

Valorisation Agenda

TU Delft 2020



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CONTENTS

FOREWORD

1. TRENDS IN THE ENVIRONMENT	7
2. TU DELFT VALORISATION PROFILE	10
3. ENTREPRENEURSHIP AND INNOVATION	14
4. ALLIANCES WITH BUSINESSES	28
5. RESEARCH FUNDING	34
REFERENCES	57

FOREWORD

The transfer and application of knowledge for the benefit of society and the economy are becoming increasingly important to the innovation policy of national and international government bodies. Technical universities play a prominent role in this. TU Delft regards it as its mission in society to deliver pioneering technological/scientific solutions that have a significant impact in helping achieve sustainability and a healthy economy.

In the past few years, valorisation has developed into a full third core activity of our university, after education and research. Examples of valorisation activities that will be strengthened in the coming years are entrepreneurial education and facilitating the start-up of new businesses, as well as cooperation with companies in order to jointly participate in large research consortia and to conduct contract research.

The 'TU Delft valorisation programme' launched in 2004 has laid the foundation for the university's valorisation profile. This is partly due to the programme playing a leading role in the realisation of the university's valorisation ambitions, as stated in the vision document 'The Next Perspective' adopted in 2006. Both our academic and support staff have ensured this programme's success.

This success will be the foundation for further successes in the coming years. In order to ensure that this occurs, this valorisation agenda defines a number of actions and ambitions in the different fields related to valorisation.

Special attention will be paid to improving TU Delft's activities in the field of entrepreneurship. The coherence of the entrepreneurial education and the research in this field, the YES!Delft incubator and the active support in the field of intellectual property are presented under the title 'entrepreneurship@tudelft'. The TU Delft Holding, with its sub-holding Delft Enterprises, plays an important facilitating role in this. Furthermore, some faculties will launch a pre-incubation programme.

Within the framework of creating this document, the faculties have set their valorisation research priorities. In order to strengthen efficient support for the valorisation activities at the centralised and decentralised levels, attention will also be paid to the manner in which other universities have organised their supporting organisation.

We are confident that TU Delft will continue to profile itself as a university with an ambitious and successful valorisation programme in the coming years.

Karel Luyben
Rector Magnificus

Paul Althuis
Valorisation programme director

Inashco

Inashco (Incinerator Ash Company) was founded in the Netherlands in 2008 and offers a pioneering solution, developed in collaboration with TU Delft, for the recovery of large amounts of aluminium and other non-ferrous metals (lead, copper and zinc) from the bottom ash of waste energy plants.

The solid metals can be recovered using existing technology. In addition to the larger metal parts, many fine metals are located in the bottom ash. With Inashco's solution, it is also possible to recover the small metal parts, with the added benefit of removing enough contaminating metals from the ash to enable its application in the concrete products industry as an alternative raw material.

This recycling solution is an internationally unique and patented concept. Inashco is a daughter company of the Fondel Group, a global player in the field of metals and metal industry that has branches in Europe and the United States.



1. TRENDS IN THE ENVIRONMENT

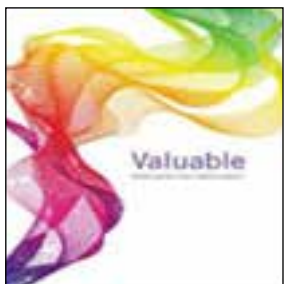
A number of macro developments influence valorisation. Examples include a changing government innovation policy, the obligatory – as of 2016 – 2.5% contribution from the public resources of universities to valorisation, and the increasing importance of knowledge-intensive regions and national and international cooperation within consortia of companies and knowledge institutions. These are important factors in determining the valorisation strategy and approach of TU Delft.

New scientific and economic world order



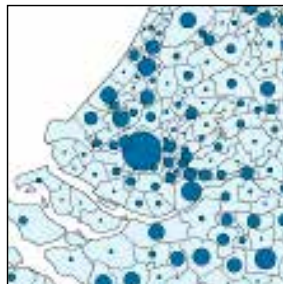
The dominant role of the European Union

A changed government innovation policy



2.5 % Contribution to valorisation

Increasing importance of knowledge-intensive regions



Social responsibility

New scientific and economic world order

Increasing numbers of companies are basing



themselves in emerging economic regions where vast amounts of money are being invested in higher education, science and

technology. Examples of these regions include the BRIC countries, but also South Korea and the countries in the Gulf region. The demand for highly educated graduates in these knowledge economies, especially in the engineering sciences, is growing apace. These regions provide opportunities for scientific collaboration, access to international funds, collaboration with the business community, and the related valorisation of knowledge.

The dominant role of the European union



'Brussels' is a dominant factor for many European universities, partly due to the Horizon 2020 programme, the Knowledge & Innovation Communities

(KICs) and the individual research grants. The social challenges and industrial leadership will place greater emphasis on innovation and collaboration with the business community. In order to successfully operate within the EU, it is essential for universities to demonstrably collaborate with European sister institutions and with the business community. Moreover, the economic crisis in the EU countries leads to pressure on the EU budget. This will have consequences for the European spending capacity for knowledge and innovation in the coming years.

A changed government innovation policy

Universities are highly dependent on direct



government funding. This also applies to government resources that are distributed as indirect funding through NWO and STW.

As a result of the economic recession, the universities' government funding revenue is stagnating. In addition, the government has implemented a change of course for the subsidisation of research by discontinuing the FES fund's strategic innovation funding. The focus is on the programmatic use of government resources, especially for the benefit of nine Top Sectors: water, food, horticulture, high-tech, life sciences, chemicals, energy, logistics and creative industry. Special emphasis is placed on measures profitable to the business community and it is hoped that this will lead to private contract funding investments in university research and the translation of knowledge into new products, services and processes for the market.

2.5 % Contribution to valorisation

The strengthening of valorisation at universities

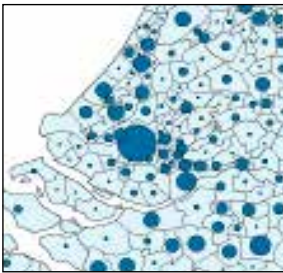


is part of the Outline Agreement between the VSNU and the Dutch Ministry of Education, Culture and Science, as well as the Performance

Agreements subsequently made between the individual universities and the ministry. Universities must contribute at least 2.5% of the public research funding to valorisation in 2016. In addition, agreements have been made for the development of indicators that can be used to ensure that the valorisation efforts and

results become more visible or measurable. As a starting point, every university makes a choice related to its own ambitions and profile. The VSNU report 'Een Raamwerk Valorisatie-indicatoren' ('A Framework of Valorisation Indicators') and the report 'Waardevol – Indicatoren voor Valorisatie' ('Valuable - Indicators for Valorisation') from the Rathenau Institute serve as guidelines for the selection of valorisation indicators.

Increasing importance of knowledge-intensive regions



Cooperation and open innovation are crucially important to successful international competition. In a world in which innovation clusters

drive future economic growth, it is essential that regional companies, government bodies and knowledge institutions cooperate in order to profit from each other's strength and take on the national and international competition together. Knowledge institutions, especially technical universities, are an important factor in the generation of economic spin-offs and opportunities within a region.

Social responsibility

More and more people want to do something meaningful for mankind and society, and



are concerned about the future of our planet. Organisations increasingly acknowledge the importance of 'corporate social responsibility' and

social impact. In seeking to achieve economic results (profit), social considerations (people) and ecological preconditions (planet) are important

factors. Involving social partners and citizens in scientific and technological innovations, and the application thereof, promotes the social impact of organisations and contributes to sustainable solutions to social issues. These developments have led to the EU programme Science with and for Society.



2. TU DELFT VALORISATION PROFILE

TU Delft views valorisation as the process of creating value from knowledge by making knowledge suitable and/or available for economic or social purposes, and by ensuring that it can be translated into competitive products, services, processes and new business activities. Valorisation mainly concerns the transfer and application of technical/scientific knowledge, with the aim of contributing to sustainable, innovative solutions to social issues. At the same time, the university generates additional revenue by capitalising on knowledge by, among other things, marketing inventions, conducting contract research for the business community, and successfully submitting research proposals at the national or EU level. The TU Delft valorisation programme launched in 2004 has laid the foundation for TU Delft's valorisation profile.

Valorisation is a full core activity, like education and research, but it is not an autonomous activity. At TU Delft, the transfer of technical and scientific knowledge is rooted in world-class scientific research. The success of valorisation is therefore primarily dependent on our academic personnel and their performance. At TU Delft, a growing number of scientists is actively engaged in the transfer and application of technical/scientific knowledge for the benefit of industry and society. It is therefore essential that the latest insights from scientific research be shared

with new generations of students. The training of engineers is the most important social task of TU Delft. The Delft Engineer of the future learns to apply technical and scientific know-how and to translate it into innovative product and process designs. During their study, they will follow educational modules focused on entrepreneurship. TU Delft encourages its students to familiarise themselves with the opportunities provided by entrepreneurship and offers support in the form of coaching, training and access to facilities.

In October 2012, the TU Delft Executive Board appointed the professors Sybrand van der Zwaag and Luuk van der Wielen as Distinguished Professors in the fields of Material Science and Biobased Economy

respectively. They have both distinguished themselves for a long time by the successful valorisation of scientific and technological knowledge for industry and society. By granting them the position

of Distinguished Professor, TU Delft has provided them with the opportunity to focus on knowledge valorisation beyond the confines of their chair and TU Delft.



The university regards providing online, publicly available education via, for example, the Massive Open Online Course (MOOCs) as part of its social task. People all over the world are given the opportunity this way to receive education, especially in underprivileged regions. On the other hand, TU Delft also offers 'Education for professionals'. This includes post-initial education, which provides professionals from the business community with the opportunity to further develop their technical and business skills, and also includes two-year technological design study programmes (PDEng), which provide a solid basis for a career in the high-tech industry.

At the European and national levels, TU Delft positions itself as a collaborative partner in innovation clusters of businesses, governments and other universities. This 'Triple Helix' collaboration is crucial to being successful in the Top consortia for Knowledge and Innovation (TKIs) and EU consortia. Improving the partnership between TU Delft and Dutch

and European companies and multinationals ensures that these consortia act decisively in order to quickly take advantage of potential opportunities. In addition, the university hereby aims to substantially enlarge the scope of the contract research conducted with the national and international business community.

For TU Delft, there are also opportunities for profiling outside of the EU, especially in the BRIC countries. This includes establishing research centres in emerging economic regions in countries such as China, Brazil, India and Russia, but also in Singapore and Vietnam, which grant the scientists of TU Delft access to funds, laboratories and the many talented young researchers in those countries, and which provide the Dutch business community with significant inroads.

TU Delft scientists work with specialists from around the world on solutions that have an impact on the quality of life of a great number of people. The Delft University of Technology





TU Delft innovation campus (from the inaugural address of Theun Baller, dean of the faculty of Mechanical, Maritime and Materials Engineering, 3mE)

Foundation is seeking the support of private and social partners in order to facilitate further excellent, pioneering, scientific and highly focused applied research and to enable results to be achieved more quickly.

The Science Park Technopolis is part of the TU Delft campus and provides an attractive and stimulating location for international high-tech companies and knowledge institutions. There is also room available for technostarters. The YES!Delft incubator, which – as an extension of the activities of TU Delft – helps scientists, students and (young) professionals to market their technically innovative ideas, is situated in the science park. A number of faculties are running a pre-incubation programme that offers students at the faculty the opportunity to become acquainted with entrepreneurship.

In order to facilitate these activities, TU Delft Holding B.V. – a 100% subsidiary of TU Delft that functions as an extension of the activities of the university – offers, among other things, fiscal-

legal expertise to technostarters originating from the patent portfolio of TU Delft. The holding also participates in the creation of funds for financing starting businesses. In addition, the university actively supports scientists and students in the area of Intellectual Property (IP).

TU Delft contributes to an economically strong and innovative region with its innovation campus and is therefore an attractive partner for regional knowledge institutions, companies (such as SMEs) and governments. The focus here is on regional innovation clusters in the field of cooperation between public and private sectors, such as 'Medical Delta', 'Cleantech Delta', and 'Safety and Security Delta'. TU Delft participates in the Regional Development Company (ROM) InnovationQuarter, which is aimed at development and (open) innovation within these regional clusters. In addition, the focus lies on marketing and acquisition, and – via a future participation company – generating funding opportunities for participating parties.

Online education

TU Delft regards providing online, publicly available education as part of its social task. In 2013, the university started providing education via Massive Online Open Courses (MOOCs). Everyone in the world has free online access to this form of education, without prior education or any admission test. Part of TU Delft's knowledge is now available for people in regions where few opportunities exist, thereby providing a valuable contribution to their schooling and development.

At the end of 2013, the first two MOOCs offered by TU Delft, 'Introduction to Water Treatment' and 'Solar Energy', were completed. Both MOOCs had a large number of serious participants. In the first half of 2014, three new MOOCs were launched:



Introduction to Aeronautical Engineering



Next Generation Infrastructures



Introduction to Credit Risk Management

These five MOOCs are the first in a series of MOOCs to be developed in the coming years that are related to, for example, the activities of the Amsterdam Institute for Advanced Metropolitan Solutions (AMS), but are also related to the Climate KIC in the field of entrepreneurship.

