Entrepreneurship development at the University of Twente
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Introduction

As part of our case study of the University of Twente (UT), this document focuses on the facilities and instruments in place to support the entrepreneurial potential of the university. The University of Twente is based in the region of Twente, in the east of the Netherlands, close to the border with Germany. It is a research university that offers programmes in social as well as engineering sciences. The university was founded in the year 1961 and developed from a predominantly technical university to a broader university. "High Tech Human Touch" is the label that the university uses in its profiling activities. The university hosts MESA+, one of the world’s largest nanotechnology research institutes. The four technical universities in the Netherlands are collaborating in the 4TU alliance (i.e. the universities of Delft, Eindhoven, Wageningen and Twente).

In the 1980s, the University of Twente’s vision shifted towards developing an entrepreneurial profile and building an ecosystem for innovation that connects the university to the various actors in its immediate regional environment. The university and its local stakeholders started promoting capacities for innovation and networking. The university’s management made a deliberate choice to play a key role in the rejuvenation of the region by engendering an entrepreneurial climate and increasing knowledge exchange with national and regional industry partners.

The move to increase the entrepreneurship activities was initially driven by regional development considerations, such as creating high-tech spin-off firms, providing skilled graduates, investing in new businesses, and providing an infrastructure for nanotechnology labs. Since then, the motivations behind the entrepreneurial practices of the University of Twente have evolved towards the adaptation of a more internationally competitive university-business cooperation outlook. In the recent years, the UT has reframed its vision to become Europe’s most entrepreneurial university, with the objective of creating value for and have
The Twente region is branding itself as a high-tech region, with over 1,200 companies (mostly SMEs), approximately 28,000 staff in the technology sector, and 28,000 students and 5,900 staff connected to the University of Twente and Saxion University of Applied Sciences. The High-Tech Systems & Materials (HTSM) sector has developed significantly in Twente, thanks in part to the interplay between entrepreneurship, the University of Twente and Saxion. In 2013, 2015 and 2017, the University of Twente was declared the most entrepreneurial university in the Netherlands. This was partly the result of its commercialisation activities and start-up firms, with spin-offs such as Thuisbezorgd.nl, Demcon, Xsens, Micronit and Booking.com. The university has contributed a great deal to the region?¡s ambitions specified in the region?¡s Agenda for Twente [2] ? a multi-annual plan for the period 2008-2017 that also includes the ambition to make Twente one of the most entrepreneurial regions in Europe. Over the years, the university has progressively increased its knowledge exchange activities through research and teaching initiatives geared to the needs of local and national industry partners.

In the remainder of the case study we will describe the most important features of the entrepreneurial ecosystem that the university has in place, starting with the key player in this respect: Kennispark Twente.

Entrepreneurship in and around the university

From BTC to Kennispark and Novel-T

A technology transfer office was established at the UT as early as 1979, and entrepreneurship education activities soon followed. A Business Technology Centre (BTC) was founded in 1985, adjacent to the university. It was a public-private partnership between the Regional Development Agency (Oost NV), the University of Twente, and the University of Applied Sciences Saxion (Saxion UAS, back then Hogeschool Enschede). The BTC assisted start-ups, mainly in the high-tech sector, by providing accommodation and some support services. Hence, it established the foundation for the Business and Science Park (in Dutch: Kennispark) that developed further from then on. The physical Kennispark hosts around 400 companies with more than 9,000 people and is the largest Dutch Business and Sciences Park. In 2013, it was awarded the title of the ?Best Business Park? in the Netherlands.

