the SDGs, we move on to introduce two tools/models: Abundance Cycle Canvas (Friedlander, 2016), and Triple layered business model canvas (Joyce, A. & Paquin, R. L. (2016). The first mentioned is mostly applicable in well-established companies that were not founded on a sustainable business idea and in a context where you want to develop and implement several smaller sustainable initiatives. The latter is more suitable for very early-stage ideas/ventures, where the entrepreneur intends to build the sustainability perspective into the business idea from the beginning so that it becomes an essential part of the business model. After the introduction, the participants get a chance to experiment with one of the two tools. At the end of the workshop, a researcher speaks about sustainability communication and associated pitfalls. In addition, we invite at least one guest speaker to present some perspectives on working with sustainability in practice.

Framework
This workshop is part of a series of free stand-alone workshops offered to students and researchers at Aarhus University as well as externals. In the longer run, we consider to either prolong the workshop or build some elements of it into our mandatory workshops for the entrepreneurs in the incubator.

Assessment
The participants’ learning outcome is not formally assessed since the workshop is organized as an extracurricular activity. However, we do carry out an evaluation of the participants’ satisfaction with the workshop.

Success factors
As mentioned previously, a huge learning outcome from a three-hour workshop is unlikely. However, we want the participants to leave the workshop feeling more motivated for and competent at including the sustainability perspective in their venture, regardless of the stage of the start-up. One of the ways to establish this is to observe whether the participants seem to find the tools relevant and take the chance to experiment with one of the tools because it seems meaningful to them. Long-term success factors are interesting, but difficult to define, because it is very doubtful that a three-hour workshop alone will cause the participants to create major changes in their venture, but smaller chances are also important.

Tips and tricks
If the workshop is offered to a broad audience, it can be a good idea to have a case ready for those who are not working at a business idea yet (and are not ready for it). Alternatively, you can set prerequisites for participating in the workshop.

Scalability
The workshop is relatively easy to offer to more participants, at least the sections that consist of presentations. For the more interactive parts, several competent facilitators are needed. The presentation parts could also be offered online either as an asynchronous or synchronous class.

11 Apart from sustainable in a strictly economic sense
CONCLUSION

In recent decades, sustainable development has moved further and further up the global agenda. Engagement with climate issues, especially amongst young people, has seen explosive growth, and the UN’s launch of the 17 Sustainable Development Goals (SDGs) in 2015 marked a clear global shift, leading foundations and investors to begin demanding a clear focus on sustainability.

Sustainability as a subject is generally in very high demand among students and within organisations in the university innovation ecosystem in the Nordics, such as incubators and holding companies. These days, many of the universities and HEIs also have a sustainability strategy or have sustainability as part of their strategies. Today entrepreneurship is, to a far greater extent than in the past, regarded as a career path for students. By highlighting successful companies that have a sustainability focus, we can create role models that can further accelerate this transition.

In this project we have focused on sustainable entrepreneurship across Sweden, Norway, Denmark and Estonia and presented some of the most recent courses and initiatives within Nordic and Estonian HEIs and within the incubator environments.

The guidebook has described a total of 17 cases and courses (links to further practices are in the appendix). We have also provided an outline of how the field of sustainable entrepreneurship at the HEIs has developed, using Sweden as an example of how to boost the ecosystem and grow interest at HEIs.

The guidebook with its many innovative cases shows that sustainable entrepreneurship is a growing field in the Nordics, representing substantial innovation with valuable learnings for a wider European take-up. It is therefore important to support this development by sharing experiences and developing new partnerships among higher education institutions and external stakeholders in the field of sustainable entrepreneurship.

With this report, the NordSEnt partners want to contribute to a solid platform of insight examples and recommendations that can be used for continuous knowledge-sharing and new collaborations among organizations that work with sustainability and entrepreneurship in HEIs.
REFERENCES


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APPENDIX: ADDITIONAL COURSES AND INITIATIVES FROM ACROSS THE REGIONS

SWEDEN

Chalmers University of Technology

Activities
Chalmers Entrepreneurship Society (CES) (https://www.facebook.com/chalmersentrepreneurshipsociety/) is an association that focuses on entrepreneurship. It shares some facilities with Chalmers Students for Sustainability (CSS), thus creating a natural collaboration hub around entrepreneurship and sustainability. CES always sets out to solve sustainability challenges from an entrepreneurial perspective. To do this, the society arranges workshops, networking events, case nights and competitions.

Miljöbron (https://miljobron.se/vast/) is a sustainability-focused, member organisation that promotes commitment, provides resources and drives innovation for the future of entrepreneurship. It helps students to build sustainable organisations of the future, while simultaneously allowing them to develop their CVs, forge new contacts and gain experiences to kick-start their career.

Education
Business Development and Entrepreneurship (https://www.chalmers.se/sv/utbildning/program-pa-grundniva/Sidor/Affarsutveckling-och-entreprenorskap.aspx) is based on both engineering and social sciences, and also incorporates sustainable development throughout the programme. Many courses in the programme are project-based. Group work and presentations are common, giving students an opportunity to improve their relationship-building skills. Several courses include elements of both business development and entrepreneurship. Students also run business development projects in cooperation with companies, giving them an insight into the business world.

Master of Sciences in Product Development (https://www.chalmers.se/en/education/programs/masters-info/Pages/Product-Development.aspx) focuses on multidisciplinary product development while taking user needs and all phases of a product’s life cycle into consideration. Development work today is typically characterised by multidisciplinary, international teamwork, as well as efforts to consider multiple issues related to the product and its life cycle simultaneously. Product development is a core industrial activity that addresses all of these aspects; it is a multidisciplinary process of identifying and envisaging the needs of the user, company and society, and bringing those needs to life.