Education for professionals

TU Delft offers 'Education for professionals'. This includes the two-year postmaster design study programmes (PDEng programmes) offered by the university for the fields of Life Sciences, (Bio)chemical Engineering and Civil Engineering. These programmes form a solid foundation for a career in the industry.

'Education for professionals' also includes the post-initial programmes specifically aimed at professionals and managers who already have some years of experience and wish to further develop their technical and business skills. The educational programmes on offer include postgraduate Master's degree programmes, short courses, study days, and symposia and in-company programmes for companies and governmental bodies that wish to strengthen their innovation power. In addition, short courses, study days and symposia are offered in a number of specific fields.



3. ENTREPRENEURSHIP AND INNOVATION

TU Delft regards facilitating and promoting the transfer and application of knowledge as its social mission. This means the translation of knowledge into competitive products, services, processes and new activities. In order to strengthen these activities, TU Delft focuses on the stimulation of entrepreneurial activities by offering entrepreneurial education, the YES!Delft incubator and active support in the field of Intellectual Property (IP), all under the title of 'entrepreneurship@tudelft.nl'. The TU Delft Holding, with its sub-holding Delft Enterprises, plays an important facilitating role in this process. Intensive collaboration with the business community is crucially important to supplying society with the developed products and services. TU Delft is committed to improving and expanding the cooperation with the business community at the international, European and national levels. Cooperation with regional knowledge institutions, companies and governmental bodies – by means of regional innovation clusters, for example – plays a significant role. The TU Delft innovation campus, which includes Science Park Technopolis, makes TU Delft an important collaborative partner for an economically strong and innovative region.

3.1 Entrepreneurship@TUDelft

Entrepreneurship is and will remain an important theme for both students and (young) researchers at the TU Delft in the coming years. Entrepreneurial education is therefore very important, presenting them with the possibility of becoming independent entrepreneurs. The region has a high-quality climate for starters. The YES!Delft incubator facilitates the start-up of promising technology-driven companies. Building a strong portfolio of patents is one of the preconditions. TU Delft participates in potentially successful start-ups based on the business cases screened and scouted by Delft Enterprises.

TU Delft is a proponent of an integrated approach symbolised by Entrepreneurship@TUDelft. Both internally and externally, this will be the umbrella under which the entrepreneurial

activities will take shape. This integrated approach is dynamic and will be enhanced in the coming years with broader entrepreneurial education at all TU Delft faculties, the focused initiation of pre-incubation activities at the faculties, and the strengthening of all existing related networks. In addition, other faculties will develop initiatives for improving the content of entrepreneurship.

Entrepreneurial education and research

The Delft Centre for Entrepreneurship (DCE) is incorporated in the Technology, Policy and Management (TPM) faculty and offers (and develops) an inspiring and qualitatively excellent educational programme in entrepreneurship. Entrepreneurial courses are offered for all education types (Bachelor, Master and PhD). The courses on offer include three minors. In addition, other faculties have also actively

responded to the demand for education in this field and will launch a mentor programme.

Furthermore, the DCE will focus on pairing the education with research programmes in the field of 'responsible innovation'. Existing research is combined to broaden and improve it, as well as to initiate new research; within this framework, a full professor of Entrepreneurship will be attracted. The multi-disciplinary programme covers areas such as marketing, finance, strategy, e-business, entrepreneurial law and patent law. Through these research programmes, DCE will make a contribution to the monitoring of and research into the development of technostarters.

TU Delft's participation in the Climate KIC and the ICT KIC provides an opportunity for diversifying the entrepreneurial education offered. An example of this is the 'Clean Tech Challenge'. This provides a boost to initiatives at the EEMCS and IDE faculties. At the IDE faculty, a promotion study of the possibilities of a Climate KIC Master's programme at the European level was launched, and the faculty will also introduce a focused elective subject in this area in 2014. The Delta Technology and Water valorisation programme (financed by the ERDF programmes of the EU) will enable the establishment or improvement of initiatives within the CEG and AS faculties.

A number of faculties will launch focused pilots in the form of a pre-incubation programme. This offers students who are in the phase between graduation and the selection process for admission to an incubator the opportunity to acquaint themselves with entrepreneurship. This will be organised at the Industrial Design Engineering (IDE), Electrical Engineering, Mathematics and Computer Sciences (EEMCS) and Aerospace Engineering (AE) faculties in the upcoming period. Eventually, other faculties

will also likely initiate similar pilots, whereby a faculty network of mentors has to support starting student entrepreneurs

YES!Delft

Making students and staff aware of the opportunities of entrepreneurship and the practical support provided for the establishment and development of a company were two of the factors that led to the success of the YES!Delft incubator, located in Science Park Technopolis.

YES!Delft was established in 2005 and offers promising starting companies coaching, training, facilities and access to relevant networks (investors/customers/talent). Approximately 130 technostarters have started under the umbrella of YES!Delft. These are companies that have an impact on different technical sectors, such as medical technology, clean tech, ICT, industrial applications and consumer products. Only a very small number of these eventually ceased operation. The climate for starting businesses at the TU Delft campus, as well as in and around



Delft, is therefore highly beneficial and has a positive effect on the economic development in the region.

YES!Delft has the ambition to become one of the pioneering incubators in the Netherlands and Europe in 2016. To achieve this, further professionalization was implemented in 2012. Furthermore, the quality of the services for the technostarters is constantly being assessed





and, when necessary, improved. Opportunities for closer collaboration with incubators in the region, such as those in Leiden and Rotterdam, are being investigated.

YES!Delft is funded to a significant extent by TU Delft and partly by the Delft municipality and TNO. The specific aim for the coming years is to attract more sponsors from the business community. To this end, a YES!Delft Business Club will be established and an active alumni policy will be implemented, among other measures.

The aim of YES!Delft is to create 'tomorrow's leading firms'; for this reason, the focus will specifically be on selecting technostarters that show a promising growth potential. The goal is not to ensure the highest number of technostarters per year, but mainly to provide support to qualitatively excellent starters. This means that an annual number of approximately 25 starters will likely enter YES!Delft in the 2014-2020 period; the potential starters will be critically evaluated on whether or not they will be able to (continue to) fit in with the YES!Delft programme during the maximum four-year period of residence. In addition, two technostarters in the growth phase (at least twenty personnel members) should be allowed to progress each year. These so-called 'expanding companies' should be able to remain on the campus. To this end, a second building is expected to be constructed in 2015 at the Science Park Technopolis with the support of the Delft municipality. This new building will also offer specific possibilities for biotech companies.

The strengthening and expansion of the entrepreneurial education at TU Delft has contributed to a greater awareness among students of the fact that entrepreneurship is a promising option after graduation. In order to further increase this awareness among both TU

Delft students and researchers, YES!Delft has been actively implementing an inspiration and communication programme in recent years. This programme covers, among other things, the organisation of inspirational lectures and workshops, as well as the Delft Entrepreneurial Scientist Award (DESA), which rewards and encourages entrepreneurship among researchers. YES!Delft Students is active in getting students more closely involved in these inspiration and communication activities.

In addition to the technostarters, TU Delft wants to pay attention to creative starters, mainly originating from the Industrial Design Engineering and Architecture faculties, with the most important objective being making a contribution to solving social problems with 'design driven innovation' and creating economic value with technical, innovative and scalable products.

Intellectual Property (IP) policy

TU Delft is committed to implementing a professional IP policy for supporting scientists and students in the coming years. Important goals in this respect are ensuring access to commercially applicable technologies for market parties and collaborating with the industry on projects.

The patent protection of developed technology allows companies or investors to exploit inventions. In addition to selling IP and supplying market parties with licences, another aim is the creation of spin-outs arising from knowledge developed by TU Delft. TU Delft participates in a number of these starting companies through Delft Enterprises, which is part of TU Delft Holding. The 'profit' or the added value from the patents not only benefits the university itself, but also others.

When securing research assignments from the

industry – in the form of contract research, for example – arrangements concerning IP will be included in the cooperation agreement and/or framework contract.

The process of transferring and applying IP requires an intensive collaboration between the knowledge transfer experts of the Valorisation Centre and the researchers and support staff at the faculties. In the coming years, a joint effort will be made to increase the knowledge and awareness of this subject for all those involved. In addition, the screening and scouting process will be further professionalised, the researchers' insight into their field of research being a determining factor for success. In 2014, a central approach will be developed for the processing of IP applications from students and researchers, as well as of IP agreements with third parties.

Regarding IP, TU Delft's long-term strategy will focus on describing Market Technology Combinations (MTCs) in research areas that are important to TU Delft. The research agendas of the TU Delft faculties and institutes are of prime importance in this regard. This approach promotes strategic long-term relationships with external parties and the active development of IP from knowledge acquired. In addition, the university aims to include an 'IP paragraph' in every research plan as a fixed element.

TU Delft aims to make the IP portfolio as cost-effective as possible in the coming years. This doesn't necessarily mean that the university is committed to creating as many patented inventions as possible and earning back the direct costs of the IP portfolio each year. The focus will mainly be on improving the quality of IP and a professional approach. Factors such as the added value of IP for society and industry, and revenue related to IP – such as a successful collaboration with a company, for example – also

contribute to this goal.

TU Delft Holding B.V.

TU Delft Holding B.V. was founded in order to partly implement the TU Delft valorisation policy and ensure the realisation of the university's valorisation objectives, insofar as their implementation occurs through its own legal entities. Within the holding company, expertise is available concerning the following:

- Relevant networks in industry, venture capitalists
- Legal and financial structures with regard to (the establishment of) participations
- Coaching and supervision of participations
- Administrative aspects, consolidation and valuation issues with regard to (majority) participations
- Taxation and regulations

TU Delft is participating in the participation fund of the Regional Development Company InnovationQuarter. This participation is incorporated into TU Delft Holding. Attracting and developing funding instruments in the near future through this participation fund is one of the aims of TU Delft Holding, which will lead to an increase in scale.

TU Delft Holding has two sub-holdings:

Delft Enterprises

An important activity of TU Delft Holding – together with partners from the industry, the financial world and the government – is the realisation of financial instruments that can be used by technostarters. These starting companies initially often cannot apply for traditional funding instruments (bank loans, research subsidies or venture capital) due to the greater risks or the applied nature of the activities. It is therefore necessary to set up 'proof-of-concept' funds, 'pre-seed' funds and/or seed investment funds in order to develop

findings or commercialise knowledge. One example is the creation of a proof-of-concept fund for MedTech (together with the EMC and LUMC academic medical centres). This sub-holding will incorporate innovative companies arising from TU Delft's expertise. TU Delft aims to ensure that these companies will eventually become independent.

- In the coming years, the university will remain committed to the cost-effective functioning of the Delft Enterprises sub-holding company and its participations. This involves ensuring transparency with regard to income and expenses, as well as fiscal operations.
- A one-stop-shop approach will be developed for graduates and researchers who want to start a business at TU Delft.

TDH Services

The sub-holding company TDH Services B.V. includes service companies that perform activities that are an extension of the activities of TU Delft. Examples include the YES!Delft incubator, the Bioprocess Pilot Facility and – recently – the Holland Particle Therapy Centre, Green Village and the legal entities established for the benefit of the research centres abroad.

- The relationship between the activities of the companies in this sub-holding and the primary processes of education and research of TU Delft will be made more transparent.
- At TDH Services, a number of its legal entities, including Green Village, Holland PTC and the foreign research centres, will receive active legal, financial and fiscal support.

TU Delft is the sole owner of TU Delft Holding, which has a General Meeting of Shareholders and a Supervisory Board. The two sub-holding companies will most probably each get their own Supervisory Board in the coming period.

Entrepreneurship@TUDelft

What will TU Delft do?

General

- Integrated development of TU Delft entrepreneurial activities – entrepreneurial education, YES!Delft incubator, IP policy, TU Delft Holding – under the name 'Entrepreneurship@tudelft'.

Entrepreneurial education and research

- Expand the curriculum and teaching capacity in the field of entrepreneurship – both at TPM (DCE) and at the other faculties.
- Attract a full professor of Entrepreneurship to act as the figurehead of the educational and research activities of the Delft Centre for Entrepreneurship (DCE).
- Strengthen the cooperation with Leiden University and the Erasmus University of Rotterdam in the area of entrepreneurial education.
- Improve the entrepreneurial education at the faculties of TU Delft through participation in KIC programmes.
- Launch pre-incubation pilots at TU Delft faculties, including IDE, EEMCS and AE.
- Create a network of mentors for starting student entrepreneurs.

YES!Delft

- Completing the professionalization process – including the new organisational structure – and continuous monitoring of the quality of the service.
- Investigating opportunities for closer collaboration with incubators in the region (such as those in Leiden and Rotterdam).
- Specific commitment to attracting more sponsors from the business community in the coming years. For this purpose, a YES!Delft Business Club will be established and an active alumni policy will be implemented, among other measures.

Technostarters

- Receive and support 25 technostarters per year on average in the 2014-2020 period, while critically evaluating whether starting companies will be able or not to (continue to) fit in with the YES!Delft programme during the maximum four-year period of residence.

Accommodation and facilities

- Realisation of YES!Delft2 to support the growth of starting companies with specific attention to biotech companies.





Entrepreneurship@TUDelft

What will TU Delft do?

