Innovation, development and research
All letters in use in the RDI activities of Universities of Applied Sciences

Report on the structural development of research, development and innovation activities at Universities of Applied Sciences

Rectors’ Conference of Finnish Universities of Applied Sciences
Arene Ry 2017
Universities of Applied Sciences are part of the national research and innovation system

Key messages

› Universities of Applied Sciences have strong expertise in the areas of research, development and innovation, and an important role in the Finnish research and innovation system.

› The RDI activities of Universities of Applied Sciences are strategically managed, making up a significant part of Finland’s research and innovation system.

› Universities of Applied Sciences have a statutory task in RDI. The national research and innovation policy and financing instruments do not recognise this task.

› The RDI activities of Universities of Applied Sciences are effective, but as yet their potential is not fully utilised in society. Innovation ecosystems* must be supported nationally with new types of financing instruments and the goal-driven targeting of financing.

› The RDI activities of Universities of Applied Sciences are based on strong interaction with interest groups. The result is open, goal-driven and practice-oriented research, development and innovation activities.

Students actively participate in research, development and innovation activities with working life. The staff’s strong connection to working life, their practical experience and research and development expertise are the foundation of RDI activities.

Revising the Finnish welfare society and business competitiveness requires better utilization of the research, development and innovation activities of Universities of Applied Sciences.

There is ongoing promotion of career paths between Universities of Applied Sciences and other RDI parties. A common understanding is needed on the mobility and need for expertise of research professors and doctors, for example.
Recommendations

- It is time to reform the Finnish research and innovation system. Finland needs new resources, particularly for utilising professionally profiled RDI expertise.
- The shared innovation ecosystems of Universities of Applied Sciences and working life are the answer to the challenges of Finland’s innovation system. An investment must be made in RDI carried out in co-operation between working life and Universities of Applied Sciences, and engaging Universities and Research Institutes.
- New instruments must be used to target a total of €600 million on the research, development and innovation funding of innovation ecosystems over the next five years.
- The RDI career paths and expertise of Universities of Applied Sciences must be strengthened by commissioning the title “professor of practice” and by developing professionally oriented, multi-disciplinary post-graduate studies as part of the Finnish education system and innovation activities.

High-quality and effective RDI activities and education must be based on co-operation with businesses, working life expertise and the latest research. New expertise will be generated, as each lecturer also carries out research, development and innovation duties, and RDI actors have a strong connection to education.

*Innovation ecosystems produce solution-driven, cross-field innovations through co-creation rather than through traditional co-operation. The key players in innovation ecosystems are universities and research institutes, working and business life, the third sector and public government. Through multiple mutual interfaces, the parties produce and refine knowledge and enable innovation for further productisation, commercialisation and propagation. (Ståhle 2015. Kaihovaara et al 2016.)
RDI activities at Universities of Applied Sciences

- Research and development was assigned as the statutory duty of Universities of Applied Sciences in Finland in 2003. Innovation was added to the statutory duties in 2015.
- The volume of financing of RDI activities for all Universities of Applied Sciences amounted to €109 million in 2015. In 2017, €86 million of the Ministry of Education’s budget financing has been allocated to the financing model of the Universities of Applied Sciences.
- 7,691 publications per year*.
- The RDI activities produced 624 new products or services, 488 new operating concepts and 233 new tools*.
- Approximately 7,210 companies, 5,300 of which were SMEs, participated in RDI*.
- 259 significant RDI environments and infrastructures that support RDI have been catalogued at Universities of Applied Sciences.
- The total number of RDI personnel is 3,988. 679 of whom are post-doctorate students*.

*According to 2015 statistics

According to the Applied Sciences Universities Act (932/2014), the duty of Universities of Applied Sciences (Section 4) is

“... based on the framework of working life and its development and on research, artistic and cultural premises, to provide university education on professional expert duties and to support the student’s professional growth.”

“Furthermore, it is the duty of a university of Applied sciences to carry out research, development and innovation activities that support education at Universities of Applied Sciences, promote working life and regional development and reform the region’s business structure, and to carry out artistic activities. In pursuing these duties, Universities of Applied Sciences must promote lifelong learning.”
RDI
Strategic focus areas of RDI comprises a solid unity.

