

OECD Skills Studies

Supporting Entrepreneurship and Innovation in Higher Education in The Netherlands



**Supporting
Entrepreneurship
and Innovation
in Higher Education
in the Netherlands**

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Foreword

This publication presents the findings and recommendations of the HEInnovate review of the impact of higher education institutions (HEIs) on entrepreneurship and innovation in the Netherlands. The review assesses the strategies and practices of HEIs in the Netherlands in supporting entrepreneurship and innovation, along with the government policy context. It stresses the value creation agenda shared by the Netherlands government and its HEIs and how this agenda has created a broader understanding of knowledge exchange activities, as well as how they can be supported.

The review was undertaken by the OECD in partnership with the European Commission, as part of the programme of work of the OECD Local Economic and Employment Development (LEED) Committee. The review is part of the HEInnovate collaboration between the European Commission's Directorate-General for Education, Youth, Sport and Culture and the OECD Centre for Entrepreneurship, SMEs, Regions and Cities.

Investing in innovative and entrepreneurial HEIs is one of the highest return investments that we can make. Innovators and entrepreneurs are not born with all the necessary competencies. Rather, underlying attitudes, skills and knowledge are developed over time in society and through education. More needs to be done to ensure that these competencies are developed through education, and to ensure that there are the right incentives and support structures to encourage staff and students in HEIs to get more involved in entrepreneurial ventures and engagement with business and society.

HEInnovate is a starting point for governments and HEIs to identify areas for action. It is a guiding framework for supporting entrepreneurship and innovation in higher education. HEInnovate offers an online self-assessment tool for higher education institutions (www.heinnovate.eu), available in 24 languages, a series of country review assessments, including this report on the Netherlands, and a Policy Learning Network that facilitates cross-country exchange and peer-learning amongst the countries participating in the country reviews.

Preface

Our modern society and its environments are changing rapidly. By stimulating entrepreneurship and innovation among students, teachers, researchers and leadership, our Higher Education Institutions (HEI's) can have a great impact on our changing society and economy. On behalf of the Dutch government I therefore welcome the partnership between the European Commission and the OECD in a series of country reviews on supporting entrepreneurship and innovation in higher education.

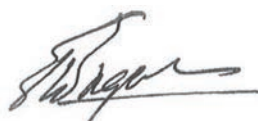
This report shows that the transfer of knowledge from Dutch HEIs to society has evolved greatly over the last two decades resulting in new support structures for research collaboration and start-ups, the emergence of new job profiles in higher education, and a general awareness and growing recognition of knowledge exchange activities across all academic disciplines.

Most higher education institutions in the Netherlands provide learning environments that support the development of entrepreneurial mindsets and competencies of their students; most provide effective support to start-ups of their staff and students and many have leading entrepreneurship researchers on their staff. Furthermore the reputation and networks that their alma mater offers can help start-ups to access resources for business growth and connect with powerful regional entrepreneurial ecosystems such as StartupDelta.

However, there is still room for improvement. I am therefore very pleased that there has been significant engagement with the HEInnovate self-assessment tool and with the country review process, both by Dutch policy makers and Dutch HEIs. The review teams met with a wide range of Dutch national and regional stakeholders. The report ensues from this partnership and its recommendations offer valuable advice upon which public policy and higher education institutions can build for the introduction of new initiatives and further development of existing ones.

The timing of this review is excellent, as both entrepreneurship education and impact feature in the sector agreements I recently concluded with the Association of Research Universities (VSNU) and the Association of Universities of Applied Sciences (VH). The priorities and ambitions therein have been formulated for the coming years: universities have the ambition to enlarge their impact, among others, by scaling up their entrepreneurship education activities and by stimulating academic start-ups. In addition, the Dutch National Research Agenda, in which various complex societal challenges have been described, will give inspiration and direction to where fundamental research, practice-oriented research and impact conjoin.

The Netherlands is ready for the next steps!



Ingrid van Engelshoven
Minister of Education, Culture and Science

Preface

To support entrepreneurship and innovation, higher education institutions (HEIs) need to be innovative and entrepreneurial in organising education, research and engagement with businesses and the broader community. Some HEIs have a solid foundation of initiatives on which to build, pioneered by individuals. Scaling up and sustaining change at institutional and systemic levels requires supporting frameworks for resource allocations, staff incentives, continuous professional development, and the creation of strategic partnerships – locally, nationally and globally.

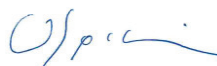
Transforming traditional HEIs into innovative and entrepreneurial organisations is a complex endeavour. For example, knowledge exchange and engagement with business and society are often not foreseen in their core functions, core funding and staff deployment provisions.

Many pioneering HEI-led actions and government policy reforms are emerging internationally. The aim of HEInnovate is to identify and analyse them, and to make information available at European and global levels in order to help new initiatives evolve and grow. HEInnovate is a guiding framework, which offers inspiration and advice, through a series of country reviews, a self-assessment tool for higher education institutions, and a peer-learning network for policymakers, rectors or presidents of HEIs, and entrepreneurship champions in HEIs.

The entire higher education sector in the Netherlands offers excellent examples of entrepreneurial and innovative HEIs. A wide range of actions at government and HEI level have been implemented and tied together within a national agenda, aimed at creating value from academic knowledge by generating innovative services, products, processes and business models that meet economic, social and environmental needs. Nevertheless, there is more to do.

Among the key priorities are increasing interdisciplinarity, scaling up efforts to strengthen entrepreneurial mindsets through teaching, creating greater incentives for effective wider global engagement of researchers and students, and strengthening support for growth-oriented start-ups from HEIs. Both the European Commission and the OECD actively support these priorities and sharing best practice.

We are grateful to the Netherlands for the effective and lasting partnership that has been created with this review, and for the great variety of “learning models” which contribute to the current discussions in Europe and the wider OECD area on effective policy options and higher education practices to support entrepreneurship and innovation. This report offers valuable lessons and ideas for policy makers, HEI leaders and staff, and other stakeholders in the Netherlands and beyond. We look forward to continued collaboration with the Netherlands in HEInnovate.

**Mari Kiviniemi***Deputy Secretary-General, OECD***Themis Christophidou***Director General for Education, Youth,
Sport and Culture, European Commission*

Acknowledgements

This review was a collaborative effort between the OECD's Centre for Entrepreneurship, SMEs, Regions and Cities (CFE), led by Lamia Kamal-Chaoui, Director; and the European Commission's Directorate for Innovation, International Cooperation and Sport in the Directorate-General for Education, Youth, Sport and Culture, led by Antoaneta Angelova-Krasteva, Director. It was undertaken in partnership with the Ministry of Education, Culture and Science, the Ministry of Economic Affairs, the Enterprise Agency (RVO), the Association of Research Universities (VSNU), and the Association of Universities of Applied Sciences (VH) of the Netherlands.

The report was prepared by Andrea-Rosalinde Hofer, Economist, under the supervision of Jonathan Potter, Head of the Entrepreneurship Policy and Analysis Unit of the SME and Entrepreneurship Division of the CFE. It is part of the programme of work of the OECD Local Economic and Employment Development (LEED) Programme, led by Sylvain Giguère of the CFE. Peter Baur from the Directorate General for Education, Youth, Sport and Culture of the European Commission participated in various review activities. Giulia Ajmone Marsan (OECD) provided comments on Chapter 1.

Sections of the report were drafted by Ben Jongbloed, Centre for Higher Education Policy Studies at Twente University (Chapter 1); Andrea-Rosalinde Hofer, OECD (Chapter 2); Maria Helena Nazaré, Rector Emeritus of the University of Aveiro, and Ruaidhri Neavyn, Policy Advisor to the Irish Higher Education Authority (Chapter 3); Gabi Kaffka, Twente University, Alain Fayolle, Professor for Entrepreneurship EM Lyon, and Kare Moberg, Danish Foundation for Entrepreneurship (Chapter 4); Phillip H. Phan, Professor of Strategy and Entrepreneurship, Johns Hopkins University, and Andrew Gibson, Senior Research Assistant at the Higher Education Policy Research Unit, Dublin Institute of Technology (Chapter 5); and Mikkel Trym, Climate KIC, and Norris F. Krueger, School of Advanced Studies, University of Phoenix, Entrepreneurship Northwest (Chapter 6).

A key source of information for the report were study visits to Erasmus University Rotterdam (EUR), Rotterdam University of Applied Sciences (HvR), Utrecht University (UU), Twente University, University of Amsterdam (UvA), Vrije Universiteit Amsterdam (VU), Amsterdam University of Applied Sciences (AUAS), Arnhem and Nijmegen University of Applied Sciences (HAN), and Maastricht University (MU). These study visits were organised by the local HEInnovate co-ordinators: Ronald van den Bos and Pleunie van den Borne (EUR), Rogier Cazemier (HvR), Onno Möller (UU), Roelyn Vanderhoek (Twente), Niek Brunsveld (UvA), Matthias Bakker (VU), Lucy Kerstens and Bart van Grevenhof (AUAS), Loes Kater and Gert-Jan Sweers (HAN), and Niels Harteman and Walter Jansen (MU). Their enthusiasm, commitment and support were crucial for the review.

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Abbreviations and acronyms

ACE	Amsterdam Centre for Entrepreneurship
AD	Associate degree
AHSS	Arts, Humanities and Social Sciences
AMFI	Amsterdam Fashion Institute
AUAS	Amsterdam University of Applied Sciences
BERD	Business expenditure on research and development
CoE	Centres of Expertise
DRZ	De Rotterdamse Zaak
DutchCE	Dutch Centres for Entrepreneurship
ECTS	European Credit Transfer and Accumulation System
ESP	Entrepreneurial Skills Pass
EU	European Union
EUR	Erasmus University
FES	Economic Reinforcement Fund
FOEL	Festival of Entrepreneurial Learning
GDP	Gross domestic product
HAN	Arnhem and Nijmegen University of Applied Sciences
HEI	Higher education institution
ISCED	International Standard Classification of Education
IT	Information technology
KNAW	Royal Netherlands Academy of Arts and Sciences
LERU	League of European Research Universities
MNC	Multinational corporations
MU	Maastricht University
NLPO	National network of entrepreneurship lectors in universities of applied sciences
NRTO	Dutch Council of Training and Education
NVAO	Accreditation Organisation of the Netherlands and Flanders
NWO	Netherlands Organisation for Scientific Research
OECD	Organisation for Economic Co-operation and Development
PBL	Problem-based learning
R&D	Research and development
RVO	Netherlands Enterprise Agency
SEP	Standard Evaluation Protocol
SMEs	Small and medium-sized enterprises
STEM	Science, Technology, Engineering and Mathematics
UAS	University/Universities of Applied Sciences
UU	Utrecht University

UvA	University of Amsterdam
VET	Vocational education and training
VH	Representative organisation of Dutch Universities of Applied Sciences
VSNU	Representative organisation of Dutch Research Universities
VU	Vrije Universiteit Amsterdam

Reader's guide

The reader's guide provides information on the HEInnovate conceptual framework and online tool. It presents the methodology used in the Netherlands' county review and concludes with a brief overview of the chapters in this report.

The HEInnovate framework

Conceptual framework

Higher education is changing across European Union and OECD countries and there is a growing expectation from policy makers and society that higher education institutions (HEIs) should evolve into a new type of economic actor. Entrepreneurship and innovation in higher education are no longer only associated with business startups and technology transfer but are increasingly understood as core elements of a procedural framework for how organisations and individuals behave. For example, in how links between teaching and research are created and nurtured, how societal engagement and knowledge exchange are organised, how resources are built and managed for effective partnerships, and how new entrepreneurs are supported.

Transforming (traditional) HEIs into entrepreneurial and innovative organisations is neither an easy nor a straightforward endeavour. It requires commitment of resources into areas of change and high impact which, in turn, needs to build on a strategic collaboration between policy makers, HEI leaders, staff, students, and partners in the local economy. The aim of HEInnovate is to stimulate and contribute to this strategic collaboration with a guiding framework that describes the innovative and entrepreneurial higher education institution through a set of good practice criteria that has been distilled from an ongoing analysis of current HEI practices across European Union and OECD countries.

HEInnovate was developed collaboratively by the Directorate-General for Education and Culture (DG EAC) of the European Commission and the Centre for Entrepreneurship, SMEs, Local Development and Tourism of the Organisation for Economic Co-operation and Development (OECD). Also contributing was a network of innovation and entrepreneurship professors and experts from across European Union countries. The stimulus for HEInnovate was the University-Business Forum in March 2011, an annual event organised by the European Commission for HEIs and their key strategic partners. Delegates expressed a need for support and guidance in implementing practices to help them become more innovative and entrepreneurial institutions.

A working definition was agreed which describes the innovative and entrepreneurial HEI as “designed to empower students and staff to demonstrate enterprise, innovation and creativity in teaching, research, and engagement with business and society. Its activities are directed to enhance learning, knowledge production and exchange in a highly complex and changing societal environment; and are dedicated to create public value via processes of open engagement”. How this can be translated into daily practice in HEIs is described through 37 statements, which are organised within the following seven dimensions (please refer to the Annex for the full HEInnovate framework and good practice statements):

1. Leadership and Governance
2. Organisational Capacity: Funding, People and Incentives
3. Entrepreneurial Teaching and Learning

4. Preparing and Supporting Entrepreneurs
5. Knowledge Exchange and Collaboration
6. The Internationalised Institution
7. Measuring the Impact

HEInnovate online tool

A freely available online self-assessment tool (www.heinnovate.eu) covering the seven dimensions of the “entrepreneurial university” was developed for HEIs to organise a participatory stock-taking exercise to review achievements and identify areas for improvement. It is possible to involve a wide range of stakeholders (leadership, staff, academic and administrative staff, key partner organisations etc.), and to repeat the exercise over time. Users can choose to remain anonymous and data is accessible only to users. The seven dimensions are available in all EU Member State languages.

Explanations of the statements, a growing number of case studies, multimedia material and workshop facilitation tools make the online tool inspirational and very user-friendly. Users can work with all dimensions or choose dimensions that are most relevant for their purpose. For example, users could choose to focus on “Organisational Capacity” and “Knowledge Exchange” if the purpose is to (re)organise collaboration with external stakeholders.

An instant reporting function generates a snapshot of the status quo and potential areas of change in the chosen dimensions, comparing the rating of the user/user group to the global/HEI mean. The report points users to guidance material and case study examples with information on concrete actions that HEIs can undertake to enhance their performance in the respective dimension(s). Results are saved and can be compared over time; they are accessible only to the respective user.

There are various examples of how HEIs have been using the HEInnovate online tool. Several HEIs have been using it to organise a creative consultation process around their institutional strategy (e.g. Manchester Metropolitan University in the UK), to design new cross-faculty education programmes (e.g. University of Aveiro in Portugal), for the re-organisation of entrepreneurship support infrastructure (e.g. Dundalk Institute of Technology in Ireland), or for the organisation of knowledge exchange activities (e.g. University of Ruse in Bulgaria).

HEInnovate country review methodology

The seven dimensions and good practice statements are also used for HEInnovate policy and system reviews at country level or regional level. The aim of these reviews is to provide a roadmap for strengthening the innovative and entrepreneurial higher education institution. Following an approach that involves a wide range of stakeholders from within the reviewed country (policy makers, HEI leaders, academic and administrative staff members, researchers etc.) and experts and peers from other countries, key areas of strength and areas for improvement are identified and analysed. Recommendations are presented for policy measures that can be implemented by national and sub-national governments, as well as for actions that HEIs can take to act upon opportunities and overcome barriers. The reviews also help to identify and examine examples of good practice from other countries that could provide relevant inspiration.

Recent HEInnovate country reviews have been undertaken in Bulgaria, Ireland, Poland, Hungary, and the Netherlands and further reviews will be undertaken with interested governments.

Method applied in the country-level review of the Netherlands

The HEInnovate country review of the Netherlands was a collaborative effort between the OECD Centre for Entrepreneurship, SMEs, Local Development and Tourism, the Directorate General for Education and Culture of the European Commission, the Ministry of Education, Culture and Science, the Ministry of Economic Affairs, the Enterprise Agency (RVO), the Association of Research Universities (VSNU), and the Association of Universities of Applied Sciences (VH) of the Netherlands. The methodology used in the Dutch review was the same as in other HEInnovate reviews and includes the steps described below.

1. Selection of case study HEIs

The selection of HEIs to be covered in the study visits was undertaken collaboratively by the review partners. Several factors were considered during the selection of HEIs, including type of institution and academic focus (e.g. general university, university of applied sciences, etc.), size (e.g. number of students) and location (e.g. rural, urban). Applications were sought from HEIs to participate in the review and subsequently the Ministry of Education, Culture and Science and the OECD jointly selected nine higher education institutions for an in-depth study. These were Amsterdam University of Applied Sciences, Rotterdam University of Applied Sciences, Arnhem and Nijmegen University of Applied Sciences, University of Amsterdam, Maastricht University, Twente University, Utrecht University, Vrije Universiteit Amsterdam, and Erasmus University Rotterdam.

2. Background report and kick-off workshop

The OECD prepared a background report containing information on the Dutch higher education system, and the visited HEIs prepared institutional profiles. A background chapter on the Dutch higher education system was commissioned during the review process and is included in this report (Chapter 1).

A kick-off workshop for the project was held in Den Haag in March 2016. The Ministry of Education, Culture and Science invited representatives of the HEIs selected for the study visits to participate in the workshop. The purpose was to familiarise the participants with the HEInnovate tool, the review method, and to identify the HEInnovate dimensions to be examined in more depth as focus areas of the review. Four dimensions were selected: Organisational Capacity, Entrepreneurial Teaching and Learning, Knowledge Exchange, and Preparing and Supporting Entrepreneurs. A representative of the OECD Secretariat presented the HEInnovate country-level review methodology and outlined the expectations for participating HEIs. The European Commission presented the HEInnovate tool and explained how the HEIs could use and benefit from it.

3. Study visits

In June and July 2016, two international review teams, led by the OECD, completed two country visits to the Netherlands with one-day study visits to each of the above mentioned nine case study HEIs to meet with presidents/rectors and/or vice-presidents/vice-rectors, deans, professors, career offices, technology transfer offices, business incubators, student associations, student and staff startup companies, students taking entrepreneurship courses,

and alumni. In addition to meeting with local and regional representatives, several meetings were held with national stakeholders, including the Ministry of Education, Culture and Science, the Ministry of Economic Affairs, RVO, VSNU, VH, NVO and business and employer representative organisations.

4. HEI Leader Survey

An online survey of HEI leaders was used to complement the information obtained in the background report and the study visits. The questionnaire is based on the HEInnovate framework and contains seven sections. It asks about current and planned practices in i) the strategic directions of the HEI, ii) management of human and financial resources, iii) the teaching and learning environment, iv) knowledge exchange activities, v) internationalisation, vi) entrepreneurship education, and vii) business startup support. In collaboration with the VSNU and the VH, the representative organisations of Dutch HEIs, invitations to the online survey were sent to the executive boards of all publicly funded HEIs, including 14 research universities and the University for Humanities (excluded were the university of the reformed church, the Catholic Apeldoorn University and the Protestant Universities, specialist universities providing teacher training), and 37 universities of applied sciences (UAS). The total number of responses was 25, of which 9 were from research universities and 16 from UAS. The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

5. Report and workshop

This report was prepared with inputs from the members of the two international review panels, drawing on information gathered during the study visits and from the online survey. An interim report summarising key findings and preliminary recommendations was presented in December 2016 at a meeting with representatives of the nine visited HEIs, the Ministry of Education, Culture and Science, the Ministry of Economic Affairs, RVO, VSNU, and VH. Written feedback on observations from the study visits and suggested actions were sent to the case study HEIs.

A draft report was presented and discussed in an interactive workshop organised by the Ministry of Education, Culture and Science and hosted by Rotterdam University of Applied Sciences in July 2017. Following the workshop, the OECD Secretariat finalised the report, taking into account written feedback and contributions that had been made.

The content of this report

Chapter 1 presents the Dutch higher education system. It describes the role of key actors and discusses the funding arrangements for education and research. The chapter provides an overview of the quality assurance mechanisms and human resource policies in higher education. It also presents the framework conditions for innovation and entrepreneurship in higher education and some recent policies for strengthening the innovative potential of the Netherlands, which will be further discussed in subsequent chapters.

Chapter 2 presents key review findings and recommendations. The analysis is aligned to the HEInnovate framework with its seven dimensions and 37 statements. It covers a holistic approach to supporting entrepreneurship and innovation, including strategy, governance and resources, practices in organising education, research and engagement with business and society, and measuring impact.

Chapters 3, 4, 5 and 6 expand on the key findings and recommendations presented in Chapter 2.

Chapter 3 discusses the challenges faced with regard to the need to sustain valorisation and entrepreneurship through public funding, and a framework that shows how valorisation feeds into education and research. It explores how regional networks can be strengthened and how to engage staff in contributing to this, and valorisation in general. The chapter also reviews current practices undertaken by higher education institutions to enhance and sustain their organisational capacity, primarily with regard to research and knowledge exchange, and presents various learning models and good practice examples.

Chapter 4 focuses on teaching and learning in Dutch HEIs. It discusses approaches undertaken by HEIs to increase interdisciplinarity of educational tracks, develop an entrepreneurial mindset among students and staff, and the growing demand from students for social entrepreneurship education. The chapter explores how to assess the effects of entrepreneurship education on the development of entrepreneurial attitudes. Three tools are presented that have been tested and validated in international studies.

Chapter 5 explores good practices and challenges related to knowledge exchange and collaboration. Given future economic and societal trends, engagement and valorisation activities will depend increasingly on multidisciplinary programmes and related support infrastructure. The chapter argues for a greater involvement of staff and students in the valorisation agenda and increased emphasis on measuring the valorisation phenomenon and impacts in order to embed valorisation further within the higher education system.

Chapter 6 reviews the startup support in Dutch higher education institutions (HEIs). The key question is how can HEIs scale, develop, refine, continue and build on the existing support infrastructure and networks? HEIs have established a strong startup support infrastructure for students and staff through training, access to facilities, mentors and networks. However, supporting entrepreneurial behaviour within the institutional borders of an HEI can be challenging because it might not be compliant with existing reward structures, rules and regulations. In its final section, the chapter analyses the role of HEIs in developing and leading entrepreneurial ecosystems and how this can be strengthened.

Executive summary

Key findings

Higher Education Institutions (HEIs) in the Netherlands are involved in an important new endeavour – to promote "valorisation"; i.e. the creation of value from scientific knowledge through economic and/or societal use. From 2005 onwards, HEIs have included valorisation in their institutional strategies. Significant national government funding has also been available for HEI projects from 2010-18 through the "Valorisation Programme". Although the programme has recently come to an end, HEIs are likely to take over much of the funding for key structures and activities from their core budgets. To avoid overdependence on project-based funding, future policy interventions will need to consider how to ensure sustainability.

The valorisation – or value creation – agenda has had many benefits. It has supported the introduction of new staff profiles and initiatives to broaden career paths for HEI staff (e.g. policy advisors). It supported an increase in collaboration between HEIs, joint initiatives with city and regional governments, and boosted research activities in the Universities of Applied Sciences.

Valorisation has also enhanced interdisciplinarity, with further stimulus from the 2016 Dutch Research Agenda. Evaluating practices and barriers in HEIs will clarify whether existing initiatives are sufficient, or whether more flexibility will be needed for HEIs to introduce and sustain interdisciplinary initiatives and whether national funding is needed to further support interdisciplinarity.

A key part of the valorisation agenda involves supporting startups by staff and students. Most HEIs offer idea generation activities, training, incubation, mentoring and networking. However, entrepreneurship support actors and activities are not always well-connected within the HEI, and support should be made more accessible for alumni.

In common with many other OECD countries, barriers exist in the Netherlands to business growth following the very early stage. In particular, young firms have to overcome the double-constraint of lack of internal resources and limited access to external resources. HEIs can help with their networks and reputation. The organisation of large entrepreneurship events (e.g. Get in the Ring) has built powerful global networks for startups, and many HEIs have growing numbers of students and staff from abroad. This international exposure is an excellent opportunity that could be further exploited for valorisation and entrepreneurship.

Many HEIs are offering a rich variety of entrepreneurship education activities. These efforts could be enhanced by offering activities earlier (for awareness raising), and ensuring that they are available and accessible to all students from across all disciplines. It should be recognised that it is not always easy for students to manage the requirements of a full-time study programme and pursue a "startup dream". There are already several good examples of how HEIs in the Netherlands support these students.

Valorisation takes many forms. Efforts are therefore underway in the Netherlands to define a common set of indicators, with the aim of showing how valorisation contributes to education and research, and how it creates societal and economic impact. Currently each HEI reports on its valorisation activities and results through a combination of self-selected indicators and narratives. While this approach describes the activities and outcomes of individual HEIs, it does not capture the system-wide extent of activities and impact nor does it show how valorisation feeds into education and research.

Overall, when considering future policies to support valorisation and entrepreneurship through higher education, building more and better synergies between the core functions of education, research and knowledge exchange are important. For this, co-ordination mechanisms amongst the different ministries are crucial and should be strengthened.

Recommendations

Recommendations for government

- **Establish a national programme for research on valorisation** in higher education. A national research initiative on processes, outcomes and impacts (i.e., going beyond results) would provide very valuable lessons for future policy making in the Netherlands and in other countries, particularly in view of the current efforts to establish a common set of impact indicators.
- **Ensure sustainability in funding for valorisation whilst stimulating synergies between education, research and valorisation activities.** This can be achieved by further anchoring valorisation in quality agreements and funding models with HEIs whilst stimulating synergies between education, research and valorisation activities. For this, effective co-ordination mechanisms between different ministries and agencies are important.

Recommendations for higher education institutions

- **Support staff to effectively participate in valorisation.** Development and training programmes, as well as centrally-anchored support mechanisms for staff to manage relationships, are fundamental and should be continued and expanded.
- **Recognise staff participation and performance in valorisation.** Job descriptions, tasks and promotion procedures should take into consideration participation and performance in valorisation processes.
- **Enhance the participation of students in valorisation.** Emerging interdisciplinary research platforms and regionally-anchored activities (e.g. City Deals and StartupDelta) should seek greater student involvement. Recognition of the acquired competencies is important (e.g. diploma supplements).
- **Support students in managing study requirements and pursuing a startup.** Several good initiatives are underway. Information should be widely disseminated.
- **Strengthen the institutional positioning of entrepreneurship centres.** Entrepreneurship centres can play a key role in valorisation and need to be strongly connected with the wider range of valorisation activities. Using the HEInnovate self-assessment tool can help to identify gaps.
- **Strengthen links with entrepreneurial alumni.** A first step would be to allow and encourage alumni to make use of the entrepreneurship support offer of the HEIs they attended.

Recommendations for joint action

- **Capacity building for better synergies between education, research and valorisation and for measuring impact.** The new quality agreements could incentivise and support HEIs in building synergies and strengthening their communication efforts.
- **Provide training opportunities for entrepreneurship educators.** A national training programme could be introduced in addition to the HEI-specific offer.
- **Enhance interdisciplinarity in education and research within and between HEIs.** Programme accreditation could be further directed towards encouraging interdisciplinarity and incentives could be introduced to promote greater sharing of research facilities. Successful collaboration with local and regional stakeholders should be strengthened.
- **Strengthen the role of HEIs in supporting startups with growth potential.** Greater collaboration across the HEIs (e.g. Amsterdam Centre for Entrepreneurship) and effective connections between different support initiatives will make access to support easier for startups. This is relevant both at national and regional levels, as well as within specific sectors.

Chapter 1

Overview of the higher education system in the Netherlands

This chapter presents the higher education system in the Netherlands. It presents key actors, and discusses the funding arrangements for education and research. The chapter provides an overview of the quality assurance mechanisms and human resource policies in higher education. It provides an introduction to the framework conditions for innovation and entrepreneurship in higher education and some recent policies for strengthening the innovative potential of the Netherlands. These will be further discussed in subsequent chapters.

Introduction

The Netherlands is a highly developed knowledge-based economy, performing very well in many science, technology, innovation and competitiveness rankings. Its 2016 rate of tertiary attainment is at 45.7% of the population aged 30-34 years, well above the 2020 target of the European Union (EU). The country has an innovative business sector with high rates of patenting activity, owing also to the presence of large, globally networked and efficient research and development (R&D) spenders. It outperforms the EU average in terms of top R&D spending enterprises, with an average of 46.0 top spending enterprises per 10 million inhabitants compared to the EU average of 29.9 (European Union, 2017 for the period 2011-15).

Relative to the EU average, small and medium sized enterprises (SMEs) are oriented more towards services than manufacturing with key strengths in transport, logistics, information technology and finance. This partly reflects the role of the Netherlands as a gateway to Europe and its large volume of re-exports. Alongside good export performance in high-technology sectors such as electronics and pharmaceuticals, Dutch exports are also strong in sectors that are traditionally not considered as knowledge-intensive or high-technology, notably in niches of agriculture and the food industry.

The government has committed to spend 2.5% of GDP by 2020 on R&D from both public and private sources. In 2015, R&D expenditure as a share of GDP in the Netherlands was 0.5 percentage points below this target, slightly above the OECD average. At 0.72% in 2015, the direct government budget for R&D as a share of GDP was higher than the EU average (0.64%). However, business enterprise expenditure on R&D (BERD) was at 1.12% of GDP in 2015, relatively low compared to the EU-28 average of 1.23% and OECD average of 1.65%.

The Innovation Union Scoreboard 2016 ranks the Netherlands in 5th place on the list of innovation leaders following Germany, Finland, Denmark, and Sweden (EU, 2016). A key strength of the Dutch innovation system lies in the quality of its science base, as reflected in the number and quality of scientific publications. The percentage of scientific publications that count among the top 10% most cited publications (14.5%) is above the worldwide average (10.5%); only the Swiss share (15.7%) is higher. The Dutch research system is very open to co-operation with partners from abroad and its researchers are well networked at international level. This is manifested in international scientific co-publications, public-private co-publications and new doctorate graduates.

The Netherlands enjoys moderately high shares of knowledge-intensive employment (on the basis of their average propensity to employ tertiary graduates). Eurostat figures for 2015 show that the share of employment in knowledge-intensive industries was relatively high at 38.1%, roughly two percentage points above the EU average. A particular strength of the country's innovation system is the expansion of professional education in the universities of applied sciences (UAS).

Table 1.1 presents an overview of basic facts on higher education in the Netherlands.

Table 1.1. **Basic facts on higher education in the Netherlands**

Population (1 January 2017)	17.1 million
GDP in EUR per capita (2015)	40 000
Total government expenditure on tertiary education as % of GDP (2015)	1.6%
Tertiary attainment in population aged 25-64 (2015)	35%
of which:	
Short cycle tertiary education	2%
Bachelor's	21%
Master's	12%
Doctoral	1%
Expenditure on tertiary education institutions as % of GDP (2013)	1.7%
Expenditure (from public and private sources) on R&D as % of GDP (2015)	2.02%
Direct government budget for R&D as % of GDP (2015)	0.72%
Number of students in publicly funded HE institutions (all levels, all modes; 2015/16)	701 086*
of which:	
Universities of Applied Sciences	442 567
Universities	261 176
Tertiary degrees conferred (2014/15)	133 102
of which:	
Degrees by Universities of Applied Sciences (bachelor's, master's, associate degree)	59 521
Degrees by Universities (BA, MA, first degree, second degree)	73 581
R&D personnel per thousand total employment (2015)	14.6
Higher education researchers as % of national total (2015)	29%
Number of citable research documents (2016)	50 349
Citations per document (2016)	24.7

* During an academic year students can switch between universities and universities of applied sciences and are then counted twice. In the overall total these students are counted only once. Therefore the sum of the parts is greater than the overall total.

Source: Author's own compilation from EUROSTAT, OECD, Scimago Research Group and National Statistical Agency (CBS).

Notwithstanding the country's strong innovation performance, a policy debate has been underway since the early 2000s on how to enhance the interaction between science, industry and government, and more recently on how to stimulate entrepreneurship as a means to create value from science and technology, and to enable talent for innovation more broadly.

Like many other European countries, the Netherlands is struggling with the challenge of creating value from the excellent knowledge it is producing. Entrepreneurship and entrepreneurial competencies are considered to be crucial for translating research and education inputs into economic value and, more broadly, for creating social impact (or public value). Creating economic, social and cultural value from scientific knowledge has therefore been included in the statutory duties (i.e. the missions) of Dutch universities and UAS as "valorisation".

In 2014, the OECD assessed the Dutch innovation system and found that it offers, in many respects, an excellent business environment (OECD, 2014). Many of the conditions relevant to business creation are largely supportive. However, there are barriers to growth after the startup phase. This observation was echoed recently by Technopolis in a study on the growth barriers of academic start-ups. Key barriers are a scarcity of start-up funding and entrepreneurship competencies (Technopolis, 2015).

Many Dutch people consider becoming an entrepreneur to be an attractive career option, although attitudes towards accepting business failures and giving entrepreneurs a second chance could improve. Graduates first see themselves working as an employee, and only some time later as a founder of a company. According to the Global University

Entrepreneurial Spirit Students' Survey (GUESSS), 6% of students want to work in their own firm directly after their studies; five years later, this applies to 27% of all students, although students in UAS in the Netherlands are somewhat more likely to have entrepreneurial intentions (both on graduation and five years later) as compared to students in research universities (ECE, 2014).¹

Key actors and elements of the Dutch higher education system

There are many actors, relationships, funding mechanisms, policies and inter-relations in the higher education and research system in the Netherlands. The following section presents a brief description of the main actors in the system and their roles.

Higher education institutions and their representative organisations

In the Netherlands, higher education – covering levels 5 and 6 of the International Standard Classification of Education (ISCED) – can be broadly divided into two distinct domains:

- The publicly-funded higher education sector, including research universities and UAS, offering programmes at ISCED 5A level
- The privately-funded higher education sector, consisting of private universities (ISCED 5A) and professional education institutions offering post-secondary programmes (ISCED 5A and 5B).

The publicly-funded higher education is binary in structure. On the one side, there are 13 research universities, an Open University and four small denominational universities (e.g. theological universities). On the other side, there are 37 universities of applied sciences (UAS; in Dutch: *hogescholen*). Over 63% of students are enrolled in the UAS sector.

The Association of Universities in the Netherlands (VSNU) represents the interests of the research universities, whereas the Association of Universities of Applied Sciences (VH) unites all government-funded UAS in the Netherlands. VSNU and VH function also as employers' organisations on behalf of their member HEIs and negotiate with the unions on collective labour agreements.

The privately-funded sector consists of one private business university and several higher professional education institutions offering mainly bachelor's degrees and short-cycle programmes. These institutions are private – not just in the legal sense, but also from the perspective of their resources, as they do not receive government funding. They may nevertheless be recognised by the public authorities as being institutions that deliver tertiary education degrees. The Dutch Council of Training and Education (NRTO) is the umbrella trade association of private training and education providers. Some of the larger (e.g. online) private providers are not members of NRTO. Data on the private institutions is very sketchy and not gathered by statistical agencies.

Research universities and the UAS sector are governed by the same legal framework stipulated by the Higher Education and Research Act of 1993. It governs the quality of the publicly-funded institutions, planning and budgeting, personnel, education, registration, teaching, examinations and doctoral studies, requirements for preliminary education and admission, students and external student auditors, the legal protection of students and external student auditors, and the administration and structure of the various institutions. The Act provides the accountability frameworks, for instance with respect to annual reporting and audit arrangements. The Act also extends to the university hospitals

(the university medical centres, which are independent entities closely affiliated to a university), the Royal Netherlands Academy of Arts and Sciences (KNAW) and the Royal Library (Rathenau Instituut, 2008).

Quality control of higher education programmes is carried out by the Accreditation Organisation of the Netherlands and Flanders (NVAO). Established in 2005, the NVAO's role encompasses quality assessment, evaluation and control. The Inspectorate of Education (in Dutch: *Onderwijsinspectie*) is responsible for the inspection and review of educational institutions, including in higher education.

Research universities and research schools

Research universities focus on the independent practice of research-oriented work in an academic or professional setting. They train students in academic study and research, although many study programmes also have a professional component. In terms of research, the universities are expected to strive for excellence and relevance involving strengthening the quality of their research groups, concentrating their research on areas of strength, and creating economic, social and cultural value from their research. The latter includes taking initiatives to make research contribute to stimulating innovation in economically important areas.

Attention is mostly focused on the 13 publicly-funded research universities. They consist of three universities of technology and a university focusing on life sciences and agriculture (Wageningen). The remainder are general universities, eight of them associated with an Academic Medical Centre. Taken together, in 2015 the 13 universities offered 400 bachelor degree programmes and 800 master's programmes, while the UAS offered some 850 bachelor-level programmes, 145 master's programmes and 90 associate degree programmes.

The research universities are well placed in international rankings. Of the top 50 higher education organisations receiving the most EU funding from Horizon 2020 in signed grants for calls closed in 2015, 9 were based in the Netherlands, compared with 15 in the United Kingdom, 5 in Germany and 5 in Sweden (EC, 2016). The Technical University Delft is 5th on this list with over EUR 50 million in EU funding and 69 participations.

Since the early 1990s, a large number of research schools have been created by research universities. These schools are places where universities work together to offer structured training programmes to – primarily – PhD candidates that work in a particular disciplinary field. The Royal Academy of Sciences (KNAW) is responsible for the accreditation of the research schools. A small part of the universities' public grant is allocated to support research schools. Today, more than 60 research schools exist; a few of them have been awarded the status of "top research school" and receive additional public funding. Apart from research schools, universities also have graduate schools, where PhD programmes and programmes for students doing a research master's degree are based.

Universities of Applied Sciences (UAS)

The UAS prepare students directly for specific professions and careers. Their study programmes focus on the practical application of knowledge. The UAS mostly award bachelor's degrees, but they have recently also started to award associate degrees and master's degrees.

The UAS sector is very diverse. Some offer a wide range of programmes and play an important role as providers of higher professional education for their region. Others are more

specialised, such as schools dedicated to the arts, and colleges for teacher training, agricultural studies, hotel management and tourism, with some, in particular the art schools, having a wider, even possibly international, catchment area. Since 2006, UAS offer two-year associate degree programmes to bridge the gap between post-secondary vocational education and higher education.

Access to higher education is – with some exceptions (e.g. medical programmes that have a fixed number of new entrants) – open to all students who hold the required entrance qualifications, implying that there is little entrance selection. However, for master's degree programmes the selection of students is possible.

Out of the 100 000 new UAS entrants, on average 3 in 10 students are from vocational education and training (VET) colleges. The Netherlands has 66 VET colleges (MBO), i.e. public schools for vocational education and training, enrolling some 490 000 students. One in five VET graduates continues his/her educational career in the UAS sector.

The UAS have a unique position within the country combining educational tasks on the one hand and connections to regional business communities on the other. In the (applied) research area, UAS are still relatively underdeveloped compared to other European countries that have a binary system with a polytechnic sector. Both their research budget and the research skills of their staff have not yet reached levels that are comparable to those of, for instance the *Fachhochschulen* in the German-speaking countries, the Institutes of Technology in Ireland, the *Ammattikorkeakoulu* in Finland, or the former polytechnics in the United Kingdom.

The Dutch UAS are catching up though, partly thanks to dedicated funding flows for applied research and the creation, some 15 years ago, of the lector position, a special type of UAS-professorship. The lector usually heads a team of UAS colleagues (a lectorate) consisting of approximately ten lecturer-researchers involved in applied (practice-oriented) research. Representatives from the world of work are often part of this team. Students may also play a role in projects carried out within the lectorate. The lectors carry out applied research and develop new knowledge with and for their professional fields. They do not have the right to award PhDs, unlike professors in research universities. The public funding for the lectors is part of the institutional core budget and is augmented by funds raised from industry, non-profits and public sector organisations. The government pays for approximately 70% of the lector positions and the rest are funded by external partners. So far, more than 600 of these positions have been created in the UAS.

UAS are encouraged to specialise in their own research themes, strengthen their research infrastructure, and link up with other HEIs and the private sector. The research in the UAS sector is known as practice-oriented research or design and development, highlighting that the UAS sector carries out its own type of research. The UAS institutions are also expected to develop a stronger connection between research and education and encourage their students to acquire more research skills as part of an increased attention to building 21st century skills (Ministry of Education, Culture and Science, 2015).

Several Centres of Expertise were established by the UAS sector from 2011 onwards to improve the connection between education and the labour market. The aim is to promote and stimulate innovation in professional education and support innovation within firms: students, teachers and UAS-researchers address real-world challenges, working towards innovative solutions that strengthen economic competitiveness.

Centres of Expertise are of particular importance for the valorisation of knowledge and research produced in the UAS sector. Activities are often concentrated on a particular theme

that is usually linked closely to the local economy. The aim is to involve students in the activities in order to make a stronger connection between research and education and to encourage students to acquire more research skills.

Each Centre of Expertise is established as a collaborative consortium between a UAS, private companies, research institutes and other partners (for example vocational schools and local governmental organisations).

Generally, half of the financing of the Centre of Expertise is provided by the consortium – of which at least half is from the private sector. This makes for shared ownership of the Centre of Expertise. The other 50% consists of a temporary (four to five year) subsidiary funding. 19 Centres of Expertise were established as a result of financial incentives from the Ministry of Education, Culture and Science or the Ministry of Economic Affairs.

Ministries and intermediary bodies

At government level, the most important actors are the Ministry of Education, Culture and Science and the Ministry of Economic Affairs. The Ministry of Education, Culture and Science has an overall responsibility for the governance of the HEIs and the public research organisations and research institutes. The Ministry of Economic Affairs has the responsibility for innovation policy instruments and all matters concerning applied and industry-oriented R&D. The two ministries work together on areas such as the promotion of entrepreneurship and the strengthening of the links between education and the world of work.

The Education Council (in Dutch: *Onderwijsraad*) is an independent governmental advisory body which advises the Minister of Education, the Minister of Economic Affairs, Parliament and local authorities on issues related to education (at all levels from pre-primary to higher education).

Every four years, the Ministry of Education, Culture and Science releases its strategic agenda, setting out the government's higher education policies for the future. The most recent agenda (Ministry of Education, Culture and Science, 2015) was published in 2015 and primarily covers policies and spending plans related to education. Policy aims related to research are covered by a separate policy document, also published regularly, the so-called Science Budget (Dutch: *Wetenschapsbudget*). The latest Science Budget was published in 2016.

Decisions on distributing science budgets and on implementing research and innovation policies are mediated through various intermediary bodies. The most important is the Netherlands Organisation for Scientific Research (NWO), a central intermediate funding organisation in the field of fundamental and strategic research. The NWO awards competitive research grants to researchers and research teams on the basis of proposals. Apart from playing a role as a funding organisation, nine research institutes in the fields of astronomy, mathematics, computer science, physics, history, maritime research, law, criminality and space research are directly overseen by the NWO.