Intellectual Property (IP) policy

- Strengthen the collaboration between knowledge transfer experts of the Valorisation Centre and scientists and support staff of the faculties, by
 - Continuing to execute a training and awareness programme.
 - Structuring and professionalising the screening & scouting process, using each other's expertise.
- In 2014, a central approach will be developed for the processing of IP applications from students and researchers, as well as IP agreements with third parties.
- Developing Market Technology Combinations (MTCs) in research areas that are important to TU Delft. The research agendas of the TU Delft faculties and institutes are of prime importance in this regard.
- Ensuring that the composition of the TU Delft IP portfolio is as cost-effective as possible, taking into account factors such as the added value of IP for society and industry, and indirect revenues related to IP, in addition to earning back the direct costs of the IP portfolio.

TU Delft Holding B.V.

- Continue and expand seed, pre-seed and proof-of-concept funds through, for example, the ROM InnovationQuarter.
- Ensure the cost-effective functioning of the Delft Enterprises sub-holding company and its participations.
- Implement, through the Delft Enterprises sub-holding company, a one-stop-shop approach for graduates and researchers who want to start a business at TU Delft.
- From the TDH Services sub-holding company, actively support – legally, financially and fiscally – a number of legal entities that fall under this sub-holding company, such as Green Village, Holland PTC and the foreign research centres.
- The establishment of a separate Supervisory Board for both TDH Services and Delft Enterprises.



The Delft Innovation Award was created in 2009 to bring attention to the most noteworthy innovations of TU Delft and as a token of respect for the scientists involved.

At the end of 2013, the Executive Board decided to place this award in a broader framework through the development of the 'DIG-it! (Delft Innovation Gallery)' programme, which has the aim of assisting TU Delft scientists and students with profiling their innovative research and/or products in society.

Xplore, Xplain & Xpose.

With these three steps, DIG-it! hopes to bring the innovative ideas that exist at the university closer to reality and to seek synergy for the purpose of developing these ideas further. During the annual DIG-it! day, the participants are provided with a platform for presenting their ideas. Additionally, various DIG-it! awards are presented on this day for the most creative and exciting innovative ideas of

the university.

The DIG-it! programme brings attention to innovative ideas all year long. In addition to the annual day, these ideas are presented in the following ways: an exhibition of the 5-10 best innovations of each faculty, alumni events, the TU Delft Zomerfestival (Summer Festival), a DIG-it! website and presentation material for companies.

The activities of the DIG-it! programme match those of the YES!Delft incubator, which stimulates researchers and students to start their own business. Furthermore, there are also opportunities for becoming involved in various initiatives. Examples include the activities of the Green Village, which will provide companies, students and scientists with an inspiring environment for jointly working on sustainable developments, especially those related to energy. Another example is the travelling D-exto (Delft Experience Tomorrow) sustainability pavilion,

which allows TU Delft, together with other campus organisations, to show what sustainable innovations are being developed on the campus.

In addition, DIG-it! has overlaps with the university's 'Delft Social Impact' initiative, which aims to highlight the social aspects of the technical-scientific solutions for social issues and get more people involved in technological developments. The latter aim can be achieved by means of, for example, co-creation, where the product user is not just seen as a user, but is also involved in the entire innovation process.

3.2 Innovative region

TU Delft is committed to the goal of an economically strong and innovative region, and will partly realise this goal by being an attractive partner for regional knowledge institutions, companies and governmental bodies. The focus is on strengthening regional innovation clusters in the field of cooperation between public and private sectors, such as Medical Delta, Cleantech Delta, and Safety and Security Delta. The university is also committed to the development of campuses for a number of specific fields of knowledge. The collaboration with SMEs is strengthened by improved access to the academic expertise of TU Delft and by further professionalising the innovation networks for the benefit of SMEs. In addition, the university offers attractive locations for (SME) companies with a significant R&D component. TU Delft participates in the Regional Development Company (ROM) InnovationQuarter.

Regional innovation clusters

Innovation clusters at the regional level have a positive influence on the promotion of open innovation, the creation of new activities and economic growth. The focus is on:

- Creating an attractive climate for the establishment of companies and knowledge institutions that want to collaborate on specific innovation themes.
- Setting a common agenda and objectives with regard to innovation and economic growth for the parties involved.
- Increasing and facilitating the opportunities for meeting and networking between parties.
- Building critical mass in the field of knowledge development and business activities.
- Connecting local innovation clusters with relevant national and international innovation clusters.

Regionally, TU Delft is active with regard to, among other things, socially relevant themes in the field of medical technology and environmentally responsible technologies, especially within the LDE partnership with Leiden University and the Erasmus University Rotterdam (in other words, 'medical tech' and 'clean tech'). In addition, these universities work closely together in the field of safety and security. In the coming years, TU Delft and its partners will invest more in the strengthening and growth of these innovation clusters.

Campuses

DTU Delft is actively committed to the creation of virtual campuses for specific areas of knowledge. These are virtual knowledge and innovation centres, potentially including physical work and meeting areas, where government bodies, regional knowledge centres and the business community can jointly examine complex issues and provide access to highly valuable knowledge, innovative activities and modern facilities. They can do this among themselves, but can also provide access to starting entrepreneurs, for example. The campuses contribute to the innovative and economic development of the region.

A successful example is the Biotech Campus Delft, an initiative of the university and DSM Delft, supported by the municipality of Delft and the province of South Holland, among others. At the Biotech Campus, there is close collaboration between the department of Biotechnology of TU Delft, DSM Delft, the Bioprocess Pilot Facility (situated on the grounds of DSM in Delft Noord) and companies such as Applikon Biotechnology (situated in the Science Park Technopolis Delft) and the Bioport Rotterdam. Starting and growing entrepreneurs are granted the opportunity to work on pilot projects related to the field of biotechnology and to develop commercial products by scaling up.

The Delft Building Technology Campus, an inspiring place where different parties combine, develop and implement their knowledge of construction, is still in development. In 2014, a physical work and meeting area will be created on the grounds of TU Delft. In this educational environment, there will be room for workshops, education and training.

TU Delft will remain committed to the development of the Biotech Campus and the Construction Campus, and will continue to actively participate in planning for new campuses.

SME

TU Delft wants to build a strong bridge between the development of knowledge and its practical application by small and medium-sized enterprises. In particular, this means supporting SME product, process and service innovation. It is therefore important that SME companies can easily find what they need at TU Delft, both in terms of available expertise and available research infrastructure. The following preconditions are important in this regard:

- Organised access to the right scientists.
- Access to national and international networks, as well as participation in the Top Sectors (Netherlands) and Horizon 2020 (EU) programmes through the above-mentioned scientists.
- IP policy that is focused on speed and transparency.
- The development of funding and networks for SME investors is facilitated by the ROM InnovationQuarter.

Strategic long-term cooperation with individual SME companies is often difficult to realise in practice and does not adequately match the innovation objectives and timetable of the company in question. TU Delft's collaboration with SMEs therefore mainly involves relatively

short and applied projects, as well as contract research. In this regard, TU Delft is especially committed to collaboration with SMEs in innovative, thematic and regional networks. By clustering questions and involving more parties in an innovation or research project, accessibility will be improved for SME companies. Examples include Medic (medical innovations), Greenport Horti Campus (horticulture) and ICT Kring Delft (platform for ICT companies).

Together with the Delft knowledge institutions, knowledge-intensive companies in Delft and the Delft municipality, TU Delft is active in strengthening an innovation network. Delft is committed to a SME agenda for strengthening the technology and company clusters in the Delft region. Delft Smart City, Delft's ambition to become an important testing ground for new technologies and innovations, is part of this agenda.

Science Park Technopolis

Science Park Technopolis is part of the Delft University of Technology campus and is an attractive place for the establishment of knowledge-intensive spin-offs, research activities and companies that the university would like to collaborate with. Science Park Technopolis provides significant added value to the entire region.

An important factor for the success of Science Park Technopolis is that scientists, the government and the business community are easily able to formally and informally find and reach each other. All parties profit optimally from each other's presence. The university develops knowledge and shares this with the business community. Companies use that knowledge to develop new practical applications. The scientists then continue to build on this. In short, this is a successful way to enhance knowledge.

The Science Park Technopolis offers companies:





- A highly attractive and stimulating environment for cooperation and the transfer of knowledge in open innovation networks, in which high-tech companies can accommodate their research and production activities and develop them to the point of commercial success.
- A unique cluster of international technology companies, knowledge institutions and spin-offs in the direct vicinity of TU Delft and two reputable academic medical centres (Erasmus Medical Centre in Rotterdam and the Leiden University Medical Centre).
- A location in one of the top economic, infrastructural and logistical regions of Europe.
- Involvement in and responsibility for long-term investments in the quality of the establishment climate on the part of the local and regional authorities, as well as the national government.

The Reactor Institute Delft is located in the Science Park Technopolis. In recent years, a number of other companies established themselves here. 3M Nederland B.V. will establish itself here in 2014. The HollandPTC (Holland particle therapy centre) is also expected to be established at the science park. The YES!Delft incubator is also situated on the Technopolis grounds.

In addition to Science Park Technopolis, there are also other locations for (starting) companies to establish themselves in the Delft region, such as the Biotech Campus on the grounds of DSM. In accordance with TU Delft's campus vision, an empty space within the university's (faculty) buildings will become eligible to be rented out to third parties. Within the Technological Innovation Campus (TIC) partnership, the preconditions are being created for making the establishment of companies in Delft more attractive. Accessibility, housing for knowledge workers and (net)work events are some of the aspects involved in this.



Companies located at Science Park Technopolis

The establishment of two higher education institutes with technical study programmes in the western part of the TU Delft Campus contributes to the solidification of its reputation as an attractive location for innovative companies to establish themselves.

In the coming years, the university, together with regional government bodies, other knowledge institutions and the business community, will remain committed to the realisation of a bustling innovative ecosystem on and near the TU Delft Campus (in the ROM InnovationQuarter, for example). TU Delft aims to ensure that 15 to 20 new companies will establish themselves on the TU Delft Campus in the 2014-2015 period.

Regional Development Company (ROM)

TU Delft participates in InnovationQuarter, the Regional Development Company for South Holland province. The most important aims of the InnovationQuarter are employment growth, the strengthening of innovative power, the improvement of regional cooperation and investments in promising technological

companies.

InnovationQuarter will focus on three areas in the coming years:



- Development and innovation, coordinating and stimulating programmes and projects concerning the technological crossovers – with the Top Sectors, for example – within the three main areas of Clean Tech, Medical and Security.
- Marketing and acquisition, including the positioning, profiling, branding and (inter) national promotion of the region.
- Participation and financing, by means of, for example, offering promising innovative young companies, growing technology companies and structure-strengthening projects access to and support with a whole range of funding opportunities. The funding will be realised by external investors or by the participation company.

In order to prevent fragmentation, a number of existing adjoining organisations have been

integrated into InnovationQuarter. One of them is Science Port Holland, a partnership which includes the Delft and Rotterdam municipalities, which is focused on the development of a highly attractive and stimulating environment where high-tech companies can collaborate and transfer knowledge.

Additionally, InnovationQuarter's relationship with a number of other partnerships will be strengthened. Examples of these include Clean Tech Delta, Medical Delta and The Hague Security Delta.

The Ministry of Economic Affairs, the province of South Holland and the municipalities of Rotterdam, The Hague, Delft, Leiden and Dordrecht are among the entities that participate in InnovationQuarter. TU Delft is also a participant, as are its LDE partners, Erasmus University Rotterdam and Leiden University. The EMC and LUMC academic medical centres also participate.

TU Delft, the Erasmus Medical Centre, the Leiden University Medical Centre and others are working together on a treatment centre for proton therapy, called HollandPTC (Holland particle therapy centre). Its intended location is the Science Park Technopolis.

The treatment was developed in the United States and involves a very precise form

HollandPTC

of radiation by means of minuscule charged particles, such as protons. Thanks to these particles, tumours can be irradiated more precisely and effectively, causing less damage to the surrounding healthy tissue than would be the case with conventional treatments. The treatment therefore has a much greater chance of succeeding, while

the patient suffers fewer side effects. The aim is to treat the first patients in Delft in 2016.

In addition to offering optimum patient care, HollandPTC will also provide education and space for pioneering scientific research. In this way, the centre contributes to future breakthroughs in the fight against cancer.

Regional alliances

What will TU Delft do?

Innovation clusters

- In the coming years, TU Delft, together with its LDE partners and the ROM InnovationQuarter, will invest more in the strengthening and growth of innovation clusters in the field of medical technology (medical tech), environmentally responsible technologies (clean tech) and safety & security.

Campuses

- To strengthen regional cooperation, TU Delft will remain committed to the development of the Biotech Campus and the Building Technology Campus (in development), and will continue to actively participate in planning for new campuses.

SME

- Improving SMEs' access to the research infrastructure, the available knowledge and the national and international networks of TU Delft, allowing SMEs to participate in the Top Sectors and Horizon 2020.
- Consolidating and professionalising the cooperation and exchange of knowledge within existing innovation networks for SME companies.

Science Park Technopolis

- TU Delft remains committed to establishing a bustling innovative ecosystem on and near the TU Delft Campus in the coming years. The Science Park Technopolis is crucially important in this regard.
- The continued development of Science Park Technopolis will be realised in cooperation with (regional) authorities, other knowledge institutions and the business community, partly within the Regional Development Company InnovationQuarter and the Delft network.
- TU Delft aims to establish 15-20 companies on the campus in the 2014-2020 period.

Regional Development Company InnovationQuarter

TU Delft will actively contribute to realising the objectives of InnovationQuarter:

- Stimulate development and innovation.
- Marketing & Acquisition, including positioning, profiling and branding of the region.
- Organise a rotating function for funding and participation.
- Networking and lobbying.