The primary stakeholders of the university?¡s entrepreneurial ecosystem form a broad network of public and government institutions in Twente, together with the students and academics of the university. More particularly, the innovation hub where the stakeholders intersect is Kennispark, nowadays known as Novel-T. Novel-T has the legal status of a foundation, with a board of two directors and a team of support staff. The Foundation Kennispark Twente, the ?key orchestrator? of Twente?¡s entrepreneurship ecosystem, was established by a partnership consisting of the University of Twente, Saxion University of Applied Sciences, the Province of Overijssel, the City of Enschede and the Twente Region (an alliance of fourteen municipalities in the Twente region). Novel-T/Kennispark Twente is the umbrella organisation driving innovation and entrepreneurship support. One of the goals of Novel-T is the creation of 10,000 new jobs for the region before the year 2020. This ambition will have to be realised through the support of Kennispark and the region?¡s Development Agency (named: Oost NV).
In terms its governance, Novel-T has a director and an associate director. This management team is overseeing a team of more than 30 professionals, ranging from lawyers, business developers, finance and IP specialists to persons responsible for organising networking events and promoting student entrepreneurship. The founders of Novel-T are represented in its steering board. This board consists of representatives from the university, the municipality, and the province, together with two entrepreneurs. A core team, consisting of over ten people from various public and private organisations is functioning as a sounding board for Novel-T. It keeps an eye on the coordination of public and private interests and provides ideas for the further development of Novel-T. The strategy of Novel-T is overseen by its strategy team, including representatives of its founders (university, municipality, province), a Novel-T representative and external consultants.

The various partners of Novel-T/Kennispark include the Chamber of Commerce, the regional development agency Oost NV, the Twente Branding Foundation (responsible for promoting the human capital and innovation potential of the Twente brand), the Technology Circle Twente (a network of innovative companies), the World Trade Centre Twente, the Entrepreneurs Society Kennispark, the food R&D company Innofood, and Kiemt, a network of environmental technology companies. The Technology Circle Twente (Technologie Kring Twente) was established in 1990 as a networking organisation that connects high-technology entrepreneurs to each other and to large companies. Today, more than 150 companies are part of this network.

Novel-T/Kennispark is the first contact point for the university-business collaboration activities of the University and Saxion University of Applied Sciences. Novel-T employs an 'open door policy': its Startup Ambassadors will investigate the possibilities for anybody who comes with an idea for starting up a business. The Business Development Team of Novel-T supports researchers in commercialising the results of research, offering advice on protecting intellectual property, developing a business case, finding start-up capital and advising on the transfer of intellectual property to a spin-off company or an existing company. The support activities offered by Kennispark include not just start-up support but also extracurricular entrepreneurship training, awareness-raising events and workshops and the use of shared facilities. The science shop is also located at the premises of Novel-T.

**TOP programme**

For more than 30 years, the University of Twente has been offering support to innovative entrepreneurs that wish to start up their own knowledge-intensive business. A well-known feature of the support offered is the TOP programme. TOP is an acronym that stands for Temporary Entrepreneur Position. Participating entrepreneurs have access to various forms of support, advice, networks and financial assistance during one year in order to make a successful start of their business. The TOP scheme offers start-up entrepreneurs pre-seed financing. The TOP scheme has been very successful over time and was copied by many other universities in the Netherlands and abroad. In addition to various support measures, the TOP loan amounts to an amount of up to €40,000. The loan is paid back between the third and fourth year. The infographic below provides some information on the TOP scheme.

On average, TOP support is awarded to about 13 companies annually. In addition to the TOP credit, the companies usually manage to attract significant private capital.

TOP Light is an offshoot of the TOP programme. It offers loans of up to €10,000, workshops,
and sessions with other start-up entrepreneurs to discuss challenges and problems. Coaching and mentoring on legal matters and access to the Technology Circle Twente is also provided. Applicants for Top Light will have to go through a light-touch screening phase before they are awarded a loan.

Figure 1: Key features of the TOP programme

The university’s TOP support was offered to almost 400 new companies. Many university spin-offs are still operational to date. The UT spin-offs account for 10% of the fastest growing high-tech companies in the Benelux countries. In the last 10 years, Novel-T has helped create more than 10,000 new jobs and over 2,200 start-ups, some of which are internationally known – for instance, Booking.com, Demcon, and Xsens. This has contributed to the university’s world-wide reputation for entrepreneurship and it being awarded the title of number one Valorisation University in the Netherlands in 2015.

