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1. Executive Summary

“Roadmap to improve and exchange innovation capacity and innovation systems and structures” is a report showing existing innovation ecosystems and innovation and entrepreneurship (I&E) related regulatory frameworks in NOBALIS consortium higher education institutions (HEIs) - Norwegian University of Life Sciences, Estonian University of Life Sciences, Latvia University of Life Sciences and Technologies, Linnaeus University, Swedish University of Agriculture Sciences - showing good-practice for innovation capacity building, and discussing on possible improvements in building better and more integrated innovation capacity and support systems in HEIs.

The overall objectives of NOBALIS project is to integrate I&E as part of daily routines in all parts of the organizations, and to leverage the integration of HEIs and their contribution to the innovation ecosystem through close collaboration on the part of a variety of knowledge triangle stakeholders. Hence this deliverable establish the status on existing innovation ecosystems in consortium HEIs and analysis made in this report will serve as stepping stone to increase innovation knowledge, facilitate practical exchanges, and tailor policies and frameworks to meet the needs of each HEI.

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2. Table of contents

1. Executive Summary	2
2. Table of contents	3
3. Annex 1. Roadmap to improve and exchange innovation capacity and innovation systems and structures	4
3.1. Background and context.....	5
3.2. Innovation ecosystem assessment frame	6
3.3. Norwegian University of Life Sciences.....	7
3.4. Estonian University of Life Sciences	13
3.5. Latvia University of Life Sciences and Technologies.....	20
3.6. Linnaeus University	27
3.7. Swedish University of Agriculture Sciences.....	34
3.8. Conclusions.....	43



3. Annex 1. Roadmap to improve and exchange innovation capacity and innovation systems and structures

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3.1. Background and context

The project “Nordic Baltic Universities boosting entrepreneurial and innovation support systems (NOBALIS)” is implemented by a consortium of five HEIs and two innovation support organizations from the Nordic and Baltic region. NOBALIS is part of HEI Initiative program of the European Institute of Innovation & Technology (EIT) (cohort 2) and is supported by EIT Food and funded by the European Union.

The consortium has committed to create a solid basis for increasing the innovation capacity and learning from other partners. In order to do this all consortium HEIs during Phase 1 of the project have prepared the ground for institutional changes to take place by completing an survey on innovation ecosystems and regulatory frameworks, and making in-depth Strength, Weaknesses, Opportunities and Threats (SWOT) analysis of current innovation ecosystem. Results of these activities are summarized in this report and it will serve to increase innovation knowledge, facilitate practical exchanges, and tailor policies and frameworks to meet the needs of each HEI (Phase 2 of the project). The policies will be embedded in administrative structures to enforce institutional change in the long term.

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3.2. Innovation ecosystem assessment frame

Innovation ecosystem assessment was based on two methodological steps: 1) survey on innovation ecosystems and regulatory frameworks; and 2) SWOT analysis of current innovation ecosystems. Such an assessment gives NOBALIS consortium partners background for exchange knowledge on existing innovation capacity and support systems in the institutions.

Survey was based on the mapping of key elements shaping innovation ecosystem in HEI and I&E related regulations and strategies that are in force and acting in the corresponding country and HEI. As key elements of innovation ecosystem in this study were considered: networking and ideation events, entrepreneurship and innovation training and courses, co-working spaces, industrial education opportunities, accelerators and incubators, funding opportunities for start-ups and spinoffs, prototyping and commercialization. All these elements were analysed and described from the perspective of students and staff (both academic and non-academic).

Competent experts from each HEI were involved to preform SWOT analysis of current innovation ecosystems and its functioning.

Innovation ecosystem assessment was concluded with Roadmap to improve innovation ecosystem that highlights which elements of ecosystem are well developed and works effective; which are well developed, but works inefficient; which are partly developed and improvements should be made; which are not developed. As well as with enumeration of next steps to improve innovation ecosystem.

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3.3. Norwegian University of Life Sciences

Profile

Norwegian University's of Life Sciences (NMBU) mission is to contribute to the well-being of the planet. Its interdisciplinary research and study programmes generate innovations in food, health, environmental protection, climate and sustainable use of natural resources. NMBU's research and study programmes are enabling people all over the world to tackle the big, global challenges regarding the environment, sustainable development, how to improve human and animal health, renewable energy sources, food production, and land- and resource management. NMBU is an applied university with strong historic bonds to the agricultural and food industry. Start-ups from the university have gathered international interest, especially in the agro-robotic field. NMBU has a have seven faculties:

- Biosciences,
- Chemistry, Biotechnology and Food Science,
- Environmental Sciences and Natural Resource Management,
- Landscape and Society,
- School of Economics and Business,
- Science and Technology,
- Veterinary Medicine.

In 2022 NMBU had 6400 students, 1900 employees, 64 study programmes.



**Norwegian University
of Life Sciences**

Find more on: <https://www.nmbu.no/en>

Current innovation ecosystem landscape

Design and content of current innovation ecosystem landscape is merely influenced by valid innovation&entrepreneurship (I&E) related regulatory framework in Norway and NMBU. As most important regulations and strategies can be mentioned:

National level regulations and strategies:

- Universitetsloven (Universities Act),
- Lov om arbeidstageroppfinnelser (Employee Inventions Act),
- The Copyright Act,
- The Patents Act,

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- IPR policy common to all Norwegian universities,
- Regjeringsplattformen (Government platform) – e.g Bioeconomy strategy,
- Innovasjon Norge (Innovation Norway) (funding structure),
- Forskningsrådets kommersialiseringsprogrammer (The Research Council's commercialisation programmes (funding structure),
- Investinor (Sovereign Wealth Fund) (funding structure),

University level regulations and strategies:

- NMBU Strategisk handlingsplan 2019-2022. Verdiskaping, innovasjon og entreprenørskap for et bærekraftig samfunn (NMBU Strategic Action Plan 2019-2022. Value creation, innovation and entrepreneurship for a sustainable society),
- IPR-retningslinjer (IPR guidelines),
 - Retningslinjer for immaterielle rettigheter og fysisk materiale i eksterne relasjoner (Guidelines for intellectual property rights and physical material in external relations),
 - Retningslinjer om arbeidsgivers rett til arbeidsresultater (Guidelines on the employer's right to work results),
 - Regler for fordeling av nettoinntekter fra kommersialisering (Rules for the distribution of net revenues from commercialisation),
- Habilitet og bierverv (ability and regulations for secondary positions outside the university,

Structural unit level regulations and strategies:

- Samarbeidsavtale NMBU-ARD and NMBU Aggrator (Cooperation agreement NMBU-ARD and NMBU Aggrator),
- Årlige tjenestekjøpsavtaler NMBU-ARD (Annual service purchase agreements NMBU-ARD),
- Årlige tjenestekjøpsavtaler NMBU-Aggrator Inkubator Ås (Annual service purchase agreements NMBU-Aggrator Incubator Ås),
- DOFI (Disclosure of Inventions),
- Ideevaluerings skjema (Idea evaluation form).

The landscape consists of interrelated elements which are reflected in NMBU strategic planning documents. On the top is the overall goal: enable research and education to provide innovation and value creation for sustainable social development. The three basic phases of the landscape are: competence, research, innovation and commercialization (Figure 3.1). Competence is developed by student innovation organizations (START, URBAN LAB, NMBU CASE CLUB, EIK LAB, FOOD LAB), faculties, NOBALIS – ARD innovation, the Entrepreneurial Village campus – Aggrator (building business for a cleaner, better world), Centres for research-based innovation (SF) and NMBUs six sustainability arenas.

Research and innovation is promoted by NMBU grants for the idea development, external funding and investor/private funding.