TU Delft core values

Respect, integrity, expertise, involvement, transparency and avoiding conflicts of interest are the core values guiding everyone associated with TU Delft. The key guiding principle at TU Delft is trust. Trust means that all members of the TU Delft community adhere to the core values, are motivated by them and feel responsible for them.

These core values play an especially significant role in the broad field of valorisation. Much of what the TU Delft does is situated on the interface between the public and private sectors. Avoiding conflicts of interests is the norm in such situations. Scientists and support staff can be faced with dilemmas regarding contract funding activities or whether or not to accept additional positions. Translating knowledge into economically and socially valuable technological innovations and business activities is part of TU Delft's mission. Because the principles of scientists and scholars (such as impartiality) can be at odds with the exploitation of intellectual property and other forms of valorisation, technological research is faced with ethical challenges.

TU Delft Conflict-of-Interest Committee

TU Delft has a Conflict-of-Interest Committee, which is composed of external experts. This committee issues recommendations to the Executive Board on cases submitted to it concerning possible conflicts of interests involving staff members who are also engaged in market-related activities in addition to their position at TU Delft.

Examples of issues that the committee advises on: issues concerning financial cooperation structures, shareholdings and secondary employment – in fact on all dilemmas that may confront an organisation such as TU Delft involved in the process of valorisation.

TU Delft Ancillary Activities Regulations

TU Delft is an innovative university that is firmly positioned within society. The performance of ancillary activities fits within this identity, because these activities are often valuable to the professional development of employees and thus for TU Delft as well. However, the university, together with its employees, must ensure that the interests of TU Delft are not harmed. The rules are established in the TU Delft Ancillary Activities Regulations. It has been agreed with the Ministry of Education, Culture and Science and the Association of Universities in the Netherlands (VSNU) that all ancillary activities of employees that could affect the interests of TU Delft will be registered and published.

For more information on the core values of TU Delft:
<http://www.tudelft.nl/en/about-tu-delft/strategy/integrity-policy/>



4. ALLIANCES WITH BUSINESSES

TU Delft wants to substantially strengthen the alliances with businesses. The university has substantial ambitions in this area for the coming years. An important aim is the realisation of a greater volume of contract research with national and international companies. TU Delft has the brand and the unique technical-scientific research to realise this aim and thereby generate substantial revenues for the university. The focus here is on the major importance of intensive collaboration with market shapers (technology shapers and disruptive innovators). In most cases, these are innovative European companies and/or multinationals with a high brand index of science-driven creative start-up enterprises. TU Delft invests in short-term strengthening of the contribution of account managers, who will, if this is necessary or desired, provide the university scientists with advice and support regarding their specific knowledge and expertise in this area.

4.1 Current approach and results

With regard to account management, in recent years TU Delft has focused on a number of multinationals within the Top Sectors HTSM and Chemistry, such as Shell, DOW, Aramco, Philips and FEI, as well as a number of branch organisations mainly consisting of SME companies. This has both improved the university's relationship with these companies and led to an increase in joint projects. In addition, there is a growing need to regulate recurring issues relating to intellectual property, publications, directions, responsibilities, etc., in a framework contract. At the moment, TU Delft has entered into ten of such framework contracts, often within the 3TU partnership.

At the faculty (and departmental) level, the TU Delft scientists and the business community 'automatically' find each other, which leads to rewarding forms of collaboration. Examples of this can be found in faculties with a clear market or industrial profile, or with many alumni in that

market (TU Delft is already well-known to that target group), such as Aerospace Engineering, Maritime Engineering, Geosciences, Architecture and Industrial Design.

Dutch contract research

TU Delft is currently working with nearly all of the major R&D parties in the Netherlands (19 companies from the Dutch R&D top 30 published by Technisch Weekblad magazine). The fact that most of the contract research at TU Delft is conducted by Dutch companies or Dutch branches of foreign multinationals is typical. For example, the university intensively collaborates with Shell in the Recovery Factory (development of technologies that lead to more intensive/effective use of oil and gas resources). Furthermore, joint R&D programmes will be strengthened and expanded in the preferred partnership agreement with these multinationals. The initiative with regard to the Building Technology Campus will be taken with Rijkswaterstaat and research will be conducted

with Philips into minimally invasive techniques and LED lighting systems. In addition, the university will join with ELAt (which includes Philips and the KU Leuven) in the Medical Delta to arrive at a KIC proposal for Healthy Living and Active Ageing in 2014.

International contract research

In recent years, the TU Delft contract research initiated abroad has undergone a positive development. In 2012, this research constituted approximately 8% of the contract research, the largest companies being Statoil, Toyota and EADS/Airbus. Furthermore, the interaction with Bosch GmbH has greatly increased, which will probably result in an expansion of this partnership in the coming years. The most important (partner) countries for TU Delft are Germany, France, the USA and Denmark, but attention is also being paid to China, India, Brazil and Russia. In order to interest more international business communities in conducting contract research with TU Delft, the Top 1000 innovative companies (Global list of most innovative companies by Booz) and the EU list of the largest R&D companies have been analysed. This analysis shows that the European companies on these lists are mainly located in Germany, France and Switzerland. An important footnote to this is that there is no level playing field between the various European research institutes (not all universities work with an integral cost price, which leads to significant price differences). This can have a limiting effect on potential contract research with foreign parties.

4.2 Account management models

Account management can be organised in different ways. It is important to realise that the choice of (large) companies for contract research with TU Delft is mainly determined by:

- The distance between the company and TU Delft
- Becoming acquainted with the talent

(recruitment)

- Reputation of the research group (allowing the company to measure itself against it)
- Specific knowledge and infrastructure

Model 1 In cases of small-scale collaboration with companies (to a maximum of €500,000), a service model is applied for which standard documents have been made available for use by the departments and faculties.

Model 2 In cases of large-scale collaboration with companies (at least €500,000), an account manager is assigned, who attempts to match supply and demand of promotional research and regulates recurring aspects of collaboration in a framework contract.

Model 3 Question-driven model, in which major strategic research initiatives are shaped by serving the specific long-term strategic needs of a company.

Model 4 The affiliation model, in which multiple parties – the business community, research institutes, subsidisers – contribute to the funding of first-rate research at TU Delft.

The first two models in particular are already being successfully applied at TU Delft. Model 2 can suitably be applied to separate research questions that do not require an integral long-term vision. On the other hand, the management of a number of (large) companies has indicated that they regard the range of research at TU Delft as chaotic and ad-hoc due to the application of this model. Meetings with representatives of these large companies/multinationals have revealed that there is an increasing need for collaboration with TU Delft, with the university contributing ideas regarding the company's R&D roadmap in a proactive and multidisciplinary way. TU Delft aims to accomplish this by working on large, pioneering (breakthrough) projects for approximately 5 million euros a year (according to models 3 and 4).



Other sources of funding are also available for pioneering contract research

Examples of first-rate research at TU Delft in which multiple parties are involved:

- BE-Basic (Biotechnology based Ecologically Balanced Sustainable Industrial Consortium) – Examples of partners: AKZO Nobel, DSM, FrieslandCampina, Heineken.
- Organs-on-a-Chip – Interested parties: Philips, Galapagos, Farma (GSK, Roche), DSM, ASML.
- Self-healing materials are created as a result of research funded by IP NL and expanded on the basis of that research to a European network of companies and knowledge institutions.
- Qutech (development of the Quantum computer) – Interested parties: ASML, VDL-ETG, FEI, Microsoft.
- Mechatronics – Interested parties: ASML, Philips, VDL-ETG, Bosch, Aalberts, Hittech.

By attracting large-scale contract research in accordance with models 3 and 4, opportunities are created for involving government bodies, as well as for the application and marketing of research results. This approach also offers possibilities for the sale of pioneering research funded by private and social partners.

Realisation of preconditions

In order to attract pioneering contract research, TU Delft needs to take the following steps in the coming years:

- The establishment of an Innovation Board with a number of high-level representatives from

companies and the specific appointment of TU Delft alumni.

- Increasing insight into the partnerships and the contract research initiated by (departments of) the faculties. To this end, there will not only be intensive collaboration with them, but other analysis tools will also be used (such as the EQUIP tool developed at the EEMCS faculty).
- Communication regarding TU Delft research with potential partners in the business community will be conducted at the right level (executive level: CEO, CTO), via the right channels (Financieel Dagblad, Financial Times, specialist journals), with the right tools (events, symposia), and with the right parties (Gartner, investment bankers, etc.).
- The university's reputation requires the involvement of prominent full professors who are known by the leading individuals of the partners that TU Delft is interested in working with, and who might have a link to those partners.
- The strengthening of partnerships will continue with the appointment of part-time professors funded by external partners, an increase in the number of double appointments and focused research communication with the R&D community of companies.
- In addition, the possibilities of contract research will be proactively investigated in an early stage – in close cooperation with the faculties – with high-tech companies and

technostarters that are located and/or wish to establish themselves at the Science Park Technopolis.

Renewed focus

The focus of TU Delft will mainly be on large, promising contract research projects in the coming years, with a contract value of at least 50 million euros in total (contract scale increasing to 4-5 million euros per year) and with the participation of at least a 'launching customer'. This will not only enable the university to strengthen its contract funding position, but it will also strengthen the brand of TU Delft and the (market) knowledge of the research group. In addition, the university will become more attractive to excellent scientists and students. This strengthens the international competitive position of TU Delft as a whole.

TU Delft aims to bring in two large projects in the coming years, which will result in the revenues from the collaboration with the 'top 50' partners structurally increasing by at least 8 million euros and the revenues from the contract

research conducted with companies in the period 2016-2020 then increasing to an annual average of 30% of the indirect/contract funding revenues. These projects will likely be defined in accordance with question-driven research originating from the business community (model 3) or with pre-competitive projects originating from the university's research, which multiple companies participate in (model 4). In addition to this renewed focus and approach, TU Delft itself will ensure that current or new contracts with companies (model 1 and 2) remain in force and will, if necessary, support these contracts from the TU Delft Valorisation Centre.

In the coming period, attention will also be paid to the development of other support models, legal and financial, for the benefit of contract research with companies. This will involve, among other things, examining the approach developed by TU Eindhoven.

EQUIP-TOOL

Pilot project

In 2012, a search engine was developed at the Electrical Engineering, Mathematics and Computer Sciences faculty that combines existing databases in a smart way, thereby facilitating the collection and editing of information. The name of the search engine is EQUIP (Elastic Queries into University Industry Projects).

Objective

To quickly and easily gain access to information regarding projects financed through indirect and contract funding:

- Content of the scientific research
- Scientists, sections and departments involved
- Companies / institutions involved
- Sources of funding and scope
- Output (thesis, publications, patents...)

Results

The first version of EQUIP has been operational at the EEMCS faculty since 2013. The results have been received positively both inside and outside the faculty. A number of other faculties started using the EQUIP tool.





Alliances with businesses

Contract research

What will TU Delft do?

- Develop pioneering contract research with large companies/multinationals, which will lead to revenues from contract research with companies in the 2016-2020 period increasing to 30% of the indirect/contract funding revenues on average per year.
- Focused approach by means of the establishment of an Innovation Board with high-level representatives from the business community and the organisation of focused alumni meetings.
- Collaboration, in close consultation with deans, with the scientific personnel of the faculties and the Executive Board members, as well as with international companies acting as partners, on the strategic contract research. The focus here is currently on Western Europe, but also on the United States, China, Brazil, India and Russia.
- Continue with and expand regular contract research/account management (model 1 and 2), whereby the support requirements at the faculties and the parties that want to establish themselves at the Science Park Technopolis are specifically examined.
- Identify 'customers' of the faculties (by using the EQUIP tool, for example), improve benchmarking and collect information (desk research) in order to arrive at a better selection of and a more focused approach to companies.
- Initiate research marketing (events, exhibitions, executive-level marketing, specialist journals).
- Develop other – legal and financial – support models for the benefit of contract research with companies.

Amsterdam Metropolitan Solutions

In 2013, TU Delft, under the leadership of the faculty of Architecture and together with MIT, Wageningen UR and partners, won the design competition for the establishment of a technological knowledge institute in Amsterdam. The operationalization of the Amsterdam Institute for Advanced Metropolitan Solutions (AMS) was initiated in 2014.



TU Delft, together with its partners, possesses a strong technological knowledge base. This knowledge can be valorised for the benefit of the quality of life and sustainability of metropolitan areas. Across the world, people are increasingly moving into cities: by 2030, around 70% of the world's population is expected to live in major cities. This presents great challenges for society, especially relating to traffic flow, food, waste, energy and health. AMS intends to adopt a multidisciplinary approach to conducting research into these issues, developing solutions and implementing them. The institute will not only conduct research, but will also offer a study programme and ensure new economic activity. The consortium has the ambition to expand the AMS to the point where it is an internationally famed institute in the field of metropolitan studies by 2022.

Amsterdam as a Living lab

By collecting data about the city relating to, for example, traffic flow, energy, food, movements of people, waste and climate, it will be possible to devise innovative solutions which can be applied and evaluated in the city. As a multi-faceted and progressive city, Amsterdam is the perfect testing ground, a 'living lab' for new concepts that can increase the quality of life and sustainability of metropolitan areas around the globe.