Innovation vouchers

The University of Twente has made a total of 50 innovation vouchers available for small and medium-sized companies (SMEs). Each voucher represents a value of €10,000. Until 2017, in two rounds a total of 15 were awarded. The vouchers are intended to encourage collaboration between knowledge-intensive SMEs and the university’s Centres of Expertise. The companies that were selected to receive a voucher are expected to use it to have a research project carried out in one of the R&D facilities at the university. It can also be used for accessing laboratory facilities as well as for acquiring supervision and training from the research centres. The SMEs are to contribute at least 25% of the total project cost, with a
minimum of €2,500. The vouchers can be used at one of the following Centres of Expertise at the University of Twente: (1) European Membrane Institute (EMI); (2) Thermoplastic Composites Research Center (TPRC); (3) MESA+ Nanolab; (4) Experimental Center for Technical Medicine (ECTM); (5) Center for Service Robotics (LEO); (6) Virtual Reality Laboratory (VR-lab / T-Xchange); and (7) the Design lab (see below).

**Pioneers in Health Care**

Together with the regional hospitals, the University of Twente established the Pioneers in Health Care (PIHC) Innovation Fund in 2014. The aim of the fund is a faster introduction of innovative technology in clinical practice by bringing new technology and medical practice closer together. Menzis, a major health insurance company based in Twente, has joined the PIHC fund in 2015 in order to contribute to higher-quality and more efficient care.

Project teams can claim innovation vouchers with a value of €50,000, which are intended as 'seed money' that, for example, may be used for validation or feasibility studies to test new ideas and products. By organising regular meetings and matchmaking events, the fund also focuses on facilitating the emergence of new partnerships. Ultimately the fund aims for sustainable cooperation between the partners of the fund.

The fund's partners jointly make an annual budget of €400,000 available to the PIHC fund and have committed themselves to this for the longer term. Every year a 'call for proposals' is announced among the researchers and care professionals at the university and the local hospitals. At the end of each year these innovation vouchers are awarded. The projects must start within six months of granting and the maximum project duration is 12 months. Researchers or healthcare professionals who have previously been awarded a PIHC voucher can only be eligible for new vouchers if they start a new collaboration or have a new research topic and they can demonstrate that their previous project has been successful.

**DSIF**

A new facility was launched in June 2015: the Dutch Student Investment Fund (DSIF). DSIF supports and finances student companies. It is a fund for students and it managed entirely by students of the University of Twente and Saxion. The fund invests between €25,000 and €100,000 in a start-up. Its first investment was made in March 2017. DSIF will be closely involved in the future development of the start-ups, given its philosophy that there is more to cooperative ventures than financial aspects alone. DSIF invests in start-ups that are in the very early stages, founded by students, PhD candidates or recent graduates. At the same time, DSIF offers students the opportunity to collaborate in its initiatives. In that way, it uncovers a source of talent for starting companies and gives students new possibilities to develop their entrepreneurial skills. The investments take the form of convertible loans which, in the case of subsequent financing, these can be converted into shares. DSIF collaborates closely with Novel-T. Companies receive support from Novel-T during their start-up phase and during the first stages of growth.

The above descriptions illustrate that there are numerous organisations, networks and facilities contributing to the entrepreneurial ecosystem in and around the university. In the subsequent paragraphs we turn to some of the elements present inside the university.