Links to relevant courses
Practical leadership and entrepreneurship

Creating technology-based ventures

Business development and entrepreneurship

Science, innovation and entrepreneurship

Technology-based entrepreneurship
https://student.portal.chalmers.se/en/search/Pages/default.aspx?q=cip017

Patents and innovation engineering

Innovation economics

Management and organisation of innovation and R&D

Circular economy

Managing stakeholders for sustainable development
Karlstad University

Activities
The Fyrklövern innovation office (https://www.kau.se/en/research/collaboration-researchers/innovation-cooperation/innovation-office-fyrklövern) arranges an informal meeting via Zoom once a month to which many actors are invited, including researchers. Attendees discuss sustainability, often with a focus on the environment. An arena or conference on the theme of sustainability in Värmland is needed. Those interviewed in the region feel that Värmland is lagging behind in this area.

Karlstad Innovation Park (https://karlstadinnovationpark.se/english/) links businesses, academia and the public sector. It offers custom processes to both new entrepreneurs and established companies. The innovation park is home to companies and organisations that want to grow through collaboration with other companies, researchers and the community.

Ecosystem
The Grants and Innovation Office (GIO; https://www.kau.se/en/research/research-support/support/grants-and-innovation-office) acts as a university incubator and provides funding support. In addition to providing strategic support to the university and faculty administration, GIO staff members offer expert advice to researchers in connection with research applications, and with the purpose of utilising and commercialising products or ideas.

The GIO works directly with researchers. It also cooperates closely with faculty innovation coordinators and with project managers who are responsible for running overarching university projects within the GIO’s area of responsibility.

Karlstad University Innovation AB (https://www.kau.se/en/external-relations/research-and-innovation-collaboration/innovationssamverkan/karlstads), established at the beginning of 2018, is a wholly owned subsidiary of Karlstad University Holding AB. This company acts on behalf of Karlstad University as needed in the surrounding innovation system – regionally, nationally and internationally.

To some extent, this holding company has the ability to influence education programmes and it offers a doctoral student course providing a number of credits. The research objective at the basic level is to become more focused on sustainability.

Karlstad University has chosen not to operate incubators under its holding company, but instead works in cooperation with external incubators and accelerators. These incubators work predominantly in forest bioeconomy, but are also active in areas such as digitalisation of welfare services. A focus on sustainability is steadily growing as a requirement among incubators. Without this focus, it is not possible to enter the incubators or seek funding.

Sting Bioeconomy (https://stingbioeconomy.com/) supports start-ups and business ideas in the field of bioeconomy, services or products that may, in one way or another, help us to preserve the earth’s finite resources. This incubator offers guidance, paths to funding, recruitment, networking, marketing and communication, and office space. Its start-up programmes focus on innovation within bioeconomics, for example renewable raw materials from the forest, soil and sea to replace fossil fuels and other materials.

Education
Master of Science in Industrial Engineering and Management (https://www.kau.se/en/education/programs-and-courses/programs/TACIE) offers a common core base and then invites students to choose between five exciting fields of study. The programme has courses in entrepreneurship and sustainability, including sustainable entrepreneurship. Students with an MSc in Industrial Engineering and Management will use their engineering knowledge and management skills to solve problems relating to management and governance of technology-based industries. They will serve as a bridge between technology specialists who lack knowledge of financial management and leadership, and business economists who lack technical knowledge.

Idea Management in the Front End of Innovation (https://www.kau.se/en/education/programs-and-courses/courses/IEAD06) is a course focusing on the idea development process linking an organisation’s idea management to sustainability. The course is based on an idea development process and divides idea management into four sub-areas.

Business Ethics and Sustainable Business (https://www.kau.se/en/education/programs-and-courses/courses/FEGB34) is a course aimed at preparing students to achieve equality, corporate social responsibility and sustainability in their business activities. Achieving these objectives often involves an organisation going through an extensive process of adaptation in terms of business development and marketing communication. Many organisations lack basic knowledge of what is required to do this. Through this course, students develop a broad understanding of how this can be achieved. From a holistic perspective, students analyse, identify and formulate an ethical challenge relating to a current event or phenomenon with relevance to the course content.

Links to relevant courses
Master Programme in Innovation and Service Development

Innovation Management
https://www.kau.se/en/education/programs-and-courses/programs/IEAD03

Idea Management in the Front End of Innovation
https://www.kau.se/en/education/programs-and-courses/courses/IEAD06

Operations Management

Sustainable Product Development for Industrial Engineering
Entrepreneurship
https://www.kau.se/en/education/programs-and-courses/courses/IEGC02

Sustainable Business and Leadership
https://www.kau.se/en/education/programs-and-courses/courses/FEAD47

Sustainable Product Development
https://www.kau.se/en/education/programs-and-courses/courses/MSAD19

Facility Management from a Service Perspective
https://www.kau.se/karlstads-universitets-uppadras-uppadrautbildningar/ledarskap-kommunikation-3

Linköping University

Activities

Navitas (https://www.navitas.se/) is the largest student organisation with a focus on sustainable development at LiU. It brings students with a passion for sustainability together with other students and organisations to inspire each other. Examples of activities include prizes for entrepreneurs and lunch lectures with companies, to create sustainable innovation.