Research and education

An innovative, entrepreneurial Master's degree programme in the field of Metropolitan Solutions will lie at the heart of the education offered by the AMS, closely intertwined with the research. The programme will be offered on campus in Amsterdam, and in the future also online, reaching across the world. Linking together the scientific programmes from Delft, Wageningen and MIT will deliver an enormous wealth of combined knowledge.

5. RESEARCH FUNDING

TU Delft wants to continue to compete with other world-class universities with its research. Indirect and contract funding of research contributes to this. Securing this funding requires competition and is therefore an important indicator of the quality and social relevance of TU Delft's research. In order to have a chance of success in EU consortia and Top Consortia for Knowledge and Innovation (TKIs), the university positions itself in Europe and in the Netherlands as an innovative partner in innovation clusters of companies, governments and universities. Outside the EU, there are opportunities for TU Delft to profile itself in emerging economies, such as the BRIC countries, but also in Singapore and Vietnam, for example. This includes establishing research centres that grant the scientists of TU Delft access to funds, laboratories and the many talented young researchers in those countries, and that provide the Dutch business community with significant inroads. In addition, the university is committed to fundraising. The Delft University of Technology Foundation is seeking the support of private and social partners in order to facilitate further excellent, pioneering scientific and highly focused applied research and enable results to be achieved more quickly.

5.1 Context

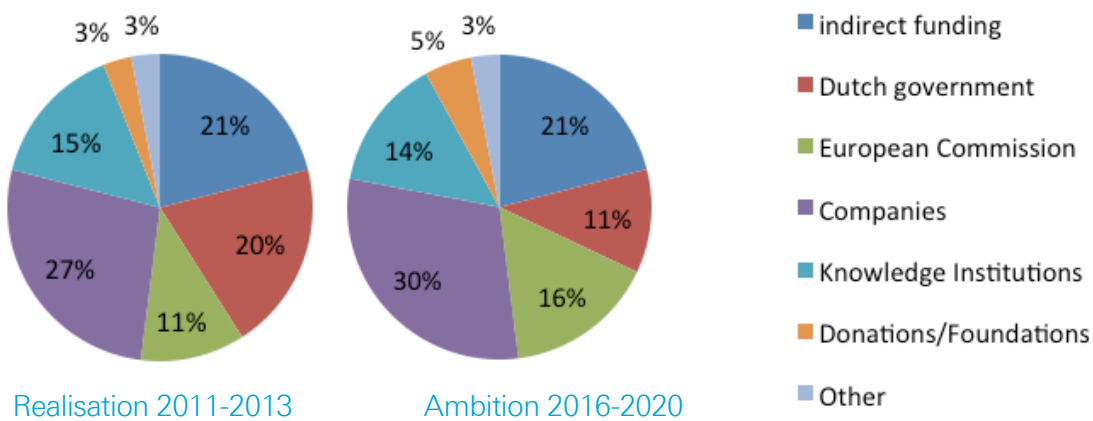
Chapter 1, 'Trends in the Environment', lists a number of macro-developments that influence valorisation, such as the changing innovation policy of the Dutch government and the dominant role of the European Union. These trends influence the resources from direct funding available for research and the possibilities for indirect and contract funding.

- Direct government funding is not assured and is the subject of political debate in The Hague. The Ministry of Science and Education is currently working on a vision on the science system that will likely influence the way in which the direct and indirect funding resources are distributed. This development is in addition to the existing tendency towards a reduction

in the resources available for research due to increasing numbers of students and necessary infrastructural investments. As a result, Dutch universities have become increasingly dependent on additional indirect and contract funding for conducting research. A shift in the manner in which subsidies are awarded, both at the national and European level, and national and international competition mean that TU Delft has to make proactive use of the indirect and contract funding opportunities.

- The relationship between the direct funding resources and the indirect and contract funding resources awarded through competition is relevant. The university needs to match the largest part of the 'work for third parties' revenues with direct funding

Distribution of the indirect/contract funding revenues (in percentages)



Realisation 2011-2013

Ambition 2016-2020

resources. The possibilities are therefore restricted by both the scale of the external subsidy grant and by the internal possibilities for using direct funding resources for this purpose. This matching pressure differs for each part of the university. It is therefore necessary for TU Delft to gain more systematic insight into the matching limit of the university and its faculties.

- Society and politicians increasingly request transparency regarding the spending of resources on research, as well as what the results of that research are. The leading question is how every euro invested in research can yield the most for the economy and for society. This question becomes more important in the criteria for indirect and contract funding projects. TU Delft will therefore have to clearly show what the added value of its research is. This matches the strategy formulated for this purpose in the Roadmap TU Delft 2020.

5.2 Securing indirect and contract funding

Each year, TU Delft secures indirect/contract funding worth approximately 150 million euros. These revenues were mainly provided by the Dutch government in previous years: contract funding, including FES resources, from ministries and the Netherlands Enterprise Agency (RVO, previously: Agentschap NL) and indirect funding from NWO/STW. In addition, many contract funding resources originated from the European government (especially FP7) and companies. Changes in policy at the national and European level will change the ratio of these revenue sources in the coming years.

Investments in university research made by the government through contract funding have been reduced considerably. The effects of this will become visible in the coming years. The indirect funding resources available through NWO/STW are slightly increasing in importance. The budget



that Europe will make available for research and innovation through Horizon 2020 will increase in the 2014-2020 period.

Within this framework, TU Delft is committed to maintaining the revenue from the indirect and contract funding projects at 150 million euros on an annual basis in the coming years.

The diagrams on the previous page show the distribution of the indirect and contract funding revenue in percentages, as realised in the 2011-2013 period and planned for the 2016-2020 period. Shifts occurring between the subsidy streams are visible. TU Delft wants to compensate for the decreasing revenues from the Dutch government by committing to:

- A strong increase in subsidies from the European Commission (especially Horizon 2020) from 11% in 2011-2013 to 16% in 2016-2020.
- An increase in contracts with companies from 27% in 2011-2013 to 30% in 2016-2020.

The years 2013, 2014 and 2015 will be transitional years; the projects initiated under the old funding scheme will be phased out and new projects will be initiated under the new funding scheme.

In order to realise this ambition in a focused way, the university must take a number of steps:

- Each faculty will formulate an indirect and contract funding strategy and encourage their departments to participate in projects in accordance with the faculty's strategy.
- Within this framework, every department should have the ambition to coordinate a large indirect/contract funding project in 2017. The efforts of the Delft scientists are essential and indicative with regard to this process.
- These efforts must be accompanied by the right support at the level of the department, faculty and university as a whole. In addition to the – often specialist – support from the TU

Delft Valorisation Centre, the faculties need to organise internal support for primary questions concerning indirect and contract funding projects. For the management of large (or medium-sized) projects, a pool of experienced project managers will be set up, composed of personnel from both the Valorisation Centre and the faculties.

- Furthermore, the attention will be focused on ensuring that the Delft scientists are actively involved in setting the agenda of the Dutch top sector policy and Horizon 2020. TU Delft therefore invests in and maintains national, European and regional relationships and networks. This includes strengthening the ties with the business community by means of European partnerships and the Top Consortia for Knowledge and Innovation (TKIs) of the top sectors policy.
- To this end, TU Delft collaborates on the content and coordinates with its strategic partners: the regional LDE partners (Leiden University, TU Delft and the Erasmus University Rotterdam), the 3TU university partners (TU Delft, TU Eindhoven and Twente University) and the national partners in the VSNU.
- At the European level, TU Delft will strengthen the administrative networks with other universities of technology via CESAER, IDEA League and the recently launched Vision 2020 (see: <http://www.2020visionnetwork.eu/>).

TU Delft profiles itself nationally, internationally and in Europe through multi-disciplinary and interdisciplinary research collaboration on social issues and across sector boundaries. This reflects the desire of the European Commission to encourage more multidisciplinary collaboration via Horizon 2020. The Delft Research-based Initiatives, the TU Delft Institutes, the LDE partnership and the 3TU Centres provide opportunities for achieving this.

Securing indirect and contract funding

What will TU Delft do?

- TU Delft is committed to maintaining the revenue from the indirect and contract funding projects at 150 million euros on an annual basis in the coming years.
- The faculties will formulate an indirect/contract funding strategy and encourage their departments to participate in projects in accordance with the faculty's strategy. In principle, every department should have the ambition to coordinate a larger indirect/contract funding project in 2017.

- Scientists are adequately supported in submitting their project proposals, both at a central level (specialist support) and within the faculties (first line requests, medium-sized and large project management). For the management of large (or medium-sized) projects, a pool of experienced project managers will be set up, composed of personnel from both the Valorisation Centre and the faculties.
- Active participation of the TU Delft scientists in setting the agenda of the top

sectors policy and Horizon 2020 by investing in and maintaining national, European and regional relationships and networks.

- Profiling by means of multidisciplinary and interdisciplinary research cooperation on social issues and across sector boundaries (for example, through Delft Research-based Initiatives, TU Delft Institutes, LDE collaboration and the 3TU Centres).

5.2.1. Dutch Research Funding

In the previous period, the government cut back severely on research subsidies, especially on contract funding subsidies from the Ministry of Economic Affairs, and has abolished FES resources for research and innovation. Furthermore, the subsidy scheme itself was revised by the use of government contract funding resources and a large part of the NWO resources (including STW) for the top sectors policy. The knowledge requirements of the Dutch business community are of prime importance in the top sectors policy. Additionally, part of the direct funding from the Ministry of Education, Culture and Science is distributed in competitions through the Zwaartekracht programmes.

As part of VSNU, TU Delft cooperates with other universities at the administrative level to engage the government in debate about the scope, spending, transparency and rules of the direct, indirect and contract funding of research. In addition, TU Delft has its own strong public affairs relationship with the research financiers in the Netherlands (Ministries of Economic Affairs/Education, Culture & Science, NWO, regional financiers).

Topsectors

By means of the top sectors policy, the government aims to increase the public research investments of the business community and ensure that the publicly funded research matches the knowledge demand of the business community better. Roadmaps for each top





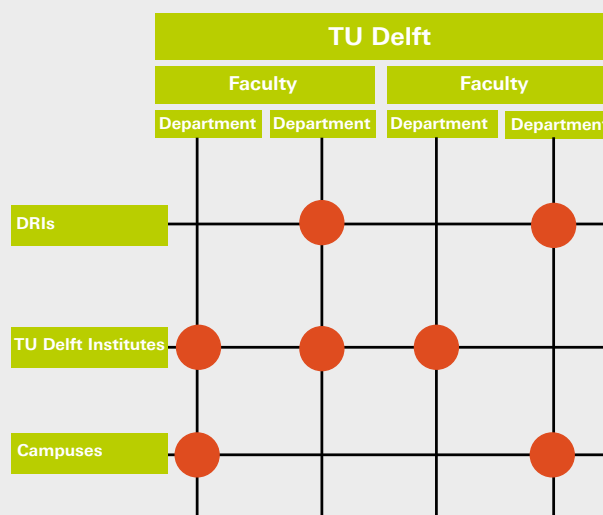
Valorisation main points of the Faculties and valorisation activities of the DRIs/TU Delft Institutes/Campuses

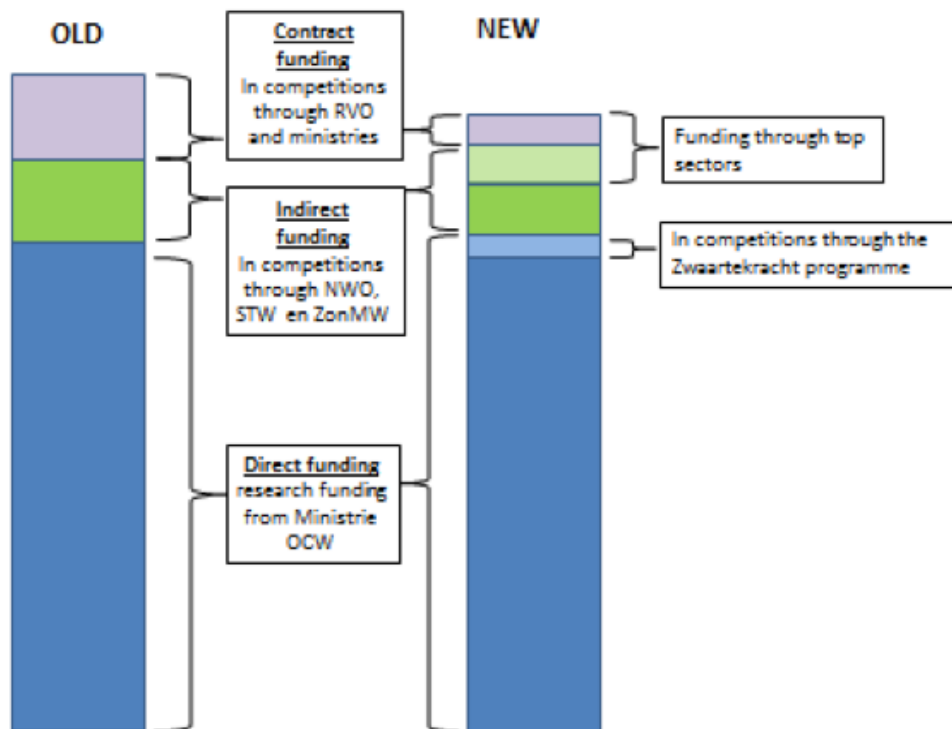
The valorisation priorities of the faculties in the field of research funding and entrepreneurship will be implemented in the coming years as a part of the faculty multi-annual plans. An important point of attention in this regard is the manner in which the support in this field is organised, both centrally and at the faculties.