**Valorisation Programme ?Koploper aan de A1?**
The Valorisation Programme is a national policy initiative undertaken by the Ministry of Economic Affairs and the Ministry for Education, Culture and Science. It was launched in 2010 with the aim to ensure that knowledge from higher education institutions contributes to solving societal challenges. A total budget of €63 million was divided among twelve innovation hubs, including Kennispark Twente (presently Novel-T) that grouped its activities under the label ?Koploper aan de A1? (Forerunner on the A1 ? the highway from Amsterdam to Berlin). The Koploper aan de A1 programme was dedicated to the enhancement of knowledge in the Twente region and received a fund of €13 million (2011-2017) to encourage entrepreneurship and to accelerate innovation and growth in existing businesses. It focused on six areas: 1) entrepreneurship in education, 2) connecting with business, 3) knowledge protection, 4) funding, 5) creating a knowledge network, 6) inspiring and connecting teachers.

The valorisation programme helped Twente in doubling the number of start-ups and the number of students taking entrepreneurship courses. Also, it yielded almost 600 start-up companies and transformed Twente into the region which has the biggest number of spin-offs in the Netherlands. Recently, it was decided that the project will be continued, and another €10 million will be invested in linking knowledge and entrepreneurship (Eijkel & Mulder, 2017).

Examples of business-oriented research collaboration

The Fraunhofer Project Center at the University of Twente is a collaboration between Fraunhofer, UT and Saxion. The Fraunhofer Project Center is located on the campus of the University of Twente, addressing the theme of design and production engineering for complex high-tech systems focusing on Smart Products for Smart Production. It serves high-tech in the region through knowledge development in the field of smart products and smart product technologies.

Entrepreneurship training

The University of Twente considers entrepreneurship to be an integral part of education and research. It therefore pays attention to stimulating entrepreneurship in the educational programmes offered to students. External stakeholders are involved every now and then in the day-to-day teaching and learning activities. On occasions, local and regional stakeholders play an active role in assisting the university?s students, for instance when it comes to students? theses, or acting as guest speakers. The university incorporates an entrepreneurial and design attitude in its educational programmes. The encouragement of entrepreneurial attitude among students takes place through the following activities:

- The DesignLab
- Entrepreneurship elements in curricula at Bachelor?s, Master?s and postgraduate level
- The Student Union

DesignLab

The DesignLab serves as a platform for the dissemination and integration of design thinking. The DesignLab is a space of learning, co-working, prototyping, and testing. The DesignLab opened in 2014. In the DesignLab, researchers and students from different disciplines design
solutions for issues that go beyond pure technology. The DesignLab provides facilities that allow connecting science and society through design. Faculty and students from all fields can work together with companies and public sector organisations to implement and develop scientific and technological solutions for complex societal challenges. One of the methods used for this is Science2Design4Society (S2D4S). It helps multidisciplinary teams of scientists and students tackle a concrete problem and develop solutions based on technical and social-scientific knowledge. The team can test their concept or prototype using, for example, a 3D printer or virtual reality glasses. Not only university research groups come up with research topics, but also companies, governments and civil society organisations suggest topics to be studied through the DesignLab facilities. They can do this in the setting of a public-private collaboration and projects may include PhD research, postdoc projects and joint research requests that are financed by third parties.

Student projects, graduation (i.e. thesis) projects or assignments are another way of making use of the DesignLab. The projects may be part of the students’ educational programme, but they may also be assigned by a company or an external organisation. Some student projects may last for an extended period of time and students will be offered a place to set up their projects to enhance research efficiency. Student-driven projects are also welcome in the DesignLab. Examples are the Solar Team competition, and the RoboTeam projects. Activities hosted by the DesignLab range from networking events with regional partner schools and refugee socialization projects to symposia on urban innovations and drones or workshops on business evaluation and welfare robotics.

The day-to-day operation of the DesignLab is run by an interdisciplinary and international team of students. The DesignLab hosts courses like 'Design of Robotic Systems' or 'Philosophy of Technology'.

**Entrepreneurship in curricula**

The university offers a number of opportunities to students that wish to improve their entrepreneurial skills. Most study programmes at the University of Twente aim to stimulate entrepreneurial attitudes, emphasise designing solutions for complex issues and encourage students to be actively involved in learning processes and to constitute the learning environment. Although there is no system in place by which all students of the university are exposed to entrepreneurship during their studies the university makes an effort to have all students do so.