The NWO underwent a major restructuring in 2017. The nine scientific areas which the NWO covers were grouped into four domains – exact and natural sciences, social sciences and humanities, applied sciences and engineering, and medical sciences – each with its own governance structure under the umbrella of NWO. Furthermore, the research institutes owned by NWO now have a separate organisation. The Taskforce for Applied Research (SIA), which awards grants to UAS, is also part of NWO.

Individual researchers that seek research council funding are now required to include a paragraph in their proposal on knowledge utilisation and on how their research will

contribute to the public good. As part of NWO, the applied and technical sciences cluster (previously known as STW) has, for some time already, employed user groups to oversee the social and economic take up of the research sponsored by the research council.

The Royal Netherlands Academy of Arts and Sciences (KNAW) is an independent council advising the government on issues of science policy, especially related to the field of basic research (e.g. codes of conduct, quality assurance, and research schools). The KNAW owns 15 research institutes that perform basic research, such as in the life sciences, humanities and scientific information. These are research institutes comparable to those of NWO. It also awards scientific prizes and scholarships to researchers. An important role for the KNAW is to help set out the criteria that are used nationally to assess the quality of academic research.

The Advisory Council for Science, Technology and Innovation (AWTI) is an independent body that advises the government and the parliament on policies relating to scientific research, technology development and innovation. The AWTI also acts as a council that the government can consult. Several other bodies are also relevant for science policy advice, such as the Scientific Council for Government Policy (WRR) and the Rathenau Institute.

The Social and Economic Council of the Netherlands (SER) advises on issues related to, for instance, the labour market. The Netherlands Bureau for Economic Policy Analysis (CPB) and the Social and Cultural Planning Office (SCP) also regularly produce reports on higher education and research matters. The VSNU, the Association of Universities in the Netherlands also plays an active role in the science policy debate.

Another body responsible for managing and implementing policies in the area of innovation and entrepreneurship is the Netherlands Enterprise Agency (*Rijksdienst voor Ondernemend Nederland*; RVO). This agency of the Ministry of Economic Affairs is primarily focused on innovation subsidies for entrepreneurs, but it also provides information, training, and individual advice for universities on how to participate in the European Commission's Horizon 2020 programme.

Public research organisations: technological institutes

Besides the aforementioned research institutes under the umbrella of the Academy of Sciences (KNAW) and the Research Council (NWO), there are also publicly supported applied research organisations. These are known as technological institutes and collaborate in the TO2 federation.

TO2 comprises the Netherlands Organisation for Applied Scientific Research (TNO), Deltares (applied research in the field of water and subsurface), the Energy Research Centre of the Netherlands (ECN), the National Aerospace Laboratory (NLR), and the Maritime Research Institute Netherlands (MARIN). The TO2 organisations conduct applied research and related activities, such as supporting industry and government in specific fields. The TO2 institutes receive basic financing from the government, but a large part of their budgets derives from specific ministry allocations, European research funds and contract research carried out for industry.

The Leading Technological Institutes (LTIs) is another group of public research organisations. They were created in 1997 as virtual organisations in which companies, research universities and other public knowledge institutes participate through public-private partnerships. Initially there were four such institutes in the fields of nutrition, metals, polymers and telematics. Later on, other LTIs were added operating in the fields of pharmaceuticals, molecular medicine, green genetics, water technology, and biomedical

materials. The nine LTIs that still exist today closely collaborate with research universities and (international) research institutes. They are participating in the Top Consortia for Knowledge and Innovation (TKIs) that were established as part of the Top Sectors policy (see below).

Research assessment arrangements

Since 1993, external peer committees have evaluated fundamental research taking place in the research universities along the four dimensions of quality: i) productivity (i.e. number of publications per academic), ii) quality of (publication) output, iii) societal relevance, and iv) long-term viability of the research group. All of the university research carried out at faculty/department level, in as far as this is organised in research programmes, is judged on a five-point scale. The reviews are organised under the auspices of the VSNU following a common protocol.

The protocol used for the quality assessments of the research was revised a few years ago by the VSNU, the NWO and the Royal Netherlands Academy of Arts and Sciences. The new Standard Evaluation Protocol (SEP) for the period 2015-21 no longer evaluates the productivity (i.e. research volume) of a unit but primarily focuses on quality, relevance and sustainability (KNAW, 2014). External assessment committees (peers) conduct these assessments for each unit or institute once every six years on a rolling schedule.

In its evaluation report, the assessment committee offers its opinion both in text (qualitative) and in categories (quantitative, using categories 1 to 4). The four possible categories are excellent, very good, good and unsatisfactory. The university or research institute decides the follow up action based on the external assessment committee's evaluation results and recommendations. There is no direct connection between the outcome of the quality assessment and the amount of the public grant received by the university for research, but the university administration can (and does) take the judgement by the external peer committees into account for its internal policymaking and resource allocation.

Societal relevance of research, engagement and value creation have long been included as criteria in the SEP. This takes into account the contributions made to specific economic, social or cultural audiences, as expressed through contract research, advisory reports for policy-makers or contributions to public debate. The SEP intentionally avoids including an exhaustive list of measurement indicators. The SEP also requests a narrative description of the societal relevance (i.e. impact) of the research in question.

The quality of the practice-oriented research in the UAS sector cannot be evaluated in the same way as the more fundamental research of the university sector, also because research activity in the UAS sector is more recent. Nevertheless, national evaluations of UAS research do take place nowadays, based on a protocol published by the VH, the umbrella organisation of UAS institutions (*Vereniging Hogescholen*, 2015). The evaluation process takes place on a six-year basis and involves an external committee and a site visit by an expert panel.

The evaluation criteria for UAS are, however, quite different from those of the SEP. The evaluations show that this type of research is beneficial to professional practice and has important links to student training – in particular in light of the above discussion on 21st century skills. The evaluation considers how the research is organised and embedded in the UAS and the degree to which the research has had an impact on professional practice and society, on education and staff professionalisation, and on the knowledge development

within the research area. The indicators used for assessing quality relate to research inputs (e.g. numbers of researchers, lecturers, revenues) and outputs/outcomes (i.e. publications, workshops, expert meetings, demonstrations, membership of committees, grants received, client satisfaction, etc.).

The UAS face some challenges in keeping up with the evaluation requirements because UAS staff (in particular the older staff) do not yet possess the required research qualifications and research experience. In the UAS sector, there is a need to further upgrade research skills and invest in research facilities. This challenge has been partly addressed through the creation of the above mentioned Centres of Expertise in the UAS and the appointment of lecturers which have led to a greater focus and thematic concentration of research activities.

Funding of education and research in Dutch higher education

Research universities and UAS receive funding through the following sources:

- tuition fees paid by students
- a core grant (lump sum) provided by the government for education, research and knowledge dissemination
- competitive project- and programme-based research funding, provided by the research council (NWO and its departments) or the Academy of Sciences
- project-based funding for education and research carried out for public and private clients.

All students pay tuition fees. If students are studying full-time and they are from the European Union, the European Economic Area, or Switzerland, they pay a fee that is equal across all HEIs and programmes. The level of the fee is set by the Ministry of Education, Culture and Science (in 2017 this was around EUR 2 000). Other students, for instance non-European students, Dutch part-time students and students that already have completed a degree in the Netherlands also pay a fee, but its rate is set by the HEI itself. In the case of students from outside Europe this fee is considerably higher and often close to a full-cost fee. In 2014, for the publicly funded universities the total revenue from tuition fees was EUR 560 million (Koier et al., 2016) and EUR 800 million for the UAS.

The core grant is the largest source of revenue for Dutch HEIs. In 2014, it was over 4.6 billion for the research universities. The Ministry of Education, Culture and Science (and the Ministry of Economic Affairs in the cases of Wageningen Agricultural University and the UAS in the field of agriculture) provide the public funds as a lump sum. This amount consists of budget components for education and research respectively, but the HEIs have large degrees of freedom on the distribution of these resources.

For research universities the core funds for education are 70% formula-based and 30% based on fixed allocations. Currently, the formula funds for education partly (roughly for two-thirds) depend on the total amount of student enrolments and bachelor's and master's degrees. For the formula, only enrolments onto standard length courses are taken into account (in the research universities: three years for a bachelor; one, two or three years for a master's, depending on the programme). Enrolments and degrees are weighted by three different funding rates: low, high and top. The low rate of 1 for studies in the field of economy, law, social sciences and humanities, and language and culture; the high rate of 1.5 for education, agriculture, technology, and health; and the top rate of 3 for medicine-related programmes. Another part (one third) of the formula funds for education is

provided in the shape of largely fixed sums per university. The same approach is used for the UAS (with the proviso that bachelor's programmes last four years and master's normally one year) with the rates being 1, 1.28 and 1.5 respectively.

In 2014, some 15% of the universities' core funds for research were based on the number of bachelor's and master's degrees – again distinguishing three subject weights (low, high, top) and, on top of that, doubling the weight for master's degrees. In that same year, 25% of core funding was based on the number of PhD degrees, applying a fixed rate per PhD. From 2017 onwards, the formula-based allocation for PhDs has been reduced to 20% of the total research allocation, implying a lower rate per PhD. The remainder of the research allocation (60% in 2014; 65% from 2017 onwards) is distributed primarily on the basis of fixed (historically-based) allocations per university, including subsidies for a selected number of research schools (i.e. the six top research schools).

In the UAS sector, the core grant is 90% based on a formula (that takes into account weighted enrolments and degrees – as described above) and 10% based on fixed allocations per UAS. In 2014, the core grant was EUR 2.8 billion. The fixed allocations for the UAS are targeted to support lectorates and practice-oriented research. The research allocations are limited in size and roughly proportional to the education component of the core grant for UAS.

The core grant is intended to support the teaching and research mission of the HEIs. It is important to note that there is no separate funding stream for valorisation, but, as discussed below, there are various dedicated public funds for valorisation. In addition, competitively awarded research funding also takes valorisation activities into account (e.g. the NWO's Innovation Research Incentive Scheme Veni, Vidi, Vici).

Core grant tied to performance agreements

For the period 2012-16, 7% of the core grant was tied to performance agreements. This accounts for approximately EUR 130 million for the research universities and EUR 170 million for the UAS sector. 2017 was a transition year towards a next round of agreements. The 7% consisted of 5% for a conditional budget, that is, conditional on the signing of the performance agreement, and continued after 2016 on the condition that the 2015 performance targets are achieved, and 2% for a selective budget, that is, a competitive fund awarding more funding for the best proposals; "best" primarily in terms of programme differentiation and research concentration.

The performance agreements included quantitative and qualitative targets, defined by the HEIs themselves. Where the conditional budget (the 5%) was tied to quantitative targets in terms of the quality of education and student completion rates, the selective budget (the 2%) was primarily for encouraging and rewarding performance in terms of differentiation and profiling in education and research and enhancing knowledge dissemination. The quantitative performance indicators for the conditional budget were: student completion (bachelor students only), student drop-out rates in year 1, share of year 1 students switching to other programmes, the number of students in honours programmes, student satisfaction scores, teaching intensity (i.e. student hours per week in class), academic staff qualifications, and the share of overhead (indirect) costs.

The ambitions relating to the selective budget were mostly expressed in qualitative terms, but institutions were encouraged to also make use of indicators, for instance to underline research and valorisation ambitions. For research, some of the indicators related

to the outcomes of research assessments or the success at winning competitive grants from organisations like the European Research Council. Examples of indicators used for illustrating valorisation activities are: students taking entrepreneurship courses, third party income (from private industry or non-profits), the number of licensing agreements, the number of spin-offs created, and the number of co-publications with industry. Half of the selective budget for the UAS institutions was set aside for competitively awarding grants of EUR 1 million per year for the creation of Centres of Expertise (see previous section).

A third revenue source for both universities and UAS consists of competitive research funds, distributed by intermediary public organisations, such as the NWO. In 2014, competitive research grants for research universities amounted to EUR 533 million. Part of the NWO budget is dedicated to support public-private partnerships in research – a policy known as the Top Sector strategy (see below). The competitive funding stream to support practice-oriented research in the UAS sector is still relatively small at around EUR 17 million per year. A significant source of funding is the RAAK programme (Dutch for Regional Attention and Action for Knowledge Circulation). The budget for this programme is allocated through the NWO's Taskforce for Applied Research (SIA). RAAK funding is aimed at improving knowledge exchange between SMEs and UAS and is awarded to projects that are executed by a consortium of one or more UAS, also involving vocational education and training providers and one or more businesses.

Both research universities and UAS receive a substantial part of their income from third party funding from various sources including public organisations (e.g. ministries, local authorities), non-profits (e.g. medical charities), and grants from European research programmes. Third party funds also include fees from contract teaching and from students doing non-degree programmes. In terms of contract research income, the universities are very active in generating research subsidies linked to encouraging public-private partnerships in research consortia.

In 2014, third party funds received by research universities totalled EUR 1.8 billion, whereas the UAS sector received EUR 170 million. UAS third party funding is much lower than for the research university sector, due to the modest research capacity in the former. A key component of UAS third party funds are the innovation vouchers (*kennisvouchers*) for SMEs to co-finance small scale research and consultancy offered by a UAS or research university. The vouchers have a value of EUR 3 750. In 2015, more than 400 vouchers were used by SMEs.

Monitoring educational quality and performance

Developments in the fields of education and science are continuously monitored. The Ministry of Education, Culture and Science presents statistics on educational quality and performance through its interactive web-tool “Trends in Focus” (Dutch: *Trends in Beeld*). An independent Review Committee was created by the Ministry of Education, Culture and Science in 2011 to oversee the performance agreements between the Ministry and each HEI. These agreements were introduced partly as a result of the recommendations of the 2009 Committee on the Future Sustainability of the Dutch Higher Education System, the so-called Veerman Committee, which stated that the Dutch higher education system was not future-proof. Student drop-out was too high, students' talents were not properly addressed and there was too little flexibility in the system to serve the various needs of students and the labour market (Veerman et al., 2010). A long-term strategy was needed to

improve the quality and diversity of Dutch higher education. The Veerman Committee recommended to reduce the share of enrolment-based funding for research universities and UAS in favour of mission-based funding tied to a performance agreement, signed between each HEI and the Ministry, and overseen by an independent oversight body.

The performance agreements for the period 2012-15 were formulated in terms of quantitative indicators and qualitative ambitions chosen by the HEIs themselves, in light of the following goals:

- Improve the quality of education and the success rate of students in universities and UAS
- Enhance the differentiation within and between higher education institutions, encouraging them to exhibit more clear education profiles and more focused research areas (including the creation of Centres of Expertise by UAS)
- Strengthen the focus of universities and UAS on their valorisation function (i.e. knowledge exchange, commercialisation, entrepreneurship support).

In 2017, the Review Committee concluded that some improvements had been made, in part as a result of the performance agreements (Review Committee, 2017a). Student completions in the research universities have improved since, but less so in the UAS sector. Results related to the objective of increasing differentiation and concentration were rather mixed, although the Centres of Expertise that have been created are seen as a successful initiative. In terms of valorisation, universities were able to show more clear results than the UAS sector (Review Committee, 2017b).

The evaluation of the performance agreements by an external evaluation commission (*Evaluatiecommissie Prestatiebepoosting Hoger Onderwijs*, 2017) highlighted the positive outcomes of the performance agreements and re-affirmed the need to incorporate some form of performance-based funding – rewarding institutions for meeting self-stated ambitions in terms of quality and differentiation.

Encouraging HEIs to strengthen their individual profiles on the basis of their strengths in education and research, and stimulating differentiation remains on the agenda. There is still a need to further increase differentiation in terms of the range of programmes offered to students (two-year associate degrees, broader bachelor programmes, research master's, honours programmes, professional master's programmes offered by UAS). This objective is difficult to achieve in a relatively open system of higher education with little room for entrance selection of students. This points towards the efforts increasingly made by HEIs to provide adequate information to potential students about programme content and what is expected of students that apply for a degree programme.

The new agreements have a focus on enhancing quality. This is also reflected in terminology. The new “quality agreements” are expected to ensure that the government's savings as a result of the abolishment of the student grants in 2015 are invested in visible quality improvements of education and a further differentiation in programme offerings and modes of instruction. Another issue, also emphasised in the recent strategy document of the Ministry of Education, Culture and Science, is that both research universities and UAS should strengthen their connections to the outside world – in education as well as in research – and reinforce their valorisation activities (Ministry of Education, Culture and Science, 2015).

What is still very much under debate is whether and how quality and performance are to be rewarded in the future system of quality agreements (see Box 1.1). The Review Committee concluded that a financial reward (or a penalty) should be connected to the

Box 1.1. Performance agreements – good practices from OECD countries

With the increasing autonomy devoted to HEIs, in many OECD countries governments have put in place new steering and accountability mechanisms. An example of these mechanisms is performance agreements between HEIs and their ministries or funding authorities.

Evidence from several OECD countries has shown that performance agreements:

- are not solely meant to strengthen performance but also have aims such as encouraging HEIs to strategically position themselves, given their particular mission and strengths
- can handle situations where HEIs have multiple objectives (education, research, innovation, entrepreneurship) and – within some nationally-set boundaries – can set their own targets
- improve the strategic dialogue between the government and the HEIs
- help to inform policy-makers and the public at large about the HEIs' performance, thus improving accountability and transparency
- can be used to promote horizontal collaboration between different actors.
- The evidence also points towards the following lessons for an effective design of this type of agreement:
 - Performance agreements are taken more seriously by all parties and have greater impact if financial consequences are attached. They should include a mechanism to reward “overachievement” and not just be focused on budget cuts as a result of failure to meet indicator-based targets.
 - The nature of financial incentives must be carefully chosen. The budget linked to the agreements must be sufficiently large to have an impact, yet not so sizeable to the extent that the incentive becomes a goal in itself, or could lead to perverse effects.
 - Agreements must primarily pertain to goals and results. The indicators related to the targets should meet the requirements of validity, relevance, and reliability. Organisation-specific performance indicators can sometimes limit the scope for horizontal collaboration, with HEIs focusing solely on meeting the performance targets assigned to them.

Source: De Boer et al. (2015); Jongbloed and Vossensteyn (2016); OECD (2016a).

agreement in order to underline the consequential importance, referring to the lessons learned from the earlier experience of performance agreements for the period 2008-11. During that period, the agreements were made with the higher education sector as a whole, that is, between the Ministry of Education, Culture and Science and the HEIs' umbrella organisations VSNU and VH, and with no financial consequences in case of failure to achieve goals. As a result, individual HEIs were not encouraged to take the agreement seriously, as consequences were minimal.

Quality assurance in Dutch higher education

Programme accreditation

As far as the education programmes in research universities and UAS are concerned, quality control is carried out by the Accreditation Organisation of the Netherlands and Flanders (NVAO), with the Ministry of Education, Culture and Science being responsible for the legal framework. The NVAO was established alongside the introduction of the Bachelor-Master system in 2005 in order to expertly and objectively assess the quality of higher

education in the Netherlands and neighbouring Flanders. However, quality assessments have been in place for much longer. The Netherlands was one of the first countries to develop a formal system to assess the quality of teaching and research, on the basis of site visits by an independent committee of experts (peer review). The quality assessments were co-ordinated by the VSNU and the VH from 1986 onwards.

The process of accreditation follows the general model of four steps, universally accepted in higher education since the early 1990s and consisting of i) a self-evaluation, ii) a site visit by an external committee of (mostly) peers, iii) a public evaluation report, and iv) the national agency co-ordinating and legitimising the process. The reviews take place every six years and comprise the evaluation of, at least, the following dimensions of educational programmes: targeted end level of the education programme; content and design of the educational programme; realised end level; appropriateness of assessment, testing and examination of the students; quality and quantity of the employed staff as well as staffing policy; and programme-specific service provision as well as institution-wide provisions which affect the quality of the programme.

The accreditation framework in the Netherlands attempts to stimulate quality enhancement beyond the threshold of the “basic quality” needed to gain accreditation. Visiting committees judge each standard against a graded scale: insufficient-sufficient-good-excellent. If enough good or excellent standards are found, the programme may then be awarded a good or excellent grade of accreditation by the NVAO. In 2015, 20% of the programmes within the UAS sector received the qualification “good”, while for research universities this share was 6%.

Efforts to reduce the administrative burden of programme accreditation were heavily discussed and, in 2011, led to the introduction of an institutional audit of institution-wide quality assurance arrangements. Programme accreditation, however, is still ongoing.

If a programme is found to be of low quality, and no improvements are made over a number of years, the government reserves the right to eliminate this study programme from the official register of recognised programmes. This would imply that the programme no longer receives public funds and its students no longer qualify for student support.

In recent years, the accreditation agency has issued positive verdicts on the quality of programmes in the large majority of cases, implying that accreditation is awarded for another six years. In cases where evidence points at sub-standard quality, accreditation can be awarded for a limited period only (two years) and the programme is expected to make the necessary improvements during that period – after which it re-applies for accreditation. In 2015, the latter was the case in 3% of the programme evaluations taking place in the UAS sector, and in 11% of the cases in the research universities. This conditional accreditation usually leads to improvements and a positive accreditation. Cases where accreditation is denied are quite rare in the public sector, but do occur in the private higher education sector. In cases where an institution expects a negative outcome, it will postpone its request for accreditation.

Special quality features: internationalisation, 21st century skills and entrepreneurial education

The accreditation process allows particular aspects of programmes to be expressed in terms of distinctive profiles or special quality features. One such feature is the attention paid to internationalisation in the programme. Another special feature is the entrepreneurial

character of the programme. If there is an above average focus on entrepreneurial teaching and learning, the institution seeking accreditation can request the review panel to award the special entrepreneurship label. The panel will then judge whether the particular entrepreneurship-related goals the institution has set for itself have been achieved and whether its students have gained the related knowledge, skills and attitudes. For this, the review panel makes use of a set of standard criteria. The entrepreneurship label has so far only been awarded to certain programmes of one university and one UAS.

Ensuring quality of education through teaching staff development initiatives

Essential to the quality of education is the quality of the teaching staff. In relation to this, research universities have started within their own system to develop and recognise their staff members' didactical skills. This started with the introduction of the University Teaching Qualification (Dutch: *Basiskwalificatie Onderwijs*; BKO). The BKO certificate has become quite common in research universities as proof of the didactic competency of teaching staff in higher education. In 2015, more than 70% of the teaching staff in universities had a BKO compared to 19% in 2011. This was also promoted through the performance agreements as the share of staff holding a BKO was one of the mandatory indicators for which universities had to set goals to be achieved by 2016.

The next step in certifying the teaching skills of academics is the Senior Teaching Qualification (Dutch: *Senior Kwalificatie Onderwijs*; SKO). The SKO denotes a higher level of skills in terms of curriculum development, leading change, and the systematic development and evaluation of courses. In most universities the BKO qualification is mandatory for all academics with a teaching task, while the SKO is aimed at staff that wish to take on more senior positions in educational management.

In the UAS sector, a basic qualification didactic competences label was introduced more recently; obtaining this qualification is slowly becoming standard practice in the UAS sector.

Benchmarking Higher Education System Performance

The Netherlands is currently participating in the OECD's Benchmarking Higher Education System Performance project, part of the *Enhancing Higher Education System Performance* programme, which envisages identifying how well higher education systems are performing, why some systems are performing better than others and what can be drawn from this analysis to improve performance in higher education on a wider scale.

The first benchmarking exercise is ongoing (2017-2018) and it includes the participation of Belgium (Flemish Community), Estonia, Norway, and the Netherlands. A benchmarking exercise will take place every two years and the work is intended to develop in terms of breadth, scope and coverage with time, informed by a systematic stakeholder dialogue (Box 1.2).

Box 1.2. OECD's Benchmarking Higher Education System Performance Project

Higher education has undergone profound transformations in recent decades. The move towards knowledge-based economies, the advent of modern technologies and the growing role of international markets in trade and in building competitiveness have created new conditions in which higher education operates. As a result, higher education has expanded over time, becoming more diversified, digitalised and open to a global market place. At the same time, government and other higher education stakeholders have higher expectations

Box 1.2. **OECD's Benchmarking Higher Education System Performance Project** (cont.)

regarding the economic and social role of higher education. These led to calls for more accountability and better monitoring of performance.

Many countries across the OECD and worldwide face similar challenges in their higher education systems and would like to learn how well their systems perform in comparison to others. They want to better understand how to develop and maintain high quality education and research; ensure that higher education is able to respond to social and economic needs; and demonstrate that investments in higher education provide positive public and private returns. To address this interest, the OECD has launched a programme of work, Enhancing Higher Education System Performance, which envisages identifying how well higher education systems are performing, why some systems are performing better than others and what can be drawn from this analysis to improve performance in higher education on a wider scale. The programme aims to achieve these objectives through its two interconnected strands of work: Benchmarking Higher Education System Performance, and In-depth Analysis of Higher Education Topics.

Unlike developing rankings or setting targets for higher education, the benchmarking approach involves a comprehensive cross-country analysis of data and information covering all levels of higher education (from short-cycle to doctoral education), to enable countries to identify how well they perform compared to other countries, learn more about their strengths and weaknesses, and draw on this information to improve policy and practice in their higher education systems. The benchmarking exercise consists of a baseline analysis, which will be consistent across benchmarking exercises. The baseline analysis is designed to provide a longitudinal analysis of higher education system performance in key areas: education (learning and teaching), research and engagement; and across different stages of the transformation process from input, activity and output to outcome. The baseline accounts for the context within which higher education is shaped, including the economic and social context, the structure, governance and policy landscape surrounding higher education systems; and the financial and human resources going into the systems. In addition, the exercise provides a detailed analysis of key policy themes, which are tailored to the needs and priorities of participating countries.

Stimuli for valorisation activities and entrepreneurship support

Policy initiatives to stimulate valorisation activities and entrepreneurship support in higher education were introduced in light of the conviction that the Netherlands, despite its excellent performance in science and technology, was lagging behind in terms of using its research output for strengthening innovation and the creation of jobs. This phenomenon was also known as the knowledge paradox, that is, excellent scientific research but a low degree of utilisation by firms.

Policy initiatives to stimulate valorisation of scientific knowledge

In its 2004 Science Budget the Dutch government announced that HEIs should fulfil a “third” mission, next to education and research. This has been taken up by the research universities and the UAS first through inclusion of valorisation in strategic documents and then by specific activities and the establishment of support structures. It should be noted that “third” mission had not been absent from the Dutch higher education sector prior to this date; rather the 2004 Science Budget triggered a more institutionalised approach.

In 2009, the following sector-wide definition of valorisation was introduced (VSNU, 2013): “Valorisation is the process of creating value from knowledge by making knowledge suitable and/or available for economic and/or societal use and translating that knowledge into competitive products, services, processes and entrepreneurial activity.” The Ministry of Education, Culture and Science has modified the definition slightly since then. The word “competitive” has been deleted and the emphasis has been placed more on valorisation as a process rather than the notion of a product or result (e.g. patent, license or treatment protocol). The Ministry of Economic Affairs also considers valorisation to be an important topic, and the two ministries work together in this field. Obviously, in this area the Ministry of Economic Affairs stresses the interests of Dutch commerce and industry, entrepreneurship education and public-private partnerships.

A broad conceptualisation of valorisation is very important and reflects a modern trend observed increasingly in OECD countries. It should be noted that the Netherlands has been pioneering such broader valorisation concepts (Box 1.3).

Box 1.3. Valorisation indicators: pioneering studies from the Netherlands

In 2010 the Dutch government commissioned research work to develop a list of generic indicators to measure valorisation performance. The indicators had to be applicable in a wide variety of settings, on several levels and for a variety of evaluation goals. The authors soon discovered that there was no ready-made set of indicators that matched the broad definition of valorisation. They were also critical of the use of patent counts as an indicator of valorisation, arguing that the broader societal and economic use of scientific knowledge needs to be taken into account.

Combining quantitative and qualitative indicators, the research proposed a comprehensive four-dimensional framework that could be applied in various situations, including research universities and the UAS. Furthermore, greater attention needs to be paid to the process of valorisation (viewed as a process of interaction during all stages of research rather than just the transfer of knowledge at the end of a research project) when trying to measure valorisation performance, rather than simply considering output indicators.

Since its publication in 2011, the framework has been used in a variety of ways, including for the award of competitive research funding, and has been discussed in parliament. It is credited with having moved valorisation measurement discussions away from focusing only on quantitative indicators of researcher and research organisation performance to a broader, more process-oriented approach that includes other actors as well.

Source: van Drooge et al. (2011) and OECD (2014).

Several programmes and grant schemes have been introduced to support valorisation activities involving a rich array of intermediary organisations in a more “bottom-up” style and including all key stakeholders in what can be circumscribed as the “polder model”. This is a form of consensus decision-making characterised by co-operation among parties despite significant differences and is common in Dutch policy making processes. There has been a great deal of change in Dutch innovation policy, in part as a result of the political and economic volatility of the last decade. However, there has been continuity in the objectives pursued and in the sectors singled out for special attention. For example, the sectors chosen for the Top Sectors policy (see below), have clear antecedents in sectors prioritised by earlier policy initiatives.

Valorisation Programme

In 2010, the Valorisation Programme was introduced by the Ministry of Education, Culture and Science and the Ministry of Economic Affairs. The aim was to stimulate entrepreneurship education, screening and scouting of knowledge transfer opportunities, provide pre-seed funding and proof-of-concept funding, stimulate network creation, and initiate other activities that contribute to knowledge exchange. The Valorisation Programme supports the entire entrepreneurial pipeline, from entrepreneurship education to the incubation of new companies.

A budget of EUR 63 million supported 12 regional consortia grouped around one or more higher education institutions and led by a research university. The Valorisation Programme offers 50% co-funding for the HEIs up to a maximum of EUR 5 million. A midterm review of the programme from 2010-14 (Panteia, 2015) found that entrepreneurial education and screening activities are well under way to becoming more embedded within higher education. It is expected that the activities launched by the Valorisation Programme will continue after the government support ends in 2018.

Top Sector policy

An important revenue source for research universities in the past was the Economic Reinforcement Fund (Dutch: *Fonds Economische Structuurversterking*; FES). FES was a government investment programme from the 1990s to 2010, based on revenues from the large natural gas reserves owned by the Netherlands. It awarded competitive funds to strengthen research infrastructure through large-scale subsidies for consortia consisting of universities, private companies, research institutes, and other public organisations.

FES is an example of a scheme intended to prioritise research, targeted towards research in a selected number of priority fields – areas of strategic interest for Dutch industry and society. The government decided that such a prioritisation policy would contribute to the creation of “focus and mass” in research (Ministry of Economic Affairs, 2004). It was argued that the creation of focus and mass in the research capacity of selected key areas was necessary to maintain a strong and internationally competitive position. The key areas selected were: flowers and food, high-tech systems and materials, water, chemistry, creative industries, and pensions and insurance. They were chosen for their perceived strategic importance in terms of growth opportunities and relevance to societal challenges.

Although the prioritisation strategy has sometimes been questioned, it still is very much alive today. An example is the Top Sector policy introduced in 2011 as an approach to focus science and technology policies on nine key sectors: agro-food; horticulture and propagating stock; high-technology materials and systems; energy; logistics; creative industries; life sciences and health; chemicals; and water. The selection of these sectors was based on a combination of the intensity of the R&D taking place in the sector and its export performance.

A point of critique is that the Top Sector policy focuses on existing sectors and thus does not provide for the exploration of new niches. In response to this, three cross-cutting themes were introduced: ICT, bio-based economy, and nanotechnology and so-called Top Consortia for Knowledge and Innovation (TKIs) were defined and allocated specific funding from the NWO. Also, a sectoral human capital agenda was drawn up, highlighting the expected and preferred skill profiles in each of the nine sectors. This includes objectives on the quality and quantity of higher and vocational education, stressing the importance of

skill development and lifelong learning. Another point of criticism is that SMEs are still under-represented within the Top Sectors.

The National Science Agenda

To enhance greater synergy between science and education across the country's higher education and research sector, the government came forward with the Science Vision 2025 – Choices for the Future (in Dutch: *Wetenschapsvisie 2025*), commonly referred to as the National Science Agenda. It was drawn up by a knowledge coalition including all key stakeholders (Kenniscoalitie, 2015). A large number of stakeholders, ranging from science to the business community and civil society organisations were invited to send in their suggestions for scientific issues and questions to be included in this agenda. The questions were inspired by scientific curiosity as well as a desire to address big societal challenges and economic opportunities. In total, 11 700 questions were submitted. The questions were condensed into themes and a total of 140 broad scientific questions were identified. The government has stated its goal to make the National Science Agenda a leading instrument in the award of funds for science supporting scientific breakthroughs.

The members of the knowledge coalition took the release of the National Science Agenda as a starting point for defining a number of “routes” (25 in total), and suggested ways in which these routes could be shaped to advance not just science in general but the Netherlands in particular. This is expected to lead to a number of thematic priorities for science. The representatives of the business sector suggested focusing on themes cross-cutting the top sectors that had been defined earlier as the focus areas for the Netherlands. Their focus is on smart cities, circular economy, smart industry, sustainable food production, and energy transition.

The knowledge coalition and other stakeholders have called on the government to provide extra budgets for science and to implement the agenda. An amount of EUR 1 billion was requested, to be spent on strengthening science. So far, the government has provided EUR 32 million to the NWO to stimulate research on three issues: youth, digital society, and natural science. Furthermore, an amount of EUR 5 million was allocated to be spent on talent development policies. This extra investment is also intended as an experiment to investigate how the National Science Agenda could function in practice and how its further implementation should take place.

A crucial element in the National Science Agenda is its attention to collaboration – in terms of public-private partnerships as well as in terms of cross-disciplinary research – and its focus on societal challenges. Concerns are expressed regarding the situation of individual disciplines (e.g. humanities, mathematics, law) and the support of individual researchers. Another issue is the need to match funds when undertaking large projects in public-private research consortia. With more resources becoming available for projects, some fear that less is left for individuals undertaking curiosity-based research.

Valorisation indicators

Over the years, potential indicators for monitoring valorisation have been proposed by several agencies (e.g. Van Drooge et al., 2011). In 2012, when all Dutch HEIs were preparing individual performance agreements with the Ministry of Education, Culture and Science for the first time, the Review Committee invited the HEIs to make use of indicators to illustrate their ambitions with respect to valorisation. Some HEIs responded to this request

and agreed to include a number of indicators in their performance agreement as well as in the reports they publish each year to report on their overall activity.

However, so far, a commonly defined set of indicators used by every HEI is not in place. Each HEI reports on valorisation through a combination of indicators and qualitative statements (i.e. narratives). Measurement indicators very much differ between HEIs, reflecting the different institutional missions.

At the conclusion of the last round of performance agreements in 2016, the Review Committee concluded that valorisation is an integral part of the activity portfolios of the universities and UAS (Review Committee, 2017b). Both types of institutions have worked actively on the dissemination of knowledge to societal parties – each in their own way. In the UAS sector, important roles are played by lecturers, Centres of Expertise and other knowledge centres. In particular, the Centres of Expertise (that were an integral part of the agreements of the UAS) were evaluated favourably by the Review Committee. While quantitative information on the Centres is still scarce, they are starting to play an important role in improving education and in boosting the regional innovation system.

Research universities have already worked for a longer time with third parties in co-producing knowledge and exchanging their knowledge in the (regional, national, international) networks they are part of. However, the valorisation indicators that research universities included in their performance agreements only properly started appearing in the universities' annual reports towards the end of the performance agreements – that is in 2016. The Review Committee praised the research universities for collectively producing a website (*Valorisatie in Beeld*, maintained by their umbrella organisation VSNU) featuring a diverse array of indicators and narratives for each university. However, the Review Committee concluded that the UAS sector has made less progress in publishing indicators (Review Committee, 2017b). Instead, the UASs mostly present narratives in their annual reports when it comes to valorisation.

In going forward, the idea was that at the completion of the performance agreements in 2016 an agreed set of well-tested indicators was to be presented and to be used by the HEIs for their annual reporting and – possibly – for the new round of quality agreements. The government has recognised that presenting a consistent national picture of value creation activities and results is difficult because every higher education institution is using its own indicators (Ministry of Education, Culture and Science, 2017). While the VSNU initiative *Valorisatie in Beeld* is a good start to document engagement and value creation activities, it is not sufficient to present a consistent national picture of processes, activities and impact.

Since every HEI uses its own indicators, it is impossible to compare results and monitor progress nationally. Therefore, a call was made to the Academy of Sciences to propose methods to make value creation activity more transparent and to propose indicators that capture the broader quality and impact of research. So far, only the research universities, (not the UAS), have been asked to prepare a proposal for a common set of indicators of value creation to be used by all research universities.

It should be mentioned here that in many OECD countries finding the “right” set of indicators to monitor value creation is an open issue, given the broad range of activities that go under this label. Valorisation takes place at many different stages of research and education, and often in synergy with one or the other. It is therefore important to acknowledge diversity in any attempt to define metrics.

Policy initiatives to support entrepreneurship in and through higher education

Since 2000, the Ministry of Education, Culture and Science and the Ministry of Economic Affairs have supported the introduction of entrepreneurship education across all levels of formal education. In higher education one of the first programmes was the Action Programme TechnoPartner, which started in 2004. The aim was to strengthen the entrepreneurial climate in the Netherlands and to encourage “technostarters”, that is, high-tech startups either from within or outside HEIs. A subsequent initiative was the Education and Enterprise Action Programme (Dutch: *Actieprogrammema Onderwijs en Ondernemen*) implemented by the Ministry of Economic Affairs from 2007 to 2011. Entrepreneurial education is, in most cases, an interdisciplinary activity involving collaboration between and across specialised disciplines. One of the achievements of this programme was the establishment of Centres of Entrepreneurship. There are six regional Centres of Entrepreneurship, with a total of sixteen HEIs involved: eight universities and eight UAS. An evaluation of six Centres of Entrepreneurship in 2012 found that since 2007 the number of students interested in entrepreneurship and starting their own company has grown; this holds in particular for graduates from the UAS (Van der Steen et al., 2012). A study by Ecorys from the same year found that more students were seeking to gain ECTS in entrepreneurship (in the UAS: 64% in 2012 compared to 50% in 2010) (Van der Aa, 2012). University-business collaboration also increased and the business community has started playing a greater role in defining the content and organisation of entrepreneurship education. Entrepreneurship is, to some extent, part of a teacher’s competence profile in many UAS.

These and other related policy initiatives were integrated in 2010 into the above described Valorisation Programme. Results have been positive. Entrepreneurship has become more deeply enshrined in higher education and is part of the curriculum offered by a growing number of HEIs. The number of HEIs that included entrepreneurship in their mission statement has also increased. Lecturers, researchers and PhD candidates can participate in courses and startup training sessions. More students are behaving in entrepreneurial ways, are positive about entrepreneurship, and are setting up their own businesses within five years of graduation (ECE, 2014). The annual monitoring reports for the performance (and now quality) agreements have also confirmed this (Review Committee, 2017a).

Most research universities have established incubators and centres of technology transfer. One of the financial instruments aimed at encouraging research universities to commercialise their discoveries is the Open Technology Programme (OTP) of the Technology Foundation (Dutch: *Stichting Technische Wetenschappen*; STW). The OTP programme financially supports high-quality university research projects with high user involvement and a high propensity for utilisation. It is a competitive programme, which does not prescribe which research themes can receive funding. Projects last between three and six years and require co-funding by third parties. In 2016, the OTP had a budget of some EUR 18 million. In 2015, around 30% of the applications were successful.

A recent report on academic startups concludes that these centres and incubators are doing a good job and that universities have invested a lot in entrepreneurship support. Nevertheless, some of the obstacles noted are the large transaction costs due to negotiations on intellectual property and a lack of entrepreneurial skills of graduates and academics. Furthermore, some of these support infrastructures lack professional expertise and/or are too oriented towards technical disciplines and medical fields (Technopolis, 2015).

A recent national programme with a lot of potential to support business start-ups from HEIs in the Netherlands is the Ambitious Entrepreneurship Action Plan, initiated by the Ministry of Economic Affairs in 2014, with an indicative budget of EUR 75 million. Key action areas are i) funding for early-stage proof-of-concept ii) funding for innovative technology development projects involving business and knowledge partners from at least two different European countries (“Eurostars projects”), iii) strengthening the international position of start-ups and growing businesses, and iv) providing temporary residence permits for non-EU entrepreneurs to start a business in the Netherlands.

In 2015, the Ministry of Education, Culture and Science and the Ministry of Economic Affairs launched the Take-off programme for supporting academic startups. The programme provides loans to high-tech entrepreneurs to carry out a feasibility study to explore the commercial potential of an invention. 13 regional innovation hubs were selected in order to integrate and scale up various activities. The hubs focus on areas like smart food, gaming, health technology, bioscience, nanotechnology, sharing economy, big data and photonics. The hubs act as one single organisation in a region, similar to the initiatives supported by the Valorisation Programme described earlier. In addition to this, a large national initiative, known as StartupDelta was launched to accelerate the startup ecosystem of the Netherlands. These initiatives are further discussed in Chapters 4, 5 and 6.

Note

1. GUESSS (Global University Entrepreneurial Spirit Students’ Survey) is a global survey on students’ entrepreneurial intentions and activities immediately after graduation and five years afterwards. It began in 2003 and is run by the Swiss Research Institute of Small Business and Entrepreneurship at the University of St. Gallen. In the 2016 edition, 122 509 students responded from 1 082 HEIs in more than 50 countries.

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Chapter 2

Applying HEInnovate to higher education in the Netherlands

This chapter presents key review findings and recommendations. The analysis is aligned to the HEInnovate framework with its seven dimensions and 37 statements. It provides a holistic framework for supporting entrepreneurship and innovation, including strategy, governance and resources, practices in organising education, research and engagement with business and society, and measuring impact. The analysis is based on study visits to nine institutions and the results of a system-wide HEI Leader survey.

Applying the HEInnovate guiding framework

HEInnovate describes the innovative and entrepreneurial higher education institution (HEI) as “designed to empower students and staff to demonstrate enterprise, innovation and creativity in teaching, research, and engagement with business and society. Its activities are directed to enhance learning, knowledge production and exchange in a highly complex and changing societal environment; and are dedicated to create public value via processes of open engagement”. How this can be translated into daily practice in HEIs is described through 37 statements which are organised within seven dimensions. This chapter presents key findings from applying the HEInnovate guiding framework to HEIs in the Netherlands. The information is based on the results of the HEI Leaders Survey in the Netherlands and information from detailed interviews with stakeholders in the case study HEIs.