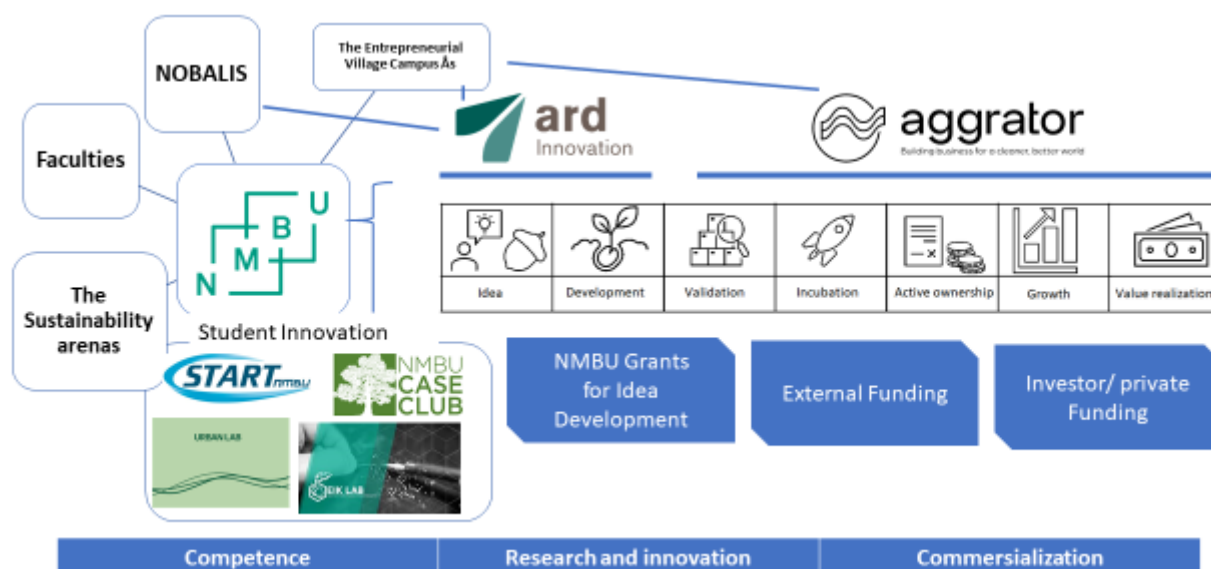


Figure 3.1. Innovation Ecosystem at Norwegian University of Life Sciences

The innovation ecosystem at NMBU is mapped by the following nine components.

Networking and idea generation events

<p>For students:</p> <ul style="list-style-type: none"> Eik Lab challenges Urban Lab hackathon Cre8 Innovation conference Food Lab hackathon (under development) 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> Breakfast meetings Yearly Innovation day Networking towards industry partners SFI – workshops on innovation and business development Strategic programs on sustainability – workshops and meetings
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Formal education

<p>For students:</p> <ul style="list-style-type: none"> Master in Innovation and entrepreneurship Ca. 30 courses with innovation content 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> Center for continuing education
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Industry education

<p>For students:</p> <ul style="list-style-type: none"> Internship among some study programs Industry PhD 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> Center for continuing education - courses in cooperation with industry
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	<ul style="list-style-type: none"> Industry PhD
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Co-working spaces

For students: <ul style="list-style-type: none"> Student co-working space (MINA, KBM) Innovation house (from January, 2023) 	For staff (academics and non-academics): <ul style="list-style-type: none"> Innovation house (from January, 2023)
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Incubators and accelerators

For students: <ul style="list-style-type: none"> Eik Lab (student innovation lab) 	For staff (academics and non-academics): <ul style="list-style-type: none"> Aggrator – Incubator Ås
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Advisory services and mentors

For students: <ul style="list-style-type: none"> STUDent mentoring Pitch training Agreement with Norwegian Patent Agency Ard mentoring and lectures 	For staff (academics and non-academics): <ul style="list-style-type: none"> Ard mentoring and lectures Aggrator mentoring Agreement with Norwegian Patent Agency SFI – workshops on innovation and business development
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Funding

For students: <ul style="list-style-type: none"> STUDent (funding 100 000 Euro from Research council Norway) 	For staff (academics and non-academics): <ul style="list-style-type: none"> NMBU Idestimuleringsmidler (NMBU Idea stimulation fund) FORNY (funding 500 000 Euro for commercialization from Research council Norway)
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Prototyping

For students: <ul style="list-style-type: none"> Eik Lab (student innovation lab) Food Lab (student innovation lab) 	For staff (academics and non-academics): <ul style="list-style-type: none"> Centre for Feed Technology (FôrTek) – pilot scale feed factory Centre for Plant Research in Controlled Climate (SKP) The Livestock Production Research Centre (SHF) Pilot Scale Dairy Fish Lab All other laboratories at Campus Ås
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Commercialization

<p>For students:</p> <ul style="list-style-type: none"> Eik Lab (student innovation lab) 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> Agreement with TTO (ARD Innovation) IPR Management
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From January 2023 NMBU has a new strategy for Innovation, well aligned with the NOBALIS Objectives. A new establishment ,“Ås Innovation House”, is to open in January 2023, and will house several key players in the innovation ecosystem at Campus Ås. NMBU will be active partner in the Innovation House, together with the NOBALIS partner Ard Innovation.

SWOT analysis of current innovation ecosystem

<p>Strengths</p> <ul style="list-style-type: none"> Applied research fields with close industry connections A history of successful employee and student innovations High score on student innovation applications (StudEnt) Several initiatives to create a student incubator - will strengthen the ecosystem for student innovation. 	<p>Weakness</p> <ul style="list-style-type: none"> Silo Communication and lack of coordination between initiatives No internal innovation structure at NMBU Weak implementation of existing strategies Low knowledge about the innovation process and regulations (IP) Weak integration in the regional innovation ecosystem
<p>Opportunities</p> <ul style="list-style-type: none"> Strong cross-disciplinary research capacity that can be transferred to I&E Strong stand on smart farming and robotics, historic position in Norwegian agriculture New Innovation House to be opened January 2023 – will strengthen the innovation ecosystem 	<p>Threats</p> <ul style="list-style-type: none"> Close industry connections - high risk of IP leaks to industry Unsecure financial situation due to reorganization of the national funding system



Roadmap to improve innovation ecosystem

Mapping of existing innovation ecosystem allowed to conclude which elements of ecosystem are well developed and works effective; which are well developed, but works inefficient; which are partly developed and improvements should be made; which are not developed. Summary of this are in Table 3.1.

Table 3.1. The Roadmap to improve innovation ecosystem at Norwegian University of Life Sciences

Phase	Ecosystem elements	Students	Academic staff	Non-academic staff
Idea generation and competence building	Networking and idea generation events			
	Formal education			
	Industry education			
Research and innovation	Co-working spaces			
	Incubators & Accelerators			
	Advisory services & Mentors			
Commercialization	Funding			
	Prototyping			
	Commercialization			

Status of ecosystem element:

Well developed and works effective

Well developed, but works ineffective

Partly developed and improvements should be made

Not developed

Next steps

- Co-location of Innovation Ecosystem (TTO, Student Labs, Incubator, Start-ups) in ÅS Innovation House
- Establish co-working space for students and staff in Ås Innovation House
- Increased focus on internal communication and coordination between initiatives
- Easy and increase commercialisation of research driven innovation through improved policies and incentives for students and staff to engage in Innovation and entrepreneurship.
- Spread I&E modules and courses to a wider part of the university
- Assess the impact of different legislation on universities' ability to innovate.
- Create tools for the university as an institution to help increase innovation capacity.

3.4. Estonian University of Life Sciences

Profile

Estonian University of Life Sciences (EMU) is only public university in Estonia that specializes in research and academic studies related to bioeconomy fields, including food and agriculture, veterinary medicine and animal sciences, environmental sciences, rural economics, forestry, technology and engineering. According to QS World University Rankings by Subject (2022), the Estonian University of Life Sciences was among the top 100 universities in the world in the field of agriculture and forestry. EMU has a strong multidisciplinary research and collaboration network with Baltic and Nordic universities and food and agricultural enterprises.

Main areas of specialization and technological expertise are:

- Plant and crop science
- Sustainable food and agricultural production
- Valorization of food raw materials and by-products
- Food technologies
- Extraction and use of plant-based products
- Animal science
- Forestry
- Waste management
- Renewable energy
- Environmental sciences
- Biodiversity and ecosystems services

In 2022 EMU had 2974 students, 1061 employees, 43 study programmes.



Find more on: <https://www.emu.ee/en>

Current innovation ecosystem landscape

Design and content of current innovation ecosystem landscape is merely influenced by valid innovation&entrepreneurship (I&E) related regulatory framework in Estonia and EMU. As most important regulations and strategies can be mentioned:

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National level regulations and strategies:

- Estonian University of Life Sciences Act,
- Organisation of Research and Development Act,
- Estonian Research and Development, Innovation and Entrepreneurship Strategy 2021—2035,
- Development Plan of the Field of Agriculture and Fishery until 2030,
- “Estonia 2035” development strategy,

University level regulations and strategies:

- Development plan of Estonian University of Life Sciences until 2025,
- The Green University Strategy of the Estonian University of Life Sciences until 2025,
- Good Academic Practice and Implementation of Principles of Academic Ethics in Estonian University of Life Sciences,
- Code of Conduct for Research Integrity,
- Procedure for intellectual property created at Estonian University of Life Sciences,
- Procedure for use of baseline funding of research and development activities,
- Procedure and conditions for rendering paid services,

Structural unit level regulations and strategies:

- Statutes of interdisciplinary units (Centre of Renewable Energy, Centre of Bioeconomy, Organic Centre, Polli Horticultural Research Centre),
- Strategies of the responsibility areas of academic activities.