Circularis (https://liu.se/en/article/circularis) is a project that aims to develop innovative support for Swedish manufacturers who want increased resource efficiency and sustainability in their products and services. The circular economy is stressed as a new economic model that addresses with recycling of products and materials through e.g. upgrading, maintenance, repair, reuse, sharing, remanufacturing and remodelling.

Engineers Without Borders (EWB) – The Reflective Engineer (https://volunteer.ewb-swe.org/departments/the-reflective-engineer) arranges seminars and activities highlighting current challenges in developing technology for a sustainable future. The goal is to highlight the role of engineers in contributing to a sustainable future.

Ecosystem

LEAD Incubator (https://www.lead.se/) is a business incubator linked to Linköping University aimed at growing companies that will benefit society. There is no separate track for sustainability, but all incubator companies in general incorporate economic and social sustainability aspects. The aim is to integrate sustainability throughout the companies, but also to realise and explore sustainable market opportunities.

LIU Holding (https://liu.se/en/organisation/liu/lhg) is owned by Linköping University. The holding company participates in educational initiatives inside the university and informs students how the holding company and the incubator work. Research funding is increasingly focused on sustainability, and students learn early on that they must aim to make an impact towards the UN's SDGs.

Linköping Innovation (LIU Innovation; https://liu.se/en/article/liu-innovation) supports students, researchers and staff at Linköping University to develop ideas from early concept to finished products or services. LIU Innovation has two tracks with a focus on sustainability – LIU Changemakers and LIU Impact Factory. Both programmes aim to accelerate solutions linked to Agenda 2030.

Vreta Kluster (https://www.vretakluster.se/in-english) is a business park, a meeting place and an arena of development agriculture, forestry, animal husbandry, food, renewable energy, aquaculture and horticulture.

Linköping Science Park (https://linkopingsciencepark.se/) is a company owned by the municipality. It works to ensure that the 350 companies with 6,500 employees grow and develop in the best possible way. Its strategy of having an open environment with proximity to international large companies, launching small start-ups and focusing on world-leading research leads to exciting collaborations and projects.

Education

Innovative entrepreneurship, TEIO06 (https://studieinfo.liu.se/en/kurs/teio06/vt-2021) is aimed at enabling students to acquire knowledge and skills in entrepreneurship, with a particular focus on idea feasibility analysis and business planning for new, innovative ventures. A CBL approach is used in this course. This is defined as "an experiential learning approach that starts out with wicked, open and sustainability-related real-life challenges that students, in multidisciplinary teams, tackle in their own way and develop into innovative and creative solutions which are presented in open forums".

Environmentally Driven Business Development, TKMJ49 (https://studieinfo.liu.se/en/kurs/TKMJ49) is a course that aims to develop the students’ ability to develop and plan a business solution to address an environmental problem. It also focuses on entrepreneurship, innovation and business activities in general and in the context of environmental technology more specifically. The course is run in close cooperation with Tekniska verken, incorporating a circular economy framework. Over the years, the course has also partners with other environmentally focused tech firms. Students combine knowledge of the environment and environmental technology with innovation and entrepreneurship.

Links to relevant courses

Master of Science in Energy – Environment – Management
https://studieinfo.liu.se/en/program/6cemm/4194

Master’s Programme in Sustainability Engineering and Management
https://liu.se/en/education/program/6msus

Sustainable Business – an ecological perspective
https://liu.se/en/education/course/723g51
SUSTAINABLE ENTREPRENEURSHIP IN THE NORDIC AND BALTIC REGION

Innovation Management
https://studeinfo.liu.se/en/kurs/teio90/ht-2018

Corporate Social Responsibility

Project course – advanced: Sustainable Business Development
https://studeinfo.liu.se/en/kurs/tmpi04/ht-2020

Bachelor Thesis – Energy and Environment Engineering
https://studeinfo.liu.se/en/kurs/tmpj41/vt-2018

Innovative Entrepreneurship
https://studeinfo.liu.se/kurs/TEIO06/vt-2022

Environmentally Driven Business Development

InGenious – Cross Disciplinary Project
https://liu.se/en/education/course/799g52

Luleå University of Technology

Activities
Innovation Day 2021 (https://www.liu.se/ltu/Samverkan/Hallbarhet-och-smarta-losningar-pa-Innovationsdagen-2021-213689?l=en) brought together innovators and entrepreneurs who presented a wealth of exciting ideas. The aim was to offer information and inspiration, and to encourage more people to become engineers. The green transition is opening up fantastic opportunities for new innovation. Sustainable food production and non-toxic flame retardants were two of the highlighted topics at the event.

The Universities of the future – impact of the pandemics (https://www.liu.se/ltu/calendar/Konferenser/Framtidens-larosaten-pandemins-paver-kan-1205492?l=en) was a conference focusing on how the pandemic has been a catalyst for change in the higher education system. The event included a discussion on how to create an innovative undergraduate programme that is flexible, choice-based, dynamic, authentic, multidisciplinary, geared towards difficult sustainability challenges, and which involves integrated, student-owned assessments.

Ecosystem
Arctic Business (https://www.abi.se/) has built over 170 tech start-ups with offices on every continent and is constantly hosting innovators from all over the globe. Together with its partners, Arctic Business offers the perfect environment for ideators, creatives and entrepreneurs. This incubator has a strategy focused on sustainability and its start-ups have completed a programme with this focus.

LTU Holding AB (https://www.ltu.se/org/LTU-Holding?l=en) only scales up two or three companies each year following a thorough selection process where those selected are considered to have the greatest growth potential. This holding company has its own equity firm (Lunova) which finances the companies. All of the companies – which include deep tech enterprises – are required to incorporate a sustainability perspective.