The activities enable all areas from research to development, innovation and commercialisation of products and services.

Creates new knowledge, develops expertise, improves understanding of relationships between ideas and applies and utilises latest research results and new knowledge.

The operations continuously identify new needs and possibilities that produce input for RDI.

Interactive networked collaboration produces information in development areas and builds new expertise.

Phenomenon-based work enables practical solutions.

Direct connection between research information and the day-to-day reality of working life.

Research
- The goal is to produce new research knowledge that can be utilised.
- Applied research with businesses and other research organisations.
- Scientific and experimental methods and research ethics.
- Scientific publishing.
- Infrastructures and environments that serves the needs of research.

Development
- New, innovative activities for finding solutions.
- Multi-disciplinary designed new products, services and concepts.
- Implementing research and innovation activities and maximising impact.
- Development of working life and business.
- Regional, national and international development.

Innovation
- Innovation of new products and services.
- Commercialising innovation and promoting entrepreneurship.
- University of Applied sciences as an innovation booster in ecosystems.
- Further R&D processing in collaboration with working life and business.
- Utilising an open culture of activities and experimentation.
Role of RDI at Universities of Applied Sciences

Bror Salmelin
The adviser for Innovation Systems at the European Commission, Directorate General for Communications, Network, content, and Technology (DG CONNECT).

“Universities of Applied Sciences have a unique role as both local and national actors, developing a distributed society, for example, through experiments. Social welfare and healthcare reform is an opportunity for Universities of Applied Sciences to show what they have. The Universities of Applied Sciences are a link between the real world and the research world.”

“The quality of Universities of Applied Sciences varies quite a bit. On the one hand, these universities are seen too much as local actors that deal with small issues, while, on the other hand, they have the potential to be national players, network-builders and even international actors. Universities of Applied Sciences should have a greater role in the system. They have been forgotten.”

“A reason for this may be the attitude of the Universities of Applied Sciences. They have tried to work partly in the same field as traditional science-makers. Both have their role in the innovation ecosystem, which involves academic actors, Universities of Applied Sciences, businesses, industry, citizens and public government and different interest groups. In this system, Universities of Applied Sciences are the glue between the different parties. They are the builders of systems and creators of new professions. This is something that the traditional academic community cannot do. Universities of Applied Sciences have a greater role as drivers and agents of change than has been expected and utilised up until now.”
“Universities of Applied Sciences have an important role in competence centres, ecosystems and a variety of networks. Different competencies are needed which openly interact with each other in solving problems. This works better if Universities of Applied Sciences are involved. The potential is definite but there are shortcomings in the implementation.

The significance of Universities of Applied Sciences is emphasised in the innovation pipeline or helix through skilled, educated people. Doing things together produces visible success stories. Connections with Universities of Applied Sciences could also strengthen the societal impact of universities and make them more versatile. Many Strategic Research Council projects involve a university of applied sciences looking for solution-centric aspects, which has been an excellent contribution.”

“Universities of Applied Sciences are the glue of the innovation system that combines problems and needs, technology, science and commercialisers and beneficiaries. It is a two-way door that helps to identify weak signals and produce impact. Only half of the innovation is done once it has been created, and the more important half remains: commercialisation, utilisation. Internationally, this expertise on commercialisation of the Universities of Applied Sciences is seen as one of Finland’s potentials. The national indicators should be changed so that they do not encourage mutual competition, but rather mutual collaboration.”
Resources in RDI

Internal and external RDI funding in 2012–2015
(Source: Data gathering from universities of applied sciences)
Development of the RDI at Universities of Applied Sciences in 2012–2017

From 2012:
- Development of R&D and improved efficiency. Operative models for R&D project assessment and monitoring.
- Development of R&D tools, e.g., project management software, financial monitoring, customer relationship data.
- The average financing volume of R&D projects is decreasing.

2013–2014:
- Decrease of funding from top years. More planned organisation of funding applications.
- Development of instructions for and quality management of R&D activities.
- Development of the quantity and quality of publications.
- Development of collaboration and networks.