Leadership and governance

Entrepreneurship is a major part of the strategy of the higher education institution

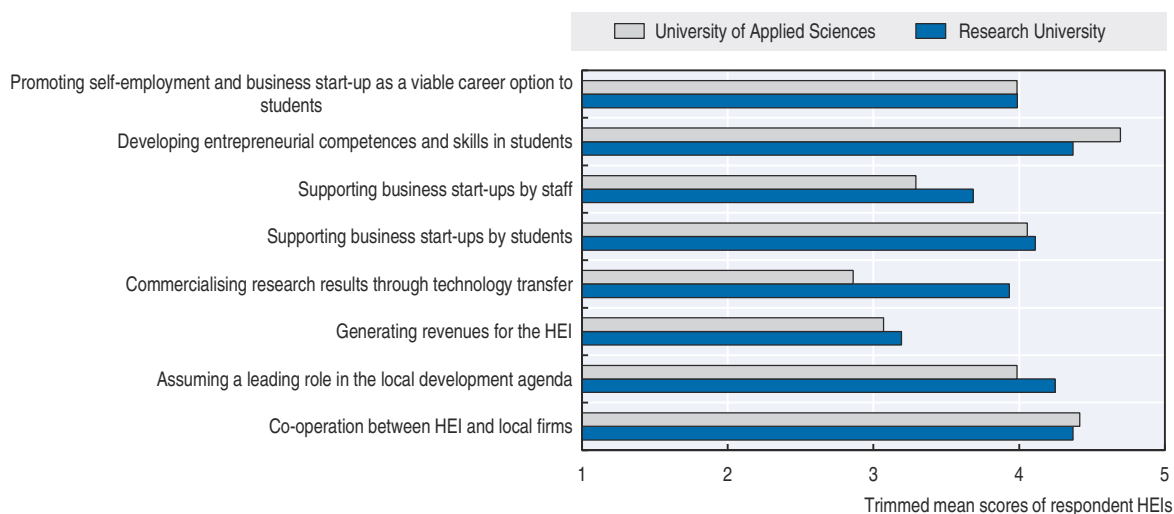
The entire higher education sector in the Netherlands – including research universities, technical universities and UAS – offers a variety of excellent examples of what it means for an HEI to be innovative and entrepreneurial. A central element is the valorisation of knowledge, that is, the process of creating value from knowledge by making it suitable and/or available for economic and/or societal use by translating knowledge into useful products, services, processes and entrepreneurial activity. Value creation encompasses all disciplines, and the impact of value creation goes well beyond economic aspects into generating societal and cultural value. For example, it also includes different ways of communicating research and research results in the media, expositions, community research, etc. In terms of support structures and dedicated education activities, entrepreneurship support can be considered the most developed part of value creation.

It is mandatory for HEIs in the Netherlands to have written and formally approved strategic plans. The surveyed HEIs reported that they review their strategies every four to six years in a participatory process which involves staff and students alongside a range of different external actors – local businesses and their representative organisations (84%), regional and local governments (80%), alumni (68%) and national government bodies (52%).

More than 60% of the surveyed HEIs have agreements with the government related to the entrepreneurship education activities they offer, and half for startup support measures. The term and concept of entrepreneurship is mentioned throughout the institutional strategies and several HEIs reported to have dedicated strategies for entrepreneurship support. All of the nine HEIs visited clearly demonstrated the embedding of entrepreneurship within their strategy and across the organisation as a whole. Dedicated and professional entrepreneurship teams continue to introduce new initiatives and bring in international partners. Entrepreneurship education and startup support are fully backed by senior management, often under the wider umbrella of value creation.

Figure 2.1 shows the varying entrepreneurship related objectives of the surveyed HEIs. In common is the desire of HEIs to help students develop entrepreneurial competences and skills, which both the research universities and the UAS rated as the most important objective of the entrepreneurial agenda. This was followed by co-operation between the HEI and local firms. Supporting startups amongst students was rated more important than supporting staff members in their venture creation activities. A notable difference exists with regard to commercialising research results through technology transfer: research universities saw this as having a greater importance than UAS. Lowest rated by all surveyed HEIs was generating revenues from the entrepreneurial agenda. Close to 80% of the HEIs reported to have performance measurements in place for these objectives.

Figure 2.1. **Entrepreneurship objectives of Dutch higher education institutions**



Notes: Higher education institutions (HEIs) were asked: “How important are the following objectives for your HEI?”. Respondents indicated the level of importance on a 5-point Likert scale from 1 = “Not important at all” to 5 = “Very important”. 5% trimmed mean scores are shown. The total number of responses was 25, of which 9 were from research universities and 16 from universities of applied sciences (UAS). The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

Source: OECD HEI Leader Survey The Netherlands (2016-17).

There is commitment at a high level to implementing the entrepreneurial agenda

An effective and sustainable implementation of the entrepreneurial agenda requires a high level of commitment. The starting point is building a shared understanding of what the entrepreneurial agenda means for the different stakeholders in the HEI, that is, leadership, academic staff, administrative staff and students, and for external partners (e.g. government, businesses, civil society organisations, donors). Central to this are communication and consultation about what the entrepreneurial agenda entails in terms of objectives, activities, priorities and resources. This can be linked with the process of defining and reviewing the HEI strategy. All surveyed HEIs reported involving staff and students in consultations. The information on entrepreneurship support is also well present on the institutional websites of the HEIs; it takes on average between two to three “clicks” to receive relevant and up-to-date information on the entrepreneurship education and startup support activities.

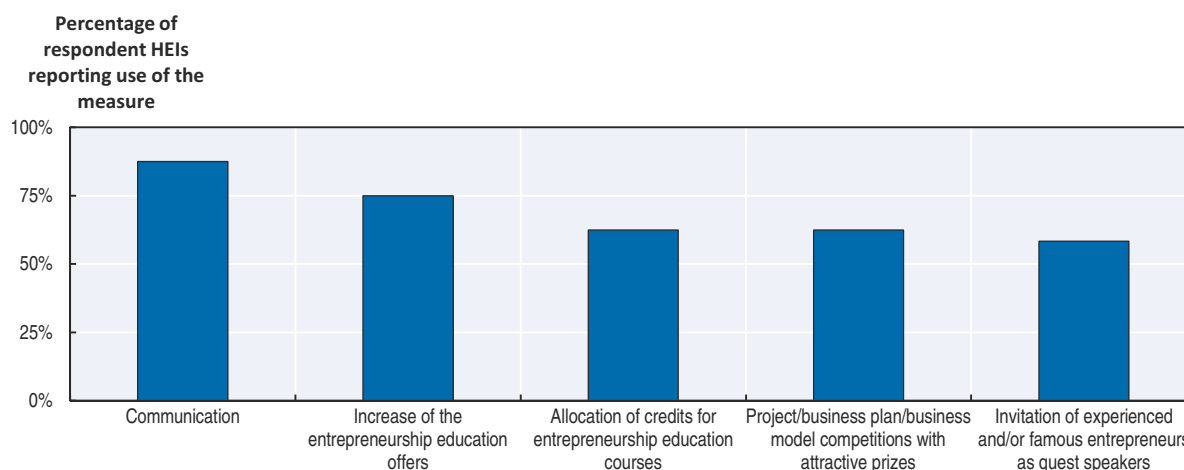
When considering the development of future policies to support value creation and entrepreneurship in Dutch higher education, consideration needs to be given to the

co-ordination of different policy actors. To build more and better synergies between the three core functions of Dutch higher education – education, research, value creation – co-ordination mechanisms between the different ministries are very important, as introduced, for example, in the Valorisation Programme (see Chapter 1).

Most of the HEIs surveyed offer entrepreneurship education activities which aim at competence development (92%), and slightly less offer targeted startup support (80%). More than half of the HEIs have created top-level management positions to support these activities, in addition to positions at departmental/faculty level and administrative staff (mostly for startup support). According to the HEI Leader Survey, on average one-third of students currently participate in entrepreneurship education activities, and the HEIs expect this to rise to over half of the student population in the next five years.

A range of targeted efforts are underway to increase participation rates and the offer of entrepreneurship education activities (Figure 2.2). Most common are the use of various communication channels and a greater offer of entrepreneurship education activities. Around 60% of the surveyed HEIs reported allocation of credits in line with the European Credit Transfer and Accumulation System (ECTS) as an effective way of raising the participation rate, along with the organisation of competitions with attractive prizes, and the invitation of experienced/famous entrepreneurs as guest speakers.

Figure 2.2. **Measures to enhance participation in entrepreneurship education**



Notes: Higher education institutions (HEIs) were asked: “What measures does your HEI implement to increase participation rates in entrepreneurship education activities?”. The total number of responses was 21, of which 8 were from research universities and 13 from universities of applied sciences (UAS). The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

Source: OECD HEI Leader Survey The Netherlands (2016-17).

There is a model in place for co-ordinating and integrating entrepreneurial activities across the HEI

HEIs across Europe have experimented with different approaches to establishing an effective model for co-ordinating and integrating various entrepreneurial activities across the institution, and to facilitate exchange of experiences and peer-support, particularly in education activities. A common approach is to anchor the entrepreneurial agenda within senior management, often in the form of a dedicated unit, which is part of the Rector’s/ President’s or the Vice-Rector’s/Vice-President’s office. Another approach is to appoint a number of professors who have entrepreneurship in their title or a chair of entrepreneurship.

An increasingly practiced approach is the establishment of an entrepreneurship centre to ensure easy access and visibility inside and outside the HEI. Whichever model is employed, it should take into account and build on existing relationships both inside the HEI and in the surrounding entrepreneurship ecosystem.

Examples of all three approaches are present in Dutch HEIs. The entrepreneurial agenda is supported and driven at senior management level most usually by a combination of the heads of faculty or departments and the valorisation or entrepreneurship centre. Most (76%) of the surveyed HEIs reported that they have a permanent contact point (e.g. entrepreneurship centre) where individuals or teams who would like to start up a business can go for support. More than two-thirds of these centres were an integral part of the HEI.

Some of the HEIs have established centralised support structures for valorisation and entrepreneurship support whereas others have opted for a decentralised approach to enhance proximity and create trust, and to diversify and target support services. Career services can also play a role in co-ordinating and integrating entrepreneurial activities across the HEI. These are relatively new in the Netherlands and started around the year 2000.

All visited HEIs have established Centres for Entrepreneurship to provide centralised support for entrepreneurship promotion. The entrepreneurship support activities and actors are not always well-connected across the HEI; there are cases when resources and programmes are located in different organisational units (entrepreneurship centre, valorisation centre, departments, research teams, entrepreneurs in residence, external lecturers, etc.). A better connection could be achieved by moving the institutional and logistical position from the periphery of the HEI to its centre; for example, anchoring valorisation and entrepreneurship in an institutionally more central position (e.g. Vice-Rector).

At the national level, the Dutch Centres for Entrepreneurship provide a platform for exchange and collaboration (Box 2.1).

Box 2.1. The Dutch Centres for Entrepreneurship

The Dutch Centres for Entrepreneurship (DutchCE) include 20 HEIs and engage them in four types of activity linked to entrepreneurship education. They engage in co-operation with each other to 1) foster a community, 2) exchange knowledge and best practices, 3) stimulate and promote entrepreneurship and entrepreneurship education in higher education, also via the development of new education techniques and methods), and 4) strengthen entrepreneurship research by facilitating national co-operation and stimulating new research that the community deems relevant to foster an entrepreneurial society.

In particular, the HEIs collaborating in DutchCE engage in applied research and they initiate and organise national or international activities to foster research on entrepreneurship. DutchCE also create wider impact by stimulating applicable insights from science, by sharing insights among a diverse audience using different channels, and by stimulating active participation in public and private contracts and the public debate.

In addition, the DutchCE also support policymaking by putting important topics related to entrepreneurship on the policy agenda, operating as a consultative body for government, politics and interest groups, and by offering validation and quality control through qualitative benchmarks. In addition, they connect with international networks and platforms such as the Global Entrepreneurship Network and academic organisations such as the Academy of Management and the International Council for Small Business.

Box 2.1. The Dutch Centres for Entrepreneurship (cont.)

Students are represented by a student division, the Dutch Students for Entrepreneurship (DutchSE). DutchSE aims to bring students and entrepreneurship together. They do this by creating a strong national network of (local) student entrepreneurship communities, in order to increase the passion, knowledge and resources of student entrepreneurship in the Netherlands.

Source: Interviews during the study visit in June 2016.

The HEI encourages and supports faculties and units to act entrepreneurially

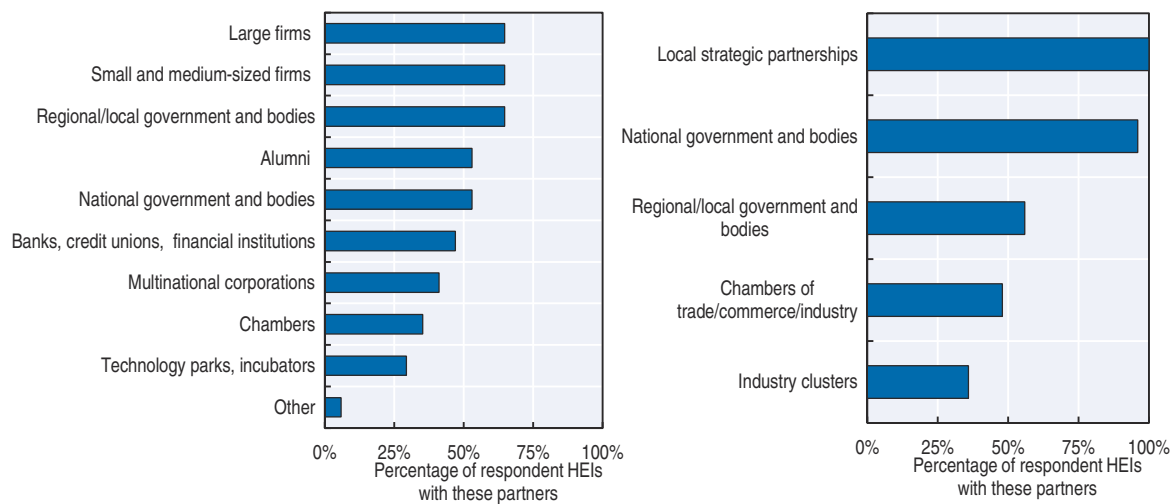
Individual faculties and units in all of the HEIs visited clearly demonstrated an ability to develop faculty initiatives in both valorisation and entrepreneurship relevant to local, regional, national and, in some instances, international needs. This clearly shows the capacity of Dutch HEIs to be responsive to meet the needs of both internal and external stakeholders. The involvement of externals as guest speakers in the entrepreneurship education activities is, in most of the surveyed HEIs (86%), lower than one-quarter of the course. Most involved in teaching entrepreneurship were, in descending order, contracted staff, researchers, externals, full professors, associate/assistant professors, and PhD students.

An example of how to effectively support innovation in teaching and learning is the Utrecht Education Incentive Fund (Dutch: *Stimuleringsfonds Onderwijs*). Every year a total of EUR 2 million is made available to enhance educational innovations, for example in the area of digital teaching and assessment methods and active learning. Half of the funding is allocated to the departments based on the number of students. Deans decide the allocation of funding within the department in consultation with the Vice-Dean of Education and the Directors of Education. The funding can be used to support the career development of exceptionally talented teaching staff. EUR 1 million per year is allocated for university-wide development projects which last a maximum of three years, are supported by at least two faculties, tie in with the Utrecht University Strategic Plan 2016-20, and make a tangible contribution to knowledge sharing.

The HEI is a driving force for entrepreneurship and innovation in regional, social and community development

HEIs in the Netherlands are important actors in the social and economic development of their immediate environments, especially in a regional context. Based on the meetings conducted with external stakeholders, including regional development agencies, business and industry groups and local authority representatives, the HEIs are seen as key drivers for innovation in the wider regional, social and community environment. The HEIs visited have embedded academic expertise in local and regional development, capacity building, organisational development etc. within their own institutions. This practice was observed across all disciplines. Several examples of good and promising practice are discussed in Chapters 4, 5 and 6.

The HEI Leader Survey indicates that the HEIs have developed relationships with various public and non-public bodies for the purposes of contributing to local development (Figure 2.3). All of the surveyed HEIs reported to engage in local strategic partnerships; also very common was participation in regional government bodies that define the development directions of the surrounding economy. Less common was involvement of HEIs in industry

Figure 2.3. **Strategic local development partners of Dutch higher education institutions**

Notes: The chart on the left shows the involvement of external stakeholders in the governing bodies of Dutch higher education institutions (HEIs). Respondents were asked “Which of the following organisations or individuals are members of the governing board of your HEI?”. The total number of responses analysed was 17. The chart on the right shows the involvement of HEIs in governing boards or strategic positions of external stakeholders. Respondents were asked “Does your HEI participate in the governing boards of the following organisations and strategic initiatives to define the development directions of the surrounding local economy?”. All 25 HEIs responded to this question. The overall survey response rate was 48%.

Source: OECD HEI Leader Survey The Netherlands (2016-17).

clusters. Overall, less practiced was the participation of external stakeholders in the HEI’s governing bodies, which was reported by close to 70% of the surveyed HEIs. Approximately two-thirds of the surveyed HEIs reported that representatives of large firms, SMEs and regional/local government participate in their governing bodies. Less than one-third reported such collaboration with chambers of commerce and technology parks.

There are numerous examples of how HEIs in the Netherlands act as driving forces for entrepreneurship and innovation in regional, social and community development.

Knowledge Mile is considered to be the street with the highest density of students in Amsterdam, with approximately 60 000 students in an area that stretches for about two kilometres from Nieuwmarkt to Amstelstation. The main initiator is the Amsterdam Creative Industries Network, one of the Centres of Expertise of the Amsterdam University of Applied Sciences (see Chapter 1 for more information on the Centres of Expertise in UAS). The aim is to establish a living laboratory which provides viable solutions to all kinds of urban challenges. Knowledge Mile works with more than 50 partners from industry, civil society, local and national governments to turn knowledge into value for all. One of them is Doppler!, a Dutch high-growth social enterprise producing re-useable plastic bottles. Together with Spotify, Beaver and the Design Thinking Center they kick-started with Knowledge Mile a challenge to make the area between Nieuwmarkt and Amstelstation the first PET-free street in the Netherlands (Knowledge Mile, 2017).

An example where collaboration with HEIs was initiated by industry is the Port of Rotterdam, a key European and global transport hub, which has actively engaged in research initiatives with the university sector to generate better solutions to the many challenges it faces. For the port, engaging with research and determining how to collaborate with HEIs is an ongoing process, with the aim of reducing the gap between science and practice in a pre-competitive way by engaging companies in scientific research. Smartport, one of the

initiatives, serves as a common contact point and facilitates the application for public funding through pooling resources and reducing risk. The commercial and technological challenges of the port make it an ideal context for HEI-industry collaboration. Smartport provides an engaging and challenging environment for researchers who are willing to do things a bit differently and learn skills beyond the requirements of their academic institution. Rotterdam University of Applied Sciences, Erasmus University Rotterdam and Delft Technical University are key partners in Smartport (HEInnovate 2017a).

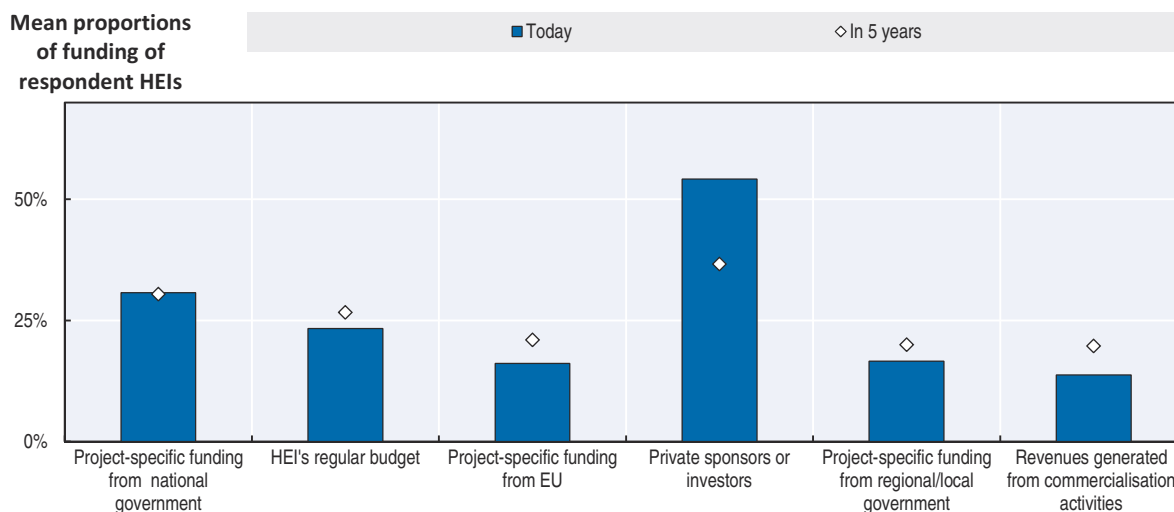
For the research universities, a lot has been documented by the umbrella organisation VSNU in an online publication with links to multimedia documentation (VSNU, 2017a). Information on how UAS interact with the local economy is usually available on the respective institution's website. In the UAS, lectors, who often share their time between teaching, research and a business/industry appointment, play an important role in connecting education and research with local development needs and opportunities. The core aim of the lector is the integration of higher education and research and includes the supervision of research groups and acquisition of external funding (see Chapter 1).

Organisational capacity: Funding, people and incentives

Entrepreneurial objectives are supported by a wide range of sustainable funding and investment sources

A particular feature of the Dutch higher education system, compared with the other countries that participated in HEInnovate reviews¹, is that entrepreneurship support in HEIs receives a large share from private sponsors and investors, which account for more than 50% of the surveyed HEIs' overall budgets for entrepreneurship support activities (Figure 2.4). Approximately one-third of the funding comes from national government, followed by the HEI's own budget.

Figure 2.4. **Financing entrepreneurship support in Dutch higher education institutions**



Notes: Higher education institutions (HEIs) that currently offer entrepreneurship support were asked "What is the approximate ratio of the different funding sources your higher education institution uses to finance the entrepreneurship support activities?", and "Looking ahead for five years what ratio do you expect to come from the following sources for financing these activities?". The total number of responses was 23. The overall survey response rate was 48%.

Source: OECD HEI Leader Survey The Netherlands (2016-17).

When asked for their prognosis of how funding from private investors for entrepreneurship support will look in five years' time, the surveyed HEIs expected a decline. The other sources are expected to grow, except for project-specific funding from national government, which is foreseen to remain at the same level.

The HEI has the capacity and culture to build new relationships and synergies across the institution

Several of the research universities and UAS have started to stimulate interdisciplinary initiatives, primarily in research but increasingly also linked with education activities (see Chapters 3 and 4).

The value of focusing on strategic interdisciplinary themes instead of discipline-focused niche areas will not be immediately obvious to all staff. The breadth of the themes and the requirement for interdisciplinary teams, however, can make people look at their research differently and recognise new value and connections. It is important that these themes allow for new and different perspectives to be explored on established issues, and that they offer opportunities for young researchers to get involved. This allows for research outside a specific discipline e.g. geographers or historians, to engage in future orientated entrepreneurial themes. Evaluating the impact and effectiveness of these approaches would be useful to clarify whether HEI-level initiatives are sufficient or need to be enhanced by national funding to establish (further) organisational support to organise and sustain interdisciplinary research and education.

At national level, new national research funding is also expected to stimulate cross-faculty co-operation (see Chapters 1 and 3). The valorisation centres and the policy advisors, who work directly with the HEI's executive board, have proved to play important roles as scouts and gatekeepers, helping to spot opportunities and engineer interdisciplinary and external partnerships that will be increasingly relevant for the acquisition of external research funding.

According to the HEI Leader Survey, interdisciplinary study programmes are very common at bachelor's level (92%) and master's level (84%), and less common for doctorate programmes (44%). It is common that students participating in interdisciplinary courses and other education activities at both bachelor's and master's levels receive ECTS points, whereas this practice applies for less than half of the interdisciplinary activities available for doctoral students.

Collaboration between HEIs is well-established within the different parts of the higher education sector, that is, research universities with other research universities, and UAS with other UAS. Valorisation and entrepreneurship support has also increased collaboration between different types of HEIs, even though joint education programmes are still rare and difficult to organise because of accreditation matters and differences in student preparation and expectations. The national StartupDelta initiative, started in 2014, has been successful at keeping ecosystem initiatives focused on activities that are bottom-up and entrepreneurial. In particular, the success of StartupDelta in building bridges between HEIs is relatively unique and should be encouraged (see Chapter 4).

The HEI is open to engaging and recruiting individuals with entrepreneurial attitudes, behaviour and experience

The valorisation agenda has been a major step towards supporting HEIs in their efforts to enhance knowledge exchange, innovation and entrepreneurship (see Chapter 1). When

academic staff are recruited or promoted, their valorisation activities and outcomes are taken into account (e.g. considering patents and patent licensing agreements, contract research and development with companies or other organisations, spin-off creation, participation in non-governmental organisation (NGO) activities that contribute to local development or Triple/Quadruple Helix models of collaboration, teaching and learning activities, acting as a mentor to student entrepreneurs, etc.). Prior experience in the private sector is a common recruitment criterion for teaching and research staff in the UAS (75%) and less common amongst research universities (22%).

Highly qualified professionals who are fully dedicated to innovation and entrepreneurship activities have well-defined and attractive careers within the HEI with salaries that are partly funded from the HEI's budget and not only from project-based funding and career development perspectives. This ensures that people with relevant knowledge and skills remain in such functions at the HEI or in the higher education sector. All of the visited HEIs have established the position of a policy advisor to the executive board, which took over the role of local HEInnovate co-ordinators. These positions seem to be crucial to allow the HEIs to contribute to national higher education policy making.

The HEI invests in staff development to support its entrepreneurial agenda

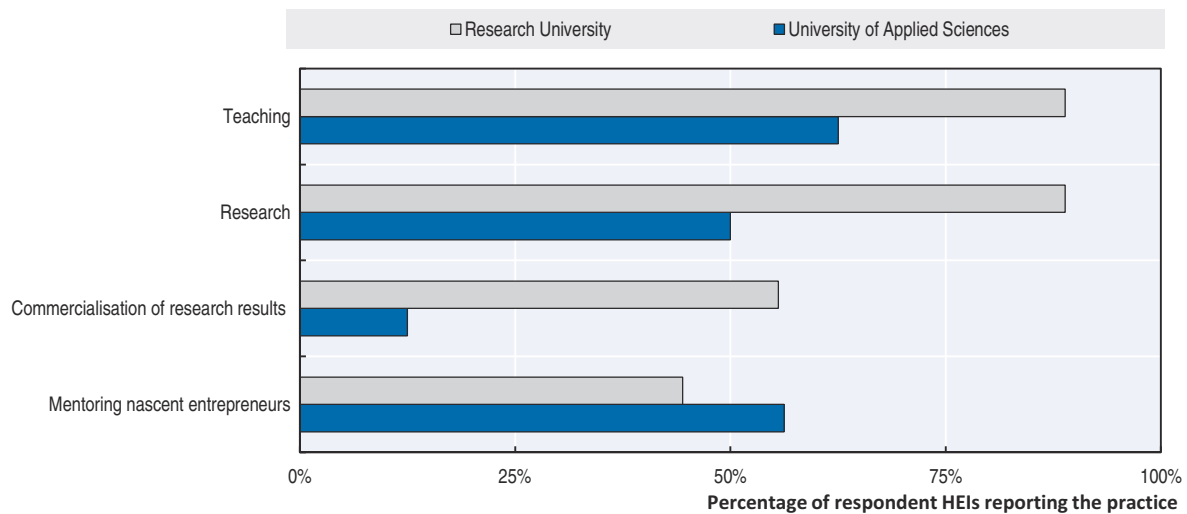
Training for teaching staff is well established in Dutch higher education. It has been practiced through formal programmes in the research universities since 2007 and similar initiatives are being introduced in the UAS. Maastricht University has created its own talent management through which people are identified by departments to enrol in training programmes. A standard approach is to mix researchers with administrative staff. Also common are retreats that last between three and four days with the aim of removing the pressure of research or teaching activities and helping participants to decide what could be good next steps in their career (What do I like? Where do I want to go?) with the help of a professional trainer.

Two-thirds of the surveyed HEIs offer training for staff involved in entrepreneurship support; training for staff involved in education activities is more common than training for staff involved in startup support activities (82% versus 67%).

In the training for teaching staff, closer connections could be developed with entrepreneurship education research, particularly with the entrepreneurial pedagogy whose pillars are co-operative learning, experiential learning and reflective learning. Focusing on entrepreneurship educators in particular, which typically includes a wide range of individuals with and without pedagogical qualifications, a national programme to train entrepreneurship educators could be considered to support teaching staff in innovative pedagogies and learning outcome assessment methodologies (see Chapter 4).

Incentives and rewards are given to staff who actively support the entrepreneurial agenda

Ensuring engagement of staff in valorisation activities requires resources, which ideally are made available on a long-term basis and are integrated into the wider resource development and incentive system. Individual HEIs reward excellent performance in teaching and research; this is more common for the surveyed research universities than the UAS. Less common are rewards for commercialisation of research results and mentoring of new entrepreneurs. The latter is more commonly practiced by UAS, but several of the surveyed HEIs reported that the introduction of such a practice was currently being discussed by their governing boards (Figure 2.5).

Figure 2.5. **Rewarding excellent performance in Dutch higher education institutions**

Notes: Higher education institutions (HEIs) were asked: “Are there formalised processes to identify and reward excellent performance in teaching?”, “Are there formalised processes to identify and reward excellent performance in research?”, “Does your HEI have an incentive system for staff, who actively support the commercialisation of research for example by making research results available, acting as mentors, etc.?”. The total number of responses was 25, of which 9 were from research universities and 16 from universities of applied sciences (UAS). The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

Source: OECD HEI Leader Survey The Netherlands (2016-17).

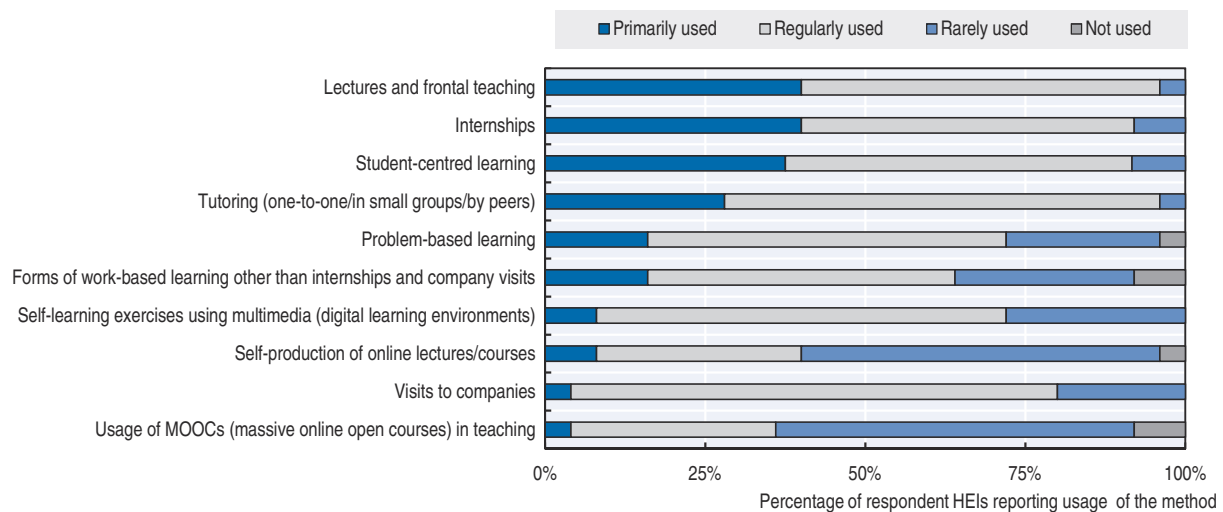
Supporting valorisation and entrepreneurship in higher education has led to the introduction of different staff profiles and several HEIs have undertaken initiatives to broaden the career paths for their academic staff to enhance more flexible mobility of staff between different areas of the HEI (e.g. policy advisors, business developers, etc.). These approaches offer valuable learnings; the examples of Erasmus University Rotterdam and the Amsterdam University of Applied Sciences are further discussed in Chapter 3.

Entrepreneurial teaching and learning

The HEI provides diverse formal learning opportunities to develop entrepreneurial mindsets and skills

Stimulating entrepreneurship plays an important role in Dutch higher education and entrepreneurship education is offered across the sector in various formats and across many disciplines. In all the HEIs visited for this report, there was clear evidence of the centrality of student development in the mission of the institutions and the desire to help students develop entrepreneurial mindsets and behaviours. Course modules and programmes in entrepreneurship commonly originated from the HEI’s business school. Increasingly these have been adapted and transferred into other disciplines and in some cases adopted across multiple disciplines within HEIs.

The HEI Leader Survey shows that the teaching and learning strategies in HEIs place significant emphasis on providing learners with greater exposure to real world experiences which promote entrepreneurial mindset and skills through internship programmes, student-centred learning, and tutoring (Figure 2.6). Methods used to deliver the programmes are also varied and include classroom delivery, one-to-one mentoring, peer mentoring and group work, use of live projects, case studies and hackathons. A wide range of teaching methods are used across the different study programmes, including problem-based learning,

Figure 2.6. **Teaching methods in Dutch higher education**

Notes: Higher education institutions (HEIs) were asked: “To what extent are the following teaching methods used at your HEI?”. Response options were “not used”, “rarely used”, “regularly used”, “primarily used”. The total number of responses was 25, of which 9 were from research universities and 16 from universities of applied sciences (UAS). The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

Source: OECD HEI Leader Survey The Netherlands (2016-17).

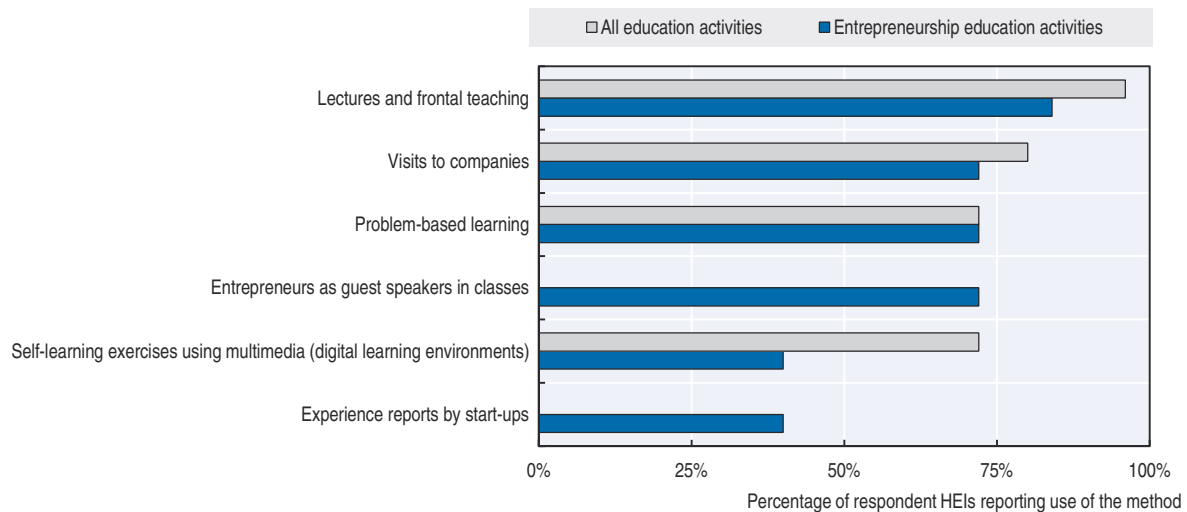
internships, visits to companies (more commonly practiced in UAS), tutoring, and self-learning exercises using digital learning environments. Less common are the self-production of online courses and lectures and the use of Massive Open Online Courses (MOOCs).

All but two of the surveyed HEIs offer entrepreneurship education activities, most of which are an integral part of the study programmes for all students. Looking more specifically at entrepreneurship education, lectures and frontal teaching are the most common teaching methods, followed by entrepreneurs as guest speakers in class, visits to companies and problem-based learning. Overall, not much difference can be noted when comparing the teaching approaches in entrepreneurship education activities with the teaching approaches in all education activities. Frontal teaching, visits to companies, and digital learning environments are less commonly practiced in entrepreneurship education activities. Experience reports by startups are common or regularly organised in 40% of the surveyed HEIs which currently offer entrepreneurship education activities (Figure 2.7). This could be increased as startups are relevant role models for would-be entrepreneurs.

An interesting example of problem-based learning is the B302 at Arnhem and Nijmegen University of Applied Sciences. B302 is a student-run company located on campus in which students “learn how to learn”, from tasks, from each other and from working with clients (see Chapter 4).

The HEI provides diverse informal learning opportunities and experiences to stimulate the development of entrepreneurial mindsets and skills

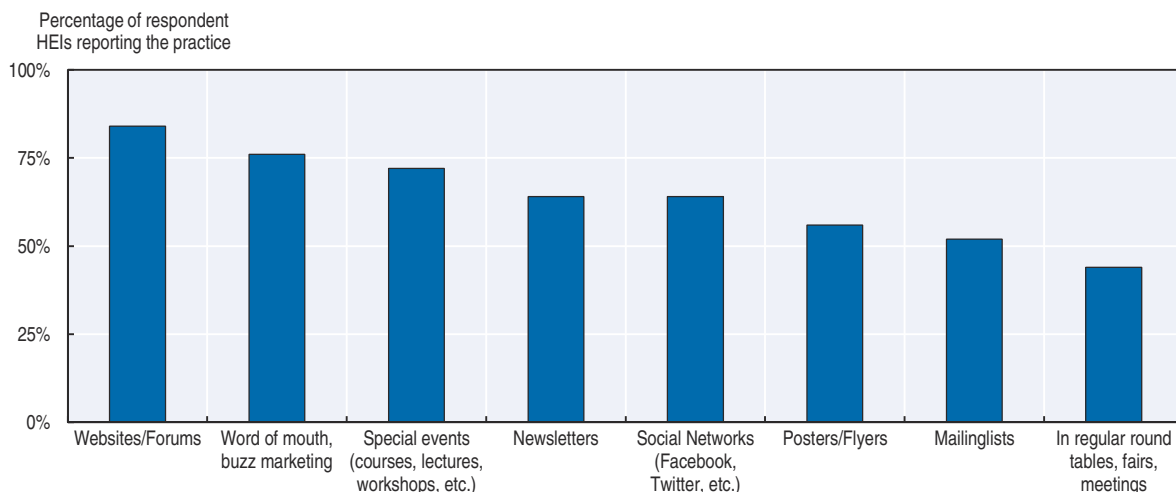
In addition to the aforementioned entrepreneurship education activities included in the study programmes, the surveyed Dutch HEIs also offer extra-curricular learning opportunities. A very popular informal learning method among students is to participate in student associations, which are well established in all Dutch HEIs. The HEI Leader Survey shows that the demand for informal learning opportunities has increased across nearly all surveyed HEIs.

Figure 2.7. **Teaching methods in entrepreneurship courses in Dutch higher education**

Notes: Higher education institutions (HEIs) were asked: “To what extent are the following teaching methods used at your HEI?” and “To what extent are the following teaching methods used in the entrepreneurship education activities currently offered at your HEI?”. Response options for both questions were “not used”, “rarely used”, “regularly used”, “primarily used”. Accumulated responses for “regularly used” and “primarily used” are shown. The total number of responses was 25, of which 9 were from research universities and 16 from universities of applied sciences (UAS). The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

Source: OECD HEI Leader Survey The Netherlands (2016-17).

The HEIs have prepared the ground for this with a broad range of communication tools used to advertise extra-curricular education activities on entrepreneurship (Figure 2.8). Most common was the use of websites and word of mouth/buzz marketing. Approximately one-third use social networks and more than half of the surveyed HEIs communicate through posters, flyers and mailing lists. Less commonly used are regular events and fairs.

Figure 2.8. **Advertising extra-curricular entrepreneurship activities in Dutch higher education**

Notes: Higher education institutions (HEIs) that currently offer entrepreneurship education activities were asked: “How do you advertise the entrepreneurship education activities that are organised outside study curricula/programmes or open across faculties?”. The total number of responses was 25, of which 9 were from research universities and 16 from universities of applied sciences (UAS). The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

Source: OECD HEI Leader Survey The Netherlands (2016-17).

An example of a student-led initiative is the DesignLab at Twente University, which offers a physical location for the application of academic research (see Chapter 4). The slogan of the DesignLab is “Science2design4society” which reflects not only the DesignLab’s goal of providing opportunities for the design of valorisation activities by students based on academic learning and research, but also the ultimate goal of serving the broader community with those valorisation activities. Students sign up for the so-called “Dream Team”, which co-ordinates the DesignLab. As Dream Team members, students experientially acquire social, managerial, administrative and leadership skills.

The HEI validates entrepreneurial learning outcomes which drives the design and execution of the entrepreneurial curriculum

All but one of the surveyed HEIs which offer entrepreneurship education activities, also undertake formal evaluations. Where practiced, this is mostly an obligatory procedure. The focus is on satisfaction of participants (100%) and competence development (80%); half of the HEIs also measured the motivation of participants to start a business. In the majority of HEIs (70%) a specifically tailored survey instrument was used. When a questionnaire was used it was at the end of the course (100%), during the course (40%), and at a point of time after the course but before graduation (20%).

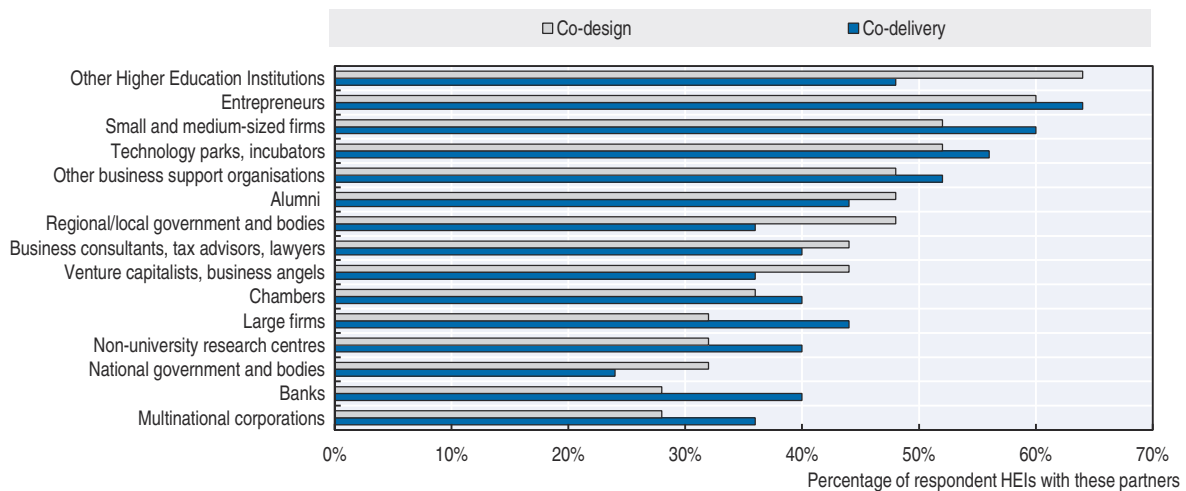
An interesting initiative of service-learning for local SMEs is De Rotterdamse Zaak (DRZ), which is aimed at entrepreneurs who are financially unable to find solutions to their problems. Students of Rotterdam University of Applied Sciences work closely together with entrepreneurs in difficulty. They learn to give advice on how to improve the business operations of these entrepreneurs – financially and commercially – and help to develop their entrepreneurial skills. The research team leading DRZ at Rotterdam University of Applied Sciences has undertaken various evaluations and regular monitoring of the learning outcomes of students and the impact on entrepreneurs and SMEs. Results are used to re-orient the teaching and overall course programme (see Chapter 4).