Education
Master Programme in Engineering, Sustainable Production (https://www.liu.se/edu/program/TCHPA/TCHPA-Civilingenjor-Hallbar-produktion-1212012?l=en). The new Master of Science in Sustainable Production is one of the few master’s programmes in Sweden with a focus on the transition to sustainable production in industry. Each module takes a holistic approach to sustainability, incorporating analysis of ecological, economic and social sustainability. Anyone studying a Master of Science in Sustainable Production will gain broad knowledge and expertise and will be able to secure a key position in industry. Students acquire knowledge and tools to shape technology, organisational structures and systems for sustainable development of the future.

Sustainable Business (https://www.liu.se/edu/course/G70/G7002N/G7002N-Hallbart-foretagande-1214883?l=en). This course addresses the work companies are doing on current sustainability challenges. It is divided into three modules. One of them aims to provide an overview of current sustainability challenges and progress on sustainability in the private sector, with a focus on how companies and organisations implement, manage, report and communicate sustainability. Another module focuses on current research on sustainable business linked to various business practices and how different research perspectives can facilitate an examination and analysis of companies’ sustainability work. The third module focuses on identifying and analysing companies and/or business operations that are aiming to integrate sustainability into their core processes.

Links to relevant courses
Master Programme in Industrial and Management Engineering
https://www.liu.se/edu/program/TCEIA/TCEIA-Civilingenjor-Industriell-ekonomi-176864?l=en

Master Programme in Industrial Design Engineering
https://www.liu.se/edu/program/TCTDA/TCTDA-Civilingenjor-Teknisk-design-176880?l=en

Master Programme in Applied Artificial Intelligence
https://www.liu.se/edu/program/TCAIA/TCAIA-Civilingenjor-Tillampad-artificiell-intelligens-1201990?l=en
Master Programme in Sustainable Process and Chemical Engineering

Artic Mineral Resources
https://www.ltu.se/edu/program/TMAMA/TMAMA-Arktiska-mineralresurser-1.201984?l=en

Master Programme in Architectural Engineering
https://www.ltu.se/edu/program/TCARA/TCARA-Civilingenjor-Arkitektur-1.76852?l=en

Master Programme in Green Networking and Cloud Computing

Master Programme in Climate Physics Engineering
Master Program in Climate Physics Engineering, Program, - Luleå University of Technology (ltu.se)

Master Programme in Business and Economics
https://www.ltu.se/edu/program/FYCEA/FYCEA-Civilekonom-1.76760?l=en

Sustainable Business, course
https://www.ltu.se/edu/course/G70/G7002N/G7002N-Hallbart-foretagande-1.214883?l=en

Lund University

Activities
Teknolögikåren (https://en.tlth.se/) has two projects: Innovation Week and Sustainability Week. At Innovation Week, students have the opportunity to interact with start-ups in a trade fair forum and through lunch lectures. Sustainability Week is a week of lunch lectures, panel discussions and other interactive events focusing on sustainability. During the week, companies are invited to talk about their sustainability work and students have the opportunity to present their ideas and provide input.

Sustainable Future Hub (https://www.lusem.lu.se/collaborate/sustainable-future-hub) is a collaboration hub for students, researchers and external actors focusing on economic and social sustainability. Sustainable Future Hub catalyses projects and collaborations where different actors can work together to drive development in the area of sustainability.

Within the Master’s Programme in Entrepreneurship and Innovation (see below), and as part of several other entrepreneurship courses, many guest lectures take place with a focus on the circular economy and circular business models. The Sustainable Business Model Canvas is also used in several courses and programmes, and the SDGs are integrated into assignments in various courses. A number of the mentors also work within the area of sustainability.

Ecosystem
LU Innovation (https://www.innovation.lu.se/en/) is the University’s hub for innovation and constitutes a place where students and researchers can convert business ideas and research results into innovations. LU Innovation is part of FSI, Lund University’s research, collaboration and innovation division, and is tasked with supporting innovation. It helps researchers and – via VentureLab – students, to develop their research results and ideas and to fund innovation projects, and provides expertise on intellectual property protection and legal issues.

LU Innovation manages a range of projects and programmes in collaboration with other stakeholders. One example is Innovationskontor Syd, the joint innovation office for all the universities in southern Sweden. Another example is SWElife, a strategic innovation programme coordinated by LU Innovation and funded by the Swedish public innovation agency Vinnova.

Venture Lab (https://www.venturelab.lu.se/home) is a part of Lund University and aims to inspire students and new graduates to try out entrepreneurship and innovation. They do this through inspiring events, programmes, an incubator, a large network and a supportive community.

Investments are managed by LU Holding AB (https://www.innovation.lu.se/en/index.php/lu-holding) which is owned by the Swedish state but managed by Lund University. LU Holding’s mission is to create new businesses from ideas and research results from Lund University that will contribute to growth and create jobs in Sweden.

LU Holding invests in innovative companies that have substantial growth potential and a committed team. Over the past two years, is has increased the focus on sustainability in the new companies. A consultant has developed models for how to work on sustainability. Sustainable production processes and transport are among the key focus areas. LU Holding has noticed that companies today are thinking more about sustainability before scaling up. Researchers should also be made more aware of the need for sustainable research solutions and innovation.

Ideon Innovation (https://www.ideoninnovation.se/) evaluates around 200 ideas annually. Of these, 10–15 are admitted to the incubator process. The reason an enterprise is not accepted is often that it is in a very early a phase and needs to work more on developing its team, offering and customer verification methods. For these entrepreneurs, Ideon Innovation offers an incubator preparation programme, where they get the opportunity to build further on their idea and will hopefully have the opportunity to enter the incubator process after six months.