The Delft Research-based Initiatives (DRIs) promote the creation of cross-faculty, multi-disciplinary research in the social fields of energy, environment, health and infrastructures & mobility, with one of the aims being the securing of subsidies through indirect and contract funding. In addition, the DRIs develop activities for students, including entrepreneurial and valorisation activities. The DRI Strategic Perspectives 2014-2020 contain the valorisation aims of the DRIs for the coming years.

The TU Delft Institutes also develop activities focused on securing indirect and contract funding and marketing knowledge. There are currently seven TU Delft Institutes for the fields of climate, transport, process technology, robotics, wind energy, safety & security and sports engineering. The number of TU Delft Institutes is expected to increase in the coming years.

For some time, TU Delft has been closely involved in the creation of a number of 'campuses'; these are virtual knowledge and innovation centres, sometimes with a physical work and meeting area, where knowledge centres and the business community can jointly examine complex issues. One example of this is the Delft Building Technology Campus, an inspiring place where companies combine, further develop and implement their knowledge of construction. The Building Technology Campus will be ready for use in 2014. Another example is the Delft Biotech Campus in the Technopolis park bordering the TU Delft campus and the DSM site in Delft.





Schematic overview of government resources for research funding in 2013

sector are created through various top consortia for knowledge and innovation (TKIs) for the purpose of functioning as guidelines for part of the research that is publicly funded by NWO, STW, ZonMW, RVO and the ministries.

TU Delft is very active in the Top Sectors. Both at the administrative level and the scientific level, TU Delft is actively involved in the creation of roadmaps for each sector in nearly all Top Sectors and the associated TKIs. On a project basis, TU Delft is even active in all top sectors. This active participation allows TU Delft to strengthen the partnerships with the business community and gain better insight into the business community's knowledge requirements. This enhances the reputation of TU Delft as an innovative partner, thereby providing opportunities for new research projects with the Dutch business community, so that TU Delft's knowledge can more quickly lead to innovation

and activities. Moreover, active participation in the Top Sectors increases insight into the calls available through various financiers. TU Delft will therefore continue to participate in the top sectors policy in the coming years. It is thereby important that TU Delft's knowledge is adequately distributed over the Top Sectors, so that opportunities can be taken advantage of in time. The internal network with regard to the Top Sectors will be strengthened.

TU Delft is committed to a number of iconic projects within the framework of the top sectors policy: concrete innovations with an (inter) national allure that contribute to the solving of social problems and that have an economic impact. TU Delft will continue to fully compete in the calls financed within the framework of the top sectors policy through NWO, STW, RVO and others.

	Architec- ture	CEG	EEMCS	IDE	AE	TPM	Applied Sciences	3mE
Chemicals			●		●		●	●
Creative Industries	●		●	●		●		●
Energy	●	●	●	●	●	●	●	●
High Tech Systems & Materials		●	●		●		●	●
Life Sciences & Health	●		●	●		●	●	●
Logistics		●	●	●		●		●
Water	●	●	●			●	●	●
AgroFood							●	

Participation of TU Delft faculties – Architecture and the Built Environment, Civil Engineering and Geosciences, Electrical Engineering Mathematics and Computer Sciences, Industrial Design Engineering, Aerospace Engineering, Technology Policy and Management, Applied Sciences, Mechanical Maritime and Materials Engineering – in Top Sectors programming

In addition, TU Delft wants to make optimal use of the opportunities provided by the TKI additional revenue scheme created by the Ministry of Economic Affairs. TU Delft will actively use its influence to ensure that this revenue is used for subjects that TU Delft scientists perform well in. Furthermore, the university will also ensure that this revenue is directly used for TU Delft projects, if possible.

• NWO and STW

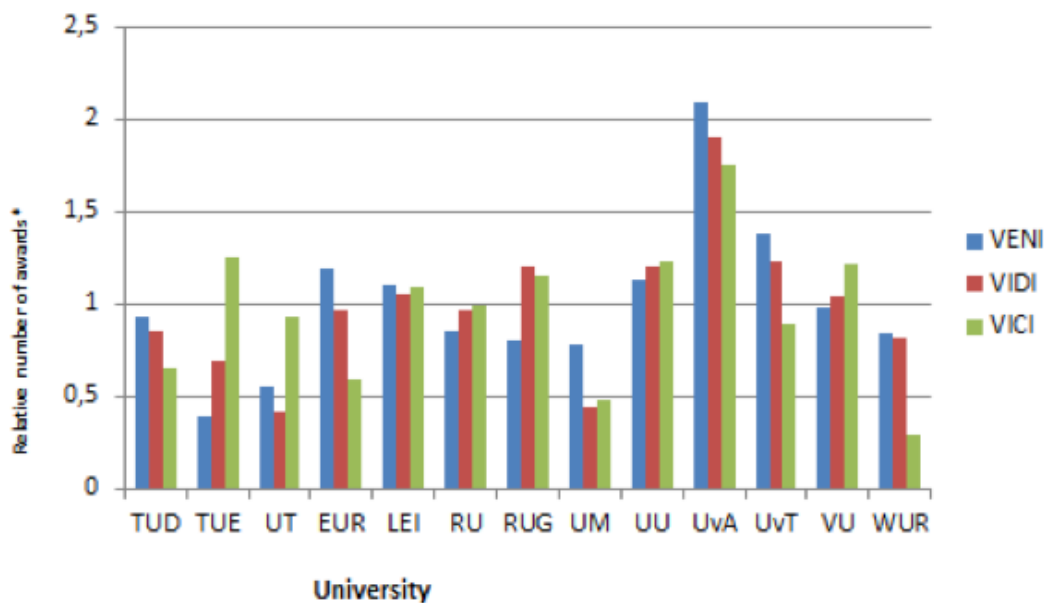
The indirect funding options for TU Delft are not expected to change much. Indirect funding revenue improvements can mainly be realised by optimising the performances of TU Delft with the existing indirect funding grants. As of 2016, TU Delft expects to realise a yearly average of 21% of the indirect/contract funding revenue through NWO/STW.

• Personal grants

A university with a global reputation in the field of science needs scientists that can strengthen this reputation. Personal grants such as the Veni, Vidi and Vici grants in the framework of the Innovational Research Incentives Scheme, Spinoza prizes and the above-mentioned ERC grants are helpful in this regard.

TU Delft has invested a great deal in the improvement of internal information and advice regarding the Innovational Research Incentives Scheme grants. Together with the talent policy of TU Delft (tenure track and fellowships), this has mainly resulted in decent award percentages with regard to the Veni and Vidi grants. From 2008 to 2013, TU Delft applied for 310 Veni grants and was awarded 58 (18.7% chance of success). In the same period, TU Delft applied for 164 Vidi grants and was awarded 28 (17.1 % chance of success). The relative number of

Awarded grants through the Innovational Research Incentives Scheme (2008-2012)



*The relative number of awards is the degree to which the subsidies are divided between each university, proportional to the the scientific personnel's use of the total direct funding of every university in 2011

awards (i.e. the number of awards in relation to the number of expected awards based on the number of FTEs for scientific personnel) is 0.99 for Venis and 1.02 for Vidis. TU Delft wants to continue to achieve these results. TU Delft submitted 70 Vici applications in the 2008-2013 period. Eight of these were awarded. This means that there is a 11.4% chance of success and that the relative number of awards is 0.66. TU Delft believes this performance can be improved. TU Delft is committed to optimising the talent policy in order to increase its chances of success.

Within the national research funding system, the Spinoza prize is the most important recognition for a scientist; the prize is proof that he or she belongs to the scientific elite. Spinoza prizes are therefore an important recognition of the scientific reputation of TU Delft researchers. The university will remain committed to presenting

talented top scientists to the Spinoza prize selection committee.

• **Research infrastructure**

TU Delft has a research infrastructure of national and European importance, with great social value. This infrastructure is an attractive factor for scientific talent and for companies that wish to work with TU Delft. It is necessary to modernise the existing research infrastructure or invest in new infrastructure in a timely fashion. The accompanying investments often exceed the financial capabilities of TU Delft. Increasing pressure on the funding of universities makes the need for seeking external funding options for these investments even more evident.

In the past, TU Delft was able to incidentally secure important sources of funding. For example, TU Delft received a significant financial contribution from the government in 2012 for





the implementation of the OYSTER programme, which allows the Reactor Institute Delft to run on higher power.

The NWO medium and large programmes and the large-scale research infrastructure roadmap provide funding opportunities for the construction, purchase and upgrading of research equipment and research infrastructure. Of the 24 applications submitted by TU Delft to NWO large and medium from 2008 to 2012, three were awarded. The relative number of awards (i.e. the number of awards in relation to the number of expected awards based on the number of FTEs for scientific personnel) is 0.66 for NWO large and 0.27 for NWO medium. In order to be able to permanently upgrade the research infrastructure for the future, the university needs to make better use of the available resources at NWO. In the coming years, a quality improvement strategy will be adopted with regard to the proposals to be submitted, which will substantially improve the chances of success. The objective for TU Delft is to ensure that at least one project is financed per call.

TU Delft has launched a multi-annual, cohesive and substantial programme to modernise or completely renew the existing infrastructure. A recent example of this is TU Delft's ambition to construct a proton clinic, 'Holland PTC', in collaboration with the LUMC and the Erasmus MC. In addition to this, the university will investigate if there is a need to establish completely new research infrastructures at a particular location. In relation to this broad investigation, the university will develop a strategy for responding better to the external funding opportunities. In this regard, both the available resources granted by NWO and the Ministry of Education, Culture and Science for the construction and upgrading of the research infrastructures, and the European resources

that will be made available through Horizon 2020 for conducting technical and feasibility studies, as well as for ensuring that the research infrastructure is freely accessible, will be examined.

• *NWO Free Competition and STW Open Technology Programme*

The NWO Free Competition and STW Open Technology programmes are aimed at every type of scientific project. These programmes offer researchers the opportunity to conduct groundbreaking research into the subject of their choice. Within these programmes, TU Delft received awards for 76 projects from 2008 to 2012. With this result, TU Delft achieves an average score in comparison with most Dutch universities, but scores lower than other Dutch universities of technology. TU Delft wants to improve its participation in the free competition and the Open Technology Programme and perform at the same level as the other Dutch technical universities. To achieve this, the provision of information and support should be intensified. In addition, the university will seek to increase awareness at the faculties, as well as involvement with the faculty plans.

• *STW Valorisation Grants*

TU Delft considers the Valorisation Grant and the Demonstrator Grant of STW to be important instruments for the promotion of the university's ambitions concerning the encouragement of innovative entrepreneurship.

- The Valorisation Grant is a personal subsidy for the development of innovative high-tech activities by entrepreneurial researchers based on the knowledge developed at the university.
- The Demonstrator Grant offers funding for the development of a practical demonstration model that shows the (commercial) possibilities of technology. In this way, STW ensures that the step from proof of principle to proof of concept can be made, thereby

reducing the risk companies face when adopting the technology.

Matters of intellectual property are related to the Valorisation Grant and the Demonstrator Grant. In principle, the university's intellectual property is used for initiating activities in these projects. When scientists apply for one of these grants in the near future, they can visit the one-stop shop that will be established at this site.

TU Delft, together with the YES!Delft incubator, will encourage (young) researchers at the TU Delft to use the available STW grants to bring their entrepreneurial ambitions and technological application one step closer to reality.

- **Zwaartekracht Programme**

The OCW Zwaartekracht programme offers the most excellent TU Delft scientists the possibility of working with the best and most influential researchers in the Netherlands within a large-scale multi-annual research programme. The Zwaartekracht grants contribute to stronger TU Delft scientific research groups and therefore also contribute to the (inter)national profiling of the university. In 2012, the NanoFront research programme coordinated by TU Delft was granted a sum of 35.9 million euros through the Zwaartekracht programme. In the 2013 round, TU Delft was part of the consortium that, together with the Soehngen Institute for Anaerobic Microbiology (SIAM), was awarded 22.9 million euros. The next Zwaartekracht round is planned for 2016. It is essential for the national and international profiling of the university that TU Delft stands out in the consortia for the 2016 Zwaartekracht round. As the coordinating university, TU Delft is firmly committed to ensuring that at least one programme will be funded in this round.

Dutch Research Funding

What will TU Delft do?

General

- As part of VSNU, TU Delft cooperates with other universities at the administrative level to engage the government in debate about the scope, spending, transparency and rules of the direct, indirect and contract funding of research.
- In addition, TU Delft has its own strong relationship with the research financiers in the Netherlands (Ministries of Economic Affairs/Education, Culture & Science, NWO, regional financiers).

Top sectors

TU Delft chooses to participate actively in the Top Sectors and the associated TKIs. The university will realise this by:

- Continuing to fully participate in the creation of future road maps for each sector.
- Committing to a number of icon projects: concrete innovations with (inter)national allure that contribute to the solving of social problems and have an economic impact.
- Continuing to fully compete in the calls within the framework of the top sectors policy through NWO, STW and RVO.
- Actively influencing the use of additional TKI revenue for the TU Delft scientists who achieve good results and also ensuring that this revenue is directly used for projects of the university, if possible.
- Strengthening its internal network with regard to the Top Sectors.