Exchange of experience is promoted at national level through the Festival of Entrepreneurial Learning (FOEL). The idea is that educators learn from each other, exchange experiences, share latest insights, new tools and programmes, and start joint activities. The FOEL festival was held for the first time in November 2016 with more than 200 participants. The intention is to organise the festival every year.

The HEI co-designs and delivers the curriculum with external stakeholders

Contact with external stakeholders in Dutch HEIs is primarily focused on improving the relevance and impact of education, R&D activities and engagement strategies, and occurs at all levels and across all units of the HEI. The HEIs also utilise the expertise of external stakeholders on a regular short term, part-time and occasional basis in their entrepreneurship education and startup support activities. Examples of this include the use of industry experts in course development and delivery and the involvement of entrepreneurs as student mentors.

Figure 2.9 shows the extent to which the various stakeholders in higher education are engaged in entrepreneurship education activities. There is more involvement in the design of entrepreneurship education activities than in the delivery. For close to two-thirds of the surveyed HEIs key partners in the design of entrepreneurship education activities are other HEIs (64%), followed by entrepreneurs (60%), technology parks and incubators, and SMEs (52%). Less than one-third collaborate in the design phase with national government,

Figure 2.9. **Partners of Dutch higher education institutions for entrepreneurship education**

Notes: Higher education institutions (HEIs) that currently offer entrepreneurship education activities were asked: “With which of the following organisations or individuals does your HEI collaborate regularly in the conceptual development of the entrepreneurship education activities?”, “With which of the following organisations or individuals does your HEI maintain regular collaboration with in the delivery of the entrepreneurship education activities?”. A total of 19 higher education institutions (8 research universities, 11 universities of applied sciences) responded to these questions. The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

Source: OECD HEI Leader Survey The Netherlands (2016-17).

public research centres, large firms, multinational corporations and banks. For the delivery of entrepreneurship education activities key partners are entrepreneurs (64%), SMEs (60%), and technology parks and incubators (56%). More than one-third of the surveyed HEIs involve banks and venture capitalists in their entrepreneurship education activities, and more than 40% collaborate with their alumni via entrepreneurship education activities. Technology parks and incubators, large firms and multinational corporations appear to collaborate more with the research universities than with the UAS in the sample.

A commonly practiced approach by the HEIs visited for this review is to invite local entrepreneurs and alumni to participate in entrepreneurship education activities on campus, including delivering guest lectures in courses and working with students on startup or consultancy projects. It is important that these activities are visible and accessible to students so that they can identify with them as role models. Celebrating successful student startups is important. These ventures are often easier for other students to identify with because these entrepreneurs are their peers. Successful student entrepreneurs could be featured at entrepreneurship events and even within entrepreneurship education.

Presentation of HEI-internal startup support programmes, and participation of individual staff members in international venture programmes and the local organisation of large entrepreneurship events (e.g. Get in the Ring) have been important in building powerful networks for new entrepreneurs and those providing entrepreneurship support in HEIs.

Results of entrepreneurship research are integrated into the entrepreneurial education offer

Many Dutch HEIs have leading European entrepreneurship researchers amongst their staff. Furthermore, there are several well-connected networks of entrepreneurship educators and of people working in the valorisation and entrepreneurship centres across the Netherlands. DARE, the Dutch Academy of Research in Entrepreneurship is an active research community of distinguished researchers on entrepreneurship, involving more than

ten research universities and ten UAS (DARE, 2017). The Dutch Centres for Entrepreneurship which bring together several entrepreneurship centres and a strong student network (DutchCE, 2017), and the *Nederlands Lectoren Platform Ondernemerschap*, a national network of entrepreneurship lecturers in the UAS (NLPO, 2017) also play an important role in integrating entrepreneurship research into the entrepreneurial education offer.

Preparing and supporting entrepreneurs

The HEI increases awareness of the value of entrepreneurship and stimulates the entrepreneurial intentions of students, graduates and staff to start up a business or venture

Students can choose from a variety of modules, courses and entire study programmes at bachelor's and master's levels. These activities are however, not always offered early on in study programmes (awareness raising), not for all students and not across all disciplines (interdisciplinary). It is important that students receive acknowledgement of the competencies acquired from entrepreneurship education activities (e.g. ECTS, diploma supplements). Some HEIs already offer this.

Communication is a priority and it is easy to find information about the entrepreneurial activities on the HEI's websites; on average it takes three "clicks" to get up-to-date information on entrepreneurship courses, hackathons, incubation facilities, co-working spaces, and other startup support measures. Erasmus University Rotterdam is building on the approach to inspire followers through role models with the "I Will" initiative. Across campus, 15 000 large posters with "I Will" statements inspire students and staff to take initiative. Started by the Rotterdam School of Management (RSM) the aim is to visualise the power of a diverse community of international students, faculties, alumni, business leaders and staff and the bond of the unifying commitment to make business a force for positive change (RSM, 2017). The excellent design and great visibility of the "I Will" statements clearly show that the effectiveness of such campaigns depends on visibility and accessibility.

It is not easy for students to manage the requirements of a full-time study programme and pursue a "startup dream" at the same time. There are already good examples of how HEIs support these students, for example by making it possible for them to partially or fully focus their graduation thesis on a research question that is related to a/their startup. For example, the Amsterdam University of Applied Sciences offers students the possibility to write their bachelor graduation thesis on a research question related to their startup. As discussed in Chapter 4, this is an approach that could be used in more HEIs.

The adoption of rules and regulations concerning the use of trademarks and for the commercialisation of research results was more common for research universities (67% and 100% respectively) than for UAS (13% and 44%). Approximately 80% of the surveyed research universities and around 20% of the UAS were, at the time of the survey, shareholders in firms founded by staff or students.

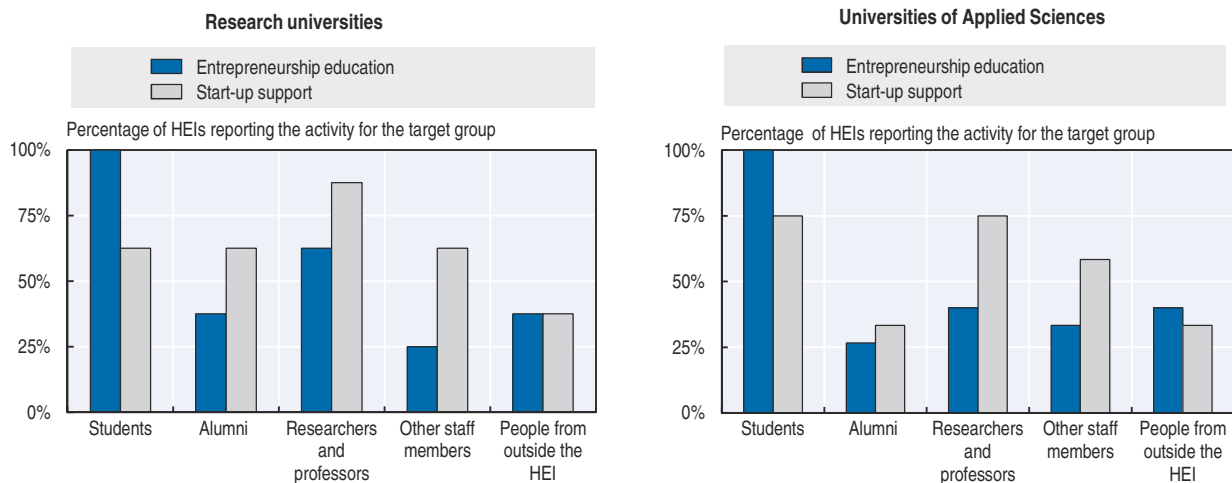
The HEI supports its students, graduates and staff to move from idea generation to business creation

Supporting startups is well-established in Dutch higher education, both in terms of entrepreneurial mindset development through educational activities, and in supporting would-be entrepreneurs in their first steps to create a new venture. The majority of research universities and most of the UAS have established rich support infrastructures with co-working and incubation facilities on campus, and startup training and mentoring

by staff and experienced entrepreneurs. These facilities and services are not always accessible to alumni.

Comparing the current offer of entrepreneurship education activities with the startup support measures, there appears to be a gap for students in terms of startup support. While students are the number one target for entrepreneurship education activities in both research universities and UAS, overall startup support is more oriented towards researchers, professors, other staff members, alumni and people from outside the HEI (Figure 2.10). This gap is less obvious in the surveyed UAS. Across the Dutch higher education sector, researchers, professors and other HEI staff members seem to have less access to entrepreneurship education activities than to startup support. This might be a missed opportunity, as such activities, particularly if organised in a highly creative context, often provide a fertile ground for idea generation and startup team building.

Figure 2.10. **Target groups for entrepreneurship support in Dutch higher education institutions**



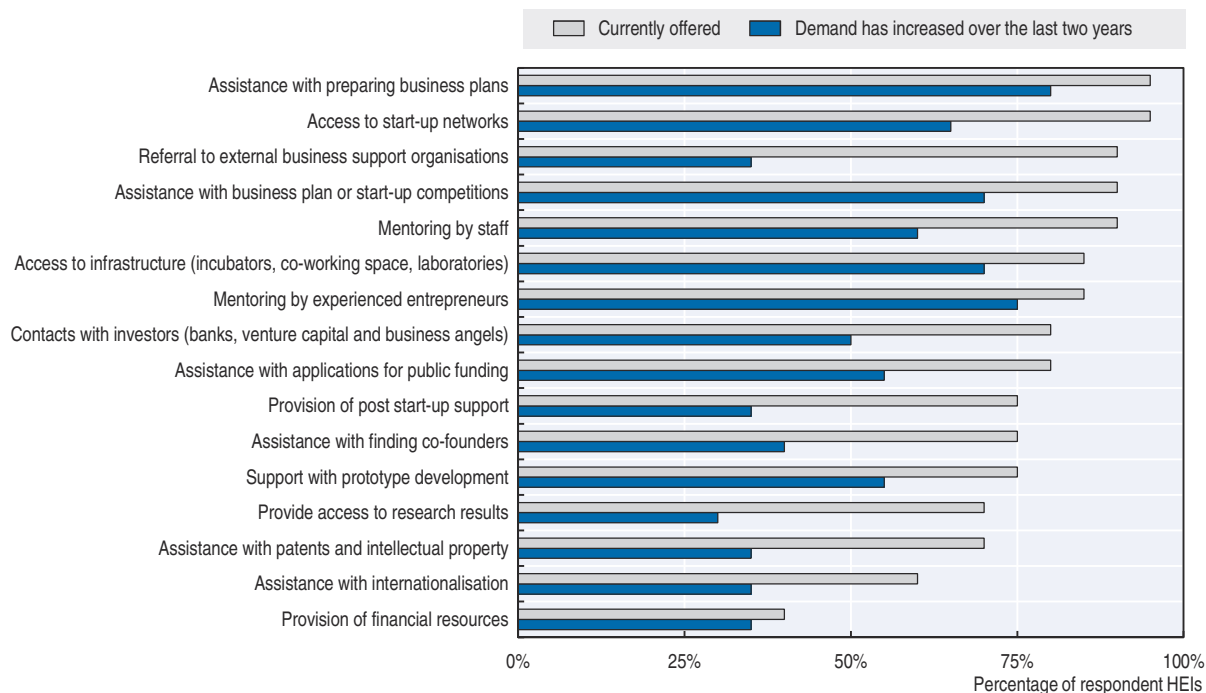
Notes: Higher education institutions (HEIs) that currently offer entrepreneurship education activities were asked: “Which of the following are target groups for the entrepreneurship education activities?” A total of 23 higher education institutions (8 research universities, 15 universities of applied sciences), responded to the question. HEIs that currently offer startup support were asked “Which of the following are target groups for the startup support measures offered at your HEI?”. A total of 20 higher education institutions (8 research universities, 12 universities of applied sciences) responded to these questions. The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

Source: OECD HEI Leader Survey The Netherlands (2016-17).

Business incubation programmes and facilities are available in all the visited HEIs and are available to both students and staff. Some have obtained international recognition, such as YES Delft and Utrecht Inc., which ranked amongst the top six in the 2015 European ranking of University Business Incubators. Ideally, such support is available for all interested students, regardless of their area of study. There are benefits to scaling the offer across departments and across different HEIs, providing would-be entrepreneurs with the possibility to participate in startup programmes outside their core area of studies/research, and allowing them to work with and be inspired by others (Chapter 6).

All of the surveyed HEIs offer a wide range of startup support measures (Figure 2.11). Most common were assistance with the preparation of business plans, access to startup networks, mentoring by staff, assistance with business plan competitions, and referral to business support organisations. Less common, but still practiced by 60% of the surveyed HEIs, is assistance with internationalisation; 40% reported to provide financial resources for

Figure 2.11. **Offer and demand for startup support measures in Dutch higher education institutions**



Notes: Higher education institutions (HEIs) that currently offer startup support were asked: “You’ve stated earlier that your HEI currently offers special support measures for individuals or teams, who are interested in starting-up a business. What special support measures are currently offered?”, “How has the demand for the special support measures developed over the last two years?”. A total of 20 higher education institutions (8 research universities, 12 universities of applied sciences) responded to these questions. The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

Source: OECD HEI Leader Survey The Netherlands (2016-17).

startups, whereas 80% facilitate contacts with investors (e.g. banks, venture capital providers and business angels), and assist founders with applications for public funding. More than half of the HEIs reported an increased demand for several startup support measures over the last two years. Top of the list were assistance with the preparation of business plans (80%) and mentoring by experienced entrepreneurs (75%). Also, access to infrastructure, that is, incubators, co-working spaces and laboratories and mentoring by HEI staff members were increasingly demanded in more than two-third of the surveyed HEIs.

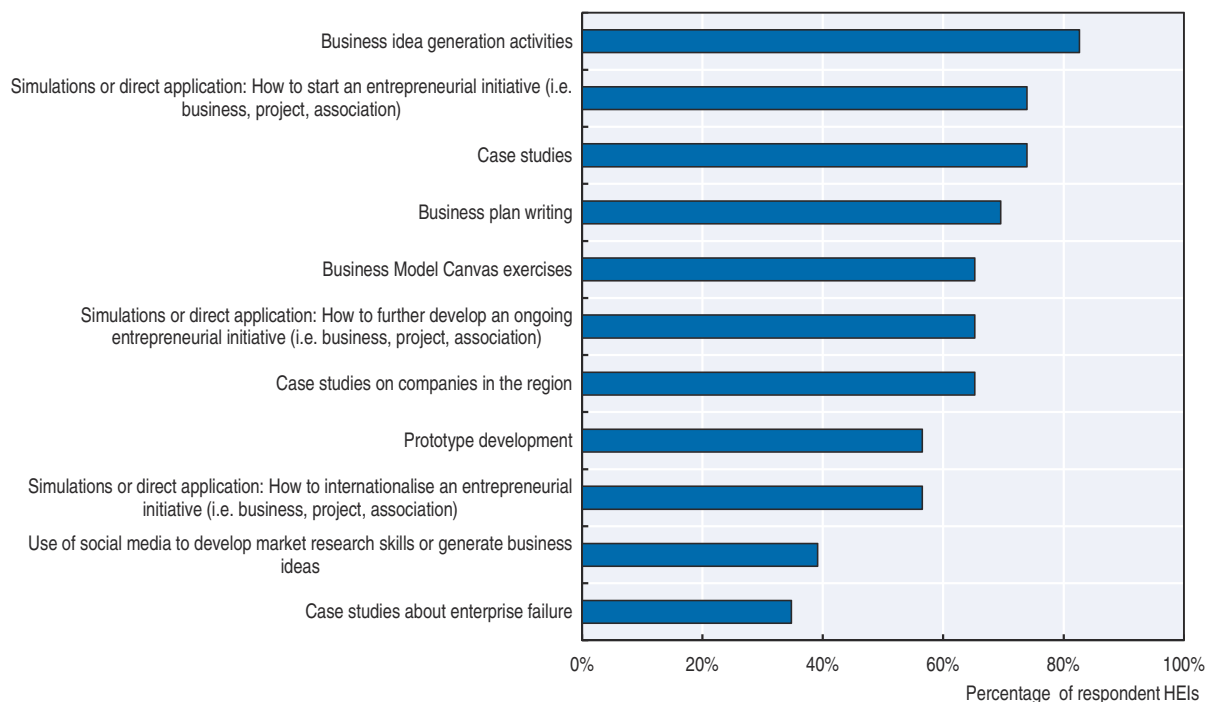
Training is offered to assist students, graduates and staff in starting, running and growing a business

Startup training courses, offered as part of the entrepreneurship education activities, provide relevant knowledge on financing, legal and regulatory issues, and human resource management. HEIs in the Netherlands offer training to assist students, graduates and staff in starting, running and growing a business as part of the entrepreneurship education activities and through the incubation facilities. Soft skills, which are very important to effectively marshal resources and handle the startup process, are often acquired through extracurricular activities.

The HEI Leader Survey shows the most practiced training methods in education activities are case studies, business idea generation activities, business plan writing, and simulations or direct applications of how to start up a business or further develop an entrepreneurial initiative (Figure 2.12). Less practiced, but still common to more than half of the surveyed HEIs, are prototype development, case studies on companies in the region,

exercises using the Business Model Canvas methodology, and case studies on company failure. Least practiced were simulations or direct applications of how to internationalise an entrepreneurial initiative.

Figure 2.12. **Startup training offer in Dutch higher education institutions**



Notes: Higher education institutions (HEIs) that currently offer entrepreneurship education activities were asked: "To what extent are the following teaching methods currently used in the entrepreneurship education activities at your HEI?" The total number of responses was 23, of which 8 were from research universities and 15 from universities of applied sciences. The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

Source: OECD HEI Leader Survey The Netherlands (2016-17).

Mentoring and other forms of personal development are offered by experienced individuals from academia or industry

Almost all HEIs reported that they offered mentoring by staff and slightly less offered mentoring by experienced entrepreneurs (Figure 2.11). Demand for mentoring has increased over the last two years, more for entrepreneurs (88%) than for staff members (67%). Half of the surveyed HEIs reported that mentoring nascent entrepreneurs was recognised along with other outstanding achievements in areas other than research and teaching.

The HEI facilitates access to financing for its entrepreneurs

The HEIs reported that they offer a range of measures to facilitate access to finance (Figure 2.11). 80% provide assistance with applications for public funding and facilitate contacts with potential investors, and 40% of the HEIs provide financial resources.

An interesting example of facilitating and providing access to finance for new entrepreneurs is the Dutch Student Investment Fund, founded in 2016 at Twente University.

The HEI offers or facilitates access to business incubation

All surveyed research universities and 75% of the UAS offer business incubation facilities on campus. More than 70% of the incubators offer free or subsidised temporary rental,

Box 2.2. Dutch Student Investment Fund

The Dutch Student Investment Fund, founded in 2016 at Twente University, is one of the first student investment fund in Europe. The fund is not only provided for students, it is also managed by students. It seems risky to let students handle huge amounts of money, but the University leadership believes that this is a great learning experience for students. The fund is managed day to day by a board consisting of four students who are supervised by three business professionals with experience in investing. DSIF invests up to EUR 50 000 in startups created by bachelor's, master's, or PhD students from either the UT or Saxion, or students that have graduated a maximum of 12 months previously.

The Dutch Student Investment Fund is looking for ambitious startups that aim for growth. Deliberately, there is no sector-specific focus; the intention is to be accessible for all student entrepreneurs aiming to grow their ideas into viable businesses. As long as the team of entrepreneurs is strong, the product or service has a lot of potential, and the business model is sound, the Dutch Student Investment Fund will get involved.

Source: Interviews at Twente following the study visit in June 2016.

tenants have access to the HEI's laboratories and research facilities, and can use the HEI's information technology services. Also commonly offered are coaching and training, and facilitation in accessing financing, but less than half of the incubators offer help with internationalisation. New entrepreneurs, who do not belong to the HEI, can access the incubators. This practice is more common for research universities (75%) than for UAS (45%).

Knowledge exchange and collaboration***The HEI is committed to collaboration and knowledge exchange with industry, the public sector and society***

Valorisation is a key mission pillar for HEIs in the Netherlands. All of the HEIs visited demonstrated active involvement in partnerships and relationships with a wide range of stakeholders. This includes, for example, active participation and involvement with local, regional and national organisations, such as county development boards, local and regional authorities, business and industry representative groups, chambers of commerce, professional bodies and state boards.

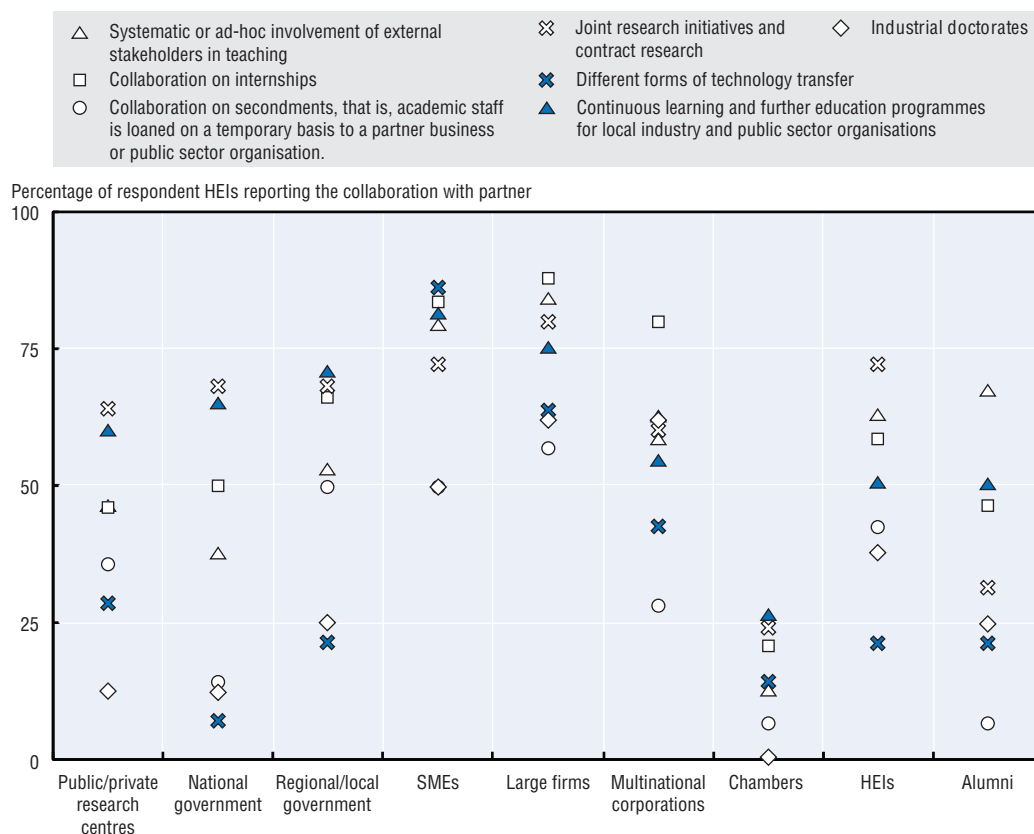
Maastricht, one of the most international universities in the Netherlands, has a strong regional responsibility and commitment to make a difference by joining forces with the region's industrial players. The result of this is Brightlands, a vibrant knowledge network with four campuses spread throughout the Limburg region: smart materials and sustainable manufacturing; regenerative medicine, precision medicine and innovative diagnostics; data science and smart services; and Food and nutrition. Brightlands is grounded on a strong Triple Helix involving education/research, industry and government with shared resources. The collaboration between the university and the regional government is very strong and has served as a learning model for other regions in the Netherlands and abroad (Brightlands, 2017). The co-location of fundamental and applied research has attracted new research groups to move to Limburg. This has jump-started research efforts and provided new ways of involving students in research. It requires an alternative mindset to spread amongst university administrators, scientists and students, which could be seen as a natural next step following the problem-based learning for which Maastricht University has become known worldwide.

The HEI demonstrates active involvement in partnerships and relationships with a wide range of stakeholders

External stakeholders interviewed as part of the review process all expressed the view that HEI participation in networks and partnerships was essential to the operation of these groups given the strength and range of expertise the HEIs had at their disposal. There are several examples of how researchers in HEIs have helped firms, civil society organisations and local authorities to scale up their innovation activities.

The results of the HEI Leader Survey show the range of knowledge exchange practices and partners of HEIs (Figure 2.13). With regard to *ad hoc* or systematic involvement of external stakeholders in teaching, most common were partnerships with large firms, SMEs and alumni. Key partners for the organisation of internships are large firms, SMEs and multinational corporations. Similar patterns can be observed for different forms of technology and knowledge transfer and industrial doctorate programmes. Temporary mobility schemes of academic staff (i.e. secondments) are organised mainly with large firms, regional government and SMEs. Lifelong learning programmes are organised for, and with, a

Figure 2.13. **Partners of Dutch higher education institutions in knowledge exchange activities**



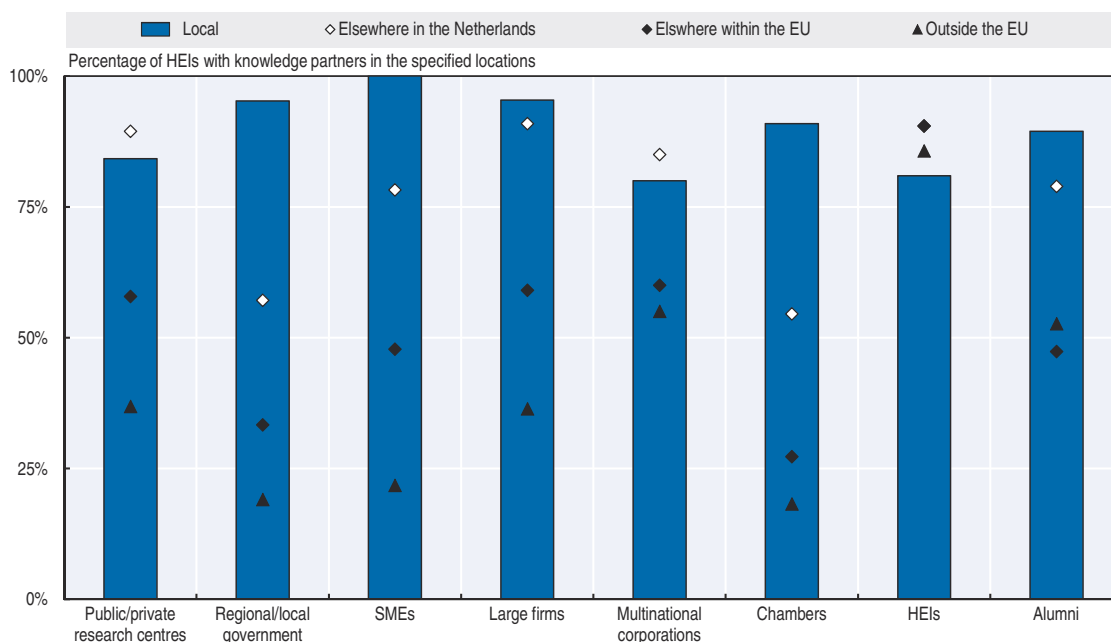
Notes: Higher education institutions (HEIs) were asked: "Knowledge exchange can take on various forms. The focus can be on teaching, research or any form of strategic collaboration. Which of the following are currently practiced at your HEI?"; "Which of the following are currently knowledge exchange partners of your HEI?". The total number of responses was 25, of which 9 were from research universities and 16 from universities of applied sciences (UAS). The HEIs reported to have knowledge exchange relationships with public/private research centres (19, 76%), national government (20, 80%), regional/local government (21, 84%), SMEs (23, 92%), large firms (22, 88%), multinational corporations (20, 80%), Chambers (11, 44%), other HEIs (21, 84%), alumni (19, 76%). The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

Source: OECD HEI Leader Survey The Netherlands (2016-17).

variety of organisations, most commonly with SMEs, large firms and regional/local governments. Key partners for joint research initiatives and contract research include SMEs, large companies and other HEIs. Overall, the most common knowledge partners of Dutch HEIs are SMEs (92%), large firms (88%), regional and local governments (84%) and other HEIs (84%). Less common were knowledge partnerships with Chambers (44%). Larger HEIs in the sample had more collaboration with public/private research centres, regional/local governments and SMEs, and research universities had more partnerships with multinational corporations than the UAS in the sample.

The geographic radius of knowledge exchange partners is large for the surveyed HEIs and included local contacts, as well as relationships with organisations located elsewhere in the Netherlands and within and outside the EU (Figure 2.14). Contacts with public/private research centres were both within their local area, and elsewhere in the country, as well as within the wider EU area (58%) and beyond (37%). Relationships with other HEIs occur at all levels of geographic distance and they account for close to 90% of the HEIs' links with partners outside the EU, followed by multinational corporations (55%) and alumni (53%). Collaboration with regional/local governments is focused on the close proximity to the HEI although 57% of the respondents also collaborate with these organisations elsewhere in the country. All of the surveyed HEIs have relationships with SMEs in the local economy and close to 80% with SMEs located elsewhere in the country. For close to half of the HEIs these relationships also cover the wider EU area, and 22% have global contacts with SMEs. Partners from large firms and multinational corporations are locally concentrated and spread across the Netherlands. Contacts with Chambers are mainly national; only 55% collaborate with the local Chamber organisations, taking into account that Chambers in general are one of the

Figure 2.14. **Location of knowledge exchange partners of Dutch higher education institutions**



Notes: Higher education institutions (HEIs) were asked: "Where are current knowledge exchange partners of your HEI located?". The total number of responses was 25, of which 9 were from research universities and 16 from universities of applied sciences (UAS). All HEIs reported to have knowledge exchange relationships with local partners (25, 100%), elsewhere in the country (23, 91%), elsewhere within the European Union (23, 90%), outside the European Union (21, 86%). The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

Source: OECD HEI Leader Survey The Netherlands (2016-17).

less common knowledge partners of HEIs. Knowledge exchange partnerships with alumni are mainly across the country but also have global scope (47%).

The HEI has strong links with incubators, science parks and other external initiatives

Of the surveyed HEIs that currently offer startup support, all of the research universities and 75% of the UAS have a business incubator on campus. Almost one-third have a representative of a technology park as a member of the HEI's governing body and more than two-thirds collaborate with technology parks and incubators on their entrepreneurship support, and on the design and delivery of entrepreneurship support activities (Figure 2.9). In 70% of the surveyed HEIs the demand for incubation facilities has increased over the last two years.

The HEI provides opportunities for staff and students to take part in innovative activities with business and the external environment

Opportunities exist to support staff and student mobility between academia and the external environment. Internships are a common practice to offer students the opportunity to participate in innovative activities with the external environment. More than two-thirds of the HEIs offer internships for their students; 72% have mandatory internships across most of their programmes at bachelor's level, 44% at master's level, and 20% for doctoral study programmes. More than 70% offer students support for the organisation of internships, which includes, in order of current practice: access to information on internship opportunities (94%), continuous support during mobility (89%), financial support (67%), and incentives for students to share their experiences with other students afterwards (50%).

Fewer initiatives exist to support the temporary mobility of HEI staff into industry and public organisations. Current practice was reported by half of the surveyed HEIs and a further two HEIs indicated that the introduction of secondment schemes is being considered by their governing boards. The support offered, in order of current practice, includes: information on mobility opportunities (93%), continuous support during mobility (86%), incentives for staff to share their experiences after mobility (79%), and funding (57%).

The HEI integrates research, education and industry (wider community) activities to exploit new knowledge

There are several examples of projects where HEIs bring together research, education and the business community. They will be discussed in Chapters 4, 5 and 6. One example that stands out is The Hague University of Applied Sciences and its Research Unit for Financial Inclusion and New Entrepreneurship. The Research Unit is very proactive in engaging with students. The research publications involve collaboration with the student community and are active educational projects. A key educational aim of the Research Unit is to support students to learn and understand more about value creation in a changing economy, related new forms of entrepreneurship and a new type of IT-based and self-controlled financing (HEInnovate 2017c).

The internationalised institution

Internationalisation is an integral part of the HEI's entrepreneurial agenda

The international strategies of HEIs in all areas, including student recruitment, exchange and placement activities; research and development; and staff mobility and recruitment, are firmly rooted and have evolved largely from the HEIs' active participation in international networks. The HEI Leader Survey confirms this: 90% of the surveyed HEIs have knowledge exchange partners from across the European Union, and more than 86% have global relationships (Figure 2.14).

All HEIs visited presented strong and ambitious international strategies of an entrepreneurial nature, which are largely focused on income generation from international student recruitment and participation in international education and R&D initiatives.

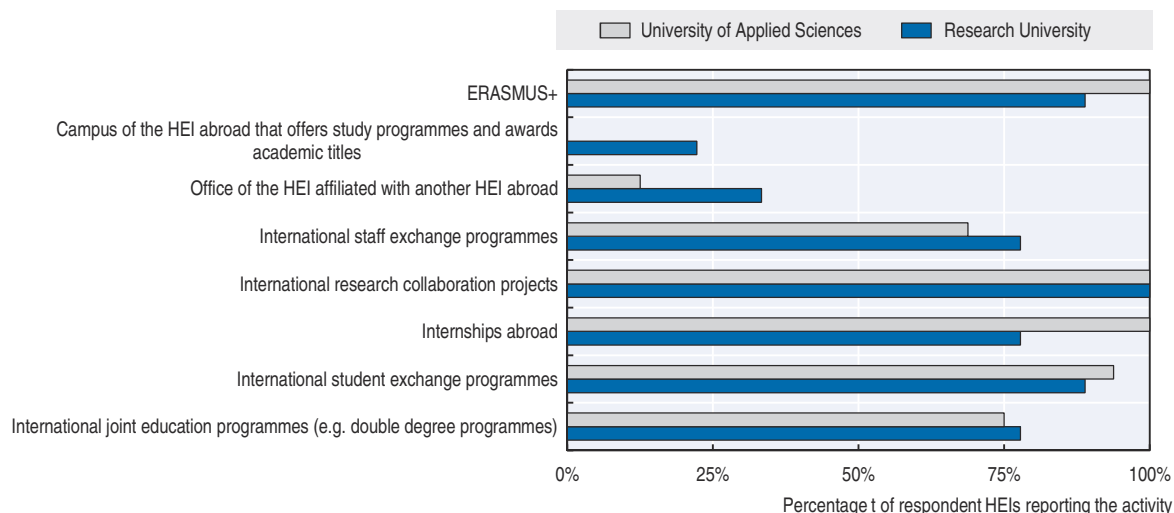
In 2016, 15.9% of the entire student population registered in government funded HEIs in the Netherlands had completed the prerequisite studies abroad and were not Dutch citizens. Most foreign students come from EU countries; Germany is by far the most common country of origin. China constitutes the largest group of non-EU international students (VSNU, 2017c). The growing number of students and staff from abroad is an excellent opportunity to enrich the academic entrepreneurship scene and should be taken into account more broadly.

The Dutch HEIs set their own internationalisation agenda and strategies based on their institutional profile. The representative umbrella organisations of the UAS and the research organisations advocate for a greater orientation of these individual strategies with the two national branding initiatives, “Nederland kennisland” (Netherlands, knowledge economy) and the “Holland” branding. These underline the key strengths of Dutch higher education, namely the very broad range of English taught programmes at all levels (bachelor’s, master’s, PhDs), study programmes that focus on global challenges, and a teaching and research culture in which freedom of expression, intellectual independence, curiosity, and the right to question are paramount (VH/VSNU, 2014).

The HEI explicitly supports the international mobility of its staff and students

Common internationalisation practices of Dutch HEIs include collaboration within Erasmus+ (part of the European Region Action Scheme for the Mobility of University Students), international student exchange programmes and student internships abroad, international research collaboration, and joint international education programmes (e.g. double degree programmes). The practices of either having offices affiliated with another HEI abroad, or their own campus abroad were uncommon and reported mostly by the research universities (Figure 2.15).

Figure 2.15. **Internationalisation activities of Dutch higher education institutions**



Notes: Higher education institutions (HEIs) were asked to report on their current internationalisation activities. The total number of responses was 25, of which 9 were from research universities and 16 from universities of applied sciences. The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), universities of applied sciences (43%). Source: OECD HEI Leader Survey The Netherlands (2016-17).

The HEI seeks and attracts international and entrepreneurial staff

Dutch HEIs are attractive employers for researchers and academic staff members from abroad. The internationalisation of staffing has gained momentum over the past few years, with HEIs increasingly competing internationally to attract talents. 60% of the surveyed HEIs reported to have recruitment policies and practices that seek to attract international staff; this included 89% of the surveyed research universities and 44% of the UAS. More than half of the surveyed HEIs reported to recruit staff for their entrepreneurship support activities.

The percentage share of non-Dutch nationals in research staff is highest for PhD candidates with above 45% and a 10% increase for the period 2006-16, and lowest for full professors at approximately 16% with a less than 3% increase since 2016 (VSNU, 2017b).

The international dimension is reflected in the HEI's approach to teaching

All HEIs visited have a teaching and learning environment tailored to a more global audience and provide access to new ideas for teaching and learning in the international environment. This increases the HEI's ability to compete on the international market and orients students to globalised job markets. A good example of how to stimulate internationalisation in higher education teaching and learning is the International Classroom at the University of Maastricht, which is a holistic approach to teaching and learning involving both students and staff in promoting a culture of inclusion and respect and preparing students for the global labour market through support activities that develop intercultural communication skills, coaching skills and conflict management (EDLAB, 2017).

International service-learning has also become a common practice for many Dutch HEIs. An example is the Theewaterskloof Programme, an initiative of the Arnhem and Nijmegen University of Applied Sciences with two South African universities (Box 2.3).

Box 2.3. Theewaterskloof Programme: international service-learning in practice

The Theewaterskloof programme is an international community development project based in the Theewaterskloof Municipality in the Western Cape province of South Africa. The original impulse behind the programme came from the observation that, in order to respond to the increasing slumification of South African towns and cities, it was necessary to develop rural regions.

The programme, part of a network of wider activities and initiatives, is made up of a consortium of six organisations in the Netherlands and South Africa: two South African universities, Western Cape University (historically black) and Cape Peninsula University of Technology; Theewaterskloof Municipality; the South African Netherlands Chamber of Commerce, CoCreateSA; Elgin Learning Foundation; and the University of Applied Sciences Arnhem and Nijmegen (HAN). Specific challenges were identified in the municipality (food insecurity, HIV/AIDS, unemployment, low levels of literacy, weak entrepreneurial culture, skills shortage, etc.), and the programme was intended to deliver a sustainable contribution to social, as well as economic development, significantly through the community having ownership over the programme, and skills transfer to the community in order to build capacity to that end.

The programme takes a service-learning approach to rural community development, something the HAN participants learned from their South African partners. This methodology, which is more common in the south, combines community service with more

Box 2.3. Theewaterskloof Programme: international service-learning in practice (cont.)

structured academic learning, where students “give something back” to society during their education. By engaging directly with complex social issues, students learn about the connection between their field of study and the kinds of problems and issues it can be used to engage with in a community. 1 500 students have participated in this programme since its inception in 2004, of which 600 were HAN students, with the remainder from Western Cape University and Cape Peninsula University of Technology. An awareness of the importance of tacit knowledge encourages students to step outside a European or Dutch mindset in order to engage with the Theewaterskloof community. Projects in the Theewaterskloof programme have focused on food gardens, waste management, arts and crafts centres, tourism and leisure promotion, “Sports for all & Train the trainer”, and architecture in the Dutch Cape style. Of the 600 HAN students involved, the majority have come from health, social work and sport, with a smaller number from education, business and engineering.

HAN’s involvement is in terms of training and skills transfer, while the content of the programme is taken care of by the South African partners. The role of HAN’s students is that they are not there to bring in money, but to bring in skills and capacity building. In terms of how funding is structured, the programme costs EUR 140 000 a year, which is a 0.4 time position in HAN, and four full-time staff in South Africa. Various costs, such as minibuses etc., are overheads coming out of this funding, but students pay their own way for travel, food, and accommodation. The funding is not simply recurrent, however. By not looking for large EU-levels of money, but by being required to reapply to HAN for funding, this brings commitment from HAN, keeping the idea and impulse behind the programme fresh in the mind of management. The Theewaterskloof programme is a valuable resource for those interested in social entrepreneurship, and brings significant innovation in moving beyond the traditional social justice model of international development and engagement education.

Source: Interviews at the Arnhem and Nijmegen University of Applied Sciences visit in July 2016.

In entrepreneurship education courses and startup training, simulation of direct application of how to internationalise an entrepreneurial initiative (i.e. business, project and association) was a regularly or primarily used teaching method in 57% of the surveyed HEIs.

The international dimension is reflected in the HEI’s approach to research

Many HEIs are part of various international research networks with reach beyond the EU. More than 80% of the surveyed HEIs have knowledge exchange relationships with HEIs in the wider EU area, and 50% also with HEIs globally. Collaboration with public/private research organisations located elsewhere in the EU was practiced by 60% of the surveyed HEIs, and close to one-third collaborated with research organisations globally.

Measuring impact

The HEI regularly assesses the impact of its entrepreneurial agenda

A central element of the entrepreneurial agenda of Dutch HEIs is the valorisation of knowledge, that is, creating value for economic and/or societal use by translating knowledge into useful products, services, processes and entrepreneurial activity (see Chapter 1). Valorisation encompasses all disciplines, and the impact of valorisation goes well beyond economic aspects into generating societal and cultural value.

From 2005 onwards, HEIs have included valorisation in their strategic plans as a function in addition to, and in synergy with, education and research. For the universities of applied sciences, the emphasis on valorisation has brought new attention and specific support to strengthen research activities. The focus on valorisation of knowledge has successfully introduced a wider understanding amongst the Dutch HEIs and individual researchers of impact in terms of education, research, engagement and networks, and in terms of academic and non-academic results inside and outside the HEI.

Impact is generated through non-linear processes, which are multi-iterative, parallel, multidimensional, absorptive and combine push and pull factors. Impact is not just about individual endeavours but is systemic, taking into account how individual actions related to past, current and future activities at departmental, faculty and institutional levels. Generation and diffusion of impact needs supportive and flexible structures, communication infrastructure and skilled people. Communication is particularly important as impact related information is both qualitative and quantitative, it can be fuzzy in its nature, and it is spread over time and different sources.

A sector-wide performance and quality management system for higher education institutions has been introduced. Every HEI agrees an individual quality agreement with the Ministry of Education, Culture and Science and a portion of the state grant is awarded based on performance and quality relative to targets set in the agreement. The first round of agreements was started in 2012 and concluded in 2016. Self-assessment is a key component of this process; HEInnovate is thus a useful practice. It will be important that HEIs are supported in self-reflection practices, in particular, in terms of exchanging information and learning from each other. With regard to entrepreneurship and innovation, this is already happening through the network of entrepreneurship lecturers in universities of applied sciences.