2015–2016:
- Strengthening of strategy and competence-centric focus, emphasis shifted according to future knowledge requirements and competence.
- Networks as support for profiling.
- Development of the management and organisation structures of Universities of Applied Sciences to improve the efficiency of RDI.
- Development of support services for RDI activities.
- Internationalisation and growth of international funding.
- Development of productisation.
- New financing model for the state financing of Universities of Applied Sciences.
- Growth of funding and RDI, for example through the new EU programming period. Simultaneous growth of RDI projects.

2016–2017:
- Development of RDI business
- Stronger collaboration of education in RDI operating models (e.g., Master’s degrees)
- Strengthening networks and deepening RDI partnerships
- Promoting and establishing an open RDI culture and open innovation

RDI activities of Universities of Applied Sciences by funding source in 2015, total €109 million

- Non-profit; 4,2 m€; 4%
- International total; 18,6 m€; 17%
- Finnish businesses total; 5,6 m€; 5%
- Academy of Finland; 0,5 m€; 1%
- Tekes (subsidies and loans); 6,6 m€; 6%
- Other Finnish public funding; 73,5 m€; 67%
Innovation Ecosystems building growth

Innovation ecosystem and the parties enabling it

Common strategies
Co-creation, co-design
Learning
Commercialisation, productisation
Start-up, Spin-off

Infrastructure
204 RDI environments and infrastructures surveyed in Universities of Applied Sciences
Network infrastructures

People
Public government, decision-making
The Public audience and citizens

Regional level
National level
The European Union
International level

People
Public government, decision-making
The Public audience and citizens

Networks
Working life

UAS
RDI actors
Lecturers
Students

Financial framework
RDI funding of Universities of Applied Sciences in 2015
€109 million

Enabling environments
Public support for innovation
Culture of entrepreneurship

Basic research and applied research
Development activities
Innovation

Open RDI
Open innovation

Research institutes
Educational institutes

Third sector

Innovation ecosystem and the parties enabling it, adapted from Mulas et al (2016) and Kaihovaara et al (2016)
“We need world-class innovation ecosystems. Although the different levels of operations are intertwined, understanding the needs of local companies and having a genuine desire to develop RDI with the needs of businesses in mind are the strengths of Universities of Applied Sciences. Universities of Applied Sciences are seen as good partners. Joint development and collaboration based on business needs are important, for example for project applications. Here, we can do even better.”

“Regionally, from the perspective of an individual business owner, there should be as clear and easy paths for collaboration with businesses as possible. Very clear concepts in the ecosystem. The recognition of learning must be properly set up in processes related to RDI, and they should support collaboration with businesses. This is the strength of Universities of Applied Sciences. Mixing the roles of personnel is an additional value at Universities of Applied Sciences.”

“The innovation voucher is an excellent example. We have received good feedback regarding it and it has improved the opinion that businesses have of Tekes as a good, easy-to-approach partner. If a company sees potential for development, it must be able to obtain expertise flexibly and quickly. In this scenario, administration must be minimal. The processes of the voucher nailed it.”
RDI at Universities of Applied Sciences is managed strategically

The RDI activities of Universities of Applied Sciences are characterised by a focus on strengths. The RDI activities of Universities of Applied Sciences are strategically managed.

- The strategic areas of focus merge local competence needs, anticipated changes brought about by society and international phenomena and the strengths of our own competences.
- As a general rule, the strategic areas of focus cover are multidisciplinary. They include different strengths and RDI priorities, related by research programme to the changes in the society and anticipated research and development needs.

RDI activities are developed as part of Universities of Applied Sciences’ strategic and human resources management. They are cost-aware and produce added value.

- RDI is managed, and the processes are developed and assessed systematically, based on feedback.
- RDI activities reform the expertise of the entire community of Universities of Applied Sciences.

RDI in the strategies of Universities of Applied Sciences

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Phenomenon-based focus areas