Innovation ecosystem landscape consists of support structures, academic and interdisciplinary units (Figure 3.2.). Support structures include the Department of Research and Development, Department of Academic Affairs, Open University and Department of Marketing and Communication. The structures have research, co-operation and education function, and they implement prototyping.

Three institutes constitute Academic units: Institute of Agricultural and Environmental Sciences, Institute of Veterinary medicine and Animal Sciences, Institute of Forestry and Engineering. University has one BA level (Rural Entrepreneurship and Financial Management) and one MA level (Economics and Entrepreneurship) entrepreneurship study program that are managed by the Chair Rural Economics that is a subunit of Institute of Agricultural and Environmental Sciences. Chair also provides different entrepreneurship courses for other units as well as introductory rural entrepreneurship module to all other BA programs. Some BA (food) and MA programs (engineering, forestry, food) in the Institute of Veterinary Medicine and Animal Sciences, Institute of Forestry and Engineering have specific product development and innovation courses. Polli Horticultural Research and Development Center, a subunit of Institute of Agricultural and Environmental Sciences, conducts food R&D and prototyping for enterprises and research. Annual business idea competition “Tarkav idu”, pre-incubation program Starter, mentorship program, internships and Wood and Food Hachatons are open to students from all three insitutes. The three institutes implement innovation promotion as well as use of national and international funding.

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Center of Bioeconomy and Center for Renewable Energy are interdisciplinary units that promote interdisciplinary collaboration within university, with the other universities and research institutions and companies/organizations in Estonia and abroad. Together with the three academic institutes they are active in knowledge transfer, including organization of applied science conferences.

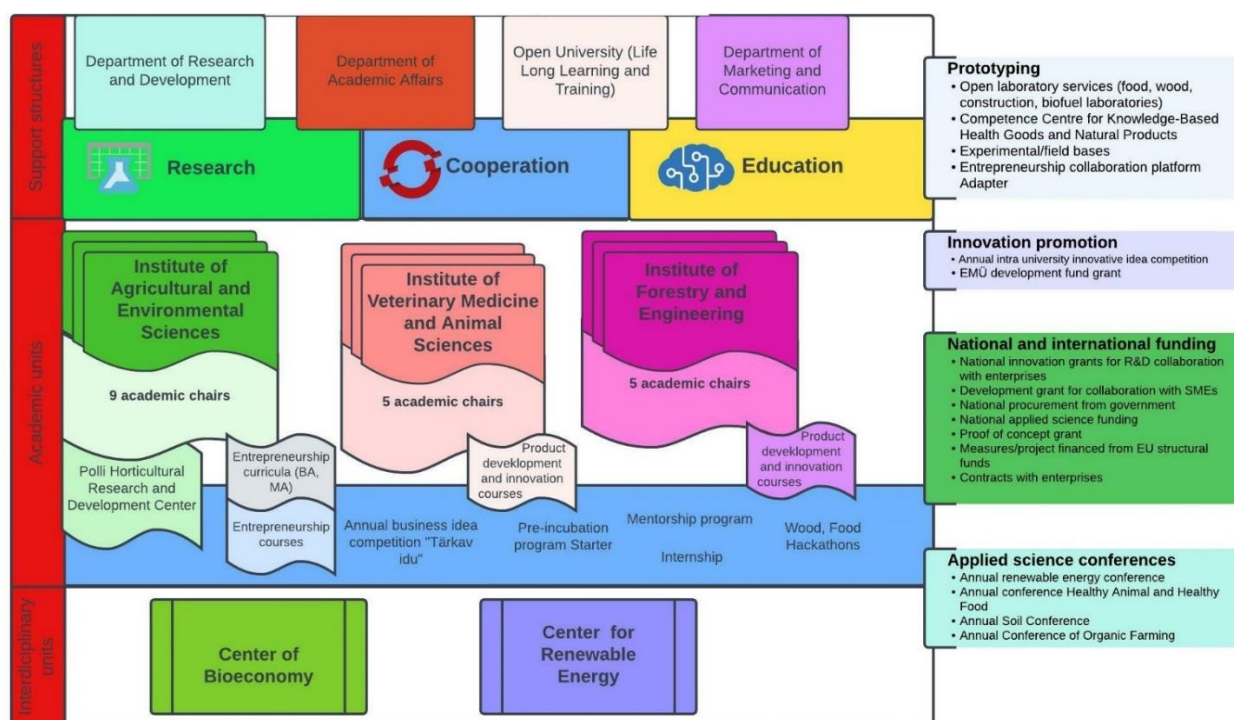


Figure 3.2. Innovation Ecosystem at Estonian University of Life Sciences

The innovation ecosystem at EMU is mapped by the following nine components.

Networking and idea generation events

For students:

- Annual business idea competition "Tärkav idu" ("Emerging sprout") for students
- Annual intra university innovative idea competition (open for both students and academic staff)
- Hackathons (2020 Wood Hackathon, 2021 Greener Food, 2022 Meat Hackathon, 2022 Build-A-Thon Energy)

For staff (academics and non-academics):

- Annual seminar for focus areas
- Variety of other/non-regular seminars
- Hackathons (2020 Wood Hackathon, 2021 Greener Food, 2022 Meat Hackathon, 2022 Build-A-Thon Energy)
- Annual Intra university innovative idea competition
- Annual Renewable Energy Conference

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	<ul style="list-style-type: none"> • Annual conference Healthy Animal and Healthy Food • Annual Soil Conference • Annual Conference of Organic Farming
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Formal education

<p>For students:</p> <ul style="list-style-type: none"> • BA curricula: Rural Entrepreneurship and Financial Management • MA curricula: Economics and Entrepreneurship • Study courses (including cross-faculty courses): BA level 7 entrepreneurship courses, 2 innovation/product development courses; MA level 1 innovation course, 2 product development courses; PhD level 1 entrepreneurship course 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Life-long learning courses • Competency development and rising courses • Courses for development of entrepreneurship education & competency through national entrepreneurship education program Edu & Tegu (from 2016)
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Industry education

<p>For students:</p> <ul style="list-style-type: none"> • Practical training/internships as a compulsory part of each BA and MA curricula • Industry internship for PhD students 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Study trips to industries
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Co-working spaces

<p>For students:</p> <ul style="list-style-type: none"> • Libraries • University campus spaces • Wood and food laboratories 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Libraries • University campus spaces • Laboratories
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Incubators and accelerators

<p>For students:</p> <ul style="list-style-type: none"> • Starter pre-incubation programme each semester at Tartu University StartUpLab • National entrepreneurship education program Edu & Tegu (from 2016) 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Collaboration with the Tartu Science Park (EMU is one of the founders of it)
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Advisory services and mentors

<p>For students:</p> <ul style="list-style-type: none"> • 2020- 2022 mentoring programme supported by the institutional development programme ASTRA • Centre of Bioeconomy (BioMAK) • Centre of Renewable Energy (TEK) 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • 2020- 2022 mentoring programme supported by the institutional development programme ASTRA • Center of Bioeconomy (BioMAK) • Centre of Renewable Energy (TEK)
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Funding

<p>For students:</p> <ul style="list-style-type: none"> • University grants and awards (best innovative idea, development fund) • National innovation grants • Measures financed from EU structural funds 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • University grants and awards, incl. EMÜ Development Fund projects • National innovation grants for R&D collaboration with enterprises • Development grant for collaboration with SMEs • National procurement from government • National applied science funding • Proof of concept grant • Measures financed from EU structural funds via ministries
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Prototyping

<p>For students:</p> <ul style="list-style-type: none"> • Open laboratory services (food laboratory, wood and construction laboratory, biofuel laboratory) • Experimental/field bases • Competence Centre for Knowledge-Based Health Goods and Natural Products 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Open laboratory services (food laboratory, wood and construction laboratory, biofuel laboratory) • Competence Centre for Knowledge-Based Health Goods and Natural Products • Experimental/field bases of the university • Entrepreneurship collaboration platform Adapter
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Commercialization

<p>For students:</p> <ul style="list-style-type: none"> • No specific activities 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Horizon Europe funding for fostering collaboration with industry to pilot novel ideas
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SWOT analysis of current innovation ecosystem

Strengths <ul style="list-style-type: none"> • The capability for a coherent and value chain-based approach to various areas of the bioeconomy • EMU has a well developed network of relationships with incubators, science parks, other external initiatives, universities, industry associations • The university values and combines research, teaching and cooperation with the companies and the wider community for knowledge transfer • The university supports the international mobility of employees and students • The internationalization is well reflected in the teaching and research activities of the university 	Weakness <ul style="list-style-type: none"> • Lack of an all-university-wide model for coordinating, financing, evaluating and sharing information on entrepreneurial activities of students and employees • Lack of success stories and success experience for selling of intellectual property • Lack of incentives and motives for staff for entrepreneurial activities and entrepreneurship support
Opportunities <ul style="list-style-type: none"> • Prioritization of funding for cooperation with enterprises in the Horizon Europe and national programs • Prioritization of the development of bioeconomy and biotechnologies in the policies and strategies of the EU and Estonia, including financing applied research programs • Increased public and private sector demand for applied research results which are applicable for the benefit of society 	Threats <ul style="list-style-type: none"> • Low capacity and lack of interest of Estonian enterprises to finance research and product development cooperation with the university • Competition in Estonia with other HEIs, R&D institutions • Funding of industrial PhD students



Roadmap to improve innovation ecosystem

Mapping of existing innovation ecosystem allowed to conclude which elements of ecosystem are well developed and works effective; which are well developed, but works inefficient; which are partly developed and improvements should be made; which are not developed. Summary of this are in Table 3.2.