There is not yet a common set of valorisation indicators which are used by all HEIs. There is a long list of valorisation indicators from which HEIs choose their own indicators. All of the research universities have documented achievements through a combination of indicators and qualitative statements in the form of narratives (VSNU, 2017a). As a result, valorisation indicators very much differ between the HEIs. Although this reflects the different specific institutional missions, it does not allow for capturing the overall impact of valorisation. To prepare for the latter, the Ministry of Education, Science and Culture has suggested that the HEIs start working collectively on developing a “long list” of valorisation indicators to cover the full spectrum of valorisation. There is an opportunity for valorisation centres (and/or entrepreneurship/innovation centres) to undertake or co-ordinate academic research on the phenomenon itself in terms of processes and outcomes.

The HEI regularly assesses how its personnel and resources support its entrepreneurial agenda

The HEI Leader Survey shows that close to 80% of the HEIs had introduced performance and quality indicators for their entrepreneurial agenda (Figure 2.1). Several research universities have introduced valorisation and entrepreneurship into staff development and annual quality reviews.

An example is Erasmus University Rotterdam where staff members are supported in various ways to develop an entrepreneurial mindset and behaviour. Staff members can participate in various trainings on negotiation, academic leadership etc. (organised for a large part together with the universities of Delft and Leiden), exemplary behaviour is

recognised, and achievements in valorisation and entrepreneurship are taken into account for recruitment and career development. The latter includes “initiative”, that is identifying problems and opportunities and taking appropriate action on own initiative, and “entrepreneurship” defined as identifying opportunities and possibilities for the development of new knowledge, its valorisation and daring to take sensible risks when doing so. For entrepreneurship the following behavioural indicators are suggested for the reviewer (i.e. staff and manager): looks for opportunities and possibilities; dares to take up new things; comes forward with new ideas for knowledge and areas of application, products and services; does research in marketing and environment; indicates which investments are needed in order to capitalise on market opportunities; and dares to take sensible risks in order to achieve specific advantages.

The HEI regularly assesses entrepreneurial teaching and learning across the institution

Assessment of entrepreneurship education is widely practiced. All but one of the surveyed HEIs which offer entrepreneurship education activities also undertake formal evaluations. Where practiced, this is mostly an obligatory procedure. The focus is on satisfaction of participants (100%) and competence development (80%); half of the HEIs also measured the motivation of participants to start a business. In the majority of HEIs (70%) a specifically tailored survey instrument was used. When a questionnaire was used, it was at the end of the course (100%), during the course (40%), and at a point of time after the courses but before graduation (20%). However, despite the rich portfolio of entrepreneurship education activities, there is an evaluation gap in the outcomes of entrepreneurial education and entrepreneurial behaviours. More research is needed into if (and when) students develop entrepreneurial behaviours within existing companies or other kinds of organisation, if they prefer acquiring existing companies, taking the lead of a family business, or engaging in social entrepreneurship.

Assessing the impact of education activities is usually conducted by individual departments/units and for individual activities. A good example of an institution-wide approach to enhance innovation in education is the establishment of the Institute of Education Innovation (EDLAB) at Maastricht University in 2015. EDLAB converges existing and new ideas on higher education and initiates projects and events that improve the quality of education in the whole university. This requires engagement at all levels: teachers, researchers, managers, and support staff, as well as students (see Chapter 4).

The HEI regularly assesses the impact of startup support

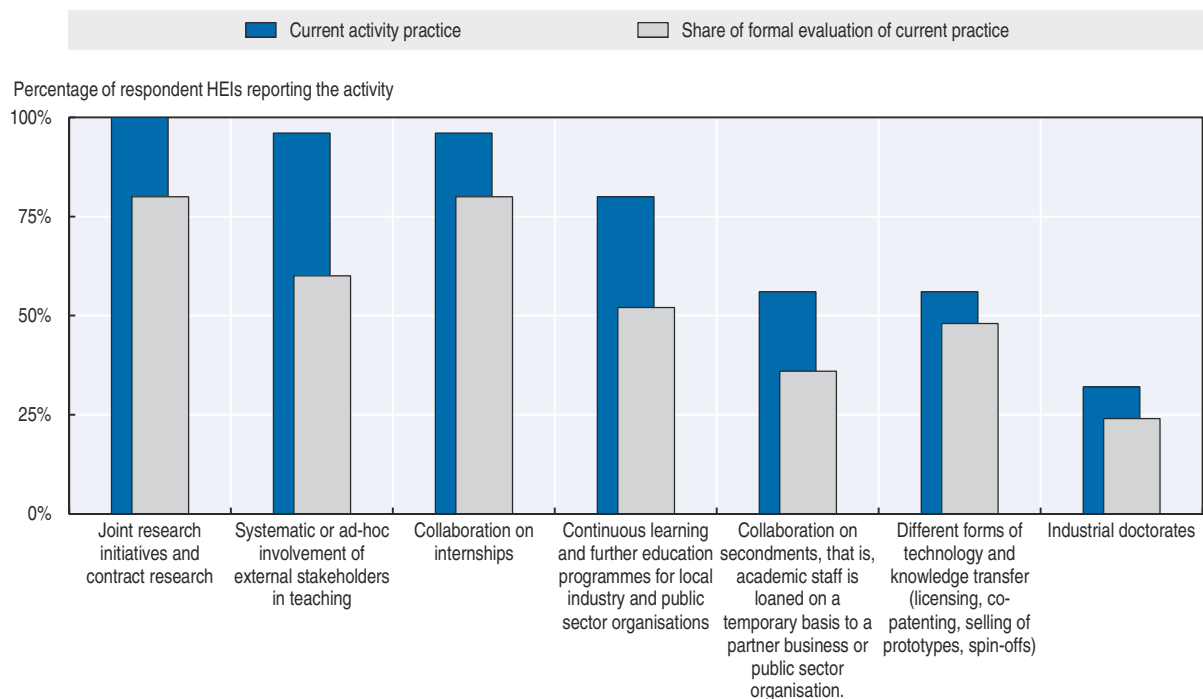
In the surveyed HEIs, evaluation of startup support is less practiced than evaluation of entrepreneurship education (60% versus 87%). For early-stage startups, the Netherlands offers, in many aspects, an excellent business environment. However, in common with many OECD countries, there are barriers to growth after the startup phase, mainly as young firms have to overcome the double-constraint of lacking internal resources and having only limited access to external resources. The reputation and networks, which most of the Dutch HEIs have because of their active roles in local and regional development, can help academic entrepreneurs to consider where, when and how to grow. Despite the many startup support measures, it was hard during the study visit to get precise figures; most notably it was almost impossible to get information on the startups and students years later. Knowing the survival rate after three and five years could be of significant interest.

The HEI regularly assesses knowledge exchange and collaboration

Dutch HEIs are very active in knowledge exchange and there are many examples of innovative and impactful research. Although each of the HEIs provides information on various activities, these are not being translated effectively enough into details of their actual impacts in terms of the economy and society as a whole.

The HEI Leader Survey gathered information on certain knowledge exchange activities and whether evaluation practices are in place. Most common were formal evaluation practices for different forms of technology and knowledge transfer (licensing, co-patenting, selling of prototypes, spin-offs), practiced by 86% of the surveyed HEIs, followed by evaluation of collaboration on internships (83%), joint research initiatives (80%), and industrial doctorate programmes (75%). Gaps can be noted for the systematic involvement of externals in teaching and continuous learning and further education programmes for local industry and public sector organisations (Figure 2.16).

Figure 2.16. **Evaluation practice of knowledge exchange activities in Dutch higher education**



Notes: Higher education institutions (HEIs) were asked: "Knowledge exchange can take on various forms. The focus can be on teaching, research or any form of strategic collaboration. Which of the following are currently practiced at your HEI?". For each of the reported knowledge exchange practices the HEIs were asked "Is there a formal evaluation practice of these knowledge exchange activities?". Percentage shares of formal evaluation of a specific knowledge exchange practice are shown. The total number of responses was 25, of which 9 were from research universities and 16 from universities of applied sciences (UAS). The overall survey response rate was 48%. The survey response rates per HEI type are the following: research universities (60%), UAS (43%).

Source: OECD HEI Leader Survey The Netherlands (2016-17).

The HEI regularly assesses its international activities in relation to its entrepreneurial agenda

The HEIs visited all track their international activities in considerable detail. However, there is room to undertake more sophisticated impact assessments to understand where further investments would have the greatest effect (see Chapter 4, particularly on the entrepreneurial ecosystem).

Recommendations for public policy action

Establish a national programme for research on valorisation. The wide range of valorisation activities across the entire Dutch higher education sector has resulted in a rich portfolio of processes, outcomes and impacts. So far, the emphasis has been on documenting the result of valorisation activities. In going forward, more emphasis is needed on the valorisation phenomenon itself. A programme could be established to incentivise research across the HEI sector into processes, activities, results and impacts of valorisation activities. This would provide very valuable lessons for future policy making in the Netherlands and beyond, particularly in view of the current efforts to establish a common set of valorisation indicators while taking into account institutional differences. With regard to entrepreneurship support, which in terms of support infrastructure and dedicated education activities can be considered the most developed part of valorisation, a national research initiative could focus on entrepreneurship education activities and explore impacts on students and startups. It will be important to connect the efforts of Dutch HEIs and research institutions with international research initiatives, and to strengthen/establish alumni tracking systems in HEIs.

Ensure sustainability in funding for valorisation whilst stimulating synergies between education, research and valorisation activities. It will be important to further anchor valorisation in the quality agreements between the Ministry of Education, Culture and Science and the HEIs to ensure that valorisation does not end up as a project-based initiative, but remains connected with education and research. In this regard, it will also be important to review and adjust funding models in the sector to ensure budget allocation that covers a minimum of infrastructure, staff allocation and activities in order to avoid over-dependence on project-based and temporary funding. To build more and better synergies between the three core functions of Dutch higher education – education, research, valorisation – co-ordination mechanisms between the different ministries should be continued and strengthened.

Recommendations for higher education institutions

Support staff to effectively participate in valorisation. All interested staff should have the opportunity to participate in development and training programmes, which include raising awareness of valorisation, and skills development for designing and delivering valorisation activities, including impact measuring and communication skills. Also important is the establishment of support mechanisms to help staff manage relationships with external partners, for example in terms of relationship building, fundraising, handling conflicts, managing intellectual property rights, communication and dissemination of results, etc. It is important to centrally anchor activities around valorisation, entrepreneurship and continuous professional development close to the HEI's executive board.

Recognise staff participation and performance in valorisation. To enhance the participation of motivated staff in valorisation activities, job descriptions, tasks and promotion procedures should take into consideration participation and performance in these activities, particularly in how these activities enrich education and research. This approach is particularly worth considering in the universities of applied sciences given high staff teaching loads and the inability of the sector to deploy significant numbers of existing staff on a full or part-time basis for valorisation and engagement activities. A key aspect of this is also to support staff in undertaking temporary intersectoral mobility, and particularly

also in the earlier stages of their academic career. If the aim is to have more staff engaged in valorisation, HEIs will need to hire new staff members for whom valorisation is already part of their intrinsic motivation, to stimulate a cultural change from within. For this, the recruitment criteria of HEIs would need to include valorisation experience and skills in addition to requirements related to teaching and research performance.

Enhance the participation of students in valorisation. Improve mechanisms which allow researchers and students to collaborate in valorisation activities, for example with valorisation-related seminar papers and graduation theses. In particular, the emerging interdisciplinary research platforms (e.g. Grand Challenges programmes, flagships) offer opportunities for this. The “City Deals” offer an excellent starting point to enhance the participation of students in valorisation activities. It is important that students participating in valorisation activities, including entrepreneurship education activities, receive recognition of the competencies acquired (e.g. ECTS, diploma supplements).

Support students in managing study requirements and pursuing a startup. It is not easy for students to manage the requirements of a full-time study programme and pursue their “startup dream” at the same time. It will be important to take stock of, and analyse, the different HEI-led initiatives in this area and provide information across the sector. This should be included in the above-proposed national funding programme to incentivise research on valorisation processes and outcomes, and entrepreneurship support.

Strengthen the institutional positioning of entrepreneurship centres. Where existing, entrepreneurship centres have played an important role in co-ordinating entrepreneurship support activities within and beyond the HEI. However, the entrepreneurship centres are not always positioned centrally and visibly, with clear connections to valorisation. It will be important to further strengthen the institutional positioning of entrepreneurship centres, create more synergies with valorisation activities, ensure that there is a broad suite of entrepreneurship education activities from awareness raising to skills and knowledge development, and put in place targeted startup training. This should also include interdisciplinary entrepreneurship education activities, a greater outreach to international students (and staff), and consider an expansion of the entrepreneurship support offer to alumni. To organise this, the HEInnovate self-assessment tool could be used to take stock of existing initiatives and identify gaps and opportunities by involving all relevant internal and external stakeholders.

Strengthen links with entrepreneurial alumni. Part of the strengthened role of HEIs in supporting growth-potential startups is to maintain links with their entrepreneurial alumni. A first step could be to allow and encourage alumni to make use of the entrepreneurship support offer after graduation; both entrepreneurship education activities and startup support.

Recommendations for joint action

Capacity building for better synergies between education, research and valorisation and for measuring impact. In addition to basic funding that ensures that valorisation will not end up as a project-based initiative, but remain connected with education and research, synergy building requires capacity building within HEIs. So far, the emphasis has been on documenting the result of valorisation activities. The current agreements triggered HEIs to more clearly communicate activities and achievements in the area of valorisation. In going forward, more emphasis is needed on the valorisation phenomenon itself, taking into account that metrics always come with a context. What needs to be done next is to show

how valorisation feeds into education and research, and how it creates societal (including economic) impact. The new quality agreements could incentivise and support HEIs to do more on understanding, capturing and measuring the processes, activities, results and impacts of valorisation activities. To be most effective, institutional efforts need to be integrated, for example through a national research programme and capacity building that shares information and builds skills and resources to measure impact.

Provide training opportunities for entrepreneurship educators. Entrepreneurship educators, that is, HEI staff and externals that are involved in the design and delivery of entrepreneurship education activities, typically include a wide range of individuals with and without pedagogical qualifications. To support teaching staff in innovative pedagogies and learning outcome assessment methodologies, a national programme to train entrepreneurship educators could be considered in addition to HEI-specific training offers. At the national level, such a programme could enhance peer-learning between educators and researchers in entrepreneurship and entrepreneurship education, building on existing efforts to periodically organise events to share (best) practices in entrepreneurship education. This should be related to the national programme of research on valorisation processes and outcomes, and entrepreneurship support.

Enhance interdisciplinarity in education and research within and between HEIs. In going forward with the implementation of the Dutch Research Agenda, it will be important to include all disciplines, across the entire higher education sector, to take into account the importance of individual researchers undertaking curiosity-based research, and to enhance collaboration across the Dutch higher education sector. In line with the national roadmap on large scale facilities, incentives should be designed to promote shared research facilities across different faculties and collaboration between HEIs. At the same time, successful efforts to involve local and regional stakeholders in interdisciplinary education programmes and research initiatives should be continued and strengthened. Several HEIs in the Netherlands have increased their efforts to enhance interdisciplinarity in education and research. It will be important to evaluate these initiatives in terms of effectiveness and impact and to share lessons learned across the wider higher education sector. At the same time, the national framework should be further directed towards interdisciplinary education programmes (e.g. programme accreditation).

Strengthen the role of HEIs in supporting growth potential startups. Most of the Dutch HEIs have developed a good reputation and network through their active roles in local and regional development. These can help academic entrepreneurs in accessing resources, building contacts and getting introduced/established into existing networks. The growing number of students and staff from abroad is an excellent opportunity to enrich academic entrepreneurship and should be further taken into account. To make full use of this, two things are necessary: on one side, greater collaboration across the HEI system, drawing from existing examples of good practice (e.g. Amsterdam Centre for Entrepreneurship), and on the other side, more and better connections between different entrepreneurship support initiatives, to make access to support easier for firms (e.g. StartupDelta). This is relevant both at national and regional levels, as well as within specific themes/clusters. Existing collaborations between HEIs and science parks already offer an excellent starting point. Existing initiatives should be evaluated and lessons learned shared across the wider higher education sector. Also, it is important to continue providing support for HEIs to collaborate internationally on the design and delivery of their startup support offer.

Note

1. At the time of writing this report the following countries have participated in HEInnovate reviews: Bulgaria (2014-15), Ireland (2015-16), Poland (2016) and Hungary (2016).

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Chapter 3

Enhancing the organisational capacity of higher education institutions in the Netherlands

This chapter expands on the findings of Chapter 2 related to organisational capacity, funding, people and incentives. It provides a more in-depth discussion of the challenges faced with regard to the need to sustain valorisation and entrepreneurship through public funding, and a framework that shows how valorisation feeds into education and research, and how valorisation creates impact. It explores how regional networks can be strengthened and how to engage staff in contributing to this, and valorisation in general. The chapter presents various learning models and good practice examples.

Introduction

Organisational capacity in the context of higher education institutions (HEIs) refers to the capacity to deliver on the demands for change (Ackerman-Anderson and Anderson, 2010). It is a strategic issue; operating effectively, while taking on board major changes, requires real capacity. The organisational capacity of an HEI drives its ability to deliver on its strategy. If an HEI is committed to carrying out entrepreneurial activities to support its core strategic objectives, then key resources such as funding and investments, people, expertise and knowledge, and incentive systems need to be in place to sustain and grow its capacity for entrepreneurship.

The higher education system in the Netherlands currently deals with the challenge of how to valorise the excellent knowledge produced in HEIs and research organisations. The indicators in the Innovation Union Scoreboard highlight the contrast between the quality of the research system, resulting in many top publications and doctorate graduates, versus a modest performance in terms of economic output. This points to the need to intensify the connection between research and development (R&D), innovation and entrepreneurship on the one hand, and science and education on the other. Several strategies and approaches have supported the need to generate greater engagement between the higher education system, the economy and society, including the top sectors policy (although it is seen as being mainly economically orientated), the Valorisation Programme and the newly established National Science Agenda (see Chapter 1).

A recent policy briefing document on valorisation; “Science with Impact”, produced by the Secretary of State for Education, Culture and Science in January 2017, reviews progress in the area of valorisation within the HE system (Ministry of Education, Culture and Science, 2017). The document describes recent positive developments in terms of engagement and valorisation, as well as future challenges, and highlights the need to:

- place greater value on the social and economic impact of research
- strengthen public-private partnerships
- remove bottle-necks for academic startups
- broaden and strengthen Knowledge Transfer Offices
- make better use of regional networks
- better monitor valorisation.

This chapter explores the views presented by various stakeholders in relation to the above themes and in the context of improving the engagement between the Dutch higher education system and both the economy and society. It became clear from the meetings with the majority of the HEIs visited that engagement and valorisation formed a critical element of their strategic plans, which is fundamental to ensuring the sustainability of the valorisation and engagement agenda going forward. Several examples of good practice and achievements in terms of valorisation, recommendations and learning models for consideration at both a national and institutional level are provided and referenced in the context of existing and emerging national policies and institutional practices.

Analysis and findings

Sustaining valorisation and entrepreneurship beyond 2018

Within the Dutch higher education system, engagement or third mission activities are more commonly referred to as valorisation. Valorisation has been defined as “the process of creating value from knowledge by making knowledge suitable and/or available for economic and/or societal use and translating that knowledge into competitive products, services, processes and entrepreneurial activity” (Chapter 1).

The Valorisation Programme, which was started in 2010, will be coming to an end in 2018. The last projects for which subsidy has been given will end in 2018. So far, HEIs could receive an amount of up to 50% co-funding for their valorisation plans up to a maximum of EUR 5 million on the condition that plans are carried out by a public-private consortium of partners (see Chapter 1). Funding issues are likely to arise in terms of sustainability. The expectation is that the HEIs will continue the funding for already established structures, support services and activities from their core budgets. Future policies supporting valorisation will need to consider how to ensure the sustainability of valorisation in higher education, for example, maintaining central funding for the valorisation central support offices and associated personnel as a minimum, in order to avoid overdependence on short-term project-based funding.

The Dutch Research Agenda, established in 2016 by a knowledge coalition including all higher education stakeholders, is expected to provide a strengthened framework for valorisation, entrepreneurship and innovation in higher education. Central elements are public-private and public-public partnerships, and interdisciplinary research funding focused on grand societal challenges. For HEIs to effectively contribute to the Dutch National Research Agenda, interdisciplinarity in the three functions of education, research and valorisation is essential. Examples of good practice were observed in all of the visited HEIs, however some departments still appear to be very inward looking and focused on competition with one another in terms of funding and recognition.

Future policies supporting valorisation would need to consider how to ensure the sustainability of valorisation activities, and how to improve the positioning of valorisation within the strategic priorities of all HEIs. It will also be important to stimulate and sustain regionally integrated approaches where HEIs partner with regional actors for valorisation and entrepreneurship activities; examples are the Centres of Expertise in the UAS and the recently promoted City Deals (see Chapters 4, 5 and 6).

In some HEIs, valorisation is currently perceived as lagging well behind the current main priorities in terms of importance; namely the quality of teaching and the development of research. To enable sustainability and greater synergies between education, research and valorisation across the Dutch HEI system, it will be important to adjust the funding allocation model to allow for recognition of valorisation activities and to reflect valorisation activities in the job descriptions and promotion regulations of academic and administrative staff.

In terms of sustainability, how institutional funding models continue to evolve and how staff are deployed within the HEIs will determine the success of existing and future engagement and valorisation initiatives. The interviewed HEIs supported the concept of changing existing funding models to further incorporate engagement and valorisation. They recommended taking an incremental rather than “big bang” approach so as not to impact negatively on the existing ecosystem within higher education, which has come to depend upon the current funding models.

As part of the visit, HEIs also raised the issue of proposed salary caps to be introduced for academic staff, which they believed will have a significant impact on the quality and experience of staff they will be able to hire in the future, particularly staff with R&D and engagement experience. Consideration should be given to examining employment arrangements in other countries which may have been specifically developed to accommodate the hiring of staff with particular valorisation experience.

In the development of future policies to support valorisation and entrepreneurship in higher education, consideration needs to be given to the co-ordination of different policy actors. To build more and better synergies between the three core functions of Dutch higher education – education, research, valorisation – co-ordination mechanisms between the different ministries should be continued and strengthened. Valuable learnings come from Denmark and its Foundation for Entrepreneurship which brings together the efforts of different ministries (see Chapter 6).

Enhancing interdisciplinarity

Given future economic and societal trends, it is clear that engagement and valorisation activities will need to utilise and depend more upon interdisciplinary approaches in education and research. One of the most important requirements for human capital development in the future is the capability and capacity to work in multidisciplinary teams and to understand each other's "languages". This should be reflected in the organisation of the higher education system.

Several of the research universities and universities of applied sciences have started to stimulate interdisciplinary initiatives, primarily in research but increasingly also linked with education activities. Evaluating the impact and effectiveness of these approaches can help to clarify whether HEI-level initiatives are sufficient or need to be enhanced with national funding, or whether more flexibility is required for HEIs to establish (further) organisational support and allocate resources to introduce and sustain interdisciplinary research and education. To encourage transdisciplinary approaches, cross-faculty and multi-faculty funding models for joint programmes and initiatives need to be facilitated at a national level through, for example, specific competitive funding calls or a wider support programme; some of which is underway with the National Science Agenda (see Chapter 1).

The value of cross-cutting networks

The Netherlands is well regarded for its scientific output and technological developments in the area of life and medical sciences. The same situation is true for Flanders, hence stimulating cross border co-operation would be relevant. Jointly, the two regions could easily become the "Silicon Valley" of Europe in respect to medical science and innovation. The success of taking such a cross-border collaboration forward will depend on properly addressing a number of key challenges, namely i) strengthening links between academic hospitals and medical devices companies and ii) promoting interaction between medical schools and hospitals. Recently, these have been included in a European wide cross-border co-operation (EIT Health), with the participation of Leiden University, the University of Delft and the Erasmus University of Rotterdam.

The importance of individual regions and the commitment of individual HEIs, as well as business and society stakeholders, to their region was clearly evident from the study visits. However, although there was evidence of immense individual stakeholder commitment to regional development, collective multi-HEI and multi-agency approaches to regional

development could be improved. A start was made with the City Deals (see Chapter 5), however no funding has been assigned to these multi-stakeholder partnerships. The establishment of a strategic innovation fund could specifically promote multi-HEI and multi-agency approaches to progress the valorisation agenda in specific regions, thus creating regional networks of valorisation. An example of this approach is the Strategic Innovation Fund in Ireland.

As part of the Irish Government's response to the OECD's Review of Higher Education in Ireland (2004), the Strategic Innovation Fund (SIF) was launched in 2006 to support the enhancement of quality and effectiveness across the higher education sector (HEA, 2017). Specifically, the SIF was established as a mechanism for institutional restructuring and modernisation; for the enhancement of teaching and learning; for the development of postgraduate education and research; and for the improvement of equity of access into, and progression through, higher education. Inter-institutional collaboration has been a distinctive feature of the SIF, as has the leveraging of existing resources (through the match funding provided by participating institutions) to advance strategic national priorities.

One of the main success stories from the SIF initiative was the formation of the Shannon Consortium (Box 3.1), a multi-HEI regional consortium which has developed even further as part of the Regional Clusters and most recent Regional Skills initiatives introduced by the Irish Department of Education and Skills in 2011 and 2015 respectively.

Box 3.1. **Shannon Consortium**

The Shannon Consortium was created in 2007 involving the University of Limerick (UL) and the Limerick Institute of Technology (LIT), the two key drivers of the consortium, which has developed into a vibrant HEI partnership, also involving Mary Immaculate College, local community and businesses, city and county councils.

Leaders in both the Limerick Institute of Technology and the University of Limerick have given substance, at a strategic level, to their joint attempts to help address regional development issues and shared service opportunities. Their actions manifest themselves as jointly seized opportunities, strategic plan statements and public commitment to their region. In 2006, the joint bid to the Strategic Innovation Fund (an Irish government initiative), to establish a Shannon Consortium, arose directly as a result of the close personal working relationship between the presidents of the two HEIs. The Chairperson of the Shannon Consortium is a retired senior civil servant and former diplomat from Limerick City.

The excellent collaboration between the HEIs has led to a growing number of innovative joint activities in education and research. Examples are a combined graduate school and PhD accreditation (which commenced in 2015), collaborative springboard courses, as well as applied research activities and new, effective ways to enhance enterprise engagement (e.g. Limerick for IT). Sharing of rewards for joint supervision of theses is under discussion and there is a clear policy in place for students who wish to transfer from LIT to UL and vice versa after successfully completing the required amount of programme modules. "Limerick for IT" is an IT skills partnership which commenced in 2014 and combines the strengths of the two HEIs in partnership with key industry partners, such as General Motors, Johnson & Johnson, Kerry Group, Limerick City and County Council and IDA Ireland. The initiative has facilitated the attraction of foreign direct investment and job creation, which has also led to new forms of collaboration between higher education and industry (e.g. Johnson & Johnson Development Centre). The "Limerick for IT" initiative has since expanded into engineering with the creation of the "Limerick for Engineering Initiative".

Box 3.1. Shannon Consortium (cont.)

The impact of the Shannon Consortium is significant. For example, the multinational company Northern Trust would not have chosen to locate in Limerick without the consortium being in place, which enabled fast response times to the development of staff training programmes, the provision of office space etc. This has led to 400 new jobs being located in Limerick.

Source: OECD/EC, 2017.

Significant evidence was presented of the HEIs' capacity and culture to build new relationships and synergies across institutions and within their regions. Initiatives of note included those to increase joint strategic approaches to strengthen co-operation between HEIs and the region, which ultimately diminish long established practices of competition among universities and among faculties within the same university. The University of Amsterdam (UvA), Vrije Universiteit Amsterdam (VU), and Amsterdam University of Applied Sciences (AUAS) have put in place initiatives to increase joint strategic approaches. The Amsterdam Economic Board, which includes the HEIs, the City of Amsterdam and key local industry stakeholders, helped to connect the HEIs with large businesses in the corporate world (e.g. TATA, Shell).

An example that offers valuable learning on the benefits and barriers of HEI-HEI collaboration is the Amsterdam Centre for Entrepreneurship (ACE), which is still a central player and key connector in the Amsterdam entrepreneurship ecosystem. ACE started in 2007, with the creation of a research chair in econometrics in UvA's Faculty of Economics, which included the fractional position of business director. Thanks to very capable, connected and committed individuals a partnership was created in 2007 bringing together four HEIs based in Amsterdam, of which two were research universities and two UAS. This ambitious project is still going and has had successes and failures. There were many compromises in the process of trying to get four universities to work together. At a faculty level, it required a significant change of approach and philosophy to move from normal teaching practice to building a cross-institution collaborative offering, which is more complex. Individuals who are used to focusing on getting things done in their own institution can become frustrated and impatient. The collaboration process reveals unexpected challenges and differences in process, values and priorities. The resource needed to address these, including the time commitment of individuals, is often way beyond what is anticipated (HEInnovate 2017b).

Traditionally, strong research universities have competed with one another for talent, research funds and notoriety with the aim of moving up the various rankings. It is clear that such "traditional" behaviour, which inhibits the advantages of inter-university co-operation, needs to be addressed. This could be done through reward programmes involving more than one university. A learning model related to this issue is the FLAMES (Flanders Training Network for Methodology and Statistics) initiative designed by the Flemish Government to promote co-operation amongst universities. This particular initiative was specifically focused on doctoral education but it can be adapted for inter-institutional valorisation programmes. The Flemish government supports training on career development and transferable skills for PhD students and other young researchers through funding of the Doctoral Schools at the Flemish universities. The funding of approximately EUR 4 million per year is directed towards creating synergies through inter-university collaboration. The

Flemish universities, through their umbrella representative, jointly organise courses involving the strategic research centres and the Flemish Supercomputing Centre. FLAMES, perhaps the most popular of these initiatives, required inter-university collaboration on a yearly basis involving several hundred participants. Similarly, the Humanities Faculty at the University of Leuven organised a series of interdisciplinary activities. Public funding is increased by 25% if the programme is interdisciplinary.

Sustainability and institutional funding of valorisation

Going forward, different funding approaches for the support of valorisation activities in higher education will need to be taken by the different types of institutions. In the case of research universities, existing funding models and sources of finance are better suited to supporting these activities. However, consideration is needed on an eventual adjustment of internal funding arrangements to recognise valorisation activities in a similar way to how research activities are currently recognised by providing, for example, funding for specific competitive calls in valorisation which could be either teaching and learning or research orientated.

Education is considered to be the primary mission of the Dutch universities of applied sciences, however the valorisation agenda has steered the tailoring of education towards relevance and generated an even greater exposure to and connection with industry and society. Some very good examples of teaching and learning activities contributing to valorisation were observed as part of this review (see Chapters 4 and 6). This kind of synergy needs to be further sustained, which could be achieved, for example, through additional ring-fenced funding for the sector with a view to assisting with the expansion of its research and valorisation capacity.

An existing international model which could be considered is the Portuguese Programme for Modernisation and Valorisation of Polytechnics, which are similar in organisational nature to the UAS in the Netherlands. The programme provides ring-fenced funding for the development of practice-based research and development (R&D) activities (Box 3.2). The aim is to modernise the model of higher education in Portuguese polytechnics and to improve their perceived value by society. One of the programme's five key axes is to reinforce the R&D activities of polytechnics, in particular their practice-based R&D activities.

Box 3.2. Portuguese Programme for Modernisation and Valorisation of Polytechnics

In May 2016, a call for funding of R&D activities of practice-based projects was launched, a first in Portugal, specifically aimed at polytechnic institutions, concerning challenges or problems relevant to their regions, and aiming for strong involvement of students in the activities of the R&D teams through consortia of different polytechnics. Projects were to be no more than 18 months long. The deadline for submissions was 30 September 2016 and 141 applications were submitted for evaluation.

The aim of this call was to promote practice-based R&D projects in polytechnics through the following objectives:

- i) To encourage the creation/mobilisation of multidisciplinary groups of researchers, teachers and students within polytechnics to identify and solve concrete problems with regional scope and relevance, emerging from the interaction with the relevant regional stakeholders or actors

**Box 3.2. Portuguese Programme for Modernisation
and Valorisation of Polytechnics (cont.)**

- ii) To foster the co-operation between polytechnic institutions and the economic, social and cultural sectors, facilitating professional knowledge transfer routines and skilled human resources
- iii) To integrate skills and to enhance synergies in terms of opportunities and regional and national needs, bringing together teachers and researchers from different areas around a specific challenge or issue that enables R&D activities to solve and create opportunities for training and creation of professional knowledge, together with the students
- iv) To support the attraction and continuous renewal of new teachers and professional experts in the polytechnic institutions, together with measures to promote high qualified jobs in different areas of science, technology and culture, enhancing regional and national networks of polytechnic institutions sharing human and material resources
- v) To encourage the participation in European networks of polytechnics to facilitate the internationalisation of the polytechnic institutions and the regions in which they operate.

Because previous experience in practice-based R&D is very limited in Portugal, as well as the design and evaluation of submissions for these kind of projects, several meetings and workshops were organised to allow for critical discussion of potential ideas for projects to be submitted to the R&D call, with the participation of experienced international scholars in the practice-based R&D field. Meanwhile, a programme of meetings, “Forum Polytechnic”, was launched. These one-day meetings were designed to present the experiences and competences of polytechnics to develop solutions in specific areas of professional knowledge and expertise and to discuss specific developments with companies and other societal actors, reinforcing thematic networks within polytechnics and their links with different stakeholders. Four meetings were organised during 2016, in different locations, on agro-industry and animal production, hospitality and catering, rehabilitation technologies and wellbeing, and sports and fitness. Ten more meetings were conducted during 2017. A total of EUR 17 million has been set aside to support this practice-based R&D initiative among Portuguese Polytechnics.

Source: Ministry of Science, Technology and Higher Education of Portugal (2016).

Reflecting valorisation in recruitment criteria and staff development

Supporting valorisation and entrepreneurship in Dutch higher education has led to the introduction of different staff profiles and several HEIs have undertaken initiatives to broaden the career paths of their academic staff to enhance more flexible mobility of staff between different areas of the HEI (e.g. policy advisors, business developers, etc.). These approaches offer valuable learnings.

Highly qualified professionals, who are fully dedicated to innovation and entrepreneurship activities, have well-defined and attractive careers with salaries that are partly funded from the HEI’s budget and not only from project-based funding. This ensures that people with relevant knowledge and skills remain in such functions at the HEI or within the higher education sector. All of the visited HEIs have established the position of a policy advisor to the executive board, which took over the role of local HEInnovate

co-ordinators. These positions seem to be crucial to allow the HEIs to contribute to national higher education policy making.

There are very promising examples of expanding current recruitment and promotion criteria to take into account experience in industry, business or societal environments, which would be relevant to valorisation and engagement activities (Chapter 2). Two examples are presented here.

Erasmus University Rotterdam supports staff members in various ways to develop an entrepreneurial mindset and behaviour. Staff members can participate in various trainings on negotiation, academic leadership etc. (some of which are organised together with the universities of Delft and Leiden), exemplary behaviour is recognised and achievements in valorisation and entrepreneurship are taken into account for recruitment and career development. The latter includes “initiative”, that is identifying problems and opportunities and taking appropriate action on own initiative, and “entrepreneurship” defined as identifying opportunities and possibilities for the development of new knowledge and areas of application for new research activities, acting accordingly and daring to take sensible risks when doing so. For entrepreneurship, the following behavioural indicators are suggested for the reviewer (i.e. staff and manager): looks for opportunities and possibilities; dares to take up new things; comes forward with new ideas for knowledge and areas of application, products and services; does research in marketing and environment; indicates which investments are needed in order to capitalise on market opportunities; and dares to take sensible risks in order to achieve specific advantages.

Amsterdam University of Applied Sciences (AUAS) exemplifies the common approach of explicitly including valorisation activities as a substantial part of the job profiles of professors and senior lecturers/researchers. Since March 2016, new profiles are in place for professors, education/research officers, lecturers, and senior lecturers/researchers to reflect the AUAS’ mission and the evolving educational practice typical of a modern knowledge institution. The job profiles include the following objective for valorisation: to stimulate the development, production, dissemination, circulation and application of knowledge by involving external parties, lecturers and students in the professorship’s activities. Example activities are ensuring that knowledge is recorded and made available to third parties (internal and external) in a methodical manner by establishing a knowledge database or contributing to the body of knowledge and skills, and developing or co-developing sustainable formal partnerships.

Mobility of academic staff into industry and vice versa is an area for further development. Several HEIs have recently taken initiatives to broaden the career paths of their academic staff in order to enhance a more flexible mobility of staff to other areas, such as university administration and industry.

Measuring impact and influencing future policy

In terms of assessing the performance of HEIs, the Netherlands, similar to other countries, has implemented a performance agreement system with its HEIs. The principal focus of the first iteration of the system was on the development and implementation of the system itself and the identification of appropriate metrics and channels of communication. The next iteration of the quality agreements needs to be more specific in terms of rewarding success in the valorisation arena and should consider applying performance funding for HEIs achieving specific targets in this area. This is not an unreasonable approach given the

proposed change in direction in the financing of higher education, with the introduction of a growing proportion of direct funding earmarked for quality and profiling.

It will be important to further anchor valorisation in the quality and performance agreements between the Ministry of Education and the HEIs to ensure that valorisation will not end up as a project-based initiative, but will remain connected with education and research. In this regard, funding issues in terms of sustainability are likely to arise following the completion of the current government-funded valorisation initiative in 2018.

Current expectations are that HEIs will provide the finance to guarantee the sustainability of the centres for entrepreneurship beyond 2018. However, given that entrepreneurial activity finances can fluctuate from year to year it would be wise to consider maintaining central funding for the valorisation central support offices and associated personnel as a minimum. The aim should be to provide basic funding for the HEIs to put in place support infrastructure and services that will further embed valorisation by building and strengthening bridges between education and research. Examples of good practice already exist (see Chapters 4 and 6), and lessons should be shared across the higher education system. In addition, the anchoring of valorisation in the quality agreements should also reward those who achieve their ambitions, without necessarily punishing HEIs for under performance.

Further anchoring of valorisation in the quality agreements requires metrics. There should not be a fixed number of valorisation indicators in the funding formula that drives the HEIs' budget, nor a separate funding stream for valorisation, but an agreement that strengthens the connections between valorisation and education, valorisation and research, and research and education.

Qualitative statements and anecdotes are not sufficient to document these synergies and measure their impact, but they are a good starting point to build a common set of indicators. So far, the emphasis has been on documenting the result of valorisation activities. The current agreements stimulated HEIs to more clearly communicate activities and achievements in the area of valorisation. Going forward, more emphasis is needed on the valorisation phenomenon itself, taking into account that metrics always come with a context. What needs to be done next is to show how valorisation feeds into education and research, and how it creates societal (including economic) impact. The new performance agreements could incentivise and support HEIs to do more on understanding, capturing and measuring the processes, activities, results and impacts of valorisation. To be most effective, institutional efforts need to be integrated across the higher education system, for example through a national research programme and capacity building that shares information, and should build the skills and resources to measure impact.

As a starting point for institutional action, HEIs could examine the potential of using impact models for R&D activities developed in other jurisdictions, such as that developed by the University of Limerick (UL) and observed as part of the Irish country review. The UL Research Impact Initiative highlights best practice through a series of activities from case study development, training and skills development, PhD scholarships and external engagement events (Box 3.3).

Box 3.3. University of Limerick – Research Impact Initiative

The University of Limerick Research Impact Initiative is driven by the concept of measurable impact that research can have on society, culture and the economy. Impact can be academic, economic and societal. The University of Limerick strives to develop a reputation for delivering translational research that makes an impact on industry, society and the wider community. To achieve this, they have fostered a collaborative problem-solving approach to deliver real change for their wider network of stakeholders.

The Vice-President for Research has brought together groups of researchers from different faculties and worked with them in order to develop an understanding of “what” impact is and “how” it can be measured. This includes the preparation of case studies and anecdotes on the impact of some of the research and how and where this can be demonstrated, for example by translating research findings into practical guidelines and tracking the practical implications of using those guidelines on developments in policy design and implementation. Training is offered and templates are available to raise impact awareness and thinking when formulating research activities. All of its case study development material and completed case studies are publicly available.

Source: OECD/EU, 2017.

Conclusions

For the organisational capacity of HEIs to effectively address the challenges and opportunities of the 21st Century, it is essential to promote greater collaboration and, where appropriate, interdisciplinarity in education, research and valorisation. Evidence of promising and proven approaches were observed in all HEIs visited. However, some departments/faculties appeared to be very inward looking and focused on competition with one another in terms of funding and recognition. Revised institutional funding models could help to overcome this and reward interfaculty collaboration.

The current public funding for valorisation is likely to undergo a significant change with the approaching end of the Valorisation Programme. To ensure that valorisation will not end up as a project-based initiative, but remain connected with education and research, it will be important to further anchor valorisation in the quality and performance-related agreements between the Ministry of Education, Culture and Science and the HEIs. In this regard, it will also be important to add to existing funding models across the sector a minimum allocation of funding to cover the basic infrastructure and staff costs currently in place, which support valorisation, in order to avoid dependence on temporary and time limited project-based funding. To build more and better synergies between the three core functions of Dutch higher education – education, research, valorisation – co-ordination mechanisms between the different ministries should be continued and strengthened.

Clearly evident through the study visits was the importance of individual regions and the commitment of individual HEIs, business and society stakeholders to their regions. However, although there was evidence of immense individual stakeholder commitment to regional development, collective multi-HEI and multi-agency approaches to regional development could be improved. The establishment of a strategic innovation fund could be considered to specifically promote multi-HEI and multi-agency approaches to progress the valorisation agenda in specific regions, thus creating regional networks of valorisation.

In terms of sustainability, how institutional funding models continue to evolve and how staff are deployed within all HEIs will determine the success of existing and future engagement and valorisation initiatives. Going forward, different approaches will need to be taken by the different types of HEIs in terms of funding. More could be done to reflect engagement and valorisation activities within recruitment criteria, staff contracts, and promotional processes. There are already good examples to learn from (e.g. Erasmus University of Rotterdam and Amsterdam University of Applied Sciences).

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Chapter 4

Building entrepreneurial capacity through teaching and learning in the Netherlands

This chapter expands on the findings presented in Chapter 2 with a focus on building entrepreneurial capacity through teaching and learning. It discusses actions that higher education institutions (HEIs) are undertaking in the Netherlands to increase interdisciplinarity of educational tracks and to develop an entrepreneurial mindset among students and staff, government policy efforts to enhance the role of universities in applied sciences in delivering lifelong learning activities, and the growing demand from students for social entrepreneurship education. The chapter also discusses how to assess the impacts of entrepreneurship education on entrepreneurial attitudes, including three assessment tools that have been tested and validated in international studies and could be applied in the Netherlands.