A new interdisciplinary bachelor programme was added to the university’s programme offerings in 2013: the Academy of Technology and Liberal Arts & Sciences (also known as ATLAS, or University College Twente [4]. The ATLAS-programme is a three-year bachelor-level programme taught entirely in English. It is an honours programme for talented students, bringing technology and society together and aimed at educating a different kind of engineer and global citizen. ATLAS students are involved in societal innovations, making use of the latest technologies, around cluster themes such as Human Movement, Systems of Sustainable Energy or Living at Extreme Conditions. The curriculum includes a personal pursuit part, in which students focus on their personal interests in music, sports, a second language or development work. The educational philosophy at University College Twente is built on the premise that each student stands at the centre of her/his own learning and personal development. It is the students’ responsibility to shape their educational path by building on their talents.
In the valorisation program carried out by Novel-T (see above), the goal was set that, by the year 2020, all students will have come into contact with entrepreneurship education at some point during their studies. The university? s education philosophy was translated into the TOM model, which stands for Twente Educational Model [5]. TOM involved a major reform of the university? s curricula. All bachelor programmes at the University of Twente nowadays are designed based on the TOM model. One of the seven learning objectives of TOM is: that a University of Twente graduate will have an entrepreneurial attitude. Most programmes (bachelor, master) devote attention to this goal, some more than others.

To this end, the university offers an elective programme (a minor), six Bachelor modules and three Master modules, often tailored to the students? degree programme. In recent years, the number of students who have followed entrepreneurship education as part of the modules in their degree programme has increased. In the year 2015, 666 students (out of 5,260, about 12%) participated in such an entrepreneurship module. They gained a total of 6,100 credits (ECTS). Although entrepreneurship education is not yet a mandatory part of all curricula, the project-based education that is now a staple throughout the university? s educational programmes requires students to cultivate their talents in terms of taking initiative, being creative, work planning and carrying out team-work. The university? s NIKOS group (see below) is very much involved in designing and teaching (part of) the entrepreneurship-oriented modules.

In recent years, the university has invested heavily in educational innovations and entrepreneurship education. Figure 2 below shows some of the entrepreneurship elements e.g. modules, electives, internship opportunities, included in the university? s three-year bachelor? s and master? s programmes, as well as some of the options offered to PhD candidates and students participating in the university? s summer school or its pre-university events. Entrepreneurship education may be part of the curriculum or the extra-curricular activities offered to students. It should be seen as a complement to the entrepreneurship support offered through Novel-T.

Creating an entrepreneurial mindset is also a goal of the training opportunities offered to the university? s regular staff (including its PhD candidates). Improving entrepreneurial attitudes among PhD students and lecturers is one of the objectives of the training packages offered to the university? s academic staff - both the existing and the newly recruited staff - in its efforts to improve the teaching skills of the lecturers and the attention for entrepreneurship in the curriculum (see the bottom rows of Figure 2 overleaf).

For graduates that already obtained a Master? s degree, the university offers a number of PDEng programmes. A PDEng is a Professional Doctorate in Engineering. It is a two-year design-oriented post-master programme, focussing on the direct needs of industry. The training is organised in consultation with the business community. There are four PDEng programmes [6]: Civil Engineering, Energy & Process Technology, Maintenance and Robotics. The programmes combine scientific research with an industrial context, thus ensuring that the trainees are able to produce high-quality innovative designs for a business. Trainees are prepared to deal with complex issues in a multidisciplinary setting.

Figure 2: Entrepreneurship education offered by the University of Twente
A recent innovation is the industrial doctorate. A PhD position where the PhD candidate is employed by the university and is conducting research on the interface between applied research and scientific research. Together with its industrial partners the university expects to invest €40 million over the next few years in this initiative known as the Impulse PhD programme in order to establish 100 PhD positions. The positions concern research projects that fit within five important research themes for the industry: advanced materials, advanced manufacturing & mechatronics, medical technology & devices, wireless & remote sensors and safety & security. The university, together with the Top Sector High Tech Systems & Materials and the business sector each pay half of the PhD positions. Up to 2016, 30 PhD positions have been awarded with a total research volume of €12.4 million. The University of Twente will continue building strategic research programmes that will involve collaboration with industry.