Table 3.2. The Roadmap to improve innovation ecosystem at Estonian University of Life Sciences

Phase	Ecosystem elements	Students	Academic staff	Non-academic staff
Idea generation and competence building	Networking and idea generation events	Well developed and works effective	Well developed and works effective	Partly developed and improvements should be made
	Formal education	Well developed and works effective	Well developed and works effective	Well developed and works effective
	Industry education	Well developed, but works ineffective	Well developed, but works ineffective	Partly developed and improvements should be made
Research and innovation	Co-working spaces	Partly developed and improvements should be made	Well developed, but works ineffective	Well developed, but works ineffective
	Incubators & Accelerators	Partly developed and improvements should be made	Partly developed and improvements should be made	Partly developed and improvements should be made
	Advisory services & Mentors	Well developed and works effective	Well developed, but works ineffective	Partly developed and improvements should be made
Commercialization	Funding	Partly developed and improvements should be made	Well developed, but works ineffective	Well developed, but works ineffective
	Prototyping	Well developed, but works ineffective	Well developed, but works ineffective	Well developed, but works ineffective

Status of ecosystem element:

Well developed and works effective

Well developed, but works ineffective

Partly developed and improvements should be made

Not developed

Next steps

Further EMU priorities for NOBALIS Phase 2:

- Development of all-university-wide model for coordinating, financing, evaluating and sharing information on entrepreneurial activities of students and employees.
- Management of information on I&E activities.
- Demonstration of examples and success stories of university/industry collaboration, IP management and sale.
- I&E modules and courses for university-wide use.

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3.5. Latvia University of Life Sciences and Technologies

Profile

Latvia University of Life Sciences and Technologies (LBTU) is one of the largest universities in Latvia providing studies and conducting research in various economic sectors in which the university implements education and research competences. According to QS EECA ranking LBTU is one of best Universities in Europe and Central Asia and the best Life-science University in Baltic states. LBTU unique areas – agriculture, forestry, veterinary, medicine, food technology and landscape, architecture; universal areas – information technologies, economics, social sciences and social sciences, rural engineering, civil engineering and pedagogy. LBTU focuses on the development of theoretical knowledge, carrying out applied research activities, creating technologies and innovations necessary for industries of the national economy and promoting their commercialization. The research specialisation is related to the accumulated knowledge and the competence of the university in the management and exploitation of biotic and abiotic natural resources.

Main areas of specialisation and technological expertise are:

- Strong development of specialisation in bioeconomy and interdisciplinary research.
- Innovative approach to research of international interest and ideas for new agrifood products and services.
- Good cooperation with experts in the agricultural, forestry, fisheries, food sector, enabling scientific projects to develop a strong link with the sector.
- Provide high quality study and lifelong learning services.

In 2022 LBTU had 3833 students, 985 employees, 53 study programmes.



**Latvia University
of Life Sciences
and Technologies**

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Current innovation ecosystem landscape

Design and content of current innovation ecosystem landscape is merely influenced by valid innovation & entrepreneurship (I&E) related regulatory framework in Latvia and LBTU. As most important regulations and strategies can be mentioned:

National level regulations and strategies:

- Research and Innovation Strategy for Smart specialization - RIS3,
- Latvian National Development Plan 2021-2027,
- Latvia's Education Development Guidelines 2021-2027,
- Science, Technology Development and Innovation Guidelines for 2021-2027,

University level regulations and strategies:

- Latvia University of Life Sciences and Technologies Development Strategy 2015-2022,
- Latvia University of Life Sciences and Technologies Quality Management System description and assurance plan,
- Latvia University of Life Sciences and Technologies Intellectual Property Management Policy,
- Latvia University of Life Sciences and Technologies Intellectual Property Management Regulations,

Structural unit level regulations and strategies:

- Regulations of structural units (i.e. laboratories, faculties).

LBTU innovation ecosystem is promoted in three phases: idea generation and competence building with three components; research and innovation with five components and commercialization with four components (Figure 3.3.). Each element is explained below.

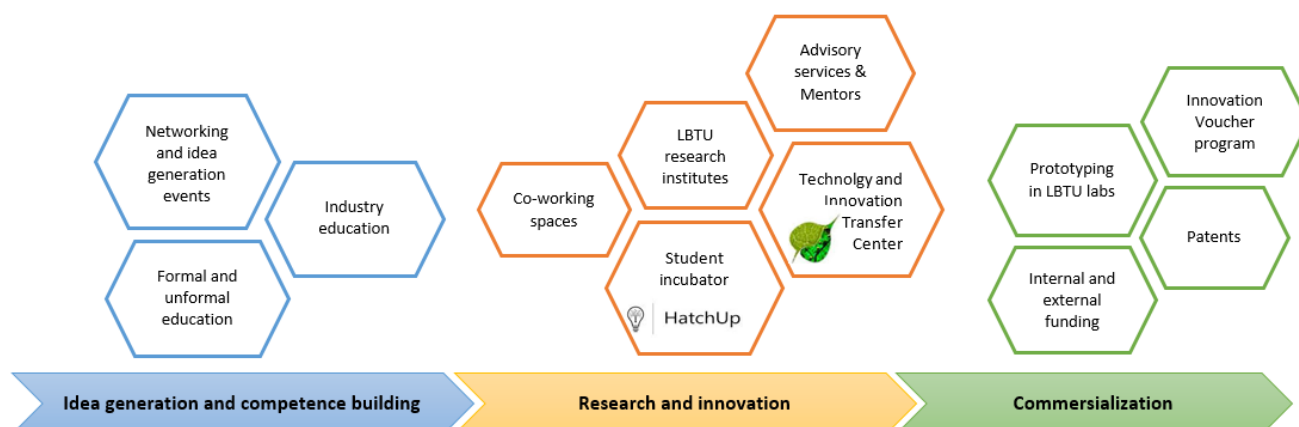


Figure 3.3. Innovation Ecosystem at Latvia University of Life Sciences and Technologies



The innovation ecosystem at LBTU is mapped by the following nine components.

Networking and idea generation events

<p>For students:</p> <ul style="list-style-type: none"> • Student's Self-government activities: https://www.llu.lv/en/student-union, participation in faculty boards, Senate and Convent • Idea generation event for students: "Reveal DNA of entrepreneur"; "Green Tech Hackathon I and II"; "Meikathon" • Technique and innovation festival "Mehatrons" • International Erasmus+ week • International student's conference "Students on their way to science" • Master's students' scientific conference "Development in diversity" • LBTU participation in International exhibition "Riga Food", "Lauksaimniecības un meža tehnika 2021", "MINOX Zemgale 2021", "Ideju spogulis – 2021" 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Idea generation afternoons • Annual thematic seminars on topical issues • Technique and innovation festival "Mehatrons" • International and national scientific/practical conferences organized by LBTU • Mobility events to LBTU international partners • LBTU participation in International exhibition "Riga Food", "Lauksaimniecības un meža tehnika 2021", "MINOX Zemgale 2021", "Ideju spogulis – 2021"
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Formal education

<p>For students:</p> <ul style="list-style-type: none"> • BA curricula: Economics, Food Quality and Innovations, Design and Crafts, etc. • MA curricula: Business Management, Agri-Food business Management, Agricultural Engineering, etc. • Study courses BA level: Innovation in Business, Bioeconomics, Sustainable Development, Basics of Crafts, etc. • Study courses MA level: Knowledge Management and Innovations, Engineering Research, etc. 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Life-long learning courses • Competency development and rising courses
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Industry education

<p>For students:</p> <ul style="list-style-type: none"> • Practical training at least 39 ECTS in every professional study programme • Regular study tours to enterprises • Alumni lecture week 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Capacity building programmes • Regular study tours to enterprises • Alumni lecture week
---	---