Introduction

Disruptive technologies and inventions in fields including robotics, energy, biochemistry, food processing and information technology have created awareness that massive technological, economic and social changes will no longer be extraordinary but become the norm. In Industry 4.0, production relations and structures are ever more rapidly changing with the technological means available. The reality is that they reach people much faster than the speed at which higher education institutions (HEIs) can adapt their curricula. The growth of research and development (R&D)-based products and services calls for a more dynamic collaboration across various academic disciplines. In addition, interdisciplinary approaches are needed to understand and deal with societal challenges of technological change, for example related to safety, energy, mobility and living.

HEIs are not yet fully prepared for their role in preparing students for this environment. For example, a survey in the USA showed that while 96% of university officials surveyed believed that their students were well-prepared for life after college, only 11% of businesses agreed (Gallup, 2014). Thus, one mechanism for legitimising new teaching and learning strategies in a context of severe competition for resources and “ivory tower” resistance among some academics to shifting of public funding towards “value creation” activities is to emphasise how new teaching and learning approaches yield important life skills that respond to the changing environment, including creativity, innovation, and entrepreneurial behaviours. The non-cognitive skills that students learn from any well-executed project- and problem-based teaching and learning strategies are applicable far beyond starting a business or even a career in business. The best programmes are encouraging students to “learn how to learn”, to be resilient, action-oriented and comfortable with significant uncertainty (OECD, 2015). The aim is to support individuals to be active, confident and purposeful instead of passive, uncertain and dependent, and to be able and keen to take responsibility as Paul Kearney describes is the approach of the “enterprising individual” (Kearney, 1999).

Interest in entrepreneurship education has increased immensely over recent decades as a means to equip citizens with competencies, as well as to increase the number of innovative and sustainable start-ups. However, knowledge on how different entrepreneurship education approaches affect different types of learners is still fairly limited. The chapter will look into this in its final section.

Analysis and findings

Developing the entrepreneurial mindset

In a changing economy, individuals are now, more than ever, required to become entrepreneurial and to create value for themselves and for others. The question is how to prepare students for this? Two key directions being taken by HEIs in the Netherlands are introducing problem-based learning and interdisciplinary research and education. Both are associated with a transition from a teacher-centric approach to student-led learning (Kolb, 2014). Problem-based and interdisciplinary learning approaches facilitate metacognitive

skill development, by emphasising the importance of critical thinking, flexibility, innovativeness and soft skills (such as giving and receiving feedback, or communication and presentation skills).

Problem-based learning

One of the key foundations of much recent theory on skill development and learning styles emphasises the role of problem-based learning (PBL). PBL is used in many HEIs in the Netherlands. It is particularly valuable in interdisciplinary teams that require interactive group work and help students to experience collaboration and co-creation in academic research. Maastricht University is one of the pioneers in PBL. From the beginning, 40 years ago, the university has used and systematised PBL across all faculties with the following key learning principles (Dolmans et al., 2005):

- Constructive learning, that is, learning is an active process of creating meaning and building personal interpretations, in which students actively construct or reconstruct their knowledge based on individual experiences and interactions.
- Self-directed learning, which implies that learners play an active role in planning, monitoring and evaluating the learning processes.
- Collaboration, seen as a social structure in which two or more people interact with each other.
- The relevance of context and the understanding that learning is situated.

In order to stimulate learning, the students are confronted with realistic problems in relation to phenomena that need to be explained. Problems engage students to construct new knowledge. From that respect, the use of problems in PBL makes learning constructive and contextualised. In PBL, teachers are facilitators who stimulate students towards self-directed learning. Their main tasks are to keep the learning process going, to ensure that all students are involved in the process, to monitor the educational progress of each student in the group and to modulate the challenge of the problem. In PBL, learning takes place in small groups of students. Problems are discussed collectively and in a collaborative environment in which students learn from interacting with each other.

PBL is often employed in entrepreneurship education (Fayolle and Verzat, 2009). The main pillars of entrepreneurship education can be seen as (Kearney, 1999):

- Giving autonomy and responsibility to the students regarding the learning processes they are committed to.
- Using experiential learning, setting up learning situations and processes that enable students to learn from their experiences.
- Encouraging co-operation among students and between students and teachers in the learning processes.
- Encouraging reflexivity and inviting students to reflect on their experiences.

Enhancing interdisciplinarity

Research universities in the Netherlands have been increasingly organising some of their education and research activities in an interdisciplinary fashion. An example is the University of Utrecht, which has started to focus its teaching, research and value creation activities around four strategic themes. Each theme has to have enough breadth to accommodate several disciplines and have scope for creating real societal impact.

The strategic themes were identified through a university-wide consultation process. The following themes were identified:

- **Dynamics of Youth** covers the development of young people in a rapidly changing society.
- **Institutions for Open Societies** examines how institutions – the formal and informal rules of human action – contribute to long-term prosperity, equality and democracy.
- **Life Sciences** investigates causes, impacts and solutions in the area of infectious diseases and chronic diseases which pose major social problems.
- **Sustainability** examines the creation of a sustainable society.

The four themes receive substantial research financing and grass root pilot programmes can receive financing from the university budget of up to EUR 100 000 over four years to develop into substantive new research and education programmes. The strategic themes and associated focus areas also have their own teaching programmes. The Young Innovators programme connects with this. Around 60 students are admitted to each programme cycle, and build their skills in personal leadership, social innovation and creating impact. The Young Innovators programme runs for one year and can be undertaken alongside any master's programme. For the first half of the year, students work on current societal challenges, for example sustainable housing for refugees, food waste, off-label drugs, transition labs, how to make a city safer through art, and accessible health services (University of Utrecht, 2017).

Capacity building for innovation in teaching and learning

Training for teaching staff is well established in the Netherlands higher education system. It has been practised through formal programmes in the research universities since 2007 and similar initiatives are being introduced in the UAS (see Chapter 1). This training will increasingly have to reflect broader changes in how higher education is organised, including more problem-based learning and interdisciplinary teaching approaches. In this respect, closer connections could be developed with training in teaching methods generally and entrepreneurship education approaches that stress co-operative learning, experiential learning and reflective learning. Spaces and mechanisms to allow teachers to share and analyse different educational practices, including entrepreneurship researchers and entrepreneurship educators, can help to support innovation in teaching and learning. To stimulate this, the Ministry of Education, Culture and Science launched, in 2016, the Comenius initiative (Box 4.1).

A good example of an institution-wide approach to promoting enhanced innovation in education approaches is the establishment of the Institute of Education Innovation (EDLAB) at Maastricht University (UM) in 2015 (Box 4.2). The initiative involves a network of teachers and other staff that develop new PBL ideas to help students learn about global developments, such as emerging technologies, internationalisation and changing dynamics in the labour market.

Digital learning environments

Digital learning and the development of digital learning resources are often co-developed across institutional borders and targeted at the needs of a more diverse student population, lifelong learning, and Industry 4.0. The NVAO and several HEIs in the Netherlands have contributed to the European Quality Assessment for E-learning framework

Box 4.1. Comenius teaching improvement initiative

The Comenius Fellowship programme funds teaching innovation projects in higher education that are proposed by excellent teachers and education professionals working at institutions of higher learning. It has three tiers: Teaching Fellow (offering grants of EUR 50 000, for innovations at the level of individual courses and modules), Senior Fellow (offering grants of EUR 100 000, for projects at the programme level), and Leadership Fellow (offering grants of EUR 250 000, for innovations at the institutional level). Projects should aim to realise concrete improvements in teaching quality, from which students directly benefit. Proposals are assessed through rigorous peer review on a competitive basis, based on pre-defined criteria. These criteria vary depending on the tier, but include innovativeness, theoretical significance, potential impact, and the teaching record of the project leader. The peer review is facilitated by the Netherlands Organisation for Scientific Research (NWO), the national funding council for education research. Comenius Fellows will also form a community, in which they will exchange and disseminate best practices, and promote high quality and innovative teaching in higher education.

The Comenius Fellowship programme aims to fund innovations in higher education to improve the quality of teaching in the sector. Secondly, it aims to create a network of passionate and accomplished higher education professionals, which can promote excellence in higher education. Thirdly, it aims to recognise outstanding and innovative teaching, thereby increasing the status of teaching within institutions of higher learning and advancing the careers of Fellows.

The Comenius Fellowship programme started in 2016-17 with 10 Teaching Fellowships, with a total budget of EUR 500 000 (out of 92 proposals submitted). For the initial year, all proposals had to pertain to the theme of improving equality of access to higher education. In future years, the Ministry of Education may set other themes. In 2017-18, around 60 Fellowships will be awarded across all three tiers, with a total value of EUR 6.5 million. The programme will gradually be expanded to around 110 Fellowships per year in 2021-22, with a total annual budget of around EUR 20 million.

Source: NWO (2017).

Box 4.2. EDLAB: The Maastricht University Institute for Education Innovation

The Institute for Education Innovation (EDLAB) addresses and improves education at a central university level at Maastricht University (UM). The Vice-Rector for Education is the director of EDLAB.

EDLAB converges existing and new ideas on higher education and initiates projects and events that improve the quality of education throughout the whole university. This requires engagement at all levels: teachers, researchers, managers, support staff and, last but not least, students.

EDLAB is set-up in such a way that only with broad faculty-wide input and approval can innovation projects take place. EDLAB employs seven faculty liaisons (incl. University Library) for one day per week to: 1) preserve a solid faculty-EDLAB network, 2) maintain strong and active communication lines with Deans and Vice-Deans of Education, 3) take active part in the aggregation of innovative ideas and interests in the faculty, 4) assist in reviewing and assessing innovative ideas and project proposals, and 5) actively promote EDLAB results and events within faculties.

Box 4.2. EDLAB: The Maastricht University Institute for Education Innovation
(cont.)

EDLAB connects to Deans of Education at an early stage to synchronise the current needs and educational issues in faculties and test the opportunities for implementation of project ideas. Faculty Deans will ultimately review EDLAB projects and give their final approval. All projects and activities are centrally evaluated and only in the case of a proof of concept will EDLAB encourage faculties and service centres to implement the results in their education and systems.

During the implementation of project results EDLAB can take up an advising role to assist the faculty in implementing the results. The mandate of EDLAB changes after projects are finished and results are communicated and distributed to faculties (e.g. through central workshops, handbooks or website).

Source: Interviews at Maastricht University in July 2016.

(E-xellence), which is based on a review of a broad range of digital learning environments (EADTU, 2016). Several HEIs have taken this up and support E-learning initiatives through central funding. Examples are the Educate IT programme and the Teaching Innovation Fund at the University of Utrecht based on central-budget funded multi-annual grants for innovation in teaching and learning.

An example of how digital learning environments can be linked with knowledge exchange and valorisation is the Leiden Law Blog, which is part of the Law School at Leiden University. In essence it is a form of valorisation of knowledge and research by means of social media. The Leiden Law Blog stands out by reacting to the latest news while, at the same time, touching on the research in the Law School. The authors are legal experts or criminologists working at the university, including undergraduate and graduate students (all contributors are presented with a short profile and photo). The blog was created in 2012 and has 299 bloggers (including 110 guests made up of former staff members, alumni or students) and more than 262 000 visits (University of Leiden, 2017).

Digital learning environments also spread across classroom borders and connect different dimensions of learning. An example is HKU 24/7. Students of Utrecht Art Academy have set up a Facebook project to report on their learning and studies. They offer a glimpse into their student life with weekly blogs in text and pictures. Those personal pages lead to “traffic” from aspiring students, and the questions, feedback and interaction offer valuable material for further study choice and student learning. The Academy also seeks to learn from these experiences in making services more accessible and education programmes more attractive.

Promoting lifelong learning

The advance of Industry 4.0 calls for continuous renewal and updating of knowledge and skills. Also, the level of skills demanded by employers is constantly being raised due to a relative decline in demand for low-level skills. This makes lifelong learning opportunities important in knowledge economies.

Lifelong learning in the Netherlands is with 18.9% in 2015 almost double the EU average 10.7% and thus well-anchored in the country’s knowledge-based economy (EU, 2016). Contract education constitutes also significant source of revenues for both research universities and universities of applied sciences. To further stimulate lifelong learning in UAS, the

Ministry of Education started a pilot in the academic year 2016/17 to introduce a new portfolio of flexible and demand-driven programmes with the aim of increasing participation in part-time higher education and the number of higher education diplomas obtained. Based on the results of the pilot, the government will decide whether or not to implement further programmes.

There are three main policy experiments underway:

- **Learning Outcomes** allows UAS to design programmes with a focus on work-based learning outcomes, for example on-the-job training, and part-time students. An educational contract between the student and the HEI states the expected learning outcomes and how these will be achieved. The educational contract gives students a greater say in what they want to learn, how and when, than has traditionally been the case, and employers are also encouraged to discuss with their employee (i.e. the student) which skills would be most valuable for the company.
- The **Partial Accreditation** initiative allows UAS to deliver part of higher vocational training programmes to individuals who are already working or who have acquired professional expertise and would like to pursue a higher education trajectory to obtain new skills or competences. It allows for the recognition of previously obtained competences such as professional certificates and on-the-job training.
- **Education Minor** is targeted at individuals who are already working in education and would like to obtain a teaching certificate for primary and secondary education.

Associate degrees

The Ministry of Education is also facilitating the design of shorter degree durations. A law has recently been passed transforming the associate's degree, currently a short-term programme accredited within existing bachelor courses, into an autonomous degree. An example of an associate's degree programme from Rotterdam University of Applied Sciences is given in Box 4.3.

Box 4.3. Associate Degrees at Rotterdam University of Applied Sciences

The associate degrees (AD) at Rotterdam University of Applied Sciences have two target groups, full-time students from secondary vocational training and people who are already in work. Each of these groups comes with their own motivations and needs. Typically, students that participate in AD programmes feel that a standard bachelor degree programme of three or four years is too long a time investment or would be too difficult to complete. Particularly for first-generation students, who cannot draw on previous family experience in higher education, the AD feels "safer" because it is much more practice-based education.

Every AD programme has a board with members from industry and local businesses who help involve external stakeholders in course design and delivery. The aim is to link students to companies very early on in their studies, starting with a recent pilot initiative to this end with 190 female students trained as pre-school nursery educators. Results so far are very promising and the trend is that most graduates find employment within three months and approximately one-third continue with a regular bachelor programme. Students who wish to continue their higher education can either join directly or get extra help to come up to speed with the requirements of a regular bachelor programme. Rotterdam University of Applied Sciences monitors the impact of the AD through student tracer studies and employer surveys.

Source: Interviews at Rotterdam University of Applied Sciences during the study visit in June 2016.

Exchange platforms that enrich education

Exchange platforms can enrich teaching and learning by supporting HEIs to engage and collaborate with business and civic society in order to draw on real-life problems and challenges. An example is the Urban Big Data Knowledge Lab at the Erasmus University of Rotterdam, which involves an exchange platform between the university and the Municipality of Rotterdam.

Box 4.4. Urban Big Data Knowledge Lab at the Erasmus University of Rotterdam

The Urban Big Data Knowledge Lab is a structural collaboration between Erasmus University Rotterdam and the Municipality of Rotterdam. Its aims and activities are twofold. On the one hand, it explores and conducts the opportunities of “big” data research for developing and implementing more effective and better-targeted urban policies and management, especially but not exclusively in the social domain. On the other hand, the Lab seeks to empower citizens and administrators by making them more aware of the ubiquity of data in the city, by discussing the risks and opportunities, and by assessing the specific areas in which citizen engagement is imperative.

The Lab works on the principle of “co-creation”, meaning that civil servants and academics together develop research questions and organise empowerment activities. A team of three academics runs the lab: three civil servants and a co-ordinator. Basic funding comes in equal parts from the municipality and the university. Additional project-based funding is allocated based on a mutual needs and benefit assessment.

The Lab started in 2015 and developed into a fully-fledged facility in which the municipality and the university could share their data and jointly develop new policy applications, struck on substantial organisational, financial and ethical challenges. It was decided, therefore, to continue on a project basis and build experience and expertise along the way. All projects concern the usage and linking of structured and unstructured city and national data and address questions on benefit fraud, re-integration of unemployed citizens, vulnerable youth, safety and security, and data awareness in the city.

The empowerment activities take several forms, such as: public lectures and workshops; hands-on exercises with data-analytic tools, including a yearly hackathon; and traineeships in the projects, both for students and civil servants with a research task. Specific tools for engaging citizens are so-called data-dialogues and data-walks. These take citizens through the city, asking them simply to look around and ask four questions: where do you see data, what do you think is done with it, who owns it, and is it necessary to have some kind of democratic control over this data?

Source: Interviews at Erasmus University of Rotterdam during the study visit in June 2016.

Some interesting lessons can be drawn from the early experiences of the Urban Big Data Lab. They pertain to different logics and routines of public administration and HEIs. These differences relate to: i) pace (immediacy in the municipality versus long term pace in the university); ii) goals (applied research for the municipality versus fundamental research for the university); iii) organisational cultures (consensus based in the municipality, highly individualised in the university); and iv) individual career assessments (based on a diverse set of activities in the municipality, and a more limited focus on funding and research output in the university).

In the early stages, these differences overlaid everyday collaboration and resulted in questions such as “why can’t we find more academics to participate?” (from the municipality) and “why do we need consensus and meetings all the time?” (from the university). The benefits of the collaboration, for both parties, however, have outweighed these tensions: the municipality has gained greatly from this new approach to evidence-based policy cycle and the university has increased the impact of its research and the relevance of its teaching.

Empowering students to co-design education activities

Even in the most advanced sciences, the practice of involving students as co-investigators, or even as curriculum co-creators, is a powerful strategy for deep student learning (Boville et al., 2011). As part of this process, students can engage with external stakeholders in informal ways. This type of approach has been practised in other countries, for example in Chalmers (Sweden), Aalto (Finland), or Stanford (US), in the form of student-led and student-designed educational programmes. The approach is also growing in Dutch higher education. Examples are the DesignLab at Twente University and the Buro 302 at Arnhem and Nijmegen University of Applied Sciences (HAN).

Box 4.5. DesignLab at Twente University

The DesignLab offers a physical location for the application of academic research. Students work together in experiential learning activities related to their own startup ideas, as part of a course assignment or as part of a business/industry innovation-challenge project. Students and staff initially advanced the idea of the DesignLab in the context of the “Create the University” initiative. Researchers from various disciplines got involved, mainly from philosophy, human media interaction, and human media design.

The slogan of the DesignLab is “Science2design4society”, which reflects not only the DesignLab’s goal of providing opportunities for the design of valorisation activities by students based on academic learning and research, but also the ultimate goal of serving the broader community.

The formula of the DesignLab is simple: Students can enter the space – supervised, though informally, by the Dream Team – and work on projects. Students from different disciplines are encouraged to collaborate and help each other, for example business and design students who work together on the development of a business opportunity. The so-called “Dream Team”, students themselves, co-ordinate the DesignLab. As Dream Team members, students experientially acquire social, managerial, administrative and leadership skills. DesignLab provides a platform for international students to meet Dutch students; a significant number of international students are part of the Dream Team.

The DesignLab has started to design a new portal (derived from LinkedIn) where researchers can be searched by theme, in order to provide students and staff with the possibility to network and organise events together. Also, companies are leveraged for their sponsorship potential: Starbucks, for example, organises coffee tastings. On “Tosti Tuesday” (Grilled Cheese Tuesday), students can get free sandwiches. In this way, DesignLab creates informal, attractive networking opportunities for students.

Source: Interviews at Twente University during the study visit in June 2016.

The DesignLab’s accessibility to all students and its interdisciplinary nature make for an informal and “safe” environment that stimulates outside-the-box thinking. Particularly by

helping each other, students also provide each other with different and new perspectives, methods and ideas that help develop entrepreneurial competencies (St-Jean and Audet, 2012).

Buro302 is a real company located on campus at Arnhem and Nijmegen University of Applied Sciences (Box 4.6). The founder and director is Professor Job Vogel. Vogel is employed by the university and of his total 1695 annual work hours as a professor, 500 hours are allocated to Buro302. Buro302 offers front-end and back-end design, mainly in the sectors of ICT and communication (Buro302, 2017). The students that work at Buro302 “learn how to learn”, from tasks, from each other, and from working with clients; in fact, they are “encouraged to fail” according to Vogel.

Box 4.6. **Buro302 – A Creative Media Mob**

Buro302 is a real company located on campus at Arnhem and Nijmegen University of Applied Sciences. B302 is based on a self-learning concept which has its own methodology. It is a good example of how problem-based learning (stemming from the client's request) in combination with experiential learning (learning by doing, together with other team members) can lead to skill development directly relevant for (future) employers.

A maximum of 25 students can work for Buro302 at any one time. Students do not receive ECTS points for this work, but are paid for their work through a contract of 12 hours per week. Profit on projects goes to the university. So far, 198 students have worked at Buro302 which also has an advisory board of alumni “mobsters”. Students are mixed into multidisciplinary teams that work on projects. By bringing together members from the business, audio/video, design and development teams, projects benefit from a wide range of perspectives, knowledge and experience.

Clients are all from industry. The project team then develops a cost estimate for the client. Students learn about traditional corporate values: accountability, responsibility, and collaboration. Creative sessions are organised with the client. B302 includes elements of problem-based learning, but in an educational environment where there is no final testing but rather students provide the guidance mutually, and success consists of whether the client is satisfied and a possible extension of the project contract. Buro302 has succeeded in setting up an international network with franchises at the University of Minnesota and contacts in Dublin.

Source: Interviews at Arnhem and Nijmegen University of Applied Sciences during the study visit in July 2016.

Linking students with the local economy

Approximately 93% of students in the Netherlands undertake an internship with a company during their higher education studies, a higher proportion than in France (84%) or Germany (79%), for example (OECD, 2014). To have a positive impact on the learner, internships need to be meaningful and relevant. This needs facilitation by the HEI. An example of how this can be organised is the De Rotterdamse Zaak (Box 4.7), developed at Rotterdam University of Applied Sciences. Students engage with local entrepreneurs to help them solve financial business challenges (De Rotterdamse Zaak, 2015).

The De Rotterdamse Zaak has been followed by the Amsterdamse Zaak (involving the Amsterdam University of Applied Sciences and the Municipality of Amsterdam), and the Gelderse Zaak (involving the University of Applied Sciences of Arnhem and Nijmegen and the local government), and more are to come (DNZO, 2017). All these initiatives engage students

Box 4.7. De Rotterdamse Zaak

De Rotterdamse Zaak (DRZ) is aimed at entrepreneurs who are financially unable to find solutions to their problems. The target audience of DRZ are individuals who have been entrepreneurs for at least 1.5 years and who face financial difficulties. Former entrepreneurs (senior coaches) act as a sounding board for the students of Rotterdam University of Applied Sciences (junior coaches). Students of RUAS help the entrepreneurs, learn to give advice on how to improve their business operations – financially and commercially – and help to develop their entrepreneurial skills. DRZ works with the *Regionaal Bureau Zelfstandigen* (RBZ, a regional bureau for the self-employed) and the *Ondernemershuis Zuid* (OHZ, a meeting place for nascent entrepreneurs), so that students are properly facilitated and get the training they need to master the skills and competencies required for coaching.

The evaluation criteria for access to the DRZ project is set by *Dienst Werk en Inkomen*, the regional governmental agency for employment. They look at the entrepreneur's business plan, their annual statement and credit risk, and decide whether the case should be handed over to the DRZ. One of the criteria for participation in DRZ, for example, is to be refused a credit loan by banks. The activities of students who “work for” DRZ and advise the entrepreneurs are peer coached by alumni students who stay on at the DRZ by means of internships. There are peer coaches for financial and commercial activities, as well as junior advisors and assistant junior advisors (from secondary vocational training). There is a weekly briefing at the Chamber of Commerce where students receive training, for example information on entrepreneurship-relevant regulations. The intake interview with the entrepreneur to assess their eligibility for participation in the project is carried out by a senior coach and junior consultant and involves a problem analysis and a plan of approach. Further practical support and guidance is given by the junior consultants, but there are also coaching consultations.

De Rotterdamse Zaak (DRZ) started in 2012 with less than 100 entrepreneurs, but by 2015 it had helped more than 250 entrepreneurs. Since 2013, about 65 students per year have been active as junior coaches. Up to 2016, a total of 905 entrepreneurs had received advice from students. The University of Groningen carried out a study on the effectiveness of DRZ, based on 100 real cases of entrepreneurs who had received its help. The results show that, in total, DRZ saved EUR 200 million, which equates to approximately EUR 100 000 per entrepreneur in terms of saved bankruptcy costs, welfare costs etc. Recently, DRZ won the prestigious European Enterprise Promotion Award.

Source: Interviews at Rotterdam University of Applied Sciences during the study visit in June 2016.

in problem-based learning which directly benefits their professional skill development, for example in terms of legal and business skills, and their knowledge on entrepreneurial skill building. The initiatives also connect entrepreneurial students with entrepreneurs in informal settings that offer insights into how to run a company. In pedagogical terms, what students (and businesses) learned from one project is shared across the projects.

Entrepreneurship education

Many HEIs in the Netherlands offer entrepreneurship courses and even full entrepreneurship degree programmes. The Accreditation Organisation of the Netherlands and Flanders (NVAO), which carries out quality control of the higher education programmes, introduced, in 2013, the so-called Distinctive Quality Feature Entrepreneurship for higher education programmes (Box 4.8). As of 2017, a number of UAS had obtained the Distinctive

Box 4.8. Distinctive Quality Feature Entrepreneurship in Dutch Higher Education

In September 2013, the Accreditation Organisation of the Netherlands and Flanders (NVAO) introduced entrepreneurship as one of four distinctive quality features that can be awarded for entrepreneurship programmes or programme components of at least 25 points in the European Credit Transfer and Accumulation System (ECTS). The other distinctive quality features are: sustainable higher education, internationalisation, and small-scale and intensive education. The assessment is carried out by a panel visiting, preferably linked to a regular assessment. The assessment panel is entirely responsible for the particular feature to be assessed, with a minimum of one member of the panel with a clear link to entrepreneurship, including both theory and practice. The rating is on a four-point scale – insufficient, sufficient, good, excellent – as used in the accreditation system. Once obtained, it will be assessed for re-accreditation every 6 years as part of the regular programme re-accreditation cycle.

The NVAO employs a broad definition of the concept of entrepreneurship, which enables institutions to justify and test their own choice from the various options to stimulate entrepreneurial thinking and acting. However, it is important that theory and practice are linked and that developments in attitude and behaviour in the field of enterprise are pursued.

Source: NVAO (2013).

Quality Feature Entrepreneurship, as well as one research university, the Vrije Universiteit Amsterdam (See Chapter 1 for more information on this).

Several Dutch research universities have undertaken efforts to bring together science, innovation and business in interdisciplinary entrepreneurship education programmes and course modules. An example is the Science, Business & Innovation (SBI) programme at master's level at the Vrije Universiteit Amsterdam. The SBI is the only university programme in the Netherlands that has obtained the NVAO's Distinctive Quality Feature Entrepreneurship (Box 4.8). In 2017, the SBI was accredited as a separate two-year science master's programme where students specialise either in energy and sustainability or in health and life sciences (Box 4.9).

Box 4.9. Master's programme in Science, Business & Innovation at the VU

The Science, Business & Innovation (SBI) programme started in 2007 and now enrolls 340 students in the three-year bachelor course at the Vrije Universiteit Amsterdam (VU). To date, SBI is the only university programme in the Netherlands to have obtained the NVAO's Distinctive Quality Feature Entrepreneurship. In 2017, the Master's SBI was accredited as a separate two-year science master's programme where students specialise either in energy and sustainability or in health and life sciences.

The rationale behind the SBI programme is based on two observations. Firstly, research shows that industry in R&D intensive sectors has a distinct need for scientists who can bridge the gap between science and business. Secondly, a sizeable group of students with a science and technology mindset are attracted to science-based interdisciplinary programmes rather than mono-disciplinary study programmes.

Box 4.9. **Master's programme in Science, Business & Innovation at the VU** (cont.)

The formal multi-faculty involvement from economics, business and social sciences, is key to SBI, while the sciences faculty as a managing entity is close to the core of discovery research. To bridge the gap between science and business, experts with a long-standing career in (international) business have been brought in. Another key part of the SBI programmes is the capstone research project that is executed at a research company allowing for immersion of the student in a corporate setting for the duration of four and six months respectively for bachelor's and master's degree programmes.

Source: Interviews at Vrije Universiteit Amsterdam during the study visit in July 2016.

Social entrepreneurship

Social entrepreneurship is receiving increasing interest from youth. Many young people would like to take initiative and make the world and their immediate environment a better place for all, but are not necessarily drawn into business-driven entrepreneurship education programmes. The discussion among entrepreneurship researchers of what exactly makes social entrepreneurship different from entrepreneurship (defined as value creation) may have delayed the implementation of specific social entrepreneurship education programmes, but demand continues to grow. At present, 14 HEIs in the Netherlands have active Enactus networks on campus that promote and facilitate social entrepreneurship. Overall, Enactus is present in 36 countries, supporting **entrepreneurial** (initiating business innovation with integrity and passion), **action** (the experience of social impact that sparks social enterprise), and **us** (student, academic and business leaders collaborating to create a better world) (Enactus, 2017).

Future policies for entrepreneurship education

When considering the development of future policies for entrepreneurship education at HEI level, attention needs to be given to the co-ordination of different policy actors. Valuable learning on this issue comes from Denmark (Box 4.10), which has introduced a close cross-ministerial collaboration on entrepreneurship with very positive effects on i) entrepreneurial skills development across all levels of education, ii) a national progression model for entrepreneurship education and training, iii) connecting national and HEI-level research efforts into the impact of entrepreneurship education; and iv) a more coherent and closer co-ordination across the various local, regional and national initiatives.

Lessons learned from the Danish approach are that a closer and more unified approach to entrepreneurship education, not only between the relevant ministries, but also including the HEIs, can greatly improve the numbers and skills of entrepreneurship teachers and the awareness of staff and students of entrepreneurship. A nationwide initiative to improve the entrepreneurial teaching competencies of teachers, for example within the University Teaching Qualification, and building on the existing capacity of research into entrepreneurial pedagogy, could be an effective way forward in developing and refining the current practices and stepping up to the next level of excellency in the field.

If the ministries decide to establish a permanent cross-ministerial collaboration structure, as is the case with the Danish Foundation for Entrepreneurship, the HEIs and their representative organisations should be involved from early on in the design and

Box 4.10. Interministerial collaboration on entrepreneurship in Denmark

In Denmark, gathering all activities and responsibilities within one single organisation, backed up by an interministerial partnership, has proven to be a successful way to implement the strategy. The mission of the Danish Foundation for Entrepreneurship (FFE) is to spread and integrate entrepreneurship education at all levels of the education system.

The organisation, therefore, carries out all those activities, which in some countries are spread across several actors. This organisation of the work enables FFE to harmonise initiatives and activities, to ensure a progression throughout the education system, to gain considerable knowledge in the area and to act as the national knowledge centre on entrepreneurship education.

From the start, monitoring and evaluation was an integrated part of FFE's activities. Measures to map and assess the impact of entrepreneurship education were determined from the beginning with the purpose to fulfil strategy goals, evaluate the strategy and serve as a basis for policy decisions. The work is discussed and evaluated on an annual basis.

FFE's goals and indicators for 2015-20 are:

1. Continue to spread entrepreneurship education in the education system. The goal is for every student to have a practical entrepreneurial experience at least once at every educational level.
2. Enhance the quality of entrepreneurship education. The goal is to assess this by measuring the number of teachers who have been certified through continuing or further education and training within entrepreneurship teaching.
3. Increase the knowledge and create more catalysing activities. A possible and measurable indicator for this is to look at the number of students who start up their own business during, and shortly after finishing their education. FFE is continuously working to find better methods for assessing the quality of entrepreneurship education, for instance through the development of new examination forms and tools for measuring the learning outcomes.

At the foundation of FFE's work lies extensive and long-term research on different ways of teaching entrepreneurship and the impact such education has on students at different education levels. This research activity is part of the strategy's evaluation/monitoring, because it provides answers on societal effects of the strategy, now and in the years to come.

FFE's research investigates the teaching of entrepreneurial skills (divided in to non-cognitive or enterprising skills and cognitive or business-oriented skills) and takes into account three different approaches depending on the way, the degree or aim to which these skills are taught/trained at different education levels: teaching about entrepreneurship, teaching through entrepreneurship, and teaching for entrepreneurship.

Basic to this research is the understanding that, in order to increase the impact and to reach the goal that every student acquire entrepreneurial key competences, entrepreneurship education must be embedded in the general education system, and not only be offered through project-based and extra-curricular programmes. This is also helpful to spread the understanding that entrepreneurship as a competence is transversal, useful in every individual's life, and relevant in all subjects and fields of study, not only in those related to business and starting up a company.

Source: Author's own work based on Annual Reports (2011-15) of the Danish Foundation for Entrepreneurship.

implementation of support programmes. This would also include individual entrepreneurial champions (teachers, administrative staff and researchers) in the HEIs.

Measuring the impact of entrepreneurship education

The main objective of entrepreneurship education is to stimulate positive entrepreneurial attitudes and behaviours, and various research has shown that entrepreneurship education has the potential to achieve this (Lackéus, 2016; Martin et al., 2012; Moberg, 2014). However, knowledge on how different educational approaches affect different types of pupils and students is still fairly limited. In order to increase understanding, HEIs should design and implement a tracking system of students and alumni to get a better understanding of the outcomes of entrepreneurship education on the entrepreneurial mindsets, knowledge and behaviours of students. Many of the most interesting outcomes only materialise years after the educational intervention and thus, longitudinal tracking is required. At the same time, teachers and practitioners also need valid information about how they influence their pupils and students in the short term, in order to be able to adjust and improve their teaching.

A competency framework to guide entrepreneurship education

The National Foundation for Entrepreneurship in Denmark has developed a national taxonomy of pedagogical practice in entrepreneurship education across different levels of education and disciplines and a competence framework for entrepreneurship (Rasmussen et al., 2015). The overall objective was to identify linkages between the overall purpose of entrepreneurship education, the concrete learning objectives, and the progression of the students.

Such a framework can serve several purposes in supporting entrepreneurship education and training across the whole educational system, including:

- *Differentiation of entrepreneurship learning goals.* A better differentiation of learning goals between enterprising skills (non-cognitive) and start-up and business-oriented skills (cognitive) could help to improve course content and steer students towards the courses that best meet their needs. Objectives for the higher education system could also be related to this distinction. It could for example be an objective to increase the uptake of enterprising skills courses from 12% to 50% of students and reduce the adoption goal for business-oriented skills courses from 12% to 8%.
- *Alignment and progression between programmes.* A competence framework can also be used to improve alignment and progression between programmes. HEIs often lack an emphasis on planning a good progression of entrepreneurial learning across different programmes. A better understanding of learning outcomes and progression can help participants in selecting the right programmes and enhancing mobility.
- *Identifying the learning outcome.* Another step to improving entrepreneurship training programmes is to understand the purpose, learning methodology, pedagogy and outcome of each course, in order to start evaluating, improving and multiplying best practices to other similar situations. Also, it is important to recognise that many courses may carry “entrepreneurship” in the title, without having much of a contribution to enhancing entrepreneurship as a career outcome. This is the case, for example, for many of the corporate entrepreneurship courses, which essentially are more about strategic management.

- *Meaningful indicators.* HEIs and the landscapes in which they operate are diverse, implying differentiated entrepreneurship support approaches. Bold quantitative indicators measuring numbers of start-ups, patents, students and courses alone are often sufficient. A more diverse but more qualitative set of outcome measures could be very complementary. For some areas the outcome measures can be generalised into numbers, whereas for others the outcome can be reflected in stories and testimonies.
- *National impact measures.* A further important step in advancing the current entrepreneurship support system in HEIs is to connect it with impact research to secure a continuous feedback mechanism aimed at improving current practice. Impact research on entrepreneurship demands substantial resources. Therefore, joint impact research across HEIs has greater promise.

Evaluating impacts on entrepreneurship skills and outcomes

The following section provides an overview of the focus and methods of current evaluation practices and identifies key issues that could be addressed through a national programme for research on the impact of entrepreneurship education activities in higher education. In addition, three tools are presented that have been tested and validated in international studies. These tools leverage the possibilities of ICT technology; they are useful for educators and vastly decrease the costs of performing programme evaluation. Some HEIs in the Netherlands are beginning to take up the challenge and the Dutch Academy of Research in Entrepreneurship (DARE), the Dutch Centres for Entrepreneurship, and the national network of entrepreneurship teachers in UAS form an excellent basis to enhance the research.

Impact studies within the field of entrepreneurship education have traditionally focused on whether or not entrepreneurship education increases the number and quality of business start-ups. In order to assess the short-term effects, many evaluations have focused on how entrepreneurship education influences the entrepreneurial attitudes and intentions of participants. However, this narrow focus has given way to a broader view of the role of entrepreneurship education in stimulating people to act entrepreneurially (Fayolle, 2013). Overall, it can be argued that the focus has shifted from cognitively-oriented entrepreneurial skills such as business planning, evaluation of business ideas, and market analysis, to entrepreneurial skills of a more non-cognitive character such as ambiguity tolerance, resource marshalling, sense of initiative, and creativity (Huber et al., 2014; Moberg, 2014).

However, whereas cognitively-oriented skills can fairly easily be assessed with traditional tests, entrepreneurial skills of a non-cognitive character, such as managing ambiguity and sense of initiative, are much more challenging to assess. Typically, it is also much easier to assess a precise and narrow outcome, such as the number of startups, than changes in non-cognitive skills.

The randomised controlled trial (RCT) methodology is typically viewed as the gold standard of approaches to test the impact of entrepreneurship education on entrepreneurship competences and behaviours. By using control groups and random assignment of the educational “treatment”, many threats to internal validity can be avoided and the number of variables that need to be controlled for can be limited. To randomly allocate entrepreneurship education to students is, however, not always feasible. Most assessment studies within the field have evaluated ongoing entrepreneurship education initiatives. This makes them less reliable since these initiatives suffer from self-selection bias, that is, the participants chose to participate out of interest and therefore may already have intentions to

become entrepreneurs. Information on the durability of the impacts is also limited since most studies collect data directly after the intervention.

One way to solve the problem of not being able to randomise participation in the educational programme is to use propensity score matching (PSM). This is a technique developed by Rosenbaum and Rubin during the 1980s which now has wide application. It requires access to detailed information on a large number of individuals, since the technique is based on calculating the probability that an individual is likely to participate in the entrepreneurship education programme conditional on a series of observable covariates. Elert et al. (2015) is an example of a programme evaluation that used PSM in the area of entrepreneurship education, specifically to assess the impact of the Junior Achievement Company Programme, a world-wide initiative which offers students aged 15-18 the opportunity to experience running their own company for one academic year and to discover first-hand how a company functions. The researchers had access to very detailed register data on both alumni students and non-alumni students. The methodology involved matching the alumni of the programme to the non-alumni based on multiple variables, hence identifying “twins”, that is, individuals who were as likely to participate in the educational programme as the ones that actually did. This enabled the impact of the programme on the participants to be calculated eleven years after their participation.

Entrepreneurship education has many interesting effects on latent variables and non-cognitive skills, such as managing uncertainty, marshalling resources, and sense of initiative and creativity; but also variables more directly related to education, such as school engagement and educational motivation. Since 2011, researchers at the Danish Foundation for Entrepreneurship have collected longitudinal data on Danish pupils to assess how entrepreneurship education influences these types of latent variables in order to establish the link between these and observable outcomes.

Randomised controlled trials and longitudinal assessment studies are, however, very resource-intensive and costly to perform, and they typically only give us information about a limited set of questions. Due to the topic's increased popularity, there has been an increase in contexts where entrepreneurship education is implemented, and there are many different approaches that are applied. For teachers and practitioners, it is of crucial importance to be able to assess how their educational initiatives influence pupils and students in the short term in order to be able to change and adapt their practice. It is important that these practitioners gain access to tangible information that they can apply, and that this information is provided during the implementation. In order to do this, it is important that there are user-friendly assessment tools available.

Evaluating impacts on entrepreneurial mindsets and intentions

Since entrepreneurial mindsets and intentions are typically of a non-cognitive character (Huber et al. 2014) they are difficult to assess with traditional methods. Many evaluation tools have therefore relied on self-assessment. However, the self-assessment process should be based on theoretical frameworks that identify the relevant measures for self-assessment. Albert Bandura's concept of self-efficacy is an example, namely an individual's belief in his/her personal capability to accomplish entrepreneurial activities and tasks (Bandura, 1997).

Another approach is the theory of planned behaviour (TPB) (Ajzen, 1991), which is particularly relevant to assessing the impact of entrepreneurship education on the intention to start a business. According to Ajzen (1991), three variables are the main antecedents to

intentions: 1) attitudes towards the behaviour, 2) perceived behaviour control, 3) social norms. This assumption makes TPB a very practical framework to apply in assessment studies since it implies focusing on the impact of the entrepreneurship education on attitudes and perceived control of behaviour in particular, while controlling for social norms.

Three potential assessment tools

Three assessment tools are presented below that have been tested and validated in international studies and could be applied in the Netherlands. Each leverages technology, which offers immediate information and automated analysis both increasing the tools' usefulness to teachers and practitioners and reducing their evaluation costs.

There are some overlaps between the three tools but they answer different questions, focus on different outcomes and thus, fulfil different needs.

OctoSkills

OctoSkills is an app-based assessment tool based on the ASTEE survey.¹ The focus is on assessing how students and pupils develop their entrepreneurial self-efficacy, that is, their self-confidence in performing entrepreneurial skills and activities, and whether the educational initiative changes their entrepreneurial attitudes and intentions (OctoSkills, 2017). In addition to this, OctoSkills has a strong focus on school engagement and educational motivation and how the students' and pupils' relations with classmates and teachers develop. The assessment tool has been developed to be used at primary, secondary and tertiary levels of education. The wording of the questions is neutral, so participants who are not familiar with entrepreneurship will also understand the questions and be able to assess them in a meaningful way. Many assessment scales within the entrepreneurship education field have been developed based on the activities of practicing entrepreneurs. This often makes the wording of the questions very business and startup biased, which makes it complicated for many respondents to understand them, especially respondents at lower levels of education and respondents in control groups.

The analysis is automated, which means that teachers and practitioners get immediate information about their pupils' or students' level in the dimensions measured and how they have developed on these dimensions. With an accompanying desktop solution, they, or someone within the school management, will be able to compare the results with other schools and classes as well as other countries and different student types; naturally all participating schools, teachers, students and pupils are anonymous. All results are presented in user-friendly "spider web" diagrams, which makes it easy to compare results and assess how the participants have developed.