NWO and STW

TU Delft aims to ensure that a yearly average of 21% of the indirect/contract funding revenue will continue to be realised through NWO/STW as of 2016. TU Delft will achieve this by optimising the performances with the existing indirect funding grants by:

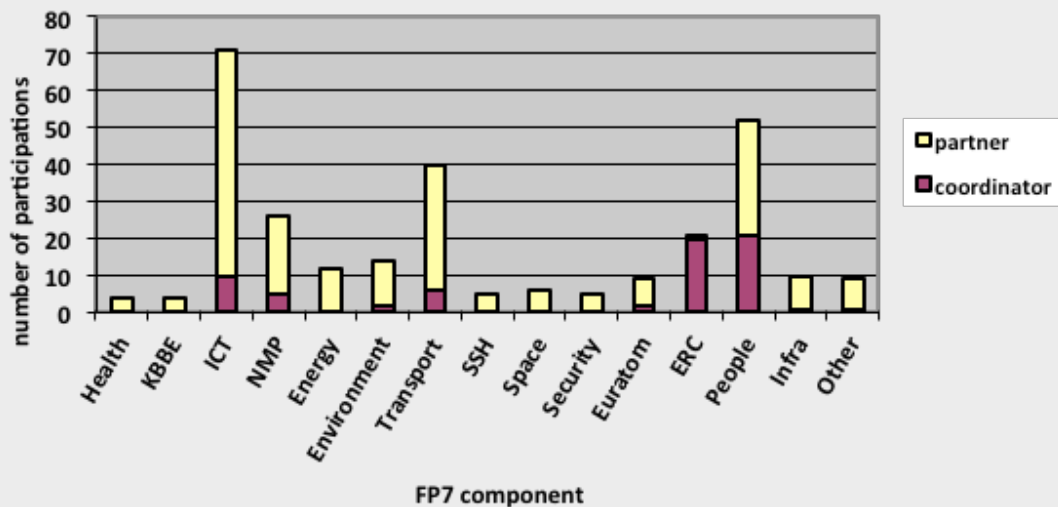
- Continuing to perform at the current high level for the Veni and Vidi grants. Additionally, TU Delft is committed to optimising the talent policy in order to ensure the realisation of a greater number of Vici grants.
- A qualitatively improved commitment to the NWO calls focused on the construction, upgrading and purchase of research equipment and research infrastructure. The objective for TU Delft is to ensure that at least one project is financed per call. The university will develop a strategy for responding better to the external funding opportunities.
- The improvement of TU Delft's participation in the free competition and the Open Technology Programme; the information provided on these programmes and the support for them will be intensified for this purpose.
- Stimulating (young) researchers at TU Delft – through the YES!Delft incubator, for example – to use the available STW grants to bring their entrepreneurial ambitions and technological applications one step closer to realisation.
- As the coordinating university, TU Delft will ensure that at least one programme is funded in the Zwaartekracht rounds of 2016.

7th EU Framework Programme

TU Delft has performed well in FP7. From 2007 up to the end of February 2013, TU Delft was the coordinator of 68 projects and a partner in 220 projects of FP7. During this period, TU Delft received more than 100 million euros in EU subsidies. This makes TU Delft the university with the most FP7 participations in the Netherlands.

TU Delft performed especially well in the FP7 components ERC, Marie Curie (people), ICT, Transport and Nano, Materials & Production (NMP). The university also fully participated in the FP7 components Energy, Environment, Euratom and Research Infrastructures. The university wants to continue performing equally well in Horizon 2020.

TU Delft participation in FP7 (2007–February 2013)



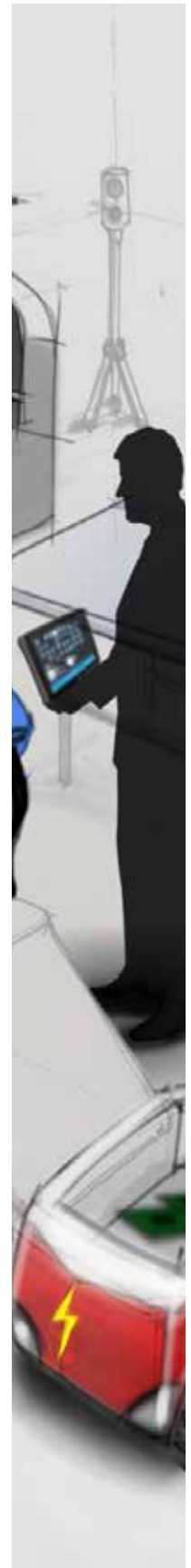
Source: Rijksdienst voor Ondernemend Nederland (RVO, Netherlands Enterprise Agency), previously known as: Agentschap NL Agency KP7.eglwiki.nl

5.2.2 EU Research Funding

The EU Seventh Framework Programme that ended in 2013 had a total budget of 52 billion euros for the 2007-2013 period. The EU Eighth Framework Programme, Horizon 2020, which was launched in 2014, has a total budget of more than 70 billion euros for the 2014-2020 period. Europe will therefore annually invest approximately 10 billion euros in subsidy in university research and knowledge institutions and companies focused on application. TU Delft strives to achieve a strong increase in subsidies

from the European Commission (especially through Horizon 2020), from 11% in 2011-2013 to 16% in 2016-2020.

The manner in which TU Delft can optimally match the content of Horizon 2020 has been systematically investigated in the preceding period. On the basis of this inventory, the conclusion may be drawn that there are significant opportunities for all faculties to successfully participate in the components of Horizon 2020 that are focused on an excellent knowledge base. These include



	Archite- cture	CEG	EEMCS	IDE	AE	TPM	Applied Sciences	3mE
ICT	●		●	●	●	●	●	●
Nanotechnologies			●		●	●	●	●
Advanced Materials	●	●	●	●	●		●	●
Biotechnology							●	
Advanced Manufacturing and Processing			●	●	●		●	●
Space			●		●			
Health, demographic change and well being			●	●			●	●
Food security, sustainable agriculture, marine & maritime research & bio- economy							●	
Secure, clean and efficient energy	●	●	●	●	●	●	●	●
Smart green and integrated transport		●	●	●	●	●		●
Climate action, resource efficiency and raw materials	●	●		●	●	●	●	●
Inclusive innova- tion and reflective societies	●		●	●		●		●
Secure societies	●		●		●	●		
Euratom							●	

Opportunities for the TU Delft faculties - Architecture and the Built Environment, Civil Engineering and Geosciences, Electrical Engineering Mathematics and Computer Sciences, Industrial Design Engineering, Aerospace Engineering, Technology Policy and Management, Applied Sciences, Mechanical Maritime and Materials Engineering – in Horizon 2020

the European Research Council, Marie Skłodowska-Curie mobility grants, funding for research infrastructures and for future, emerging technology areas. Depending on the profile of the faculty, there are also opportunities for successful participation in Horizon 2020 components aimed at contributing to scientific solutions for social challenges or at contributing to industrial technology areas. The inventory of ideas for participation – performed partly through a ‘one pagers’ approach – is expected to be repeated in the coming years in order to influence the work programmes of Horizon 2020 in 2016 and in the subsequent period, and to form consortia with relevant partners in advance.

- **New rules for Horizon 2020**

Horizon 2020 will have stricter financial and legal rules than FP7. It is important to note that the compensation based on the combined cost price, the so-called full cost option, which TU Delft used in FP7 does not apply in Horizon 2020. A compensation of 100% of the direct costs and a compensation for the indirect costs that equals 25% of the direct costs are used instead. TU Delft will therefore be confronted with higher matching obligations when participating in European collaborative projects. TU Delft will adjust its internal financial and legal regulations to match the regulations of Horizon 2020. Horizon 2020 will also stimulate open access to research results.

- **Personal grants**

The acquisition of ERC grants and Marie Skłodowska-Curie grants contributes to the improvement of TU Delft’s scientific reputation and ensures that the university is an attractive partner for the business community.

- **European Research Council (ERC)**

A budget of 12 billion euros has been proposed for the ERC in Horizon 2020 for a period of seven years. This is double the budget available in

FP7. In FP7, the scientists of the TU Delft were awarded seventeen ERC starting grants and seven ERC advanced grants. TU Delft will pursue an active talent policy focused on experienced, excellent scientists and encouraging the active acquisition of ERC grants by these scientists. With these efforts and by taking the growth of the ERC budget into account, TU Delft intends to acquire 29 ERC starting grants and 12 ERC advanced grants in Horizon 2020.

- **Marie Skłodowska-Curie grants**

Approximately 6.1 billion euros are available in Horizon 2020 for Marie Skłodowska-Curie grants. In FP7, a budget of 4.7 billion euros was available. TU Delft participated in 52 Marie Curie projects in FP7 and wants to at least equal this accomplishment in Horizon 2020.

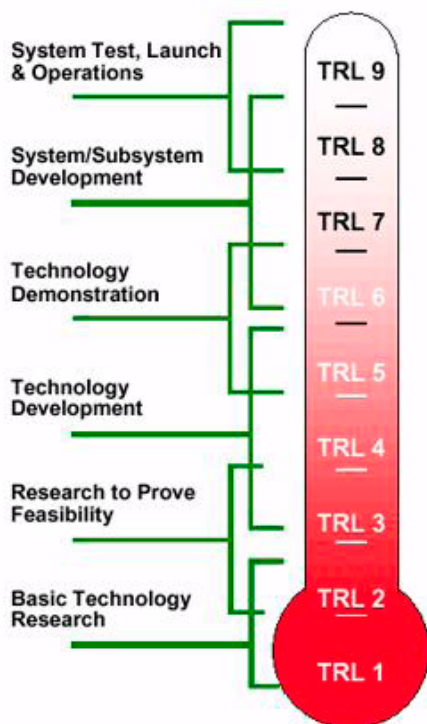
- **Collaborative projects relating to social challenges and industrial technologies**

Within the Horizon 2020 components focused on social challenges and industrial technologies, projects which feature collaboration between knowledge institutes and companies are funded on the basis of predetermined themes. The emphasis here is on innovation, multidisciplinary research, applicability of knowledge and collaboration with the business community, including SMEs. By participating in these collaborative projects, TU Delft’s knowledge will be distributed across these fields. This will quickly lead to innovation and business activities. The European Commission will mainly finance projects characterised by higher technology readiness levels (TRL). This system was developed and is used in the aeronautical and space industries to qualify the different stages from research to application.

In order to realise its ambition with regard to participation in Horizon 2020, TU Delft needs to fully participate in projects related to social challenges and industrial technologies. The



university is therefore actively committed to early participation in setting the agenda of these Horizon 2020 components. In order to accomplish this, the strategic relations with partners in the European business community will be strengthened. This will occur by participating more intensively in European networks in which the business community is active, such as the European Technology Platforms, European innovation partnerships, Joint Technology Initiatives and Knowledge & Innovation Communities of the European Institute of Innovation en Technology. A special point of attention is the collaboration with European SME companies. TU Delft is not able to reach these companies as directly in other countries and will mainly have to find them through cooperation with other European knowledge institutions and larger companies through the above-mentioned networks.



Source: NASA or Mankins's white paper, 1995.

One example is the Biobased Industries (BBI) Initiative programme of 3.8 billion euros, the public-private collaboration between the EU and the Biobased Industries Consortium (BIC). BBI features collaboration intended to bridge the innovation gap between technological developments and the use and application thereof in high-quality biobased products. TU Delft's affiliated partners in this respect are from Belgium and Germany. This programme is implemented in the region by direct and indirect collaboration, for example through the technostarter Delft Advanced Biorenewables B.V. (DAB), within the BE-BASIC SME cluster.

By participating in the large European networks, TU Delft also takes advantage of the shift in Horizon 2020's focus from project funding to programme funding. Project proposals must be submitted more often as part of a strategic long-term research agenda formulated by major formal or informal partnerships of companies and knowledge institutions. These partnerships and networks help TU Delft influence Horizon 2020's work programmes, in collaboration with industrial partners and on the basis of a common research strategy. Moreover, relevant collaborative partners can be found early this way in order to be submitted on calls.

Furthermore, TU Delft is actively involved with expert committees of the European Commission and sounding board groups of the national government for the purpose of influencing the work plans of Horizon 2020.

• **Knowledge & Innovation Communities (KICs)**

Following the example of MIT, the European Commission founded the European Institute of Innovation and Technology (EIT) in 2009. By means of thematically oriented KICs, EIT stimulates projects that unite research and entrepreneurship to strengthen Europe's innovative power. The EIT is funded through

Horizon 2020. Since 2010, TU Delft has participated successfully in two of the three KICs, namely the Climate KIC and ICT Labs. In 2014, the EIT will launch two new KICs, Raw Materials and Healthy Living and Active Ageing, followed by Food4Future and Added Value Manufacturing in 2016. Finally, an Urban Mobility KIC will be launched in 2018. TU Delft is committed to participation in at least four KICs in 2018.

- **Innovation in education**

TU Delft strives to fulfil a pre-eminent role as an innovator in technical-scientific education and educational methods, especially in the area of online education. This not only concerns the development of MOOCs and the offering of course material through OpenCourseWare, but also the opportunity for following a Master's degree programme through Online Distance Education (ODE). Within the EU, TU Delft participates in the discussion about the modernisation of European higher education. Within the framework of these developments, the possibilities for subsidising innovative educational projects will be explored in Horizon 2020 and in the Erasmus+ subsidy programme, which is partly focused on supporting the modernisation of educational and study programme systems.