Co-working spaces

<p>For students:</p> <ul style="list-style-type: none"> • LBTU Fundamental Library • Interdisciplinary scientific laboratories (Virtual and Mixed Reality Lab, Interdisciplinary Scientific Laboratory of the Faculty of Forestry) • Rest rooms and specialized libraries in faculties 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • LBTU Fundamental Library • Interdisciplinary scientific laboratories (Virtual and Mixed Reality Lab, Interdisciplinary Scientific Laboratory of the Faculty of Forestry) • Rest rooms and specialized libraries in faculties
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Incubators and accelerators

<p>For students:</p> <ul style="list-style-type: none"> • Student's Business incubator "HatchUp" • Technology and Innovation Transfer Centre • Four LBTU scientific institutes (Institute of Agricultural Resources and Economics, Institute of Horticulture, Latvian Plant Protection Research Centre, Research Institute of Agronomy) 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Student's Business incubator "HatchUp" • Technology and Innovation Transfer Centre • Four LBTU scientific institutes (Institute of Agricultural Resources and Economics, Institute of Horticulture, Latvian Plant Protection Research Centre, Research Institute of Agronomy)
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Advisory services and mentors

<p>For students:</p> <ul style="list-style-type: none"> • Mentoring programme offered by student's business incubator "HatchUp" 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Close cooperation with Latvia Investment Development Agency (LIAA), Jelgava Business Incubator • Close cooperation with Latvian Rural Advisory and Training Centre • International Advisory Board (15 members from 12 HEIs)
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Funding

<p>For students:</p> <ul style="list-style-type: none"> • Industry awards • LBTU Developmental Foundation, faculty's, industry, names, national scholarships • LBTU internal grants for PhD students; • PhD school grants • Bilateral agreement with industry 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Yearly award "Sejejs" – science in practice and innovations • LBTU Developmental Foundation • LBTU internal grants for scientists • National and international projects • Bilateral agreement with industry
--	---

Prototyping

<p>For students:</p> <ul style="list-style-type: none"> • Open laboratory • Four LBTU scientific testing bases • Interdisciplinary scientific laboratories (Virtual and Mixed Reality Lab, Interdisciplinary Scientific Laboratory of the Faculty of Forestry) • Projects 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Open laboratory • Four LBTU scientific testing bases • Interdisciplinary scientific laboratories (Virtual and Mixed Reality Lab, Interdisciplinary Scientific Laboratory of the Faculty of Forestry) • Projects
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Commercialization

<p>For students:</p> <ul style="list-style-type: none"> • Innovation Voucher program 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Innovation Voucher program (in 2021, 40 cooperation agreements were concluded for the total amount of 632 234.96 EUR; 3 commercialization offers have been prepared, which are distributed to the entrepreneurs of the respective industries) • Patents (in 2021, LBTU maintains 20 patents)
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SWOT analysis of current innovation ecosystem

Strengths <ul style="list-style-type: none"> Significant improvement of the research infrastructure (buildings, equipment, analytical hardware, new labs) in the LBTU as a whole, allowing an increase in proportion of interdisciplinary research and innovation Well-developed cooperation with agricultural, forestry, food sector enterprises, non-governmental organisations, municipalities, ministries Provide qualified human resource for industry and society 	Weakness <ul style="list-style-type: none"> Scarcity of basic funding, cyclical and unpredictability of project funding, impacts on the variability of the remuneration of people in science, which poses a threat to the successive development of scientific staff Low interest of students in science and continuation of studies in doctoral studies due to lack of financial incentives Fragmented support system, insufficient supporting staff, project administrators, etc.
Opportunities <ul style="list-style-type: none"> Coordinated implementation of Ideation process. Implementation of the academic and scientific staff update plan and support strategy. Development, commercialisation, promotion of research possibilities and services provided by scientific research, scientific laboratories and staff of the LBTU 	Threats <ul style="list-style-type: none"> Unpredictability of public funding for research, lack of priorities, misalignment of political decisions with financial resources Low private funding for scientific research - decreasing attractiveness for research, particularly in the fields of STEM and bioeconomy Prevalence of applied research, lack of fundamental and long term research



Roadmap to improve innovation ecosystem

Mapping of existing innovation ecosystem allowed to conclude which elements of ecosystem are well developed and works effective; which are well developed, but works inefficient; which are partly developed and improvements should be made; which are not developed. Summary of this are in Table 3.3.

Table 3.3. The Roadmap to improve innovation ecosystem at Latvia University of Life Sciences and Technologies

Phase	Ecosystem elements	Students	Academic staff	Non-academic staff
Idea generation and competence building	Networking and idea generation events	Well developed and works effective	Well developed and works effective	Well developed, but works ineffective
	Formal education	Well developed and works effective	Well developed and works effective	Well developed, but works ineffective
	Industry education	Well developed and works effective	Well developed and works effective	Well developed, but works ineffective
Research and innovation	Co-working spaces	Well developed, but works ineffective	Well developed, but works ineffective	Well developed, but works ineffective
	Incubators & Accelerators	Well developed, but works ineffective	Well developed, but works ineffective	Well developed, but works ineffective
	Advisory services & Mentors	Well developed and works effective	Well developed and works effective	Well developed, but works ineffective
Commercialization	Funding	Not developed	Not developed	Not developed
	Prototyping	Not developed	Not developed	Not developed
	Commercialization	Not developed	Not developed	Not developed

Status of ecosystem element:

Well developed and works effective

Well developed, but works ineffective

Partly developed and improvements should be made

Not developed

Next steps

Further LBTU priorities for NOBALIS Phase 2:

- Development, commercialisation, promotion of research possibilities and services provided by scientific research, scientific laboratories and staff of the LBTU.
- Coordinated implementation of Ideation process.
- Implementation of the academic and scientific staff update plan and support strategy.
- I&E curricula/module resources for further use by other professors.

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3.6. Linnaeus University

Profile

Linnaeus University (LNU) is a relatively new university (since 2010) with campuses in Växjö and Kalmar. It strives to be a modern international university. Here students can study different subjects within arts and humanities, health and life sciences, social sciences, natural sciences, technology, and business & economics. LNU also offers a range of different contract educations, like nurse education, police education etc.

The Entrepreneurial University. The ambition at Linnaeus University is to stand out at a national and international level through the way of working with innovation and entrepreneurship, hence be able to present the highest proportion of entrepreneurs among the students.

Knowledge in motion. In order to meet current and future societal challenges, knowledge from a broader and larger perspective is needed. Therefore, LNU have established knowledge environments at Linnaeus University where prominent research, education, and collaboration is connected. LNU knowledge environments are interdisciplinary in order to put knowledge in motion across subjects and get a broad take on the challenges.

Seven of the university's knowledge environments have been appointed Linnaeus Knowledge Environment. This focus is on the fields; *education, materials, democracy, water, digitalisation, environment, and health*. They all work interdisciplinary and link together subjects, departments, and faculties in order to get a broad take on the societal challenges within each field.

LNU is member of the EUniWELL – a consortium within the European Universities initiative.

In 2022 LNU had 41 036 students, 2 168 employees, 200 study programmes.

Linnaeus University 

Find more on: <https://lnu.se/en/>

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Current innovation ecosystem landscape

Design and content of current innovation ecosystem landscape is merely influenced by valid innovation&entrepreneurship (I&E) related regulatory framework in Sweden and LNU. As most important regulations and strategies can be mentioned:

National level regulations and strategies:

- Higher Education Act
- Young Entreprises i Kalmar Län,
- Smart Specialization Regions
- Global Entrepreneurship week,

University level regulations and strategies:

- Entrepreneurial University policy,

Structural unit level regulations and strategies:

- The entrepreneurial university" project.

LNU innovation ecosystem is promoted in three phases: performance, process and result elements (Figure 3.4.). Each element is explained below.