For the purpose of assessing the impacts of entrepreneurship education, the surveys can be distributed either as a pre-mid-post survey or as a reciprocal survey. The pre-mid-post survey is distributed before the start of the educational initiative, in the middle of it and after it has been completed. This makes it possible to assess how the participants develop during the programme and not only after it has been completed, which allows the teacher to adjust his or her teaching during the educational initiative. If the educational initiative that needs to be tested is short, the mid-test could be distributed right after the completion of the initiative and the post-test as a follow-up a couple of weeks or months later, in order to assess the "stickiness" of the effect. The reciprocal test, on the other hand, is distributed after an educational initiative has been completed. In this survey type the participants are asked to assess at which level they perceived themselves to be before participating in the

educational initiative, and at which level they perceive themselves to be now, after the educational initiative has ended. This survey type is typically useful for educational initiatives that have already started when the decision to assess it is being made.

The OctoSkills tool also includes a questionnaire for teachers. This allows teachers to evaluate how they develop their self-confidence in teaching entrepreneurial education and how their teaching methods develop. The teacher questionnaire also makes it possible for an evaluator to assess how different teachers affect their students and to analyse the influence of different background variables and teaching styles.

With its user-friendly interface and opportunity to access information and results immediately, the OctoSkills tool can be very useful for teachers and schools that wish to evaluate their educational initiatives. Similar to standard questionnaire-based assessment studies, the OctoSkills tool can also be used in large-scale evaluation studies. It has the advantage over “normal” evaluation studies in that it makes it possible to easily follow the participants over a long time period, as identification is not a problem. In addition to this, there is an incentive for participants to participate since they get immediate access to the results. OctoSkills can, thus, be very useful for policy makers who wish to assess large-scale educational initiatives or who want to establish assessment as a natural component in educational initiatives.

The Entrepreneurial Skills Pass

The Entrepreneurial Skills Pass was developed in an international collaboration project co-funded by the EU (ESP, 2017). The main goal of this project was to develop a validated test that can certify the entrepreneurial knowledge of participants in the Junior Achievement Company Programme, an entrepreneurship programme at secondary level which stretches over a whole school year. A student of the Junior Achievement Company Programme who wishes to certify his or her knowledge may apply to take the test. The test draws random questions from various areas of knowledge that have been taught/trained during the Junior Achievement Company Programme. A prerequisite to taking the test is that the student has participated in the self-evaluation survey which has been distributed before and after (pre/post) the educational initiative. If the student succeeds, a certificate of his or her entrepreneurial knowledge will be issued.

The focus of the self-assessment survey is similar to the one in OctoSkills, but has an additional focus on the participants’ perception of entrepreneurs and entrepreneurship. The combination of a self-assessment survey and a standardised test can be used to efficiently assess how the respondent has developed, both regarding non-cognitive entrepreneurial skills and cognitively-oriented entrepreneurial skills; especially if both are distributed in a pre/post manner.

Since ESP is used as a certification of entrepreneurial competence, it is limited to participants in the Junior Achievement Company Programme. This is due to the large variety of approaches to entrepreneurship education that currently exist, and that in order to function as a certificate the educational experience should be standardised. There are also administration costs related to the standardised test and the certification process. The ESP is therefore fee-based, and in order to use it, either the participants, the educational institutions or a third party need to cover the costs involved.

ESP can be very useful from a policy maker’s point of view. Although it can, in principle, be used to evaluate any type of educational initiative at secondary level focusing

on entrepreneurship and new venture creation, it is specifically developed to assess and certify students who have participated in the Junior Achievement Company Programme. Given the popularity of the programme and the number of participants in this educational initiative, ESP offers lots of information that can be used to compare the extent to which different countries focus on entrepreneurship education.

LoopMe

LoopMe has a different approach compared to the more traditional pre-test/post-test assessment tools described above (Lackéus 2014). Rather than quantitatively assessing the outcomes of an educational initiative, LoopMe focuses on the activities that take place during the educational initiative. It makes it possible for the teacher to follow the activities of his/her pupils and/or students, also outside the classroom. This is important since many practical activities in entrepreneurship education take place outside school and outside the teacher's direct supervision. Theoretically, the experience-sampling method that LoopMe applies aligns to the proxy-theory, that is, the assumption that certain activities lead to certain outcomes. Since activities are typically easier to register and measure than their outcomes, it makes good sense to focus on activities.

LoopMe gives pupils and students the opportunity to report situations and events that trigger their emotions. They are asked to answer a short questionnaire about the activities they are performing and how they feel about it. This report is sent to their teachers (anonymously, if they wish). The teachers can then respond to the report. This creates a "loop" of feedback between teacher and student. The "looping" of mutual reflection on the activities makes LoopMe a very effective tool for formative evaluation, both from the student to the teacher and vice versa.

The structure of LoopMe offers multiple possibilities for practitioners and evaluators to assess educational initiatives. The formative feedback that is generated through the "loops" creates a good basis for teachers and practitioners to evaluate and assess their practice. It is, however, a bit more challenging to apply the tool in quantitative evaluations since it is voluntary for the participants to send the reports. Multiple threats to the internal validity thus need to be accounted for when LoopMe is used in its default setting. It can be expected that the participants' inclination to send in reports are different, depending on multiple factors. This can easily create many unfortunate response biases depending on different factors such as the background of the students, how successful they have been in their activities, how much time has been allocated to the activity, instructions from the teachers about how to use the app, etc. However, if all participants are asked to report their activities at certain time points many of these problems will be solved. This will make it possible to compare different educational initiatives and assess them on the number of activities and which type of activities are performed. Based on this information, it is possible to assess how "entrepreneurial" and challenging the initiative has been and how many opportunities for entrepreneurial learning it has offered. However, the gains regarding increased validity from an assessment point-of-view would come at the expense of the usefulness that LoopMe offers practitioners. The formative feedback that LoopMe makes possible is typically more useful when it is submitted on a voluntary basis.

LoopMe can be very useful in qualitative evaluations of educational initiatives. The evaluator can select who to interview based on the "loops" that the participants have provided and thus select, for example, individuals who have had positive experiences or individuals who have had negative experiences. The "loops" can also be used as "anchors"

in the interviews, that is, as experiences that can be discussed and elaborated upon. Recall bias can therefore be avoided to some extent.

LoopMe can thus be very useful to teachers and practitioners, both as an educational tool and as an assessment tool. Its focus on activities supports qualitative evaluations in a very good way. With a structured data collection and a clear evaluation protocol it can also offer a lot of insight into which types of activities are taking place in different educational initiatives. These activities can then be linked to different outcomes that can either be assessed through qualitative methods, longitudinal data or through one of the “pre-test/post-test” based evaluation tools presented above.

Conclusions

A rich and diverse set of learning opportunities for entrepreneurial mindsets is being developed in the Netherlands in many ways. These include capacity building support to teachers and HEIs for innovation in education methods, the creation of digital learning environments, initiatives to promote lifelong learning, the creation of exchange platforms with business and other external stakeholders, empowering students to co-design education programmes, and linking students with the local economy. Entrepreneurship education also has an objective of supporting those students who are interested in starting a business at some time in the future to obtain the necessary competences, including potential social entrepreneurs.

It is important to improve information on the impacts that entrepreneurship education has on developing entrepreneurial mindsets and entrepreneurship behaviours. Various evaluation methods can be used, including random control trials or quasi-experiments using propensity score matching and digital capture of information on the entrepreneurial intentions of students.

HEIs in the Netherlands have embarked on all of these issues and stimulated new forms of teaching and learning. Based on this proactivity and experimentation, there is now an opportunity to look into these issues from a system-perspective and evaluate what has worked best and what lessons can be learned from what individual HEIs have been doing so far.

Note

1. The ASTEE (Assessment Tools and Indicators for Entrepreneurship Education) survey was collaboratively developed by organisations residing in seven countries (Denmark, Ireland, Germany, Portugal, Croatia, France, and Belgium). Questionnaire-based assessment tools for entrepreneurial education at primary, secondary and tertiary levels were developed and tested in 13 countries (in addition to the seven partnering countries it was also tested in: Sweden, the United Kingdom, Italy, Austria, Romania, and Spain).

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Chapter 5

Enhancing knowledge exchange with higher education institutions in the Netherlands

This chapter expands on the findings presented in Chapter 2 related to knowledge exchange and collaboration. Given future economic and societal trends, engagement and valorisation activities will depend increasingly on multidisciplinary programmes and related support infrastructure. The chapter explores how this has been taken up in the Netherlands. It reports a wide range of value creation activities across the higher education system in the Netherlands resulting in a rich portfolio of processes, outcomes and impacts. The chapter argues for a greater involvement of staff and students in the valorisation agenda and increased emphasis on measuring the valorisation phenomenon and impacts in order to embed valorisation further within the higher education system.

Introduction

Value creation from scientific knowledge is a very important phenomenon globally. It has been driven, in part, by the trends of reduced expenditure and productivity of basic research within industrial corporations in industries such as pharmaceuticals (Munir, 2012; PhRMA, 2015), combined with increasing attention from enterprises to exploiting the energy and creativity of university-based research and innovation through industrial partnerships (e.g. General Electric, 2016). At the same time, in the United States at least, public funding for research at universities has levelled off (AAAS, 2016), putting more pressure on higher education institutions (HEIs) to raise research funding through corporate partnerships and other value creation activities.

Creating value from knowledge has become one of the core functions of higher education in the Netherlands. The definition that has been adopted in the Netherlands from 2009 onwards is that “value creation is the process of creating value from knowledge by making knowledge suitable and/or available for economic and/or societal use and translating that knowledge into competitive products, services, processes and entrepreneurial activity” (VSNU, 2013). The reference to “competitive” was subsequently removed by the Ministry of Education, Culture and Science in order to underline that value creation is a process and not a product, that value creation activities aim at making knowledge suitable and available for use in and by society and not just in business, and that its impacts can go well beyond economic aspects into generating societal and cultural value. Hence, valorisation encompasses all disciplines and takes many forms depending upon the scientific domain in question as well as on the counterparts and recipients. It also includes different ways of communicating research and research results in the media, expositions, community research, etc. In terms of support structures and dedicated education activities, entrepreneurship support can be considered the most developed part of valorisation.

A number of government measures can support value creation activities, including support of applied research, building innovation infrastructure, creating networks to foster knowledge exchange, and providing training, finance and incubation for entrepreneurship (see Chapter 1). An important innovation in the Netherlands in this respect has been the establishment of “City Deals” (*Kennis maken*), which involve partnership between the Ministry of Education, Culture and Science, the Ministry of Economic Affairs, the Ministry of Interior Affairs and the governments of cities with one or more HEIs. The aim is to bundle knowledge to effectively tackle city development challenges, identify and act upon new opportunities, and provide an “enriched learning environment” for students.

HEIs also play a crucial role in the Netherlands as players in regional entrepreneurial ecosystems, through their knowledge exchange activities and their education and skills development. To strengthen this role, HEI leaders should work to deepen their understanding of the entrepreneurial ecosystems in which they are embedded. This may require new ways of interacting with students, the business community and civil society, blurring bureaucratic boundaries, as will be discussed later in this chapter.

Analysis and findings

Collaborations that cut across scientific domains have strong knowledge exchange potential

The most innovative knowledge exchange outcomes are those that cross knowledge and organisational boundaries. Interdisciplinarity is essential to the creation of new knowledge; strategy, planning, governance and leadership are critical to the development of an institutional environment that is conducive to interdisciplinary activities. However, HEIs often have small budgets for transdisciplinary work, and the incentives to conduct related translational research are even less apparent in the way departments and entire HEIs are funded or staff members are rewarded (LERU, 2016).

In the Netherlands, several research universities and universities of applied sciences (UAS) are on the way to establishing interdisciplinarity as a core principle in their education, research and value creation. This includes identifying and supporting research areas where interdisciplinary collaboration is likely to create new knowledge. The level of collaboration and knowledge exchange is very high when specific resources are dedicated to interdisciplinary and joint research. This suggests the importance of shared research facilities rather than department or university centric facilities. There are natural incentives to build department level research units, but less so for shared facilities.

One learning model for how to convene the start of such new interdisciplinary collaborations is that of so called “sandpits”, which bring together researchers in different disciplines in order to build collaborative projects and proposals (Box 5.1). Sandpits have been supported since 2004 in the UK by the Engineering and Physical Sciences Research Council (EPSRC), the main government agency for funding research and training in engineering and the physical sciences. Sandpits and other innovative tools to stimulate collaboration and identify new niche areas for collaborative research can also be used to develop interdisciplinary education, also spanning across different HEIs (see Chapter 4).

Box 5.1. Sandpits to enhance collaboration across disciplines

Sandpits are residential interactive workshops over five days. They have a highly multidisciplinary mix of 20-30 participants, some active researchers and others potential users of research outcomes, to drive lateral thinking and radical approaches to address research challenges. Sandpits are intensive discussion forums where free thinking is encouraged to delve into the problems on the agenda to uncover innovative solutions.

The Engineering and Physical Sciences Research Council (EPSRC) in the United Kingdom has been working with sandpits since 2004 as part of their IDEAS Factory. Sandpits often have a rich diversity bringing together physical scientists, engineers, designers, social scientists, psychologists and healthcare specialists. Each sandpit is led by a director, who defines the topic and facilitates discussions at the event. A group of stakeholders and subject experts facilitate the process as mentors. The EPSRC invests around GBP 740 million per annum in universities in a broad range of science, technology engineering and mathematics (STEM) subjects. Participants are selected for each sandpit according to their skills and expertise.

The sandpit process can be broken down into five output-driven phases:

1. Defining the scope of the issue
2. Agreeing a common language and terminology amongst diverse backgrounds and disciplines
3. Sharing various perspectives on the issue

Box 5.1. Sandpits to enhance collaboration across disciplines (cont.)

4. Using creative and innovative thinking techniques in break-out sessions to focus on a problem
5. Turning Sandpit outputs into a research project

Sandpits are intensive events and for the well-being of participants, venues offer relaxation opportunities, and the timetable includes informal networking activities as a break from detailed technical discussions. Due to group dynamics and continual evaluation it is not possible to “dip in and out” of the process. Participants must stay for the whole duration of the event.

Source: OECD/EU (2017), based on the EPSRC website.

It is very common for HEIs in the Netherlands to collaborate with multinational corporations (MNCs). In the US, MNC collaboration as a source of research funding and route to value creation is now a routine part of an HEI's strategy to boost research funding and value creation (e.g. Bayer's collaboration with Harvard University and the Massachusetts Institute of Technology). Given the resources afforded by and interests of corporations to fund commercialisable research, and the increasing momentum among corporate labs to outsource applied research, there appear to be opportunities for greater knowledge exchange with MNCs in the Netherlands. However, for these efforts to have meaningful impact, the HEI leadership should take a key role in proposing and managing collaborations that cut across the scientific domains of the HEI.

Boosting knowledge exchange and value creation in the arts, humanities and social sciences

While valorisation in terms of science, technology, engineering and mathematics fields (STEM) is quite well developed, both internationally and in the Netherlands, the term as it is applied to arts, humanities and social sciences (AHSS), and specifically the arts and humanities, is recognised as being a challenge to address (Benneworth et al., 2016; Hazelkorn et al., 2013). One way in which this is being addressed is by looking at existing scholarly activities and behaviours which can be understood in terms of valorisation, as well as entrepreneurship and innovation as these concepts can be more broadly understood. Value creation activities in the arts and humanities are new, or they happen under a different label (Benneworth et al., 2016; Hazelkorn et al., 2013).

An interesting example of value creation in the arts is underway at the University of Amsterdam (UvA) with the development of a taxonomy of arts and humanities value creation practices in recent years. Part of the reasoning behind this was that managers and administrators were hearing about value creation activities second-hand, and it seemed as if researchers in the arts, humanities and social sciences (AHSS) were getting involved in value creation “accidentally”.

A further effort to build capacity for such activities was through the foundation of the “ASCH Valorisation Award”, awarded annually to a member or members of the UvA's School of Culture and History. This award recognises an individual or team's ability to reach new audiences, and also their lasting impact on the public. The award is accompanied by a prize of EUR 250. The 2015-16 award had nominations across a number of areas, including students' oral history projects on working-class neighbourhoods in Amsterdam, teaching

modules for secondary education, contributions to a major exhibition on the Battle of Waterloo, a blog about the timeliness of the Middle Ages, and contributions to important debates on slavery. The unanimously agreed winner was Franz Grijzenhout, who discovered the location of a Vermeer painting in Delft (University of Amsterdam, 2016). This was an excellent example of valorisation in AHSS as it demonstrated how meticulous archival research can lead to new insights and publications, appealing to a wide audience beyond academia.

Another example is the “Venture Lab Humanities” at Amsterdam Centre for Entrepreneurship (ACE) Venture Lab (Venture Lab Humanities, 2017). This pilot is aimed at students and alumni from the Faculty of Humanities, who may have ideas to start their own business. ACE Venture Lab has been supporting students and alumni from other faculties with science- and technology-based startups over the previous three years, and the Venture Lab Humanities seeks to extend similar support to humanities students and alumni from their network of coaches and mentors.

Also, the integration of valorisation in the education of PhDs is a good way of broadening the range of activities and mobilising young researchers. Valorisation is not viewed just in terms of outputs and products, but in terms of structures and processes. As such, as well as recognising how valorisation can be seen in existing research activities, valorisation is built in to the development of early career researchers. This younger generation is increasingly aware of the need for valorisation, as the majority of them will not secure positions in academia. Valorisation for them is thus an especially important skill set that helps them to better translate their research expertise into different contexts.

The Amsterdam Institute for Humanities Research (AIHR) has developed a valorisation/knowledge utilisation workshop for PhD candidates in the humanities (University of Amsterdam, 2017). This course is designed to provide participants with an insight into how their research (and academic knowledge more broadly) in the humanities can be applied for societal and/or economic utilisation. Understanding the increasingly varied number of fields that PhD students in AHSS are working in, this workshop is designed to give participants expertise in writing grant applications that require details relating to valorisation, but also serves as preparation for job interviews and research activities outside academia.

Design and fashion have great value creation potential. An example is the Amsterdam Fashion Institute (AMFI). It was founded in 1992 following the merger of two other institutes that had existed since the 1950s, and is now a part of the Amsterdam University of Applied Sciences. Innovation and entrepreneurship are integral parts of the undergraduate and postgraduate programmes. Entrepreneurial learning includes virtual presentations of collections, students’ use of micro-blogging platforms such as Pinterest and Tumblr, six-month work placements and internships with fabric companies, and use of 3D printing and other manufacturing technologies and methodologies. AMFI aims to create a skill and knowledge resource that helps build relationships with the fashion and manufacturing industry.

In terms of teaching and learning, given that fashion education takes place in a workshop and studio setting, contact time between staff and students is at a premium. With over 1 000 students and more than 100 staff (many on fractional/part-time appointments), using technology in innovative ways is one way to maximise the most efficient use of time for both students and staff. One means of doing this has been through the use of QR codes on various machines in the workshops (including 3D printers). Students can scan these QR

codes with their smartphones, which takes them to videos that explain how to use the equipment. This is one way to make tacit knowledge explicit and concrete, and saves instructors time in terms of not having to explain techniques or technical features and settings multiple times.

One notable example of AMFI's integration of value creation and entrepreneurship into its programmes is the MA in Fashion Enterprise Creation (AMFI, 2017). This course is designed to prepare its graduates for careers as fashion entrepreneurs by providing them with the technical as well as organisational and business skillsets, through offerings such as "Finance for Fashion", and "Innovation Management". This course, which is two years, full-time, operates in collaboration with London College of Fashion, and provides a collaborative module where students network with industry through a two-week exchange. In addition, at the very start of this master's of arts programme, students register a business as a requirement of the course (allowing their course fees to be tax-deductible).

Valorisation has strengthened the research agenda in the universities of applied sciences (UAS)

Traditionally, UAS in the Netherlands are closely connected to enterprises (including for mandatory student internships, sponsored research, problem-based learning) and actively exchange knowledge and collaborate on value creation with them. The Valorisation Programme, introduced by the Dutch government in 2010, resulted in the establishment of regional consortia across the country, each grouped around one or more HEIs and led by a research university. For the UAS, the emphasis on valorisation has brought new attention and specific support to their applied research activities and triggered an important dialogue between the different parts of the Dutch higher education sector.

An example is the Sustainable Electrical Energy Centre of Expertise (SEECE) at the Arnhem and Nijmegen University of Applied Sciences (HAN). SEECE is organised as a public-private partnership which engages entrepreneurs, scientists, local and national government, academic researchers, and students. Sustainable energy is one the university's institutional pillars, connecting directly with the Dutch government's focus on energy as one of its top sectors, based on the recognition that the energy transition away from fossil fuels requires capacity-building in the realm of sustainable alternatives. SEECE connects HAN with national and regional government, as well as with over 40 external companies and institutes, combining industry expertise with innovation and research.

Companies partner with HAN to receive funding through the Top Sectors programme (see Chapter 1), on the understanding that HAN as a university of applied sciences does not do fundamental research, but rather focuses on implementing research and strengthening links with industry. As such, SEECE i) uses the new knowledge produced by the universities, ii) finds innovative ways to apply it, which iii) uses the expertise of companies to do so, and iv) involves students in the process. These academia-industry connections are very significant for renewable energy as the issues with the technology in this area relate less to sustainability per se, but more to reliability and affordability.

SEECE also involves students in the process of bringing research and technology out from the university into the marketplace. Through its courses at the bachelor's and master's levels, as well as shorter courses, SEECE educates students to be qualified technicians working in the energy sector. SEECE trained students replace those retiring, support the growth of jobs in the sector and fill skills gaps. Graduates from SEECE courses are at an

advantage through their involvement in research activities during their studies, or time spent working in companies related to the energy sector in certain courses. By developing courses in co-operation with energy companies, SEECE combines human capital development with innovation, maintaining a feedback loop ensuring that students are acquiring industry relevant skills.

Another advantage of the approach taken by SEECE is that the emphasis on sustainability has introduced an ethical focus to engineering, which might not otherwise be apparent to young people considering studies in this field. As a result, SEECE attracts a new generation of students interested in electrical engineering by focusing on the social, as well as technical, challenges related to the energy transition. One example is the SOPRA project (Sustainable Off-grid Power Station for Rural Applications), which connected various sustainable energy sources to a storage system to create a sustainable power plant. The sustainable energy sources in this project included 30kW solar panels, a 30kW wind power simulator and a biodiesel generator. Climate data and experimental measurements were used to assess how many households such autonomous energy grids would be able to supply with electricity. The SOPRA project is an example of SEECE combining environmental and social impact with engineering research and education, connecting engineering challenges with the global social challenge of supplying reliable energy in rural areas in countries without electricity.

HEI leadership support is a key determinant for effective value creation

All HEIs visited for this review generally acknowledged the need to deepen and widen staff involvement in value creation and engagement beyond top-professor/researcher levels, and to develop and strengthen a layer of people to translate research into impact, in addition to the existing technology transfer offices.

In moving forward on this, it seems that key enablers are: i) HEI leadership, who are willing to rewrite the rules for performance assessment, beyond the usual publications in top peer reviewed journals, ii) local policy makers with long term vision willing to take risks, iii) HEI administrators focused on results rather than procedures and red tape, and iv) academic staff undertaking valorisation, even if such activities do not necessarily result in new publications.

This is illustrated with the case example of the Johns Hopkins University (JHU), a leading research university in the United States. JHU has nine divisions (Engineering, Nursing, Medicine, Business, Arts and Sciences, International Affairs, Public Health, Education, and Music) and with the Applied Physics Laboratory, has been the leader in research spending in the US (National Science Foundation, 2016). 36 individuals, past and present, affiliated with JSU have won the Nobel Prize. Individual divisions, for example, the Bloomberg School of Public Health and the Carey Business School, always have engaged global partners (JHU, 2017a), and Carey Business School Global MBA students have, for example, participated in more than 70 Innovation for Humanity projects worldwide (JHU, 2017b). More recently, the aim is to impact national policy through data-driven approaches to solve large public health problems (JHU, 2017c) and provide better health care for marginalised local communities.

Five years ago, the university leadership (president, provost and deans) realised that for the institution to take impact to the next level, they have to collaboratively engage their research communities to tackle the big societal problems that remain stubbornly unsolved. Such an undertaking required strategically directed multidisciplinary research and

education. This conversation resulted in an initiative called “Rising to the Challenge”, underpinned by a USD 5 billion funding to support research and education:

- 21st Century Cities: to use data-driven methods, academic staff, students, and city planners to define problems, develop on-the-ground solutions, measure results, and engage in urban revitalisation.
- Global Health: to develop and implement interventions for non-communicable diseases, injuries, infectious diseases, food and food security, and the health of women and children with academic staff and students from public health, medicine, nursing, engineering, economics, and public policy.
- Precision Medicine: to customise treatment for the individual patient, reduce unnecessary testing, recommend behavioural changes, and improve preventive measures by uniting physicians, scientists, engineers, and information experts to interrogate big data for clinical, epigenomic, phenotypic, and geographic information.
- Learning: to optimise how we learn, from the molecular to the individual person to the classroom, including new human-machine technologies, by connecting neuroscientists, computer scientists, psychologists, and education experts.

These initiatives are helmed by individual academic staff, research centres, and specially appointed staff with dual tenure appointments in more than one division, called “Bloomberg Distinguished Professorships”, of which 50 were endowed. The core mission of the professors and others involved in these multidisciplinary research initiatives is to conduct basic research and to translate it (valorise) for use by policymakers, health care providers, companies, government departments, and entrepreneurs. Each of these initiatives is supported by an advisory board composed of leaders and citizens from industry, non-profit organisations, advocacy and civic organisations, users and clients, the scientific community, and local government.

Involving students in knowledge exchange and value creation activities

How many people in the community feel that they can connect with what is going on inside the walls of our third level institutions? What happens to all these projects that students pursue in order to obtain their degrees and advance their careers? Do they gather dust in the archives never to be looked at again? Does the research really matter to anyone else except the student?

The involvement of students and student associations in the valorisation agenda appears to be lower than in entrepreneurship support, where students play a central role in several Dutch HEIs. More and better mechanisms are needed to allow researchers and students to collaborate in valorisation activities, for example with valorisation-related seminar papers or collaboration on graduation theses. The emerging interdisciplinary research platforms (see Chapter 4) offer opportunities for this.

Also, the “City Deals” (*Kennis Maken*) offer an excellent starting point to enhance the participation of students in knowledge exchange activities (Box 5.2). However, although this encourages the creation of new partnerships, there is so far no specific funding available for the work of the partnerships. The Comenius grants (see Chapter 4) have a specific call for topics on “connection with society”. This could be used to pilot initiatives even if it concerns only a small proportion of the grants and the call is open to a broad spectrum of researchers.

Box 5.2. City Deals – Partnerships to Innovate

The foundation of the City Deals lies in the European and national “Agenda Stad” (Urban Agenda). Cities, the government and societal partners have committed themselves to support (economic) growth, quality of life and innovation in the Dutch city-networks. City Deals are the means to reach the goal of “Agenda Stad”.

Topics and partners are diverse, for example different partners in the municipalities of Zaanstad, Leeuwarden, Enschede, Utrecht, and Eindhoven are working on the “inclusive city” (focus on the social domain), while different municipalities in The Hague and Rotterdam developed a “Roadmap Next Economy” and are seeking answers to IT and renewable energy challenges.

In 2009, a network of “knowledge cities” (Netwerk Kennissteden) was formed by cities with a university: Amsterdam, Delft, Eindhoven, Enschede, Groningen, Leiden, Maastricht, Nijmegen, Rotterdam, Tilburg, Utrecht, and Wageningen. The HEI umbrella organisations (VSNU and VH) and the organisation for student housing (Kences) are also members of the network. In February 2017, the network members, the participating municipalities, the HEI’s, the Ministry of Education, the Ministry of Internal Affairs and the Ministry of External Affairs signed the City Deal “Kennis Maken”. The goal of this specific City Deal is to stimulate the co-operation between HEI’s, municipalities and other partners in solving regional social issues/challenges through research and education.

Source: Interviews during and after the study visits in June and July 2017.

It is important that students participating in value creation activities receive recognition of the competencies acquired (e.g., ECTS, diploma supplements). Examples of initiatives that are doing this are CityLab at the Carey Business School, CARL at the University College Cork in Ireland, and two bachelor degree programmes at Rotterdam University of Applied Sciences.

CityLab is a social enterprise laboratory at the Carey Business School at Johns Hopkins University that partners students with existing economic and community development projects. One project involved turning a 133-year-old brick building into apartments and retail space. The students created a business plan for a café in the building and suggested hiring Jonestown residents and using some of the café’s profits to help seed start-ups by local (at-risk) youth, some of which could come out of a small incubator space the developer was considering for the building (Lanahan, 2014).

CARL is the Community-Academic Research Links initiative at the University College Cork in Ireland (OECD-EC, 2017). Since 2010, important pieces of research have been produced and implemented, some of which have also had an impact on national policy. CARL researchers work with not-for-profit voluntary and community organisations on a range of research topics. Selected research projects are intended to result in practical applications. For example, one CARL project looked at respite services for people with learning difficulties in County Clare. The research examined an innovative and cost-efficient type of respite called “Home Share” where host-families welcome children and adults with disabilities into their own homes as an alternative or complementary to more institutional services. The students presented their findings and discussed their recommendations at two national conferences, and the Health Service Executive Service, which provides public health and social care services in Ireland, referred to this research in their recent report. Home Share Clare was successful in leveraging funding of EUR 30 000 for the continuation of the project and was featured on national television.

The Rotterdam University of Applied Sciences has embarked on a strategy to make its programmes as practical and relevant as possible. Two recently developed BA programmes are Marketing & Social Business and Creative Marketing & Sales. These programmes have been developed with a view to students being exposed to valorisation activities from start to finish within the programme. The course content places problem-based learning at the core of the curriculum and students are exposed to real world problems throughout by working on live projects for businesses and organisations at all stages within the programmes. Further, the programmes also expose students to an interdisciplinary approach to problem solving, and direct collaboration with regional organisations and businesses.

There may be merit in reviewing programme accreditation criteria in light of particular needs of the valorisation aims of certain study programmes. For example, education programmes that are embedded in the valorisation agenda may need specific expertise that may require the involvement of teaching staff who do not have a PhD but who do have extensive exposure to business, industry or society. Their participation should not be restricted by existing programme accreditation requirements.

The role of early career researchers in valorisation

There is further scope to strengthen the implementation of initiatives for knowledge exchange and valorisation in higher education by engaging early-career researchers. While specific funding calls for valorisation may be relevant for established researchers, they may not have the transformative potential that is hoped for, as they are a supplement to the activities these established researchers are already engaged with. An alternative is to use early career researchers (ECRs) as an asset in this process.

The professional development and employment trends for PhDs, postdocs, and other ECRs means that today an ever-increasing number are entering the non-academic workforce. Of structural necessity, ECRs are more mobile than their more senior/established research colleagues. ECRs are already part of informal knowledge exchange networks, but formalising these networks would provide a more established route than policy makers can currently rely on in terms of observing the productivity of such relationships, as well as a platform for future initiatives.

The mobility of ECRs within networks of innovation can be looked at in various ways. Within academia this mobility is as they proceed from PhD study in one institution, to postdoctoral positions and short-term contracts in other institutions. Outside academia, this means moving from PhD and postdoctoral work in higher education into industry and the workforce. Institutional rules and incentives should recognise and reflect that such mobility exists and has the potential to circulate ideas and knowledge more quickly than would otherwise be the case.

Stimulating academic research on the phenomenon of valorisation

The wide range of valorisation activities across the entire Dutch higher education sector has resulted in a rich portfolio of processes, outcomes and impacts. This is being monitored by HEIs and government. In this effort it is important to track the impact of such activities on staff and students beyond the boundaries of the HEI. The benefits of knowledge exchange between the HEI and the wider world are varied and depend on the context, but can be assessed qualitatively as well as quantitatively.

So far, the emphasis has been on documenting the result of valorisation activities. In going forward, more emphasis is needed on understanding the valorisation phenomenon

itself. A national funding programme could be established to incentivise research across the HEI sector into processes, activities, results and impacts of valorisation activities. This would provide very valuable lessons for future policy making in the Netherlands and beyond, particularly in view of the current efforts in different European countries to establish a common set of valorisation indicators.

In order to foster knowledge creation on valorisation as a phenomenon, there is a need for the systematic collection and curation of data on all aspects of the valorisation activities of HEIs. In particular, it is important to track the impact of such activities on academic staff and students beyond the boundaries of the HEI. The benefits of knowledge exchange between the HEI and the wider world are varied and depend on the context, but can be assessed qualitatively as well as quantitatively. At the same time, it is not sufficient to simply collect data without a context or theoretical framework. Data collection is only meaningful if it is grounded in a programme of systematic academic research on the topic. Nowadays, the state of the art in valorisation (or entrepreneurship and innovation) centres is to incorporate academic research on the phenomenon itself. In large part, this is because valorisation takes many forms and is dependent on the scientific domain in question. Therefore, the discovery and societal application process of, say an artistic expression, is fundamentally different at the neural level, than a biotarget for lymphoma. Not all HEIs need to be engaged in this type of high-level research on valorisation as a phenomenon, but funding should be made specifically available for this type of focused research effort, perhaps in collaboration with EU initiatives to improve regional competitiveness.

HEIs in Ireland are making progress in demonstrating the impact of valorisation by means of capturing the economic and societal value of their education, research and engagement/knowledge exchange functions. An example is the recently published report of Dublin City University in which the qualitative value of civic engagement is translated into quantitative metrics (Box 5.3).

Box 5.3. Dublin City University: how to measure value of engagement

In the report “Capturing the Economic and Social Value of Higher Education”, the Dublin City University presents some key results of its pilot study aimed at measuring the social and economic impact of the university. In that study, a holistic approach was applied to capturing the broader economic and social value generated by the university’s engagement activities. Three different approaches were used to come to a valuation of DCU community activities. One, a market-equivalent fee was used to impute a value for certain community-oriented course programmes by reviewing a range of courses including further education colleges which offer similar types of coaching and training activity. The official “full economic price” for this level of course is still an administered rather than a “market price”, however it arguably reflects the minimum economic value which is delivered. Second, for voluntary work the “opportunity cost” of an hour of volunteer delivery time at minimum wage rates was applied. Third, the economic value of other voluntary activities delivered was calculated using participant time-cost, with a rate derived from official sources and also used by the Irish Government for evaluation of costs.

A social weighting is applied to the volunteer time, which reflects the great social value being delivered, for example for students from lower income “priority groups”, and which yields a socially modified economic value of all activities.

Source: Dublin City University (2014).

Conclusions

Given future economic and societal trends, knowledge exchange and value creation through HEIs will depend increasingly on multidisciplinary research and engagement programmes that bring together STEM and AHSS, and related knowledge exchange support infrastructure. This can be encouraged at a national level through, for example, specific competitive funding calls or support infrastructure development programmes. Students and early-career researchers can also play an important role in knowledge exchange. It is important, in particular, to create opportunities for young researchers to get involved in projects with industry at early stages of their academic career. Allied to the need to embed valorisation further within the higher education system is the need to be able to measure the impact of valorisation activities at the national and HEI levels. Valorisation, in the context of knowledge exchange and collaboration, refers to more than just the economic value of scientific discovery. Valorisation should also be defined in terms of the creation of new art forms or creative expressions, and community wellbeing. However, whether we are discussing economic, psychosocial or community wellbeing, a proper assessment of the impact of scientific knowledge can only be achieved if we can measure the outcomes.

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Chapter 6

Strengthening entrepreneurship support in higher education in the Netherlands

This chapter expands on the findings presented in Chapter 2 related to start-up support in higher education institutions (HEIs) in the Netherlands. It shows that there is a very strong entrepreneurship support infrastructure in HEIs in the Netherlands, including various good practice initiatives to support entrepreneurial students and staff, for example through training, access to premises and facilities, provision of mentors, and connections into networks. This chapter discusses how HEIs can scale, develop, refine, continue and build on the existing support infrastructure and networks, including how to ensure that encouraging entrepreneurial behaviour can be consistent with institutional reward structures, rules and regulations. In its final section, the chapter analyses the role of HEIs in developing and leading entrepreneurial ecosystems and identifies areas of improvement.

Introduction

Higher education institutions (HEIs) in the Netherlands have managed to establish a very strong entrepreneurship support infrastructure including a range of business start-up training, facilities, mentoring and networking activities. In addition, there is a strong private and public business support infrastructure in the regions in which HEIs are located, that is, start-up networks, mentors, accelerators and incubators, etc. This needs to be recognised and a degree of interaction and co-operation established between the HEI support offer and the external support offer. Establishing a well-functioning interface reaching out to the regional economy requires a strong partnership framework that defines the roles of the different stakeholders and tailors relevant external support services to the particular needs of staff and student entrepreneurs.

The reward structures, rules and regulations of HEIs can also be important in influencing start-up behaviour and the potential institutional obstacles need to be recognised and adjusted or worked around. For example, start-up students may wish to postpone exams or suspend their studies for some time. Staff members starting a business may run the risk of losing their tenure track and of not being able to return to their academic career after their entrepreneurial endeavour. It is therefore important to develop an HEI-wide understanding of what may stand in the way of or facilitate pathways for entrepreneurs.

In the Netherlands, there are more than 2 million entrepreneurs; half of them are self-employed. This number was only approximately 600 000 four years ago (Boom, 2015). A large proportion of the top entrepreneurs in the Netherlands have tertiary education (University of Amsterdam, 2007). HEIs have, through their core functions of education, research, and knowledge exchange, a crucial role in growing vibrant and sustainable entrepreneurial ecosystems. HEIs should work to understand the entrepreneurial ecosystems in which they are embedded. This embeddedness is something that most HEIs find difficult. Yet, to be impactful as innovative and entrepreneurial organisations, HEIs must be co-embedded with students, the business community and civil society, blurring bureaucratic boundaries.

Analysis and findings

The business start-up environment is excellent but complex

The Netherlands offers an excellent business environment for business start-ups in many aspects (OECD, 2014). However, in common with many OECD countries, there are barriers to growth after the start-up phase, mainly as young firms have to overcome the double-constraint of lacking internal resources and having only limited access to external resources.

Lack of funding remains the main bottleneck for growth according to 90% of interviewees in a recent study on barriers to academic start-ups in the Netherlands (Technopolis, 2015). The lending survey of the European Central Bank shows that small and medium-sized enterprises (SMEs) in the Netherlands, anticipating possible rejection, are less likely to apply for credit than firms in comparable countries, and if they do apply, are less likely to get what they want

(European Central Bank, 2017). Venture capital investment (including early-stage) as a percentage of gross domestic product, is roughly on par with comparator countries in the European Union but far behind the leading countries. To strengthen equity capital availability to academic entrepreneurs and others, the government has put in place several targeted financing facilities and is planning additional ones, such as an early-stage instrument and the business angels co-investment facility. This might be an area for HEIs, individually or in a partnership, to address, for example, by raising joint investment funds.

There is substantial public funding to stimulate innovation collaboration between HEIs and business. However, the potential to involve entrepreneurial students and start-ups in innovation collaboration programmes appears to be under-exploited. StartupDelta has recently developed a promising initiative to open up public procurement to startups with the help of a coalition of government departments and municipalities collaborating in a testlab and experimenting new models of startup support delivery (Chapter 4).

As of 2015, a new regulation makes it possible for ambitious entrepreneurs from abroad to apply for a temporary residence permit in the country. The so-called residence permit scheme for start-ups gives ambitious entrepreneurs one year to launch an innovative business. A prerequisite is that this start-up must be guided by an experienced mentor (facilitator) who is based in the Netherlands. Under this scheme, new start-ups, with a potentially international orientation, are offered support to develop into mature enterprises. This regulation offers a particular opportunity to HEIs in the Netherlands to support ambitious entrepreneurs among international entrepreneurial staff and students.

A bottom-up initiative to support start-ups in getting globally connected is “Get in the Ring”. It started a few years ago and quickly became part of a global start-up network with regular events all around the world (Box 6.1).

Box 6.1. **Get in the Ring – Connecting Startups Globally**

Get in the Ring is managed by the Rotterdam Business School at Erasmus University. It started a few years ago and quickly became part of a global startup network with regular events all around the world. Each of the events gathers several hundred startups from a minimum of 100 countries.

One of the recent initiatives to connect startups globally is Global1000. The aim is to organise 1 000 impactful collaborations between startups and large organisations up to 2030 to more quickly test and scale impact innovations across different contexts. Projects that can contribute to achieving the United Nation’s Sustainable Development Goals are prioritised.

Source: Interviews during the study visit to Erasmus University Rotterdam in June 2016.

In all these different areas there is a strong environment for startups from HEIs. On the other hand, the support system is quite complex for entrepreneurs to navigate due to a high density of actors and support offers.

Students are “game changers”

DesignLabs, Fablabs, StudentIncs, Centres of Entrepreneurship, etc., all play an important role in getting students involved in entrepreneurship. Also, hackathons are an increasingly common practice to raise interest in innovation and entrepreneurship and build interdisciplinary teams. There are good examples of using student union

re-enrolment questionnaires to ask students about their interest in entrepreneurship and connect students with relevant initiatives, as practised at Twente University for example.

Some of the most internationally-recognised entrepreneurial universities, such as Stanford University in California and Aalto University in Helsinki, have entrepreneurship awareness activities that are often driven by students. When the student community is gaining momentum, it often builds on a great variety of entrepreneurial role models to push the “tipping point” and trigger a fundamental change of culture. Beyond this point, the HEI no longer only offers incubation facilities for entrepreneurship, but is genuinely perceived as “one incubator” and a place where people look with admiration at entrepreneurs.

Slush is an example of a student-driven global entrepreneurial success in raising awareness of entrepreneurship and start-ups (Box 6.2), similar to Get in the Ring and other start-up initiatives in the Netherlands.

Box 6.2. **Slush**

Slush was started in 2008 by a group of students at Aalto University outside Helsinki. The students were part of the emerging student community (Startup Sauna) situated around the Aalto Design Factory. Slush is held during the darkest time of the year in Helsinki and has always been characterised by a unique energy and enthusiasm. Slush has grown from a small assembly to a world-renowned event, now spreading globally. The philosophy behind Slush has remained the same: to help the next generation of great, world-beating companies forward. Slush is still a student-driven, non-profit movement originally founded to change attitudes towards entrepreneurship.

The first event in 2008 gathered around 300 participants; this number has grown exponentially over eight editions to 20 000 participants, (including 2 000 startups, 1 000 investors and more than 600 journalists, together representing 100 countries), gathered in Helsinki in 2016. Stories are told that entire planes were chartered to fly in business angels and investors from Silicon Valley, and how it has become the must-attend event for large groups of startups. Slush has spread globally to Tokyo, Beijing, Shanghai and Singapore.

Source: Slush (2017).

Clearly, a student event such as Slush depends on the students who created the event in the first place, and in this sense it can be difficult to plan and aim for. However, it was not a coincidence that the students at Aalto University got such an aspiration. The initiative resonated well, even in its very early stages, with the university management, who supported their students in organising Slush.