1. Lapland UAS: Service Business and Entrepreneurship, Smart use of Natural Resources, Managing Distances, Security Competence, Arctic Co-operation and Cross-Border Expertise
2. Oulu UAS: Future health and well-being, Energy, natural resources and the environment, Multidisciplinary business and entrepreneurship, Reforming teaching and teacher training at Universities of Applied Sciences
3. Centria: Service activities through entrepreneurship, Chemistry and bioeconomy, Digitalisation, Production technology
4. VAMK: Export industry business expertise, Smart machines, Devices and systems in electrical engineering, Promotion of popular health and well-being
5. Novia: Health and well-being of the elderly, Sustainable energy technology, Bioeconomy, Ship simulation, Culture and entrepreneurship
6. SeAMK: Food solutions, Smart and energy-efficient systems, Well-being and creativity, Entrepreneurship and growth
7. TAMK: Entrepreneurship and new business, Smart machines and devices, New operating models in social and health services, Energy-efficient and healthy environment, Developing pedagogical expertise
8. SAMK: Elderly services, Seafaring, Automation and industry 4.0
9. HAMK: Thin plate competence, Bioeconomy, Smart services, Professional competence
10. Laurea: Service business, Health and social integrity, Coherent security
11. LAMK: Well-being and renewing growth, Smart industry, Vital environment, Design
12. Saimia: Business from innovation, Internationalisation and growth of SMEs, Customer-oriented social and health services
13. Karelia: Renewing well-being services, Sustainable energy solutions and materials
14. XAMK: Digital economy, Forest, environment and energy, Sustainable well-being, Logistics and seafaring
15. Savonia: Renewing machine and energy industry, Water safety, Responsible food production, Applied well-being technology
16. JAMK: Education expertise and business, Bioeconomy, Applied cybersecurity, Multi-disciplinary rehabilitation
17. Kajaani UAS: Intelligent solutions, (Intelligent) home care, (Intelligent) experiential activities, (Intelligent) business operation potential, (Intelligent) production systems, (Intelligent) game and measurement applications
# Practical and effective RDI at Universities of Applied Sciences

## Operating models for the influence and usability of RDI at Universities of Applied Sciences

### Interaction and joint planning
- **Planned work with interest groups**
  - Planning and applying for funding—implementation—use of results—further use
- **Active, interactive operating models**
  - Open innovation environments
  - Collaboration with working life and businesses
  - Collaboration with other research and educational institutes
- **Operating model that combines learning, RDI and work with interest groups**
  - Student participation in RDI
  - UAS master’s education mode of operation

### Quality of expertise and knowledge, co-creation and openness
- **User orientation, usability and services**
  - User orientation and service design
  - Supporting innovation and development at companies
  - Operating model for productising and commercialising innovations
  - Assessing and refining innovations
- **Openness, experimentation and proactivity**
  - Open operating models
  - Experimenting culture
  - Piloting
- **Promotion of entrepreneurship**
  - Start-up, spin-off
  - Development of businesses

### Focusing on strengths and planned processes
- **Strategic management and operative organisation**
  - Establishment of strategic and functional collaboration with interest groups
  - Development of staff expertise
- **Planned and managed activities**
  - Planned and managed RDI processes
  - Quality assessment and ensuring benefit
  - Use and development of RDI environments and infrastructure

### Active communication and promotion of usability
- **Further development and communication of results**
  - Multi-channel and broad scale communication on activities and results
  - General and targeted events
  - High-quality publications
  - Operating models for utilising results
  - Expert and developer networks
  - Communities of practise
## Strong connection between Education and RDI

### Operating models that ensure the connection between RDI and teaching

#### Pedagogical solutions
- Operating models and pedagogics that combine learning, RDI and working life
  - Project studies included in curriculums
  - Multi-disciplinary aspects and multi-professionalism in curriculums
  - Studies completed in project and working life co-operation, theses and practice
  - Recognition of RDI activities as competences
  - RDI and learning environments involving the areas of focus

#### Planning RDI activities
- Teaching integration aspect in RDI
  - Competence-based RDI and content of education linked with focus areas
  - Planning the connection with teaching from RDI preparation
  - Connection between working life and education
  - Ensuring the connection in management

#### Multiple roles and skills of staff
- Staff involved in education and RDI
  - All staff participate in education and RDI
  - Teachers’ RDI expertise and participation in RDI and RDI planning
  - Participation of RDI staff in teaching
  - Engaging students
  - Strategic resource allocation and goals supporting the integration
  - Teaching and RDI are functionally close to each other

#### Students in RDI
- Studies at the core of RDI
  - Broad-scale application of open innovation
  - UAS master’s education implementation model
  - RDIE models
  - Learning by Developing Model
  - Innovation pedagogics
  - Coaching pedagogics
  - Interactive MINNO operating concept for innovation projects
  - Identifying and sharing theses
  - Students as active developers
Interactive RDI model at Universities of Applied sciences