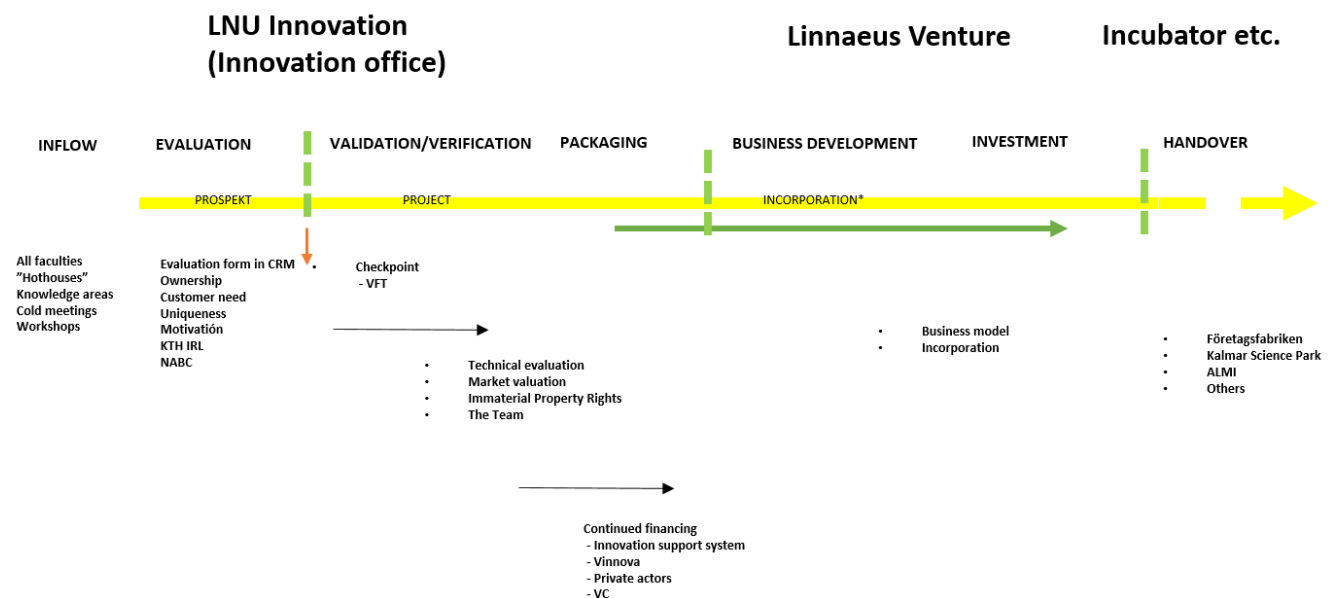


Figure 3.4. Innovation Ecosystem at Linnaeus University

The **Performance elements** are: Innovation office, Venture, Incubator, etc. The Innovation office obtain prospects from all faculties in the inflow process and then they are evaluated. Next step is

project validation/verification including technical and market evaluation, immaterial property rights and team. During project packaging continued financing is allocated by innovation support system, Swedish Agency for Economic and Regional Growth (Tillväxtverket), Vinnova, private sectors or VC. Then through business development and investment incorporation and business model are developed. Then handover is implemented by various structures.

The **process elements** are inflow, evaluation, validation/evaluation/verification, packaging, business development, investment, and handover. External relations are crucial in research and education through collaboration with the society, internationalization, innovation, utilization, and research funding. Innovation and utilization. The external relations are developed by the following teams:

- ER: External Relations
- IR: International Relations
- GIO: Grant's and Innovation Office.
- LNU Innovation.

Innovation and utilization of research results and ideas for researchers, employees and students are implemented by means of the following components: identify assets in research, advise and support for developing ideas, market research and Immaterial property rights, verification grants up to 400 000 SEK per idea, PhD course "Innovative Application of Research and Science".

The **result elements** are: prospect, project and incorporation. As regards LNU Innovations two components are expanded more detailed. The first is Advice and support in relation to innovation, commercial and non-commercial utilization and Immaterial Property Rights. The second is Verification grants and they also deal with Immaterial Property Rights, market research, end-user testing, etc. Innovations are presented/developed through PhD course "Innovative Application of Research and Science"; workshops like Intellectual Asset Inventory, Impact Planning canvas, Facilitation; presentation-/pitch-training and Value Creation Forum.

The innovation ecosystem at LNU is mapped by the following nine components.

Networking and idea generation events

For students: <ul style="list-style-type: none"> • "Hothouses" • Knowledge areas • Cold meetings • Workshops 	For staff (academics and non-academics): <ul style="list-style-type: none"> • "Hothouses" • Knowledge areas • Cold meetings • Workshops
--	---

Formal education

For students:	For staff (academics and non-academics):
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<ul style="list-style-type: none"> • PhD course “Innovative Application of Research and Science” • LNU offers many courses on innovation and entrepreneurship from 5-7,5 ECTS at different programs. Hence, it is a part on nearly all the 200 programs 	<ul style="list-style-type: none"> • n.d.
---	--

Industry education

<p>For students:</p> <ul style="list-style-type: none"> • Intellectual Asset Inventory • Impact Planning canvas • Facilitation • Value Creation Forum 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Intellectual Asset Inventory • Impact Planning canvas • Facilitation • Value Creation Forum
---	--

Co-working spaces

<p>For students:</p> <ul style="list-style-type: none"> • n.d. 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • n.d.
---	--

Incubators and accelerators

<p>For students:</p> <ul style="list-style-type: none"> • Drivhuset 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • n.d.
--	--

Advisory services and mentors

<p>For students:</p> <ul style="list-style-type: none"> • ER • IR • GIO: Grant's and Innovation Office • LNU Innovation • Drivhuset 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • ER • IR • GIO: Grant's and Innovation Office • LNU Innovation
--	--

Funding

<p>For students:</p> <ul style="list-style-type: none"> • Innovation support system • Vinnova • Private actors • Venture Capital 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Innovation support system • Vinnova • Private actors • Venture Capital
--	---

Prototyping

<p>For students:</p> <ul style="list-style-type: none"> • Företagsfabriken • Kalmar Science Park 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Företagsfabriken • Kalmar Science Park
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• ALMI	• ALMI
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Commercialization

For students: <ul style="list-style-type: none">• Science Parks	For staff (academics and non-academics): <ul style="list-style-type: none">• n.d.
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ALMI is a Public owned company that welcomes all companies and business concepts that have growth potential. The greater the potential for growth, the greater the commitment from Almi.

Almi offers loans to companies with growth potential and assists in their business development. This applies to businesses in the start-up phase as well as established companies. **Almi Invest** provides venture capital for early-stage, emerging companies with high growth potential and a scalable business concept.

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SWOT analysis of current innovation ecosystem

Strengths <ul style="list-style-type: none"> The capability for a coherent and value chain-based approach to different knowledge environment LNU has a well-developed network of relationships with incubators, science parks, other external initiatives The university values and combines research, teaching and cooperation with the companies and the wider community for knowledge transfer The university supports the international mobility of employees and students The internationalization is well reflected in the teaching and research activities of the university 	Weakness <ul style="list-style-type: none"> Lack of an all-university-wide model for coordinating, financing, evaluating, and sharing information on entrepreneurial activities of students and employees – No internal marketing Still focused on faculties and not knowledge environments, hence not all collaborative projects might become commercial in a classical sense Lack of alignment with the incubators in science parks – reinventing the wheel. No onboarding processes Lack of incentives and motives for staff for entrepreneurial activities and entrepreneurship support and collaboration with Drivhuset
Opportunities <ul style="list-style-type: none"> Prioritization of funding for cooperation with enterprises in the Horizon Europe and national programs like KK-Stiftelsen, Interreg etc. Prioritization of in the policies and strategies of the EU and Sweden, including financing applied research programs Increased public and private sector demand for applied research results which are applicable for the benefit of society 	Threats <ul style="list-style-type: none"> Low capacity and lack of interest of Swedish SME's to finance research and product development cooperation with the university Competition in Sweden with other HEIs, R&D institutions like RIS Funding of industrial PhD students Not a clear focus on the food industry and innovation, research by LNU LNU Venture becomes redundant



Roadmap to improve innovation ecosystem

Mapping of existing innovation ecosystem allowed to conclude which elements of ecosystem are well developed and works effective; which are well developed, but works inefficient; which are partly developed and improvements should be made; which are not developed. Summary of this are in Table 3.4.

Table 3.4. The Roadmap to improve innovation ecosystem at Linnaeus University

Phase	Ecosystem elements	Students	Academic staff	Non-academic staff
Idea generation and competence building	Networking and idea generation events	Well developed and works effective	Well developed, but works inefficient	Not developed
	Formal education	Well developed and works effective	Well developed, but works inefficient	Not developed
	Industry education	Well developed and works effective	Well developed, but works inefficient	Not developed
Research and innovation	Co-working spaces	Well developed, but works inefficient	Well developed, but works inefficient	Well developed, but works inefficient
	Incubators & Accelerators	Well developed, but works inefficient	Well developed, but works inefficient	Well developed, but works inefficient
	Advisory services & Mentors	Well developed, but works inefficient	Well developed, but works inefficient	Well developed, but works inefficient
Commercialization	Funding	Well developed, but works inefficient	Well developed, but works inefficient	Well developed, but works inefficient
	Prototyping	Well developed, but works inefficient	Well developed, but works inefficient	Well developed, but works inefficient
	Commercialization	Well developed, but works inefficient	Well developed, but works inefficient	Well developed, but works inefficient

Status of ecosystem element:

Well developed and works effective

Well developed, but works inefficient

Partly developed and improvements should be made

Not developed

Next steps

Phase 1 of the NOBALIS project has shed light on how the current innovation system at LNU works. In Phase 2, and onwards in order to improve functioning of certain ecosystem elements a number of areas for improvement have been identified:

- Development of an all-university-wide model for coordinating, financing, evaluating, and sharing information on entrepreneurial activities of students and employees.
- More focusing on knowledge environments and facilitating that more collaborative projects might become commercial.
- Development of incentives and motives for staff for entrepreneurial activities and entrepreneurship support and collaboration with Drivhuset.