Smile (https://www.smileincubator.life/) is a non-profit business incubator for life science start-ups with a vision of creating a future of better health by nurturing a community of passionate life science innovators. The incubator does this by offering advanced coaching programmes, well-equipped labs with state-of-the-art equipment, a large international network of industry partners and investors, and a community of world-class life science innovators.
Education

ENTN10 Business Model Development (https://www.lu.se/staff-pages/media/studies/msc/curriculum/eagei.pdf) is a course within the Master’s Programme in Entrepreneurship and Innovation. In this course the students learn about various types of business models. They also gain an understanding of what business model development involves and are provided with the skills they need to develop, iterate and test business models. The course includes a Live Case assignment with IKEA Circular to design a circular/pay-per-use furniture business model for households and workspaces.

Master’s Programme in Environmental Management and Policy (https://www.iiiee.lu.se/education/masters-program-environmental-management-and-policy-emp). The courses in this programme cover environmental science, business management, economics and technical systems. From the second semester, the courses focus on various challenges and the application of knowledge gained. This involves projects in cooperation with external organisations as well as individual research.

Links to relevant courses

Entrepreneurship and Project Management
https://kursplaner.lu.se/pdf/kurs/sv/ENTA70

Master’s Programme in Entrepreneurship and Innovation
https://www.lu.se/staff-pages/media/studies/msc/curriculum/eagei.pdf

The International Institute for Industrial Environmental Economics – Master’s Programme in Environmental Management and Policy (EMP)
https://www.iiiee.lu.se/education/masters-program-environmental-management-and-policy-emp

Environmental Management and Policy – Master’s Programme
https://www.lunduniversity.lu.se/lubas/i-uoh-lu-XAMIS

Innovation and Global Sustainable Development – Master’s Programme
https://www.lunduniversity.lu.se/lubas/i-uoh-lu-EAIGH

Sustainable Energy Engineering – Master’s Programme
https://www.lunduniversity.lu.se/lubas/i-uoh-lu-TAHET

Agenda 2030 – Knowing, Measuring and Leading
https://kursplaner.lu.se/pdf/kurs/sv/MESC02

Industrial Environmental Management
https://kurser.lth.se/kursplaner/21_22/KIIF01.html

Innovation Management
https://kurser.lth.se/kursplaner/21_22/INNN15.html

Business Model Development
https://kursplaner.lu.se/pdf/kurs/sv/ENTN10

Royal Institute of Technology

Activities

KTH Executive School (https://kthexecutiveschool.se/courses-2/) specialises in helping leaders manage disruptive business landscapes. Through a short but intense course in Sustainable Digital Innovation, students get tools to drive sustainable innovation across businesses.

In KTH Innovation’s pre-incubator program (https://www.kth.se/en/om/innovation/program-extra-stod/forinkubator-program/kth-innovations-for-inkubatorprogram-1.414438) students have office space on campus to be part of a supportive work environment. They also receive extra support to develop their ideas together with other teams in the programme.

Drop-in Sustainability (https://www.kth.se/en/student/kalender/hallbarhetseven/drop-in-hallbarhet-1.1114779) is organised by KTH Students for Sustainability. The purpose is to bring people together, educate KTH students on sustainability and create an environment of collaboration between sustainability and entrepreneurship initiatives.

Ecosystem

KTH Innovation (https://www.kth.se/en/om/innovation) supports students, researchers and employees at KTH who want to develop new ideas or who want their research to have an impact through commercialisation. There is close cooperation with regional and international partners aimed at enabling more technology and knowledge from KTH to have an impact in society.

KTH Innovation works together with students, giving them an opportunity to work on fictitious projects and write business plans. Students with an idea can take a course to help turn it into reality. Within the framework of their course of study, many of the students can try to commercialise their business ideas through summer internships or can work on their Master’s degree project within the incubator.

Since 2013, KTH Innovation has had its own framework, KTH Innovation Readiness Level®, as a basis for its support activities. Recently, sustainability has been integrated at all levels in the model. The model has also attracted a lot of international interest. So far, over 500 organisations all around the world have up signed up to access this concept.
KTH Holding AB (https://www.holding.kth.se/) is a state-owned company managed by KTH's university board. The company invests in promising start-ups based on KTH research or education programmes, with the aim of supporting the commercialisation process and making it easier for new science to benefit society. The company also focuses on sustainable entrepreneurship and aims to channel 75 percent of its investments towards sustainability, with an emphasis on the UN Sustainable Development Goals (SDGs). Students with projects without a clear sustainability connection are encouraged to think more along these lines early on in the process.

Some investors are still focused on high profitability and not necessarily on creating real change. The company may support cases that are not entirely sustainable.

Education


**Story**

The MSc in Integrated Product Design offers two specialisation tracks: Industrial Design Engineering, and Innovation Management and Product Development. During the programme, students have contacts with industry and projects are often conducted in co-operation with companies or organisations, providing students with valuable practical experience.

The Innovation Management and Product Development track focuses on managing innovation and product development processes. Students study and work on innovation in three ways: developing new products, services and business models, organising and managing innovation processes from both a development project perspective and an organisational structure perspective and, finally, working on innovation strategies in new business development. Cutting-edge research in innovation management and product development is an important element, as is strong collaboration with industry.

In the programme, students become familiar and well-equipped with tools that will help them systematically organise, lead and manage various types of product development projects and the challenges associated with them. They also gain knowledge and skills identified as being crucial for organisations to survive and prosper and to meet the great challenges facing our society.