Knowledge and expertise transmission to working life in RDI

- Design
  - Participation of companies and other interest groups in activities and planning
  - Customer orientation and connections with working life

- Implementation
  - Connection between education and RDI
  - Service business, productisation and commercialisation
  - Promotion of entrepreneurship
  - Events, communication and publishing
  - On going dialogue with interest groups

- Dissemination of results
  - Customer orientation and connections with working life
  - Expert, user and developer networks
Co-operation and interaction with interest groups characterises RDI activities at Universities of Applied Sciences.
› Because of customer and need focus and active interaction, the activities and the results are relevant and usable for companies.
› Interaction also takes place in strategic partnership networks.
› The expertise of students is reflected in working life in RDI.
› Promoting entrepreneurship lays the foundation for new companies brought about by innovation.
› The impact is increased by versatile communication, traditional and open publishing.

Flexible operating models and multidisciplinary innovation networks act proactively.
› Continuous co-operation with users of information and other research actors.
› Information and expertise produced at Universities of Applied Sciences is shared—it is not kept for internal use only.

Staff expertise accumulates and is reflected in new research studies, development and innovation.

Key utilisers of RDI activities and its results

- Business •
- Public organisations •
- Other RDI organisations •
- Other education Institutes *
- Public audience and general usability •
- Third Sector •
- Other •
- Regional administration *

* 24 answer
** 3 answer

Average of university of applied sciences responses. Scale: 1=Not at all important, 2= Somewhat important, 3= Sometimes important, 4= Rather important, 5= Very important.

Source: Survey of Universities of Applied Sciences
“RDI must increasingly connect with the context in which the results will be applied. This implies that there are no ready-made solutions but that they are created during the process. The process is open and adapts to the situation flexibly. This is an opportunity for a university of applied sciences. Public sector actors will increasingly have to participate in processes that show the elements of a successful ecosystem and can engage different actors.”

Esko Kilpi
Futurologist

“We are not headed towards an information-intensive society but towards a learning-intensive one. The expert is not the person who knows the most but the person who learns the fastest.”

Aleksi Neuvonen
DemosHelsinki

“Gaining expertise gradually is no longer sufficient. Now we are emphasising fast pace, changing the division of work, the key mode in the career and doing work is learning—no longer the development of routine but looking in new directions, at things we didn’t know were relevant. We must have the courage to jump away from processes that are currently profitable and look at something altogether new.”
Pekka Soini  
Director General, Tekes  

“Innovation is taking place in increasingly shorter cycles, it is turning into platforms and environments with mechanisms moving and emerging at the same time where development and customer relationships are present at the same time and very close to each other. Universities of Applied Sciences have an important role here. Fast cycles emphasise the fast usability of research data. Activities are also more challenge-based. There is a problem, there is a solution to the problem and then there is business.”

Harri Kulmala  
Managing Director, DIMECC Oy  
Member of the H2020 High-level group for maximising the impact of European R&I programmes  

“The clock frequency is increasing and the pace is getting faster: don’t polish it forever but just give a derivative.”

Anni Vesa  
Education policy advisor, SAMOK  

“The RDI integration of studies is likely to become more integrated. RDI projects could be cut into smaller pieces, involving students in the implementation of only one or two parts or stages. By introducing RDI potential, small and great alike, as a visible part of student life, the students’ role can be strengthened. When students understand what RDI is, they can also convey the message into their working life wherever they go. This would strengthen the potential for the recognition of work as learning competence and the thought that, at Universities of Applied Sciences in particular, work and study are not two separate things, but have a strong connection to each other.”
Where to get the missing support and financing instruments for the innovation system?