One of the main messages is that HEIs should seek to involve students in their start-up support agenda. In doing so, they should emphasise continuity in their collaboration with students. Often student associations change their leadership quickly and it is important that the new student leaders can access the institutional knowledge and connections accumulated over time.

Supporting start-up students to cross the “drop-out valley” and opening support for alumni

Supporting student start-up requires that study programmes are sufficiently flexible to allow students to pursue business creation by extending the duration of their studies.

Students who start a business during their studies risk abandoning their studies. HEIs can help students get through this “drop-out valley” by, for example, allowing them to suspend their studies as they start up their business, and/or by giving them the chance to focus part of (or all of) their entire graduation thesis on a research question that is related to the start up. Several UAS in the Netherlands already offer their students this possibility. These options are less present in research universities.

The decision to start up a business may not occur during studies or directly after graduation. Rather, it often takes place after an initial period of employment during which graduates gain experience in how businesses and markets operate. Two important consequences result from this. Firstly, students may not look for start-up support in the first instance, but for education activities that stimulate their creativity and require the application of knowledge to solving real-world challenges. These activities are often extra-curricular in nature. It is important that students have the opportunity to document the competencies and skills developed in such activities, for example with diploma supplements or other certificates, in particular when they decide to delay their startup and to initially look for a paid job. And, secondly, startup support offered by HEIs should be accessible to alumni.

Currently in the Netherlands, alumni cannot use start-up services offered by their former HEI. Often, new graduates that have a business idea (e.g. conceived from their thesis work) are under high pressure (economically and culturally) to quickly find a job, whereas they would be at a very favourable point in their life to found a start-up because they still have relatively few commitments and economic needs. A first step could be to allow alumni to use the HEI’s entrepreneurial support system after graduation. Further, a national scholarship scheme could be considered for new graduates (e.g. master’s and PhD graduates) to seek funding for continuing setting up their business. An example that offers valuable learning is the EXIST Business Start-up Grant in Germany (Box 6.3).

Box 6.3. EXIST Business Startup Grant, Germany

The EXIST Business Startup Grant supports students, graduates and scientists from universities and research institutes who want to turn their business idea into a business plan. To be eligible, projects should be innovative, technology or knowledge based with unique features and good commercialisation prospects. The fund supports scientists from public and non-profit higher education institutions, alumni and former staff members up to five years after getting a degree, dropping out or changing jobs, and students who have completed at least half of their studies. Teams of up to three people are also funded; in this case one of the team members can have a degree that is more than five years old.

The grant covers, for a maximum of 12 months, monthly personal living expenses in the range of EUR 1 000 (students), EUR 2 500 (completed university degree), and EUR 3 000 (doctorate holders). Child benefits are EUR 150 per month per child. In addition, materials and equipment are financed with up to EUR 10 000 for solo startups and a maximum of EUR 30 000 for team startups. In addition, coaching expenditures are reimbursed up to EUR 5 000.

The HEI affiliated with the team manages the grant. It should be involved in an “entrepreneurial network” (see EXIST, 2017b for an overview), and offer the startup a mentor, a workplace and free use of infrastructure. The startup is expected to present a first draft of the business plan after five months, submit the business plan after ten months, and make tax and national insurance payments.

Box 6.3. EXIST Business Startup Grant, Germany (cont.)

The latest available evaluation data for the period 2007-12 shows that 875 grants were awarded, supported by 166 HEIs and with a total funding value of EUR 70.6 million.

EXIST is a support programme of the German Federal Ministry for Economic Affairs and Energy which started in 2008. It is co-financed by funds from the European Social Fund (ESF). The programme seeks to improve the entrepreneurial environment within universities and research institutes and to increase the number and success of technology and knowledge-based business startups. Besides the EXIST Business Start-up Grant, the EXIST programme offers:

- EXIST Culture of Entrepreneurship which currently supports more than 128 HEIs in formulating and implementing a comprehensive and sustained university-wide strategy for increasing entrepreneurial culture and spirit.
- EXIST Transfer of Research which funds both the resource development necessary to prove the technical feasibility of start-up ideas based on research and the preparation necessary to launch a business.

Source: EXIST (2017a); EXIST (2017b); Kulicke (2013).

Targeted and internationally connected startup support

HEIs in the Netherlands generally offer a range of role models, coaches and mentors to inspire and support potential student entrepreneurs. They come from within the HEI, from the business and student communities and from external partners. They also support access to networks for potential entrepreneurs.

Reaching out to potential would-be entrepreneurs among staff members requires a different approach than working with students. Visibly placing entrepreneurship in general, and startup support in particular, within the HEI's mission statement and regularly informing staff about the existence of supportive rules and regulations (e.g. owning shares in spinoffs, working part time, sabbaticals, diploma supplements) are very important. For this, central communication mechanisms, which reach internal and external stakeholders, are needed. The knowledge or technology transfer offices (KTOs/TTOs) play an important role in this.

It is important that regulations on how to handle intellectual property rights are clear and simple and that KTOs have the necessary skills and critical mass across all disciplines. An example of how such support can be organised across different higher education institutions is IXA, an expert interface between five Technology Transfer Offices in Amsterdam (Box 6.4).

An international perspective to encouraging entrepreneurship among students and staff is also important. A good number of the Dutch universities have large and increasing numbers of international students and staff, which is an important, but not fully recognised opportunity to enrich entrepreneurship.

Building effective regional entrepreneurial ecosystems

An effective ecosystem appears critical for successful valorisation, and HEIs, research organisations and individual inventors need that ecosystem support to flourish. When communities that form around the HEIs are inclusive, connections are built as well as a physical community of ventures. Effective entrepreneurial ecosystems connect the

Box 6.4. IXA – Innovation Exchange Amsterdam

IXA is a partnership involving the University of Amsterdam (UvA), Free University of Amsterdam (VU), and Amsterdam University of Applied Sciences (AUAS) and their academic medical centres, which acts as the interface between Amsterdam-based academic institutions and parties interested in their research findings and knowledge. IXA deploys its expertise in both directions: assisting researchers in generating social and economic impact from their work and assisting external parties navigating the academic landscape to find a solution or spot an opportunity. Among other services, like IP, spin-off, legal advice etc., support is provided to applicants who wish to apply for grants, although that support is offered only to UvA and AUAS.

Source: Interviews during a joint study visit to the University of Amsterdam, Free University of Amsterdam, and Amsterdam University of Applied Sciences in July 2016.

connectors and reward participants for stewardship not ownership. This remains relatively rare for HEIs globally.

Regional entrepreneurial ecosystems in the Netherlands are already growing in depth and breadth, driven by an above-average level of co-operation across usually rivalrous institutions (Stam, 2014). Engagement in local activities and engaging the community in HEI activities are clear markers of a healthy regional entrepreneurial ecosystem. Rewarding this is imperative for the HEI as well as local, regional and national policy makers.

A key concept for understanding regional entrepreneurial ecosystems is that they are networks. Researchers have begun to use social network analysis to explore ecosystems. If it is a network, then the connectors are more important than the nodes; the more connectors (and the more connections they have) the more information and resources flow through the network. A key question is whether the connectors control access to resources (gatekeeper) or connect people to resources and each other (hub). A healthy regional entrepreneurial ecosystem will find many ways to create and nurture connectors and especially “super-connectors” who proactively connect the connectors. There are many super-connectors acting in support of regional entrepreneurial ecosystems in HEIs in the Netherlands. Consider Stanford where, in the 1960s, Engineering Dean Fred Terman set out to connect with everyone in the area to help find jobs for his students. In time, he became the super-connector for Silicon Valley and set Stanford on its trajectory to being a key source of regional connectors and convenors. Stanford is now also a leader in connecting other universities. In the Netherlands, the emergence of centres that channel resources into knowledge exchange can be at the start of such a movement.

Feld (2012) described four elements that sustain entrepreneurial ecosystems: i) they grow bottom-up, that is, they are led by entrepreneurs and not by institutions; ii) they are inclusive of the entire entrepreneurial stack, that is, different types of businesses and support entities; iii) there are one or more rallying points for the community to focus their identity; and iv) they must be allowed to develop their sustainability for the long-term.

In many ways, the Netherlands has begun to fit the regional entrepreneurial ecosystem model and even show leadership with initiatives such as StartupDelta, which brings together all ecosystems in the Netherlands into one single hub helping all sorts of startups to grow (Box 6.5). Each partner contributes with its own speciality or local stronghold; this maintains the exchange of knowledge and best practices in policies regarding start-up ecosystems. A

Box 6.5. StartupDelta

StartupDelta is an independent public-private partnership, which brings together all ecosystems in the Netherlands into one single hub helping all sorts of startups grow, and is supported by the Ministry of Economic Affairs and the Ministry of Education Culture and Science. The aim is to break down barriers and improve access to talent, capital, networks, knowledge and markets.

Key activities of StartupDelta focus on opening up public procurement to startups by establishing a coalition of government departments and municipalities collaborating in a testlab and experimenting with new models. StartupDelta also attracts and supports foreign startups to the Netherlands through efforts to introduce the Orange Carpet programme, with seven simple steps for foreign startups for a smooth start in the Netherlands and a single point of entry and support portal for all foreign startup questions.

Regularly, StartupDelta missions are organised to global hubs and network events, such as WebSummit, Slush, SouthbySouthWest, Hannover Messe, and globally known ecosystems, such as Silicon Valley, Tel Aviv, Berlin, London, and promising destinations for Dutch startups in China and South Korea. Efforts are underway to create a community of proactive “startup diplomats” at embassies and consulates in priority countries to raise the profile of StartupDelta in the global embassy network of the Netherlands.

Source: OECD interviews with national stakeholders; StartupDelta (2017).

key strength of StartupDelta is its ability to minimise the “turf” battles that plague many countries. Too many ecosystems are held back by powerful institutions that seek (and feel entitled) to “own” the ecosystem. And far too often the HEIs are the leading culprits. A lot can be learned from how StartupDelta has defused such conflicts so far, by modelling the ecosystem as a network of networks. Critical is that the success derives largely from the formal and informal incentives to minimise both territorial and free-rider tendencies.

Many excellent entrepreneurial learning systems in the world (Y-Combinator, TechStars, Startup Weekend) operate as open source. If little is owned then there is less incentive to seek ownership. StartupDelta is predicated on an implicit gentlemen’s agreement among the different areas in the Netherlands that is reflected in an explicit specialisation in distinctive innovative research and development areas across the country. For example, while the area around Rotterdam focuses on logistics research, development innovation and startup activity, the regional economy around Twente university emphasises its world-renowned nanotechnology institute and attracts associated firms and start-up activity.

HEIs in the Netherlands should work to understand the entrepreneurial ecosystems in which they are embedded. This embeddedness is something that most HEIs find difficult. As Feld (2012) observed, HEIs want to be the experts and the critical source of knowledge, so they neglect the powerful roles they can play in growing a healthy, resilient community. Yet to be impactful as innovative and entrepreneurial organisations, HEIs must be co-embedded with students, the business community and others, blurring bureaucratic boundaries. They need to reward and incentivise their staff to engage in this way. Furthermore, the Netherlands has a lot of grassroots dynamic in its regional entrepreneurial ecosystems, but the HEIs can do more to be the “hubs” and not just the “gatekeepers”. One potent role that any HEI can play is to foster a reputation as “convenor” or “broker” in providing a safe harbour for strategic collaboration.

One of the barriers is lack of a deep, accurate understanding of the current state of regional entrepreneurial ecosystems and in particular their specific players, including the

individual entrepreneurs, their motivations, opportunities and problems. The Netherlands is no exception in this, but the existing “networked infrastructure”, for example StartupDelta and the Dutch Centres of Entrepreneurship, are a good starting point to rigorously map the existing ecosystems. Important are “listening sessions” with Dutch entrepreneurs across the country and across industries; this has already started (e.g. City of Amsterdam) and should be encouraged, further developed and rewarded. An interesting learning model is KCSOURCELINK in Kansas, USA, which connects 245 business support organisations. Its research unit develops action plans, monitors and reports on the progress of the overall ecosystem (Box 6.6).

Box 6.6. **SourceLink, Kansas City, US**

KCSOURCELINK connects 245 business support organisations across the Kansas area in the US with 18 counties and a population of approximately 2.4 million people. The organisation is a spinoff of the Ewing Marion Kauffman Foundation. Through KCSOURCELINK, thousands of businesses are able to gain access to the right resources at the right time to start, grow and accelerate. KCSOURCELINK has also been leading the effort to make Kansas City America’s most entrepreneurial city and co-ordinate large scale events for entrepreneurs, like Global Entrepreneurship Week and Battle of the Brands.

KCSOURCELINK maintains an up-to-date online directory of business support organisations, connecting them together and fostering collaborations to encourage efficiency. It analyses and fills gaps in the Kansas City entrepreneurial ecosystem and maintains Kansas City’s most comprehensive business calendar. Its research unit develops action plans, monitors and reports on the progress of the overall ecosystem.

KCSOURCELINK has a clever way to visualise an entrepreneurial ecosystem. Five different types of businesses are distinguished and shown as differently coloured rail tracks: i) innovation line for tech or high-growth companies, ii) main street line for brick-and-mortar businesses, iii) microenterprise line for very small and/or online businesses, iv) second stage line for established businesses poised for exponential growth, and v) the money line for businesses looking for capital to grow. The resource rail tracks (though not all of them) run through four stages: inception/idea, proof of concept/prototype/market intro, rollout, and growth expansion. All support organisations are listed on the map using the same colour code as for the rail tracks and five different types of businesses. For example, the Mid-America Angels, a network of accredited investors in promising early stage companies in the Kansas-Missouri region, shows up as a relevant support organisation for the innovation line and the money line.

Source: KCSOURCELINK (2017).

Conclusions

HEI engagement in regional entrepreneurial ecosystems is a key potential vector for HEI knowledge exchange and value creation. It is therefore important to reward this type of engagement, including for people and departments playing connector and gatekeeper and hub roles in the flow of knowledge in regional entrepreneurial ecosystems. A general awareness among HEI leaders and staff of the importance of open innovation is a key marker of having the right incentives at the HEI level.

The Netherlands offers an excellent environment for business startups by students and staff in HEIs. To bring this to the next level, four areas of improvement can be proposed.

1. There is an opportunity to strengthen interministerial collaboration on value creation and entrepreneurship, and the example of the Danish Foundation for Entrepreneurship provides relevant lessons. A key issue, which is best approached at national level rather than by each HEI trying to develop its own approach, is quality improvement and quality assurance of entrepreneurship support.
2. Students are game changers and some HEIs are already building on this potential. More should be done to share experiences across the higher education system on involving students in promoting entrepreneurship. Students need acknowledgements for the skills acquired in entrepreneurship courses which they can present to future employers, and they need support to avoid having to choose between studies or startup. Alumni (graduates and dropouts) should not be excluded from startup support.
3. Most HEIs in the Netherlands have growing numbers of students and staff from abroad. This provides excellent opportunities to enrich the academic entrepreneurship scene. There is scope for the sharing of good practice experiences involving international students and staff in entrepreneurship and entrepreneurship support across Dutch HEIs.
4. Many HEIs in the Netherlands have been successful in supporting their staff and students to consider starting up a business. This has led to many new firms. The next step would be to help these firms to grow. The good reputations and networks that most HEIs in the Netherlands have developed in their regions through active linkages with businesses and external partners can be exploited. To fully act upon this potential, greater collaboration across the higher education system and strong partnerships with local and regional governments are needed. StartupDelta is a very promising start.

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ANNEX

HEInnovate framework and good practice statements

1. Leadership and Governance

Strong leadership and good governance are crucial to developing an entrepreneurial and innovative culture within an HEI. Many HEIs include the words “enterprise” and “entrepreneurship” in their mission statements, but in an entrepreneurial institution this is more than a reference. This section highlights some of the important factors an HEI may consider in order to strengthen its entrepreneurial agenda.

1.1. Entrepreneurship is a major part of the HEI’s strategy

An HEI should see itself as an entrepreneurial organisation and environment, held together by a common vision, values and mission. The strategy of an HEI should reflect its entrepreneurial aspirations and agenda.

To score highly, an HEI could, for example:

- Have a mission statement and written strategy, setting out an entrepreneurial vision for the future of the institution
- Have a strategy which clearly emphasises the importance of entrepreneurship, culturally, socially and economically
- Articulate a clear implementation plan to achieve its strategy and vision with clear objectives and key performance indicators
- Provide examples of how the strategy and vision create opportunities across all aspects of the institution and its wider community

1.2. There is commitment at a high level to implementing the entrepreneurial agenda

A deep commitment at senior management level of an HEI is needed to drive the implementation of the entrepreneurial agenda.

To score highly, an HEI could, for example:

- Communicate the strategy across the institution, and make sure that it is understood as a priority by staff, students and stakeholders
- Ensure that there is a dedicated person at a high level/senior management responsible for the implementation of the entrepreneurial vision and strategy
- Provide a strategic roadmap presented in a simple format that is widely communicated throughout the HEI
- Articulate how the entrepreneurial strategy is regularly reviewed and revised to keep it up-to-date and relevant

1.3. There is a model in place for co-ordinating and integrating entrepreneurial activities across the HEI

An HEI needs an effective model for co-ordinating and integrating innovative activities across the institution. There are a variety of models which can be used, such as:

- A dedicated person at senior management level

- A dedicated unit close to senior management
- Co-ordination linked to a specific staff or faculty member
- Co-ordination by a centre for entrepreneurship/innovation

To score highly, an HEI could, for example:

- Build on existing relationships and activities
- Co-ordinate and integrate entrepreneurial activities across departments, faculties and other centres
- Co-ordinate activities with other stakeholders within the local entrepreneurship ecosystem

1.4. The HEI encourages and supports faculties and units to act entrepreneurially

An HEI with open, flexible and devolved approaches finds it easier to undertake innovative activities and speed up decision-making. An HEI should provide an environment that encourages idea creation and the emergence of new activities and initiatives.

To score highly, an HEI could, for example:

- Allow faculties or units within the institution to take full responsibility and ownership of the development of new structures and centres
- Ensure ownership of and allocate responsibility for the development of new activities and initiatives that stimulate entrepreneurial capacity
- Support the faculties or units through a range of incentives and rewards linked to the demonstration of entrepreneurial and innovative outcomes

1.5. The HEI is a driving force for entrepreneurship and innovation in regional, social and community development

An HEI can play several roles in its community and wider ecosystem. One of the key functions of an HEI is to support and drive regional, social and community development.

To score highly, an HEI could, for example:

- Be actively involved in the development and implementation of the local, regional and/or national innovation and entrepreneurship strategies
- Provide general access to the facilities of the institution to others in the wider community
- Support start-ups and/or established companies in the region to enhance innovation and growth
- Have a strong presence in its communities, for example, by supporting local cultural and artistic activities

2. Organisational Capacity: Funding, People and Incentives

The organisational capacity of an HEI drives its ability to deliver on its strategy. If an HEI is committed to carrying out entrepreneurial activities to support its strategic objectives, then key resources such as funding and investments, people, expertise and knowledge, and incentive systems need to be in place to sustain and grow its capacity for entrepreneurship.

2.1. Entrepreneurial objectives are supported by a wide range of sustainable funding and investment sources

Becoming an entrepreneurial HEI is an incremental and long-term organisational development process that requires a sustainable and diverse financial basis and access to key resources and investments.

To score highly, an HEI could, for example:

- Ensure a close link between its long-term commitment to investing in entrepreneurial and innovative activities and its financial strategy
- Continuously engage with funders and investors to secure financial resources to deliver on its objectives
- Aim for a balanced and diversified range of funding and investment sources, including in-kind contributions
- Reinvest revenues generated from leveraging their own research, teaching and third mission activities (self-funding)

2.2. The HEI has the capacity and culture to build new relationships and synergies across the institution

All internal stakeholders, staff and students, have a role in supporting an HEI's entrepreneurial agenda. Encouraging dialogue and synergies between the administration, academic faculties and staff, students and management helps break down traditional boundaries, foster new relationships and exploit internal knowledge and resources.

To score highly, an HEI could, for example:

- Promote shared facilities across faculties
- Establish structures for staff-student dialogue and decision making
- Create and support interdisciplinary structures
- Support cross-faculty teaching and research groups

2.3. The HEI is open to engaging and recruiting individuals with entrepreneurial attitudes, behaviour and experience

An HEI can build an entrepreneurial culture and fulfil its objectives by engaging stakeholders with a strong entrepreneurial background and experience. These individuals can bring different viewpoints, knowledge, and expertise unavailable internally. Such individuals can be permanent members of staff, guest contributors, visiting associates or external stakeholders.

To score highly, an HEI could, for example:

- Demonstrate the importance it attaches to bringing in people with diverse backgrounds
- Give status and recognition to those who contribute to the institution's entrepreneurial agenda
- Recruit individuals with strong entrepreneurial backgrounds from the private, public or voluntary sectors and outside of academia
- Have mechanisms in place for shared risk and rewards in engaging in entrepreneurial opportunities

2.4. The HEI invests in staff development to support its entrepreneurial agenda

Staff, both academic and administrative, are a key and necessary resource required to deliver on all elements of an HEI's entrepreneurial agenda, including the delivery of entrepreneurship education, provision of support for business start-ups, development of partnerships with other external stakeholders and supporting local and regional development.

To score highly, an HEI could, for example:

- Have a formal policy for career development for all staff linked to the implementation of the institution's entrepreneurial strategy and vision
- Set individual objectives and performance indicators for all staff supporting the implementation of the entrepreneurial agenda
- Measure staff progression against these objectives on a regular basis
- Link the training needs of staff with career objectives that support the entrepreneurial agenda

2.5. Incentives and rewards are given to staff who actively support the entrepreneurial agenda

Encouraging and rewarding entrepreneurial behaviour in all staff reinforces the commitment to developing as an innovative HEI. This includes staff who actively seek out new opportunities to develop the institution in line with its strategic objectives. Incentive and reward systems should be available at an individual level as well as for faculties/departments, extending beyond classic career progression models.

To score highly, an HEI could, for example:

- Adjust staff teaching and research workloads for those who take on new responsibilities that support the institution's entrepreneurial agenda
- Provide institutional funds to staff to stimulate innovation and change
- Provide development sabbaticals for staff who seek to enhance their entrepreneurial capacity
- Instigate systems for rewards beyond traditional research, publications and teaching criteria
- Provide opportunities for professors to work part-time in their own companies (where permissible)
- Make office and laboratory space available for staff to pursue entrepreneurial activities

3. Entrepreneurial Teaching and Learning

Entrepreneurial teaching and learning involves exploring innovative teaching methods and finding ways to stimulate entrepreneurial mindsets. It is not just learning about entrepreneurship, it is also about being exposed to entrepreneurial experiences and acquiring the skills and competences for developing entrepreneurial mindsets.

3.1. The HEI provides diverse formal learning opportunities to develop entrepreneurial mindsets and skills

An entrepreneurial HEI provides a range of learning opportunities to facilitate innovative teaching and learning across all faculties. Such an HEI should be encouraging innovation and diversity in its approach to teaching and learning across all departments as well as developing entrepreneurial mindsets and skills across all programmes.

To score highly, an HEI could, for example:

- Support curriculum change to stimulate and develop entrepreneurial mindsets and skills through new pedagogies, student-centred, cross-disciplinary and practice-based learning (e.g. living labs, the use of case studies, games and simulation)
- Provide support and training to staff in creating new curriculum related to entrepreneurship

- Provide mechanisms for students to engage in review and feedback on courses
- Introduce new mechanisms for supporting students, including experiencing starting new ventures within the students' formal education or delivering entrepreneurship education with practising entrepreneurs

3.2. The HEI provides diverse informal learning opportunities and experiences to stimulate the development of entrepreneurial mindsets and skills

Extra-curricular learning opportunities are an important complementary part of entrepreneurship teaching and learning provision. An innovative HEI should offer a range of informal learning opportunities to students to inspire individuals to act entrepreneurially.

To score highly, an HEI could, for example:

- Support access to student enterprise clubs, awards and societies
- Organise networking events between students and entrepreneurs/businesses
- Engage students in business idea/plan competitions as part of their extra-curricular opportunities
- Formally recognise extra-curricular activities

3.3. The HEI validates entrepreneurial learning outcomes which drives the design and execution of the entrepreneurial curriculum

An entrepreneurial learning experience provides opportunities to develop important skills and competences. These are essential for both graduate entrepreneurs as well as entrepreneurial graduates entering into employment. An HEI that values entrepreneurial learning commits to regular review, validation, and the updating of course content and learning outcomes across all study programmes.

To score highly, an HEI could, for example:

- Codify the expected entrepreneurial learning outcomes in relation to knowledge, skills and competences in all degree programmes
- Ensure students have a clear understanding of the entrepreneurial learning outcomes expected and achieved
- Validate entrepreneurial learning outcomes at the institutional level
- Recognise entrepreneurial learning outcomes in the students' records of achievements

3.4. The HEI co-designs and delivers the curriculum with external stakeholders

External stakeholders are an important source of expertise that can be used in entrepreneurial teaching and learning. Regular engagement with external stakeholders encourages long-term collaborative relationships that can provide useful inputs to understanding future skills needs as well.

To score highly, an HEI could, for example:

- Regularly review and assess the involvement of external stakeholders in course design and delivery
- Provide a mechanism for staff to work with external stakeholders to develop and deliver high quality course content
- Integrate external stakeholders' experience and expertise into the development and delivery of extra-curricular learning activities and support services

- Support a diversity of collaborative partnerships with local communities and organisations, local and regional governments, chambers of commerce, industry and HEI alumni

3.5. Results of entrepreneurship research are integrated into the entrepreneurial education offer

For a curriculum to stay up-to-date and relevant, the entrepreneurial education offer needs to be continuously reviewed and updated. Therefore an HEI should integrate the results of entrepreneurship research into its teaching.

To score highly, an HEI could, for example:

- Encourage staff and educators to review the latest research in entrepreneurship education
- Provide a forum whereby staff and educators can exchange new knowledge and ideas, incorporating the latest research
- Provide access to inspiration from other HEIs through networking and sharing good practices

4. Preparing and Supporting Entrepreneurs

HEIs can help students, graduates and staff consider starting a business as a career option. At the outset it is important to help individuals reflect on the commercial, social, environmental or lifestyle objectives related to their entrepreneurial aspirations and intentions. For those who decide to proceed to start a business, or other type of venture, targeted assistance can then be offered in generating, evaluating and acting upon the idea, building the skills necessary for successful entrepreneurship, and importantly finding relevant team members and getting access to appropriate finance and effective networks. In offering such support, an HEI should ideally act as part of a wider business support ecosystem rather than operating in isolation.

4.1. The HEI increases awareness of the value of entrepreneurship and stimulates the entrepreneurial intentions of students, graduates and staff to start up a business or venture

Raising awareness of entrepreneurship in an HEI is about helping people make informed decisions about their careers, including the option of starting an enterprise.

To score highly, an HEI could, for example:

- Provide conducive framework conditions for start-up, such as enabling staff to own shares, work part-time, take sabbaticals, and the possibility for students to extend the duration of their study programmes to support starting a new venture while studying
- Make effective use of communication channels to raise awareness of opportunities and showcase entrepreneurship among staff and students across all parts of the institution
- Celebrate and recognise successes of student, graduate and staff entrepreneurs
- Provide opportunities for students to be involved in research projects leading to entrepreneurial opportunities and to take up internships with entrepreneurs

4.2. The HEI supports its students, graduates and staff to move from idea generation to business creation

An HEI can support motivated students, graduates and staff in taking their first steps in preparing for a start-up. This includes developing an idea, finding a team, and exploring the technical and market feasibility of a project. As well as introducing staff to new networks, an

HEI can offer regular activities to generate and evaluate business ideas emerging across the institution.

To score highly, an HEI could, for example:

- Offer entrepreneurial team building support and conflict management
- Provide intellectual property assistance for potential start-ups
- Create an expert advisory panel for early-stage concepts
- Organise interdisciplinary idea generation activities (e.g. start-up weekends)
- Organise idea and start-up pitch prizes
- Offer funds to support market feasibility studies

4.3. Training is offered to assist students, graduates and staff in starting, running and growing a business

Entrepreneurship training can provide some of the skills and competences needed to start, run and grow a business. The training should impart relevant knowledge and skills about a wide range of topics, for example financing, legal and regulatory issues, dealing with people and building relationships, managing innovation processes, coping with success, stress and risk, and how to restructure or exit. Emotional preparation is as important as the technical aspects.

To score highly, an HEI could, for example:

- Offer tailored entrepreneurship courses across all subject areas and levels of study
- Actively recruit students and staff to training activities and monitor levels of engagement
- Involve entrepreneurs and key actors from the entrepreneurship ecosystem
- Use up to date teaching methods focused on learning-by-doing and critical reflection
- Implement mechanisms to increase rates of take-up by diverse groups

4.4. Mentoring and other forms of personal development are offered by experienced individuals from academia or industry

Mentoring and other personal development relationships (such as coaching and tutoring) can help start-up entrepreneurs identify and overcome problems and develop their business networks. They provide valuable support in the form of knowledge, experience, social capital and encouragement on a long-term basis. Mentors and coaches tend to be experienced (academic) entrepreneurs, company managers and often alumni.

To score highly, an HEI could, for example:

- Organise visible, accessible and good-quality mentoring and personal development activities
- Actively recruit mentors and provide them with training, resources (e.g. IP assistance), formal recognition and rewards
- Facilitate matchmaking of mentors and protégés
- Provide feedback mechanisms on the contributions from entrepreneurs
- Provide opportunities for peer-to-peer mentoring, such as entrepreneur clubs, where members help each other

4.5. The HEI facilitates access to financing for its entrepreneurs

External financing can be essential for the success of a new venture, e.g. providing investment for feasibility and market studies, product and prototype development such as

proof of concept funding, for initial production or for offering the founders some living income before their first revenues are generated.

To score highly, an HEI could, for example:

- Offer financial education to entrepreneurs and potential entrepreneurs to better understand financial concepts and how to apply them
- Organise networking and financing events for aspiring entrepreneurs to pitch their ideas to investors and to get feedback
- Offer microfinance instruments such as grants, prizes, loans and equity
- Utilise its network of potential investors for crowd-funding
- Closely link access to financing activities with training, mentoring and incubation

4.6. The HEI offers or facilitates access to business incubation

Business incubators commonly provide a range of services such as free or subsidised premises, access to laboratories and research facilities, prototyping support, IT and secretarial services and networking. They also offer a visible and accessible location for entrepreneurs to access an integrated package of coaching, mentoring, training, shared platforms and financing.

To score highly, an HEI could, for example:

- Host their own incubators or facilitate easy access to external incubators
- Ensure that their incubators offer a full range of soft support (networking, mentoring, etc.) as well as physical infrastructure
- Promote the incubator widely across campus and host events that engage potential entrepreneurs
- Embed the incubation facilities with the research and education infrastructure of the HEI to enhance synergies

5. Knowledge Exchange and Collaboration

Knowledge exchange is an important catalyst for organisational innovation, the advancement of teaching and research, and local development. It is a continuous process which includes the “third mission” of an HEI, defined as the stimulation and direct application and exploitation of knowledge for the benefit of the social, cultural and economic development of society. The motivation for increased collaboration and knowledge exchange is to create value for the HEI and society.

5.1. The HEI is committed to collaboration and knowledge exchange with industry, the public sector and society

Knowledge exchange through collaboration and partnerships is an important component of any innovative HEI. It provides the opportunity to advance organisational innovation, teaching and research while creating value for society.

To score highly, an HEI could, for example:

- Ensure knowledge exchange and collaboration is a high priority at senior level and that implementation is in line with the institution’s entrepreneurial agenda
- Establish structures to exploit knowledge exchange and collaboration opportunities, and encourage staff to engage in such activities
- Include support mechanisms for co-ordinating and sharing relationships across the HEI

- Give guidance on how to develop and implement all types of relationships with the public and private sector

5.2. The HEI demonstrates active involvement in partnerships and relationships with a wide range of stakeholders

An innovative HEI understands the value of engaging with multiple stakeholders. There are many types of organisation with whom an HEI can form partnerships. These include, for example, regional and local organisations, quasi-public or private organisations, businesses (SMEs, large and international firms, social enterprises and entrepreneurs), schools and alumni.

To score highly, an HEI could for example:

- Involve external stakeholders in the work of the institution through governance, teaching, research, support for student activities and positions with institutes and centres
- Play an active role in influencing regional governance and regional/local development including entrepreneurship development
- Support entrepreneurship development of schools and colleges through networking and broader engagement
- Provide monitoring and feedback of the mutual value developed through stakeholder relationships

5.3. The HEI has strong links with incubators, science parks and other external initiatives

Knowledge intensive structures surrounding an HEI provide opportunities to exchange knowledge and ideas. These include incubators, science parks and other initiatives. An innovative HEI should have systems in place that allow both inward and outward flows of knowledge and ideas.

To score highly, an HEI could, for example:

- Encourage the joint use of facilities
- Have direct financial or management interest in science parks and incubators, ranging from participation to ownership
- Ensure that the flow of people is incentivised in both directions
- Monitor the added value generated through linkages and cross-fertilisation activities

5.4. The HEI provides opportunities for staff and students to take part in innovative activities with business/the external environment

An entrepreneurial HEI engages with the external environment through a variety of innovative activities. These can range from informal activities, such as breakfast clubs and networking events, through to more formalised initiatives including internships, learning factories, collaborative research and entrepreneurship projects.

To score highly, an HEI could, for example:

- Provide open spaces and facilities for collaboration with external actors
- Organise events that encourage engagement with external stakeholders, such as lectures, joint workshops, breakfast meetings and other networking events and opportunities
- Encourage, support and recognise mobility of staff and students through internships, sabbaticals, dedicated study programmes (e.g. industrial doctorates, sandwich programmes)

5.5. The HEI integrates research, education and industry (wider community) activities to exploit new knowledge

Strong relationships with the external environment help stimulate the creation of new knowledge. An innovative HEI should integrate and assimilate the knowledge generated for extending its entrepreneurial agenda.

To score highly, an HEI could, for example:

- Have mechanisms in place to integrate and absorb information and experience from the wider ecosystem
- Monitor research activities regionally, nationally and internationally to identify new and relevant knowledge
- Initiate dialogue and discussion between the HEI and the external environment for mutual benefit
- Provide support for the identification of new ideas and their mutual exploitation
- Have clear mechanisms for exploiting entrepreneurial opportunities with commercial and industrial partners

6. The Internationalised Institution

Internationalisation is the process of integrating an international or global dimension into the design and delivery of education, research, and knowledge exchange. Internationalisation is not an end in itself, but a vehicle for change and improvement. It introduces alternative ways of thinking, questions traditional teaching methods, and opens up governance and management to external stakeholders. Therefore, it is linked very strongly to being entrepreneurial. It is not possible for an HEI to be entrepreneurial without being international, but the HEI can be international without being entrepreneurial or innovative.

6.1. Internationalisation is an integral part of the HEI's entrepreneurial agenda

An international perspective is a key characteristic of an entrepreneurial and innovative HEI. Most institutions have internationalisation strategies and an innovative HEI will harmonise its internationalisation strategy and entrepreneurial agenda.

To score highly, an HEI could, for example:

- Ensure the internationalisation strategy reflects its entrepreneurial agenda
- Build common objectives and synergies between internationalisation and the entrepreneurial agenda

6.2. The HEI explicitly supports the international mobility of its staff and students

International mobility brings in new educational and research ideas, creates intercultural opportunities and long lasting partnerships. In addition to attracting international staff and students, an entrepreneurial HEI actively encourages and supports the international mobility of its own staff and students.

To score highly, an HEI could, for example:

- Link international mobility objectives with the entrepreneurial agenda of the HEI
- Promote international mobility through exchange programmes, scholarships, fellowships and internships

- Apply for European mobility programmes and support the application of staff and students to mobility grants, scholarships and programmes
- Incentivise, recognise and reward international mobility

6.3. The HEI seeks and attracts international and entrepreneurial staff

The internationalisation of an HEI depends upon people who can stimulate new approaches to teaching, learning and research in a global framework, using world-wide reputations and contacts to benefit the HEI's international network.

To score highly, an HEI could, for example:

- Explicitly set out to attract international staff which match the needs of its entrepreneurial agenda
- Have specific international recruitment drives in place
- Develop PhD programmes in collaboration with other partner institutions
- Have a support system in place for the cultural integration of international staff

6.4. International perspectives are reflected in the HEI's approach to teaching

Access to new ideas for teaching and learning in the international environment can increase an HEI's ability to compete on the international market. Therefore an innovative HEI should have a teaching and learning environment tailored to a more global audience.

To score highly, an HEI could for example:

- Invest in an international-orientated curriculum which supports the institution's entrepreneurial agenda
- Ensure the curriculum is set up to prepare students for performing professionally and socially in an international and multicultural context
- Design and develop a curriculum which considers both "internationalisation abroad" and "internationalisation at home" experiences for staff and students
- Support international partnerships and networks which add value to teaching entrepreneurship
- Increase the number of joint/double degrees which include entrepreneurship and innovation in their curriculum
- Include classroom-based activities with an international perspective

6.5. The international dimension is reflected in the HEI's approach to research

Strategic international research partnerships are an important part of an HEI's entrepreneurial agenda. The partnerships should be fully functional, not just paper agreements, and engage both staff and students.

To score highly, an HEI could, for example:

- Ensure that relationships with international research partners support its entrepreneurial agenda
- Develop extensive links with international research networks and innovation clusters
- Have internal support structures in place to manage and grow international relationships
- Use networks and partnerships to feed back into its research agenda
- Ensure all departments and faculties actively participate in international research partnerships and networks

7. Measuring Impact

Entrepreneurial/innovative HEIs need to understand the impact of the changes they bring about in their institution. The concept of an entrepreneurial/innovative HEI combines institutional self-perception, external reflection and an evidence-based approach. However, impact measurement in HEIs remains underdeveloped. The current measurements typically focus on the quantity of spin-offs, the volume and quality of intellectual property generation and research income generation, rather than graduate entrepreneurship, teaching and learning outcomes, retaining talent, the contribution to local economic development or the impact of the broader entrepreneurial agenda. This section identifies the areas where an institution might measure impact.

7.1. The HEI regularly assesses the impact of its entrepreneurial agenda

The impact of the entrepreneurial agenda can be wide ranging across research, education and innovation, as well as within governance and leadership, depending on the type of HEI. Understanding whether objectives are being met is crucial, if an HEI is to achieve its intended outcomes.

To score highly, an HEI could, for example:

- Set clear intended outcomes/impacts related to its entrepreneurial agenda
- Collect evidence of the outcomes/impacts of the entrepreneurial agenda
- Use the evidence of the outcomes/impacts as a tool for reflection and review of the strategy and mission of the institution

7.2. The HEI regularly assesses how its personnel and resources support its entrepreneurial agenda

Becoming an entrepreneurial institution may require an HEI to re-think how its personnel and resources are employed. An HEI may need to develop new human resource strategies, leverage external partnerships to overcome internal shortcomings, and secure new sources of financial support.

To score highly, an HEI could, for example:

- Undertake a skills/competence audit against the entrepreneurial agenda to assess its institutional development needs
- Use the information from the skills assessment and embed in recruitment strategies and staff performance appraisals
- Leverage external partners and resources to address any skills gaps
- Review and assess the success of the allocation of personnel and resources at regular intervals

7.3. The HEI regularly assesses entrepreneurial teaching and learning across the institution

Ensuring that entrepreneurial teaching activities reach their full potential requires systematic assessment across all faculties and departments. An entrepreneurial HEI should have set clear objectives, which are regularly monitored and evaluated, and the results fed back into course renewal and staff development plans.

To score highly, an HEI could, for example:

- Set clear objectives for the impact of entrepreneurship courses and activities

- Measure the impact of entrepreneurship teaching and learning at different phases of its implementation (beginning, end, point in time after) to get an accurate picture of change
- Measure changes in participants' motivation and the level of knowledge, skills and competences gained through the entrepreneurship education activities
- Track findings over time and across all faculties and departments

7.4. The HEI regularly assesses the impact of start-up support

It is important to monitor and evaluate start-up support activities to ensure that they are providing the appropriate quality of support in an effective manner. An entrepreneurial HEI should also examine outreach, take-up and the role played by start-up support across all faculties and departments.

To score highly, an HEI could, for example:

- Set clear objectives and intended outcomes/impacts for start-up support activities, including participation rates, satisfaction and outcomes
- Measure the intended outcomes/impacts immediately following the end of support measures and at later dates to measure the success in relation to start-ups
- Ensure the findings are fed back into the development of start-up support activities

7.5. The HEI regularly assesses knowledge exchange and collaboration

Assessing and gaining a better understanding of the HEI's knowledge exchange and collaborative activities can result in increased value creation for both the institution and society. Therefore, an innovative HEI should have mechanisms and activities in place to regularly monitor and evaluate the intended outcomes and impacts of these activities across all faculties and departments.

To score highly, an HEI could, for example:

- Set clear objectives and intended outcomes/impacts for knowledge exchange linked to its entrepreneurial agenda
- Set internal measurements of success such as new research ideas generated, joint HEI-business projects and relationships formed, number of start-ups and spins-offs created
- Set external measurements of success, such as perceived value and impact of the HEI on the wider environment (e.g. business, government)
- Assess these intended outcomes/impacts from an internal and external viewpoint
- Use the evidence of success as a tool for reflection and review of the entrepreneurial agenda

7.6. The HEI regularly assesses the institution's international activities in relation to its entrepreneurial agenda

Having an international perspective is a key characteristic of an entrepreneurial HEI. An entrepreneurial HEI should regularly monitor and evaluate whether its internationalisation strategy supports the development of its entrepreneurial agenda across all faculties and departments.

To score highly, an HEI could, for example:

- Set clear objectives and intended outcomes/impacts for internationalisation activities linked to its entrepreneurial agenda

- Undertake regular mapping exercises of the internationalisation activities in teaching and research to prioritise and further develop its entrepreneurial activities
- Use the evidence of success as a tool for reflection and review of its internationalisation and entrepreneurial agenda

Supporting Entrepreneurship and Innovation in Higher Education in The Netherlands

The higher education sector in The Netherlands offers excellent examples of what it means to be innovative and entrepreneurial, and promote entrepreneurial mind sets, entrepreneurship and knowledge exchange. Creating value from academic knowledge through innovative services, products, processes and business models that meet economic, social and environmental needs lies at the core of this strategy. The current challenge is to strengthen the anchoring of value-creation processes in education and research. This can be achieved through increased interdisciplinarity, entrepreneurial mindset development across all subject areas, incentives for effective wider world engagement of researchers and students, and growth-oriented support for startups. This report presents an in-depth analysis of the policy framework and institutional practices and provides useful guidance for policy makers and university leaders across the world. HEInnovate is a joint initiative of the European Commission and the OECD to promote the innovative and entrepreneurial higher education institution.

Consult this publication on line at <http://dx.doi.org/10.1787/9789264292048-en>.

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