Paul Rullmann: ‘Worldwide there are millions of people screaming out for knowledge’

Rullmann, a member of the Executive Board for nearly eleven years, is also always accompanied by a faithful old friend, his car. He will leave the TU at the end of March. His portfolio was education. Under his leadership the university grew from over 13,000 to 17,500 students and researchers. The Delft Systematic Yacht Hull Series is online. Paul Rullmann, a member of the Executive Board for nearly eleven years, is also always accompanied by a faithful old friend, his car. He will leave the TU at the end of March. His portfolio was education. Under his leadership the university grew from over 13,000 to 17,500 students and researchers. The Delft Systematic Yacht Hull Series is online.

Life work

In this edition two Delft icons tell us about their life work. Lex Keuning is a familiar figure at the Delft towing tank. Indeed his fame is surpassed only by that of the old canine companion he always has with him. After nearly forty years of researching yacht hulls and two years before retiring, this boat expert is sharing his life’s work with yacht builders and researchers. The Delft Systematic Yacht Hull Series is online.

The dredgers seem to be fighting a losing battle in the river Waal; the waterways are silting up more quickly as a result of the floodplains being lowered and the summer dikes moved. Reason enough for student Tim van der Lugt (CEG) to spend this winter trying out something new, together with the captain of dredger M.S. Dintel. Rather than levelling the sandbanks with a vertical plate, the dredgers take a ‘bite’ of sand, which they then move under water and deposit elsewhere. This reduces friction tremendously. The technique has not yet been fully developed. On one occasion, the stern of the ship completely disappeared under water when the flap valve of the plough failed to open quickly enough.

Efficient dredging

Colophon

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Can I help you?

Now that most shops are full of cameras anyway, we might as well do something useful with them, Dr Mirela Popa (EEMCS) thought. She managed to get the computer to track customers on video footage and to identify whether they were near any merchandise. Another system could recognise typical searching behaviour. The prototype could make staff observant of interested visitors in the shop.

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Electric highways

If it were up to Dr Pavol Bauer (EEMCS), the drivers of electric cars would never again have to worry about being stranded at the side of the road with an empty battery. He forecasts a future in which cars are wirelessly charged as they drive along a motorway with magnetic coils in the asphalt. Solar panels and wind turbines at the roadside generate electricity. “I have calculated that it is possible”, Bauer says in Delta. “Now to convince the financiers.” In January Bauer published three articles on this subject in the magazine IEEE Transactions on Industrial Electronics.

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New lab quantum computer

To make the first working quantum computer circuit, based partly on the recently discovered Majorana fermions, that is the ambition of nanoscientists Prof. Lex Kourkoutzoglou and Prof. Lieven Vandersypen of the Kavli Institute of Nanoscience and Carlio Beenakker (Leiden University). In December the European Union announced that it would provide fifteen million euros of funding for this research. A new laboratory is to be built especially for this research.

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Get out of here

Evacuations could be accomplished more effectively and efficiently by equipping people in the affected area with simple means of navigation and communication, so argues PhD candidate Lucy T. Gunawan. Her crowd-sourcing evacuation is based on the assumption that most people in the area will be able to walk, and bundles their observations in the recommended evacuation routes. As a result people are less likely to make mistakes and get lost than only armed with a map. Gunawan believes her system could support and indeed replace the current centralised evacuation system.

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Delft in Brief

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Robot institute

Late January saw the official kick-off of the TU Delft Robotics Institute, the new ‘umbrella’ for all robotics research in Delft. Practically everything made in Delft that communicates, flies, rolls, walks, runs, swims, creeps or grubs, was set up at 3mE. And that included the walking robot Leo, the running Phaës and care robot Eva.

Eva cares

“Look, there’s Eva”, says one of the receptionists cheerfully at the Viva Zorggroep nursing home in Hoenscherk. “We’ll be out of work soon, thanks to her”, she adds, laughing. Care robot Eva got her first taste of work at the end of January when she visited a nursing home for the first time. A woman in a wheelchair recovering from foot surgery was also quite taken by Eva. “When I go to the bathroom, she can carry my clothes.”