Student Union

The Student Union is the university’s umbrella organisation for all student associations of the University of Twente. It is the only such student organisation in the Netherlands. Together with the Executive Board of the university, the Student Union co-determines the policies affecting the social life of students on the campus. It oversees all activities in the area of sports, culture and student housing and helps manage the campus facilities, including some dedicated buildings. The Student Union also organises various student events, such as fairs where students can meet companies. Almost two-thirds of the university’s students are a member of the Student Union. Upon the start of their university career, each student when registering is asked to indicate whether she/he is interested in entrepreneurship. The Student Union is
following up on this.

The Student Union is stimulating entrepreneurship among students through Hardstart, its association (community) for entrepreneurial students. It is run by students and provides services to students that wish to start-up their own business. Hardstart collaborates with Novel-T in realising this. At the university there are also other student-run associations that help students in getting an internship in a company or act as an intermediary in giving students an opportunity to carry out a consultancy job for a company. About 3.5% of the university’s students are entrepreneurs while studying.

NIKOS

Acting as an expertise centre on entrepreneurship, NIKOS (Netherlands Institute of Knowledge Intensive Entrepreneurship) carries out research on the theme of entrepreneurship. NIKOS is part of the university’s Faculty of Behavioural, Management and Social Sciences. Its research focuses on three themes: (1) Technology Venturing & Entrepreneurship, (2) Collaborative Innovation & Networks, and (3) Entrepreneurial Behaviour & Leadership. NIKOS also is actively involved in teaching courses for Bachelor and Master’s students on the area of entrepreneurship and innovation. These courses are delivered either directly as NIKOS activities or in collaboration with the university’s faculties and its research institutes. For about 150 business administration students a year at Bachelor level an entrepreneurship course is offered. At the Master’s level, about 30-50 students follow each year a study track on entrepreneurship and innovation. NIKOS offers a one-year master specialisation in Entrepreneurship, Innovation and Strategy and a Double Diploma in Innovation Management & Entrepreneurship together with the Technical University Berlin. Furthermore, NIKOS helps organise the university’s summer school EntrepreneurialU (as part of the university’s CuriousU summer school) and it is involved in training the trainers about entrepreneurial skill development.

NIKOS staff is involved in the TOP programme and in 2009 one of its professors (Aard Groen) created VentureLab, a research-based business development programme for technology-based startups. Today, the VentureLab programme is part of VentureLab International and operates at two locations: VentureLab East - at the University of Twente connected to NIKOS - and VentureLab North - in the city of Groningen, connected to the University of Groningen’s Centre for Entrepreneurship UCGE. VentureLab International offers an MBA-level business development programme that aims at accelerating growth for young businesses. It offers a one-year tailor-made programme that includes personal coaching, training sessions, as well as access to experts, labs, technologies, office space and equipment. VentureLab participants are also enterprising university researchers. They combine the business development support experience and networks of NIKOS and SKIO, the Saxion University of Applied Science’s Knowledge Centre for Innovation and Entrepreneurship.

The University of Twente’s entrepreneurial support system presents a dense and well-connected network that facilitates interaction and exchange of know-how. The university continues to strengthen this network further in order to remain Europe’s leading entrepreneurial university?. Certainly, the role of the university in the Twente ecosystem has led to the development of Twente as one of the leading technological regions in the Netherlands.
References

This case study draws upon the following literature:


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https://www.ub-cooperation.eu/index/casestudies [7]


University of Twente website www.utwente.nl [9]

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1 For more background information on the university the reader is referred to case study: Leadership and Governance at the University of Twente


Links