**Tools and methods**

As sustainable development is an integral part of all programmes at KTH, graduates have the knowledge and tools to move society in a more sustainable direction. Three key SDGs are addressed by the programme: Goal 9 – Industry, Innovation and Infrastructure; Goal 11 – Sustainable Cities and Communities; and Goal 12 – Responsible Consumption and Production.

It is of utmost important to tackle the challenge of transforming industry into a fully sustainable system. In the programme this is tackled on at least three levels:

- On a system level the programme pushes a circular approach, including moving into a service paradigm with business models based on providing shared functionality rather than just pushing stuff to the market.
- On a product level, where products need to be designed for use, repair, refurbishment and reuse, while also taking the choice of materials and production methods into close consideration.
- Finally, KTH research points to the need to also be innovative in the areas of management, organisational structures and business models in order to change the present linear paradigm into a circular one.

Tools have been introduced and are used in the programme to help students systematically organise, lead and manage different types of product development projects and the challenges related to them. Students acquire knowledge and skills that have been identified as being crucial for organisations to survive and prosper, and to meet the great challenges facing our society.

**Special activities**

Students take an initial course and they are then invited to develop their ideas into products.

Many of the researchers at the department have recently become engaged in the challenge of sustainable mobility in cities. One focus area is accessibility, i.e. providing more of the services people need at walking distance from their homes. Another focus area is providing mobility as a service (Maas) as a way of breaking dependency on car ownership.

The Green Leap research team addresses sustainability challenges using design methods, often in partnership with companies, organisations and design practitioners. A Living Lab method is often used to gain useful insights into people’s behaviour and their willingness to change in a sustainable direction.

**Framework**

Although the university is stuck in an old structure, there are some local initiatives. Global Hub, with innovation projects focused on urban environments, is one example. There are also some activities in partnership with Stockholm University, and collaboration between engineers and medical students. Students from some African universities also come to Sweden as part of their study programmes.

**Needs**

The university needs a vice-chancellor who emphasises innovation and entrepreneurship. KTH is very large and fragmented. People typically work on their own, which means that few common educational initiatives are created. This needs to be addressed at the vice-chancellor level. Sustainability is on the agenda but entrepreneurship is not as yet.

A basic course in entrepreneurship would give so many more students an opportunity to see a career as an entrepreneur and in business as an option.
Scalability

In order for students to develop their ideas they should be given opportunities to do so without risk in a protected environment. This is absolutely essential. Having courses where students can start developing their ideas and building prototypes will give them an opportunity to then test their idea in an incubator. KTH does not have this process today and it needs to be implemented.

A very important aspect for anyone studying management and engineering would be to develop awareness of what entrepreneurship can look like for engineers.

Master’s Programme in Entrepreneurship and Innovation Management (https://www.kth.se/student/kurser/program/TEILM/20212/arskurs1?l=en) was launched in the fall 2021. The programme aims to provide deep knowledge of established and newer theories and models within the field of innovation and entrepreneurship, as a complement to and an extension of previously acquired technical and scientific knowledge. It also provides a thorough understanding of scientific and practical methods for assessing, developing and running creative and innovative projects, in either existing companies or new enterprises.

Master of Science in ICT Innovation (https://www.kth.se/en/studies/master/ict-innovation/). The main subjects are computer science and electrical engineering. The programme combines advanced technical education in information and communication technology with business-oriented courses focusing on innovation and entrepreneurship, preparing future ICT engineers to exercise an entrepreneurial mindset to contribute to digital transformation. The courses focusing on innovation and entrepreneurship emphasise sustainability and are taken by all students in the programme.

Master of Science in Transport, Mobility and Innovation (EIT Urban Mobility) (https://www.kth.se/en/studies/master/transport-mobility-innovation) integrates traditional engineering disciplines with innovation and entrepreneurship. New technology and business models are transforming the world’s cities and the way we move around. This transformation requires engineers who can construct urban environments that consume fewer resources, are more sustainable and support more liveable communities and workplaces.

Links to relevant courses

Master of Science in Industrial Engineering and Management
https://www.kth.se/utbildning/civilingenjor/industriell-ekonomi/industriell-ekonomi-civilingenjor-300-hp-1.4891 (only in Swedish)

Master of Science in Integrated Product Design

Entrepreneurship in Technology and Health
https://www.kth.se/student/kurser/kurs/CM2008

Innovation and Entrepreneurship in Sustainable Energy Technology
https://www.kth.se/student/kurser/kurs/CM2008

Business Economics and Entrepreneurship
https://www.kth.se/student/kurser/kurs/HE1201

Entrepreneurship in Developing Countries
https://www.kth.se/student/kurser/kurs/ME2828

Innovations for Sustainable Development on a Local or Global Level
https://www.kth.se/student/kurser/kurs/AE1707

Innovation and Entrepreneurship in Electric Power Engineering
https://www.kth.se/student/kurser/kurs/EI2600

Product Innovation
https://www.kth.se/student/kurser/kurs/MF2046

Innovation and Product Development Processes
https://www.kth.se/student/kurser/kurs/MF2085

Energy Systems, Business and Management
https://www.kth.se/student/kurser/kurs/ME2146

Challenge Driven Innovation for Sustainable Development
https://www.kth.se/student/kurser/kurs/MF2089

Innovation and Entrepreneurship in Sustainable Energy Technology
https://www.kth.se/student/kurser/kurs/ME2828
ESTONIA

Tallinn University. School of Educational Sciences
Educational Innovation and Leadership, Master’s studies

Tallinn University. School of Governance, Law and Society
Social Entrepreneurship, Master’s studies

The Social Entrepreneurship programme is a progressive educational initiative of Tallinn University with the aim to promote entrepreneurship and the innovation of the social and health sector, environmental protection, urban development, rural development and community development.