During a group discussion held later that day with employees and inhabitants it was agreed upon that it would not be a good idea to have the robot perform medical tasks, at least not in the near future. Eva will thus not be handling injection needles, that much is clear. Lively discussions were held about whether tasks such as feeding people, helping them with rehabilitation exercises, washing patients and measuring blood pressure could and should be performed by robots. “All tasks that need human interpretation should always be performed by people” one of the attending doctors stated which pretty much concluded the whole discussion.

Marcel Laan, IT-manager of the nursing home, who invited the Delft researchers, is not disappointed. “Eva isn’t really capable of doing anything”, he says. “This technology still needs a lot of work. We have always been interested in new technologies and we are thrilled to be at the forefront of these developments in robotics.” In time, Dr Joost Broekhoven, researcher with the interactive intelligence research group (EEMCS), hopes that she will be able to take lost patients back to their rooms. At the end of the year the robot will come to the nursing home for a week’s trial.

Erik Schuitema met robot Leo

Robot Leo was programmed to teach himself to walk. It takes him about five hours, not counting the time it took him to pick himself up again. For his doctoral research, Dr Erik Schuitema (3mE) spent hours watching how the little 50-centimetre robot tirelessly moved his feet, fell over and then pushed himself up again. “It made me realise that this research is gradually winning ground, headed for a very distant goal”, says Schuitema. Walking robots should be able to move among people more flexibly.

From walking...to running...

Fellow PhD candidate Dr Daniel Karssen also let his robot freely move round the Delft BioRobotics Lab, but then dancing like a mechanical ballerina. The objective of the running robot Phaës was to establish whether and how disturbing influences could be reduced for people walking with prosthetic legs - influences such as irregular road surfaces, or a knock on the side. Karssen discovered that prosthetic legs are much more stable if special, nonlinear dampers are used. After a certain point these actually generate less rather than more strength.

Flood disaster in a nutshell

TU Delft researchers Dr Olivier Hoes (CEG) and Christian Kehl (EEMCS) have combined the latest pro-informatics with hydraulic calculations and computer graphics in an interactive 3D-image of the floods of 1953 which struck the provinces of Zeeland, Zuid-Holland and West-Brabant. Dikes breached at more than four hundred locations and some places were still flooded six months later. This setup can be perceived and experienced in the TU Delft Science Centre.

Stabilised laser

Researchers of MIT have developed a new terahertz laser, the size of a comma. PhD candidate Yuan Ren (Applied Sciences) has managed to stabilise this laser, making it suitable for astronomical observations on board satellites or balloon missions.

Fascinating façades

Phil candidate Holger Strauss (Architecture) expects it will be some time yet before a 3D printer can produce whole buildings. But such new production techniques do bring freely designed computer façades a little closer. Strauss expects that mounting systems with individually printed components will simplify the production of fascinating façades. This will be the beginning of an entirely different approach to façades, he believes: as a dynamic shell that both separates and connects indoors and outside.

Auxiliary branch for LED

In 2011, TU Delft opened its first research centre in China, followed by another three centres last November. But the reverse is also possible. In January, the Chinese State Key Laboratory opened an office for research into Solid State Lighting (LED lighting) within TU Delft’s research institute (EEMCS). Together, 3mE and TU Delft aim to expand their cooperation and to attract more knowledge and to attract more researchers, is not disappointed. “Eva isn’t really capable of doing anything”, he says. “This technology still needs a lot of work. We have always been interested in new technologies and we are thrilled to be at the forefront of these developments in robotics.”
After nearly forty years researching yacht hulls in the Delft towing tank, boat expert Dr Lex Keuning has decided to share his life’s work with yacht builders and researchers. The Delft Systematic Yacht Hull Series is available online.