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3.7. Swedish University of Agriculture Sciences

Profile

Swedish University of Agriculture Science (SLU) is a world-class international university with research, education and environmental assessment within the sciences for sustainable life. SLU has the knowledge and tools to bring about genuine change. SLU contribute to something greater and life-changing, like providing knowledge, decision support and facts about climate solutions. SLU teach their students about sustainability, and they inspire to further reduce our climate impact. Through education, research and environmental assessment SLU is creating the right conditions for a sustainable, thriving and better world.

SLU is a university with national responsibility for education and research in the green sectors. On the contrary to other higher education and research institutes in Sweden it is an institution that lies under the Ministry of Enterprise and Innovation and not the Ministry for Higher Education. SLU has three main campuses, in Uppsala, Alnarp and Umeå, and has research stations and other entities across the country. In 2022, SLU had 4,500 students, and close to 4,000 employees, 62 study programmes: 37 on Bachelor level, and 25 Master level.



Swedish University
of Agricultural Sciences

Find more on: <https://www.slu.se/en/>

Current innovation ecosystem landscape

The landscape consist of the following components: formal education; industry education; networking and idea generation; funding, prototyping and commercialization.

The SLU-related innovation ecosystem can be described in term of the internal and external actors involved. Internally, SLU have no particular internal organization to handle issues of innovation (i.e. exploitation of ideas emerging from research and knowledge development).

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Formal education

SLU have a few courses on the topic of innovation (see overview in the table below), where students also often develop their own business ideas. In some courses of business administration there are also elements of entrepreneurship and innovation. But these are rather rare and are only included in a handful of SLU:s around 50 different study programmes.

There is no industry education (i.e. education directed towards industry professionals) within the frames of SLU, although there are some PhD students (around 10 annually) that comes from industry to be so called 'industry PhD-students'. SLU has two organizational groups that occasionally make tailor-made courses for entrepreneurs (mostly farmers) and advisory service: The Swedish Centre for Agricultural Business Management (KCF), and SLU Råd Nu, which is the National Competence Centre for Advisory Services. Both are organizationally located at the department of People and Society at the The Faculty of Landscape Architecture, Horticulture and Crop Production Sciences.

The special role of SLU Holding - Networking and idea generation; funding, prototyping and commercialization

Students and employees are directed to the, by the university owned, holding company SLU Holding. This body offers advise, consultancy, courses, network access, help with financing for those that want to develop their ideas. SLU Holding can enter a start-up as co-owner, contributing with financial means, but typically not for longer periods. Instead they can help with finding other sources of financing when the firm expands. SLU Holding can also contribute with financial support that is derived from other public funding, e.g. EU-funding, or funding through the governmental body Vinnova (Sweden's innovation agency). As SLU is distributed across the country, SLU holding also has regional offices in Uppsala, Alnarp and Umeå. As illustrated in Figure 3.5, the main parts of the SLU innovation system (with SLU Holding as the "spider in the net") contains the modules of the internal Grants office (internal assistance to researchers to localize and apply for funding and grants), the access to various regional incubators, the access to science parks (including possibility to access facilities for prototyping, depending on the needs), early-stage investments, and finally innovation support. Students, in addition, have access to local student oriented facilitators, platforms for innovation support. In Uppsala, Drivhuset (which is partially financed by SLU Holding, and the counterpart at Uppsala University), and in Alnarp, SLUVentureLab@Alnarp (fully financed by SLU Holding). These actors also hold activities of idea generation and networking.

Other university faculty-related structures to promote innovation and collaboration

The Faculty of Landscape Architecture, Horticulture and Crop Production Sciences has a special platform for collaboration with industry in research, the "Partnership Alnarp Platform". It contributes with networks with its 70 member enterprises, and co-finance projects where the enterprises stands for 50% of the financing.

There are also the SLU Futures platforms that aims at developing networks and manage communication within and outside the university, for example the SLU Future Food platform, with a specific focus on food related research and collaborations.

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The innovation system in Uppsala

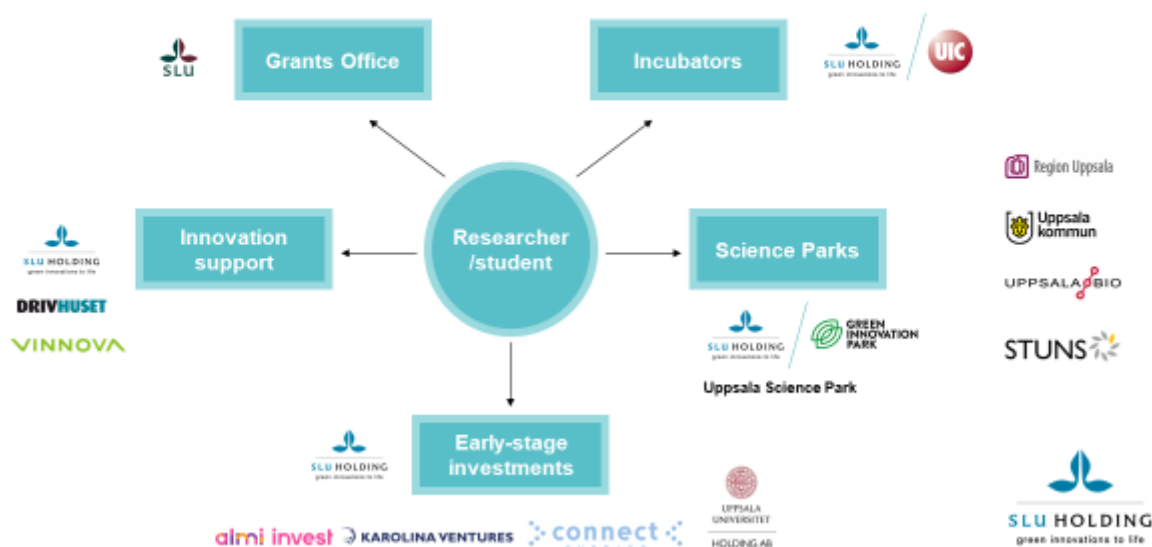


Figure 3.5. Innovation Ecosystem at Swedish University of Agriculture Science

Note: the picture illustrates the case of campus Uppsala. There are also campuses in Alnarp, Umeå and Skara with similar structures.

The national innovation system

As in most countries the AKIS (Agricultural Knowledge and Innovation System) is extensive and contains multiple actors, where SLU is only one of these. The innovation system of the food and agriculture sector in Sweden includes various advisory services (e.g. Hushållningssällskapen, Växa Sverige), regional clusters of research actors and incubators, external financiers (such as the Foundation for agricultural research, Kampradstiftelsen, Craafordstiftelsen, and many others), Research Institutes of Sweden, Municipal development offices, governmental agencies of various kinds (e.g. Swedish board of agriculture, Swedish Food Agency, The Swedish Agency for Economic and Regional Growth, The County Boards), Regional innovation offices, incubators and 'enterprise parks', other local, regional and national innovation offices supporting entrepreneurs (e.g. Almi företagspartner). In addition there is also the private sector (often with their own R&D departments, or collaborative arrangements with customers) related to e.g. agricultural inputs, machinery, constructions and IT services.

National level regulations and strategies:

- Higher Education Act





- The national food strategy (2017) points out “knowledge and innovation” as one of three key strategic areas (En livsmedelsstrategi för Sverige - fler jobb och hållbar tillväxt i hela landet, Prop. 2016/17:104 (pdf 761 kB). The government’s approved proposal includes targets to support the knowledge and innovation system to contribute to increased productivity and innovation in the food chain, as well as sustainable production and consumption of food. It also stress that knowledge from research and new knowledge should be developed in collaboration between different institutions of higher education, research institutes, enterprises as well as other relevant parts of society. It also includes to meet enterprises’ need for competence development and advisory services. A central part of the strategy also identify that the innovation system better should support the the food chain through dissemination and commercialisation of research and new knowledge and growth in new knowledge intensive actors.
- Support for commercialisation can come from different sources: private banks, Almi Företagspartner AB, the holding companies owned by higher education institutions (like SLU Holding), and regionally financed innovation support (consultancy and R&D-cheques).

University level regulations and strategies:

The SLU strategy (SLU ua 2020.1.1.1-3420) put forward the role of innovation at two occasions:

- 1) Our research, education and environmental assessment have the potential to a much higher degree than today contribute to sustainable production systems, innovations and increased knowledge that can promote the transition towards a sustainable society.
- 2) Our campuses should be used as meeting spaces, where collaboration around knowledge development, innovation and entrepreneurship is stimulated.

There are no other statements at the highest level at SLU that put forward innovation.