- **Regional Funds**

In 2014, the new programme period within the framework of the European Regional Development Fund (ERDF) will start. To prepare for this new programme period, all regions have formulated a specialisation strategy. In collaboration with the universities of the Randstad conurbation, TU Delft is actively involved in formulating a regional specialisation strategy called 'Kansen voor West' ('Opportunities for West'). The thematic focus of the ERDF resources for the coming programme period is therefore very much in line with the

strengths of TU Delft. With regard to the ERDF resources, the emphasis will be on valorisation and entrepreneurship. This mainly concerns company-driven projects that stimulate R&D investments.

In the 2007-2013 programme period, TU Delft fully participated in ERDF projects in the West region. A budget of 25 million euros has been provided for this region for the 2014-2020 programme period. This amount is substantially smaller than the one in the previous programme period, limiting the possibilities for TU Delft. TU Delft seeks to participate in at least three large ERDF projects in the coming years. Examples of such projects include living labs. LDE collaboration and intensive collaboration with companies in the region will provide opportunities to realise this ambition. The Interreg programme – a European subsidy scheme which involves parties from multiple countries working together on projects in the field of sustainable spatial planning and regional development – offers financial opportunities for interregional cooperation. TU Delft traditionally performs well in these programmes – which are frequently run by the faculties in terms of application, assignment and execution – due to the themes being very much in line with the university's strengths. In 2014, a new Interreg programme period will start. TU Delft wants to continue to perform at the current participation level in these programmes.

EU Research Funding

What will TU Delft do?

Horizon 2020

- TU Delft aims to achieve a strong increase in subsidies from the European Commission (especially Horizon 2020), from 11% in 2011-2013 to 16% in 2016-2020. The university will achieve this by:
 - o A substantial increase in the number of ERC grants. The aim is to get 29 ERC starting grants and 12 ERC advanced grants approved.
 - o Participation in at least four KICs in 2018.
 - o Undiminished commitment to participation in the other components of Horizon 2020, including collaborative projects concerning social challenges and industrial technologies for knowledge institutions and companies.
- TU Delft is becoming more active in the early creation of the Horizon 2020 agenda:
 - o The university has a strong relationship with Brussels.
 - o The 'one pagers' are used to influence the work programmes of Horizon 2020 and the early creation of consortia with relevant partners.
 - o TU Delft is intensifying its participation and involvement in setting strategic research agendas through European networks in which the business community is active, such as the European Technology Platforms, European Innovation Partnerships, Joint Technology Initiatives and KICs of the European Institute of Innovation and Technology.
 - o TU Delft is actively involved with expert committees of the European Commission.
- TU Delft will investigate the subsidy options in Horizon 2020 and Erasmus+ for innovative (method/organisation) educational projects.
- TU Delft will adjust its internal financial and legal regulations to match the regulations of Horizon 2020.
- TU Delft will actively respond to the encouragement of open access to research results by, for example, making agreements on a European working method with CESAER.

Regional Funds

- TU Delft wants to participate in at least three large projects in the 2014-2020 ERDF programme period.
- TU Delft wants to continue to perform at the current participation level in the 2014-2020 Interreg programmes.

5.2.3 International research funding

In a number of international economic regions, investments are made on a very large scale in higher education, science and technology. Examples of these regions can be found in China, Singapore, India, Vietnam, Brazil and Saudi Arabia. The demand for highly educated graduates in these knowledge economies, especially in the engineering sciences, is growing apace. This makes these regions attractive places for companies to expand into. These developments provide the scientific sector with great opportunities for cooperation. In cooperation with the business community, TU Delft seeks to establish scientific partnerships in these emerging economies. An important aim in this endeavour is to increase the chances of success with regard to the participation in large research projects funded by international (non-EU) subsidies. By providing its scientists with the opportunity to be active in these international knowledge regions, TU Delft also grants them access to the funds, laboratories and the many talented young researchers in those countries.

TU Delft research centres

Founding international research centres in collaboration with local knowledge institutes and companies contributes to the visibility of the university and the strengthening of its position on these emerging economies. The choice of research subjects of the different centres is not arbitrary; these are areas of research that TU Delft is strong in.

TU Delft has already founded a number of these research centres: five of them in China, one in Brazil and one in Vietnam. The focus here is primarily on research collaboration, but eventually the activities might be expanded to include entrepreneurial activities (such as spin-offs) and educational activities (such as the linking of educational activities in the MSc phase). In addition, these research centres are a

point of contact for the Dutch, Chinese, Brazilian and Vietnamese business communities. In the coming years, TU Delft will expand the number of TU Delft Research Centres abroad.

Plan of action

In order to strengthen the position of existing research centres and to identify opportunities – new research centres or other forms of collaboration – in other emerging economies, TU Delft will develop a plan of action in the coming period. This involves identifying which opportunities exist in the medium to long term, and which sources of research funding are available to TU Delft, and under which conditions. The following aspects will be dealt with in the plan of action:

- The further identification of funding opportunities in emerging economies. This includes investigating the countries' innovation strategy, as well as the scope of government investments and investments made by the business community in education and economy. In addition, the most prominent universities and institutes in those countries are identified.
- Is there a favourable climate in those countries for the development of local alliances with knowledge centres and companies, in which both local and Dutch companies can participate?
- Are there opportunities for TU Delft spin-offs to explore new R&D cooperation and new markets?

Delft Data Science

(Electrical Engineering, Mathematics, Computer Science)

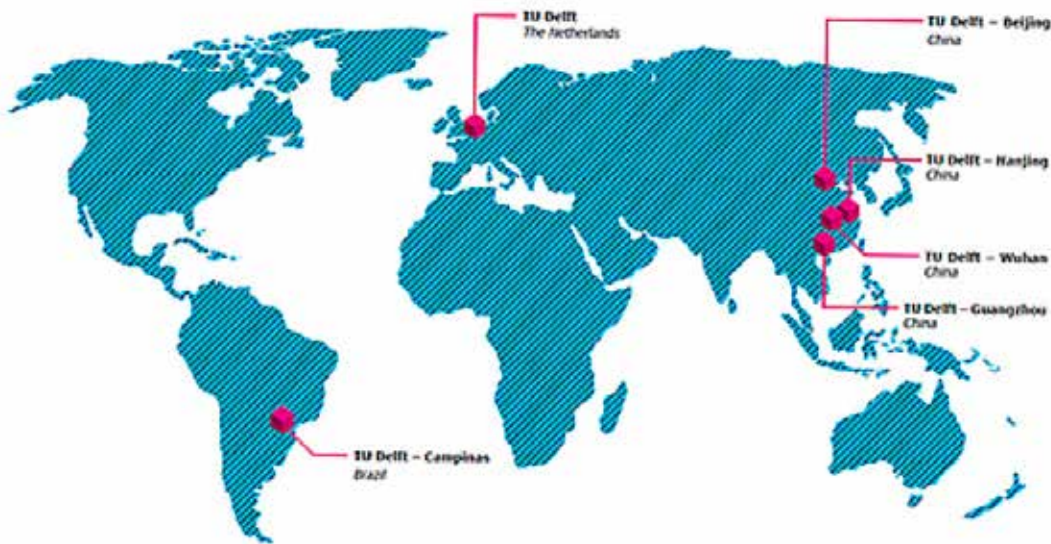
Delft Data Science (DDS) offers the full range of expertise for tackling the challenges of Data Science. Data Science involves the processing and analysis of Big Data, as well as the validation of this data. DDS accomplishes this with a strong technical focus, ranging from adaptive hardware for Big Data (with IBM), via cloud programming and software (with Oracle), to Big Data visualisation (with Intel, Philips). Crowdsourcing is also used to study the role of people in the analysis. DDS works on solutions for data analysis in different domains, such as data from the social domain (with Google, Microsoft) or data released due to the rising popularity of MOOC's. DDS contributes to the bio/medical sector with visualisation technology and applied medical technology. In the field of the environment, DDS conducts research into sensor data and 'social sensing' in order to improve analyses of climates or urban developments.

More information: www.delftdatascience.tudelft.nl



TU Delft has the following international research centres:

- Nanjing, China - Water
- Beijing, China - Solid State Lighting
- Changzhou, China – Solid State Lighting
- Wuhan, China - Spatial Information
- Guangzhou, China - Urban Systems & Environment
- Campinas, Brazil - Biobased Economy
- Hanoi, Vietnam - VINWATER (Vietnam Netherlands Centre for Water and Environment)



International Research Funding

What will TU Delft do?

- Develop of a plan of action in order to identify which opportunities exist in which countries in the medium to long term, and which sources of research funding are available to TU Delft, and under which conditions.
- Improve the existing research centres in China, Brazil and Vietnam by, for example, expanding their activities in the field of education and entrepreneurship.
- Increase the number of research centres and/or entering into other forms of collaboration outside of the EU, with the ambition of improving the chances of success with regard to participation in large research projects funded with international (non-EU) subsidies.



Delft University of Technology Foundation

Donation for Research

TU Delft scientists work with specialists from around the world on solutions that have an impact on the quality of life of a great number of people. The Delft University of Technology Foundation is seeking the support of private and social partners with a corporate charity policy in order to facilitate further excellent, pioneering scientific and highly focused applied research and to enable results to be achieved more quickly. The contributions of TU Delft alumni – through the alumni network of the university, for example – is important in this regard; this link will be established professionally. In addition, the expertise of the academic staff involved in the research projects, as well as the contribution of leading university personnel (deans and members of the Executive Board) will be used – where appropriate – in the communication on this subject. Research projects for which the university is seeking support come from the 'Grand Challenges for Society', which covers the themes of Health, Energy, Environment, Infrastructures & Mobility.

Example projects

Health is one of the urgent issues for which TU Delft is developing solutions, both for now and for the future. Medical technology is driving a wave of innovation in healthcare, to the advantage of both doctors and patients. Three hundred TU Delft scientists are active within this theme. TU Delft believes that additional funding, on top of that provided by the government and the business community, will enable medical innovations to be achieved more quickly. This is why an active fundraising campaign has been established. Examples of projects are:

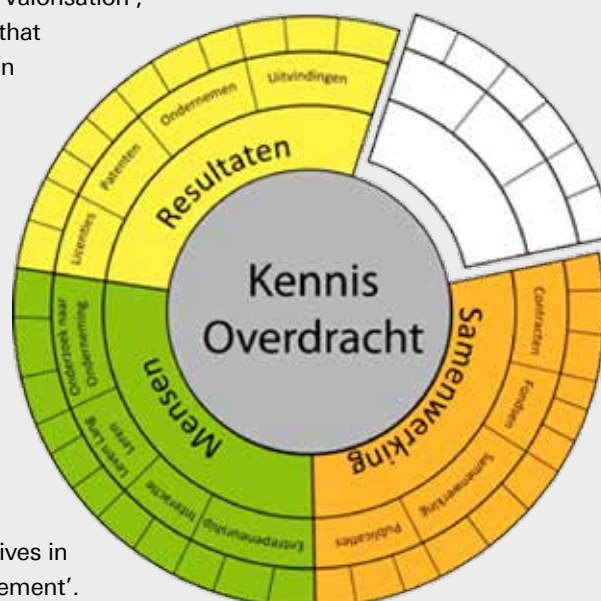
- Targeted radiation, minimal damage
- Diagnosis and surgery through minimal intervention



Valorisation indicators

In view of the third core activity, 'Valorisation', government and society request that universities make their valorisation efforts transparent.

In the outline agreement that the VSNU entered into with the State Secretary of the Ministry of Education, Culture and Science, the universities committed themselves to developing indicators for measuring the efforts and results of their valorisation activities in 2013. Anticipating this, in the spring of 2012 the universities formulated their ambitions and valorisation objectives in the 'Proposed Performance Agreement'.



3TU.Federation valorisation indicators

The 3TU.Federation develops a common selection of valorisation indicators, consisting of a number of quantitative and qualitative indicators. At the end of 2013 and at the start of 2014, the definitions, readings and registration of the selected indicators were operationalised. This work set will be developed further and tested in the coming period. In 2016, the result of this process must be a tested and validated set of indicators, which allow the university's efforts to be observed in the complex context of valorisation.

The valorisation indicators were selected on the basis of:

- relevance (policy richness),
- a connection to the indicators currently in use,
- the VSNU report 'Een Raamwerk Valorisatie-indicatoren' and the
- report 'Waardevol – Indicatoren voor Valorisatie' of the Rathenau Institute (this report was chosen as a guideline within the 3TU.Federation).

Exo-L

Ir. Marcel Fleuren graduated cum laude from the faculty of Industrial Design Engineering in 2011. His graduation project was the Exo-L, an external ankle band that is attached to a shoe in order to prevent wearers from spraining their ankle. The patented Exo-L gives way up to a certain point and only tightens up if the ankle looks as though it is about to be sprained. The Exo-L is made to measure. This is done with the help of a 3D scan and a 3D printer. The Exo-L was a finalist at six different product competitions, from the Philips Innovation Award to the National Sport Innovation Prize. Marcel Fleuren has just started his own firm at YES!Delft, the TU Delft business centre for high-tech start-ups. He gets a lot of energy out of developing the company, where five people are currently employed and which accepts additional graduates and internship students. His goal is to make Exo-L the new standard for ankle protection all over the world.



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COLOPHON

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The digital version of the TU Delft Valorisation Agenda 2020 will also appear on the website: www.tudelft.nl

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