The programme provides with a flexible opportunity to develop your own ideas using the innovative and business-friendly infrastructure of Estonia and being supported by experts of Tallinn University.

Tallinn University – EXU Academy
EXU = Company x University
https://www.exu.tlu.ee/exu-akadeemia-salvestused

Tallinn University’s Development and Cooperation Center EXU brings together companies and organizations with university researchers to work together to develop future-proof solutions to practical problems. We have nearly 400 researchers and lecturers, among whom entrepreneurs can find like-minded people to implement their ambitious ideas.

EXU Academy is a series of short lectures and discussions in the format of a themed morning coffee, which is organized in cooperation with the Tallinn Strategy Center. As part of a series of seminars, they introduce entrepreneurs to topics from Tallinn University’s focus areas and sectoral trends, helping them develop entrepreneurial skills and gain new knowledge. The last season’s recordings of seminars can be found in the website (Estonian only) https://www.exu.tlu.ee/exu-akadeemia-salvestused

EcolChange. Centre of Excellence in Research
Best practice: EcolChange, created in cooperation between Estonian University of Life Sciences and University of Tartu

The EcolChange represents a synergistic network of expertise to elaborate global and local scenarios for terrestrial ecosystems in the context of global change. Through lateral integration six top-level research teams, one from Estonian University of Life Sciences and 5 from University of Tartu, contribute towards further internationalization and strengthening of the research agenda and provides the necessary resources to target national priorities in environmental and agricultural research and adaptation to climate change.

It aims to:

• Integrate studies of ecosystem function, biodiversity and adaptability;
• Create symbiosis between macroecological big-data, genetic and experimental approaches
• Incorporate ecological knowledge into principles of adaptation to global change through sustainable ecosystem management;
• Enhance ecologically sustainable economic growth via smart regional planning in forestry and agriculture: functionally diverse forests, cultivars for future climates, novel crops and sustainable nutrient cycles.

Tallinn University of Technology
Best practice: Euroteq Waste Challenge (Taltech). Extra-curricular project-based initiative

Cooperation between Educators & Entrepreneurs. Students address challenges in the following areas:

• Cities (eg construction / buildings, outdoor lighting, streets)
• Energy (eg recyclable materials, transport, data management)
• Consumption (eg food, plastics, fashion)
DENMARK

Aalborg University

Education

**Market Creation and Entrepreneurship**
5 ECTS. Course in the Bachelor of Sustainable Design. The course is about how to create markets based on sustainability and how to contribute to solving environmental challenges.

**MNCs and Ecosystems: Innovation and Value Co-creation for Sustainable Development**
5 ECTS. The course is offered in several fields of study and deals with global innovation management, e.g. from value creation to value co-creation with global partners, establishment of transnational strategic alliances and networks to innovative collaboration around innovative ecosystems for sustainable development, etc.

**Business Driven Innovation by Design**
20 ECTS. Course at Cand.polyt. and Cand.Tech. Students learn to work professionally in engineering collaboration and product development with a company, taking into account the environmental impact of the solution.

**Technology Innovation Driven by Design**
20 ECTS. Course at Cand.polyt. and Cand.Tech. Students learn to work with technological innovation with a focus on value-added design, and in the process to take into account the environmental impact.

**Life Science Companies – from Innovation to Industry**
5 ECTS. Course in the programme Master of Science in Sustainable Biotechnology. The course deals with, among other things, bioeconomy, sustainability, circular economy, patenting. After the course, the student will be able to, among other things, base a business plan and budget for production in bioengineering and biotechnology, pharmacology, food and bioenergy.

Other initiatives

**SEA - Supporting Entrepreneurship at Aalborg University**
Incubator for student entrepreneurship, including green solutions.

**Mega projects**
Semester projects, where students across the whole university contribute with their professionalism and knowledge in an interdisciplinary collaboration. All megaprojects are based on global problems as formulated in the 17 UN Sustainable Development Goals.

**Scandinavian Growth Creators**
The project creates case collaborations between small interdisciplinary teams of students. One of the aims of the project is to integrate the UN’s Sustainable Development Goals into the collaborations, which is why Aalborg University is training its own business developers in sustainable business development.

Aarhus University

Education

**Addressing Global Challenges**
45 ECTS. Bachelor elective. Focus on the 17 UN Sustainable Development Goals and case work on concrete local challenges in GC lab and discussion of possible solutions with local external partners.

**Cultural and Creative Industries**
45 ECTS. Bachelor elective. Alternating between teaching and interdisciplinary project collaboration with external companies, in order to find solutions to global challenges.

**Begivenhedskultur**
Danish only.

45 ECTS. Bachelor elective. On contemporary cultural value creation, e.g. in the cultural and cultural-industrial sectors (e.g. libraries, museums, heritage sites, festivals, etc.) and in the development of solutions to social, cultural and regional challenges (e.g. in relation to peripheral issues, sustainability, identity and social exclusion).

Other initiatives

**ORBIT Lab**
Tech incubator at Aarhus University School of Engineering, where work includes developing new sustainable solutions to social and environmental problems.
Sustainable Entrepreneurship in the Nordic and Baltic Region

Copenhagen Business School

Other initiatives

**Sustainable Entrepreneurship & Innovation Group**
Research group identifying opportunities to meet the UN SDGs through new business models that create market imbalances, resulting in industries changing in a sustainable direction.