Structural unit level regulations and strategies:

SLU has four faculties: 1) Faculty of Landscape Architecture, Horticulture and Crop Production Sciences; 2) Faculty of forestry sciences; 3) Faculty of Veterinary Medicine and Animal Science; 4) Faculty of Natural Resources and Agricultural Sciences. In their strategy documents for the period 2021-25, only two faculties include issues related to innovation.

The Faculty of Landscape Architecture, Horticulture and Crop Production Sciences is the faculty that has come fartherst as regards innovation and have longer sections in the strategy related to the issue. The faculty make active investments to improve relations with the surrounding green industry sectors and other actors and mention in its strategy that it works with a from the outside and in perspective in the knowledge building, and work to broaden networks of employees and students for the benefit of education, research and innovation. The faculty works with developing knowledge for innovation in close collaboration with SLU Holding, and other actors, and finally put forward that the campuses specific values for research, teaching, collaboration, innovation and communication should be used most effectively, through, for example, living labs. The Faculty of Landscape Architecture, Horticulture and Crop Production Sciences also runs the SLU Food Lab, which is a

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facility for prototyping of food. The facility is also involved in three of SLU:s innovation courses, with practical food lab activities for developing innovative food products.

The Faculty of Natural Resources and Agricultural Sciences stress that there is a potential for innovation, but do not indicate that innovation is a focus area, the faculty runs two courses on the topic of innovation management.

The other two faculties do not mention innovation in their strategies.

The innovation ecosystem at SLU is mapped by the following eight (nine) components.

Networking and idea generation events

<p>For students:</p> <ul style="list-style-type: none"> • SLU Holding Uppsala, and VentureLab@SLU (Alnarp), Drivhuset Uppsala (external partner financed by SLU Holding among others) regularly arranges idea generation events • VentureLab@SLU (Alnarp), Drivhuset Uppsala, regularly arranges networking events for students • Monthly inspirational “Innovation Fika” (coffee and cake event) for students at SLU Green Innovation Park Uppsala 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Inspirational visits to Green Innovation Park, Alnarp, Friday breakfasts (recurring) • SLU Holding arranges innovation prize events for idea inspiration • Open meetings with SLU Holding staff
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Formal education

<p>For students:</p> <p>SLU offers five innovation focused courses 7,5-15 ECTS at different programmes. Specifically the following courses:</p> <ul style="list-style-type: none"> • Industrial economics and sustainable innovation Fö0477, 5,0 ECTS Uppsala • Product Development and Innovation Systems in Horticulture Fö0435, 15,0 ECTS Alnarp • Innovation and implementation LK0422, 15,0 ECTS, Alnarp • Project management for innovation in sustainable food systems LV0102, 15,0 ECTS, Uppsala • Innovation and sustainable development Fö0444, 7,5 ECTS, Uppsala 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • Occasional courses in patent handling for co-workers (on demand)
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Industry education

<p>For students:</p> <ul style="list-style-type: none"> • Internship courses at some of the MSc programmes • Possibility to write student theses in collaboration with industry (no number of thesis works recorded) • Commonly, courses include study visits to industry actors/enterprises and often people from the industry, as well as alumni, participate in courses as guest lecturers. 	<p>For staff (academics and non-academics):</p> <p>n/a</p>
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Co-working spaces

<p>For students:</p> <ul style="list-style-type: none"> • SLU Holding/Green Innovation Park 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • SLU Holding/Green Innovation Park
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Incubators and accelerators, commercialisation

<p>For students and staff:</p> <ul style="list-style-type: none"> • SLU Holding/Green Innovation Park • VentureLabAlnarp@SLU, Drivhuset Uppsala/ • MinC • Medeon Malmö • Ideon Lund • Medicon village Lund 	
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Advisory services and mentors

<p>For students:</p> <ul style="list-style-type: none"> • SLU Holding/Venture Lab Alnarp • SLU Holding/Drivhuset Uppsala 	<p>For staff (academics and non-academics):</p> <ul style="list-style-type: none"> • SLU Holding
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Funding

<p>For students and staff:</p> <p>Internal, university-related sources for SLU staff and students</p> <ul style="list-style-type: none"> • SLU Holding (also directing money from the public financier Vinnova and other) • Partnership Alnarp, a collaborative platform with industry actors <p>External sources</p> <p>A plentiful flora of private, industrial and public investors (e.g. business angels, Almi invest, Spintop ventures, Vinnova)</p>	
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Prototyping

<p>For students and staff:</p>	
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- SLU food lab (offer possibility to develop food products)
- SLU Holding, the “plant protein factory”
- The Biotrone (biological test area)
- Trädgårdslabbet (area for testing of horticultural plants)
- Alnarp food tech (hydroponics and similar production systems)
- Balsgård food tech
- Krinova (not associated with SLU, but in the geographical vicinity)

SWOT analysis of current innovation ecosystem

Strengths <ul style="list-style-type: none"> • Self-organising faculties and departments as well as multiple (inter- and disciplinary) initiatives that enables research and innovation • SLU Holding/Green Innovation park are their own entity owned as a company by SLU. This creates flexibility, not dependent on faculty structures 	Weakness <ul style="list-style-type: none"> • Ties between SLU research and SLU holding that support innovations are unclear • Undefined relationship between SLU Holding and involvement in study programmes. SLU Holding is not assigned to be involved in education, possibly another actor should be involved
Opportunities <ul style="list-style-type: none"> • Societal demand for innovations that can help resolve sustainability challenges opens up opportunities for universities to meet such demands • Increased collaboration with industry in education • Could be possible to develop innovation and entrepreneurship modules with external actors to be ready to use in more study programmes and courses • Potential to increase the attractiveness of innovation (e.g. patents, external collaboration, formal board experience etc) so that it is perceived as an academic merit besides the typical academic merits of publications and received research grants 	Threats <ul style="list-style-type: none"> • External funding structures may not fully support research projects that aims at prototyping innovations • The university’s view on its task to collaborate with the external environment not always prioritized today. There is the risk that the university looks more inwards than outwards • Innovation systems thinking, which is arguably the dominant perspective for devising innovation policy, identifies firms (not universities) as the key place for innovation, and aims at improving innovation capabilities of firm, including the institutional settings to support them



Roadmap to improve innovation ecosystem

Mapping of existing innovation ecosystem allowed to conclude which elements of ecosystem are well developed and works effective; which are well developed, but works inefficient; which are partly developed and improvements should be made; which are not developed. Summary of this are in Table 3.4.

Table 3.5. The Roadmap to improve innovation ecosystem at Swedish University of Agriculture Science

Phase	Ecosystem elements	Students	Academic staff	Non-academic staff
Idea generation and competence building	Networking and idea generation events			
	Formal education			
	Industry education			
Research and innovation	Co-working spaces			
	Incubators & Accelerators			
	Advisory services & Mentors			
Commercialization	Funding			
	Prototyping			
	Commercialization			

Status of ecosystem element:

Well developed and works effective

Well developed, but works ineffective

Partly developed and improvements should be made

Not developed

Next steps

Phase 1 of the NOBALIS project has shed light on how the current innovation system at SLU works. In phase 2, and onwards in order to improve functioning of certain ecosystem elements a number of areas for improvement have been identified.

In particular relations needs be made between the “academic entrepreneurs” (i.e students/ researchers) and the functional units designed to support innovation processes as depicted in Figure 3.5. There has been identified that there are certain weaknesses in communication between the external and internal parts of the SLU innovation system. In particular the connection between education and collaboration with the surrounding actors. There is currently no natural link, for example involvement in course activities, for students to be introduced to the external actors in other than a few courses (e.g. meetings, study visits, with SLU Holding/Green Innovation Park/Drivhuset). The next step should include a more pronounced strategy to give students more direct contact with these actors within current education.

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The development of easy-to-conduct study modules on the topics of innovation and entrepreneurship can possibly increase student's awareness on the innovation process, and the possibilities to go from idea to commercialisable product with the help from supporting innovation system actors.

An outreaching approach should be introduced to reach those professions at the university that is normally not addressed, e.g. lab assistants, librarians, communication officers, administrative staff.

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3.8. Conclusions

This report summarizes main results of innovation ecosystem assessment in five NOBALIS consortium HEIs. Assessment was based on mapping of existing innovation ecosystem components and regulatory frameworks as well as on SWOT analysis of current innovation ecosystems. That allowed HEIs to summarize and better understand their status quo in innovation and entrepreneurship management and promotion, to identify strong and weak points in their innovation ecosystem, to create background for exchange knowledge on existing innovation capacity and support systems in the institutions. This innovation ecosystem assessment will be used as solid base for building better and more integrated innovation capacity and support systems in NOBALIS consortium HEIs in Phase 2 of NOBALIS project and in post-project period.

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