Finding new knowledge and ideas

A new idea is produced and researched
A new need for knowledge is identified

In an innovation ecosystem
In research, development and innovation activities
In businesses and in working life
Among users, utilisers and customers
Elsewhere in society

Funding: Basic funding of universities, Universities of Applied Sciences and research institutes, Academy of Finland, businesses

From idea to innovation and expertise in an innovation ecosystem with the resources of Universities of Applied Sciences

Co-creation of new knowledge
Testing ideas with experimental research methods
Operation of the innovation ecosystem
Putting the solution into practice
Commercialisation of the idea
Productisation of the idea

Funding: Basic funding for Universities of Applied Sciences, Tekes, businesses

New activities and developing practices

Funding: Tekes, business subsidies, businesses, customers

Utilised, commissioned innovation
The Finnish research and innovation system must be reformed to correspond to current thinking on international development and innovation ecosystem. This must also be supported through policy and administrative incentives.

- The Research and Innovation Council must take a strong role in the promotion of innovation ecosystems across administrative borders and election periods.
- The Strategic Research Council of the Academy of Finland must better orient itself to support versatile consortia that also utilise the expertise of Universities of Applied Sciences.
- Tekes must strengthen the support of innovation-based growth. More RDI instruments, such as the innovation voucher, must be created and targeted for universities.
- Shared programmes with definite goals are needed between the Academy of Finland and Tekes to ensure interaction between the parts of the innovation ecosystem. This spin-in-type financing would strengthen RDI activities in the innovation ecosystem.

The financing of research and innovation policy must be reformed. The cross-administrative view between the Ministry of Education and Culture and the Ministry of the Employment and Labour must be strengthened.

- There are no science policy instruments for the research, development and innovation task set forth in the Applied Sciences Universities Act (932/2014). These must now be created.
- National, public research financing can push the long-term participation of Universities of Applied Sciences in international research applications for funding and consortia.
Strengthening competences is important for the continuity of effective RDI

- The essentials are what kind of high-quality research and development expertise the business world and innovation ecosystems need and how current Finnish post-graduate education can address these needs.
- The expertise and career paths of the RDI and teaching staff at Universities of Applied Sciences should be developed to better correspond to changing needs.
- Collaboration between Universities of Applied Sciences, universities, research institutes and working life and business must be developed, for example with respect to utilising RDI environments and infrastructures.

Universities of Applied Sciences must further strengthen the RDI structures and operating models related to innovation ecosystems on a regional, national and international level, in accordance with the vision of the best higher education system in the world.

- The benefit of the RDI activities at Universities of Applied Sciences for collaboration networks and working and business life continues to be poorly recognised.
- Universities of Applied Sciences must boldly assume a role as modern innovation actors, as a clue in the innovation ecosystem and accelerators of change.
- The key is the usability of RDI, which is promoted by strengthening impact, an open RDI culture, business capacity and commercialisation.
Arene RDI working group
Petri Raivo, Chairman, Rector, Karelia
Juha Kämäri, Rector, SAMK
Tapio Huttula, Rector, Humak
Henrik Wolff, Rector, Arcada
Outi Kallioinen, Rector, LAMK
Tapio Varmola, Arene Chairman, Rector, SeAMK
Anne Ilvonen, Director of Research and Development, Karelia

Working group secretaries
Riitta Rissanen, Executive Director, Arene
Juha Viitasaari, Advisor, Arene

More details:
Arene Chairman
Rector Tapio Varmola
040 830 4100
tapio.varmola@seamk.fi

Chairman of the RDI working group
Rector Petri Raivo
050 310 9749
petri.raivo@karelia.fi

Abbreviations used:
Arcada Arcada
Centria Centria University of Applied Sciences
DiaK Diaconia University of Applied Sciences
Haaga-Helia Haaga-Helia University of Applied Sciences
Humak Humak University of Applied Sciences
HAMK Häme University of Applied Sciences
JAMK JAMK University of Applied Sciences
KAMK Kajaani University of Applied Sciences
XAMK South-Eastern Finland University of Applied Sciences
LAMK Lahti University of Applied Sciences
Lapin AMK Lapland University of Applied Sciences
Laurea Laurea University of Applied Sciences
Metropolia Metropolia University of Applied Sciences
OAMK Oulu University of Applied Sciences
Karelia Karelia University of Applied Sciences
PolAMK Police University College
Saimia Saimaa University of Applied Sciences
SAMK Satakunta University of Applied Sciences
Savonia Savonia University of Applied Sciences
SeAMK Seinäjoki University of Applied Sciences
TAMK Tampere University of Applied Sciences
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VAMK Vaasa University of Applied Sciences
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