Technical University of Copenhagen

Education

**Entrepreneurship in food and bio engineering**
5 ECTS. Bachelor course. Students practice their entrepreneurial skills by working on a concrete idea, finding the right business model and developing a ready-to-go business plan.

**Green Entrepreneurship**
Danish only.
5 ECTS. Course at the Diploma in Engineering. Students will develop their entrepreneurial skills, including collaborating on idea development through testing and prototyping, and including sustainability, technical and economic aspects in this process.

**Development of innovative future food: Ecotrophelia and Blue Dot course**
5 ECTS. Bachelor course in Food Technology. Practical hands-on course where students in small groups invent new sustainable food products, make prototypes and participate in the Ecotrophelia competition.

**X-Tech Entrepreneurship**
10 ECTS. Graduate course in Design and Innovation and in Building Design. The aim is to produce a prototype demonstrating the technology and a business plan presented to the examiner and investors - to raise money for the further commercialisation of the technology. The idea will be evaluated from a sustainability and SDG perspective. The course may offer the student the opportunity to participate in the Grøn Dyst (Green Challenge).

Other initiatives

**DTU Skylab**
A lab for innovation and entrepreneurship, where the latest technology meets science, and where students, researchers and industry come together to share knowledge and develop visionary solutions to current societal challenges.

**DTU Link**
Innovation hub, facilitating innovation pathways for SMEs and incubating tech start-ups. The focus is on innovation and technological breakthroughs - solutions that can solve the problems of the future and make a difference for the many.

**DTU Entrepreneurship**
The Centre for Tech Entrepreneurship focuses on research and curricular entrepreneurship programs, providing DTU students with opportunities to develop their entrepreneurial skills.

**EnergyLab Nordhavn**
Students, researchers, public authorities and companies are developing and testing the energy system of the future.

**PowerLab**
One of the world’s leading test laboratories for energy systems. Here, companies, organisations, students and researchers from home and abroad can develop and test future electricity and energy technology solutions on a large scale.

**Grøn Dyst (Green Challenge)**
Annual educational conference for engineering students on innovation, sustainability, climate technology and the environment.

**Next Generation**
Next Generation involves students, university start-ups and youth organisations in international events and summits on sustainability and as next generation academics, entrepreneurs and influencers. This is done through collaborations, courses and tailored tracks for startups.

University of Copenhagen

Education

**Microbial Biotechnology**
75 ECTS. Bachelor course at the Faculty of Natural and Life Sciences. Students learn about methods for improving microbial strains, products and processes in biotechnology. In addition, they are introduced to innovation processes by developing and pitching their own ideas in microbial biotechnology.
**Applied Biotechnology**

75 ECTS. Bachelor course at the Faculty of Natural and Life Sciences. The course provides insight into biotechnological methods for the development of innovative solutions, and works with experimental design in research and industry. Students learn to collaborate on the development of creative biotechnology ideas to solve a wide range of problems. Guest lecturers from relevant companies provide insights into how they use biotechnology to create sustainable solutions.

**Sustainable Food Systems and Diets**

75 ECTS. Graduate course at the Faculty of Natural and Life Sciences. The course provides, inter alia, competences to propose and assess innovative solutions to transform the existing food system into a more sustainable one.

**Other initiatives**

**Sund Hub Incubator for Health Innovators**

The SUND Hub provides a framework for the development of health innovations - including effective and sustainable treatment, new health solutions and health promotion nationally and internationally.

**Science Innovation Hub**

Incubator and office community at KU, helping students with innovative ideas. The Hub helps students with a business idea who need a push and a community to take the idea to the next level.

**Human & Legal Innovation Hub for Humanities, Law and Theology**

One of three innovation hubs at the University of Copenhagen. The hub helps students create new projects and businesses, lecturers develop courses and find external collaborations, and businesses and organisations see new opportunities in our academic environments - all with a focus on solving current and future challenges based on understanding people and society.

**Roskilde Universitet**

**Other initiatives**

**Corolab**

Innovation platform and conference on partnerships between businesses, public organisations and knowledge institutions that create sustainable solutions to societal challenges.

**University of Southern Denmark**

**Education**

**Experts in Team Innovation – Interdisciplinary development project during the fifth semester**

Project course for 5th semester engineering students, focusing on learning about innovation. Based on a concrete innovation challenge in a company, students acquire knowledge and experience of driving an innovation process in a multidisciplinary group process. Expert in Team Innovation focuses on sustainable entrepreneurship through the selection and maturation of the real-life cases involved.

**Other initiatives**

**SDU Entrepreneurship Labs**

Some focus on the SDGs and entrepreneurship. In collaboration with SDU's entrepreneurship department, “Cortex Open” is held three times a year, where prototyping rooms are visited, sparring with other companies and creative projects are initiated.

**SDG Camp**

This initiative aims to foster an entrepreneurial culture and develop graduate students’ skills to find innovative solutions in the field of sustainability.

**Inspire Educate Innovate**

Physics and science outreach programme. The aim is to stimulate physics students' skills in entrepreneurship and intrapreneurship to contribute to, among other things, creating technological solutions to the UN's Sustainable Development Goals. The academic focus is the role of physics in climate and energy technology, health technology and IT and financial technology. The programme is supported by the Entrepreneurship Fund.

**Spin-in project**

Website only Danish.

Students across the University of Southern Denmark, Aarhus University, Designskolen Kolding and Kunstakademiets Designskole come together to work with a number of design and lifestyle organisations on sustainability agendas.