Jos Wassink

Due to an unfortunate combination of events, Dr Keuning was unable to personally attend the presentation of his systematic series at the Hiswa Symposium – the annual symposium on yacht design and yacht construction. TU Delft researcher Michiel Katgert did the honours. He explained that the full measurement data of seventy hull shapes over the last 39 years, as well as the forty publications based on these data, are now publicly available to anyone who takes the trouble to request a login (at dsyhs.tudelft.nl).

According to Katgert, these measurement data can then be used to develop software that will predict the performance of ships during the design stage (the so-called velocity prediction programmes or VPPs). The Delft data can also be used to validate numerical approaches to a ship’s resistance, for example. Katgert asked designers at the symposium to post on the website discussion forum to let them know how they use the data. “We invite you to participate in our research.” That sounded very open-source and contemporary, but a little later Katgert had to admit that expanding the series was no longer an option in Delft.

Mathematical aid

Yacht designer and ocean yachtsman Gerard Dijkstra made a name for himself with the ‘Stad Amsterdam’ (which featured in the VPRO series ‘Beagle’), the mysterious three-master ‘Maltese Falcon’ and Greenpeace’s new mother ship: the motor yacht ‘Rainbow Warrior III’. When performing design calculations, Dijkstra prefers to use ‘the Delft series’ or ‘Sysser’ (systematic series). During the coffee break at the Hiswa symposium he said: “I have been familiar with the series from day one and witnessed its development. That inspires confidence.”

Keuning (62) witnessed the beginning of the series as a student. That was in 1973 when Professor Jelle Gerritsma, Professor of Ship Hydromechanics, wanted to start generating comparative measurements of yacht hulls. He did this together with two colleagues from Massachusetts Institute of Technology who shared his passion for yachts and sailing. The two men concerned were Nick Newman, Professor of Ship Hydromechanics, and Justin Kerwin, Professor of Hydromechanics.

The objective was twofold: to create a mathematical aid to enable yacht designers to determine the sailing properties of their design and to develop a method of calculating the handicaps of the various yachts in a yachting race.

‘There are forces above and under water which together form a complex balance’

“It is much more difficult to predict the velocity of sailing yachts than that of motor yachts,” explains Keuning (3mE faculty) in his office next to the towing tank. His aged dog is lying near the door. “There are forces above and under water which together form a complex balance.”

The research needed to be systematic. This means using adjustments on the basis of a standard-model ship. The ship chosen as standard was Frans Maas’ ‘Standfast 43’, a 13-metre sailing yacht of which a 1:6.25 scale model was built. Keuning explains the adjustment process: “Taking the mother ship as starting point, we increased and reduced the width slightly. This resulted in three models, which were all dragged. Any differences in resistance that you measure are consequently attributable to the difference in width. You can do the same with the length, draught and water displacement.”

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Yacht designer Gerard Dijkstra: ‘The series inspire confidence.’

It sounds simple but adjusting the width also changes the displacement. There are many interdependencies.”

The first systematic series consisted of nine models.

Towing tank
The measurements were performed in the large TU Delft towing tank: 142 metres long, 4 metres wide and 2.5 metres deep. As all the measurements were performed using the same method and the same equipment, they are not only comparable with each other but also with the measurements of later models.

Drag tests involve a 4-ton aluminium carriage travelling along rails on either side of the tank at a maximum speed of nearly 30 km/h. Below a hull model, fully lit, cuts through the waves. The hull is hinged – only the angle between the heading and the track (the drift angle) is registered and the angle with respect to the vertical (slope). This is where we encounter nautical terminology such as pitching, heaving and yawing (see more in the box on ship movements). The measurements take at least a week for each hull. Just consider: besides the upright box on ship movements, the water in the tank to settle sufficiently for the data from Delft form the basis for the velocity prediction programmes or so VPPs that yacht builders use during the design stage. “The nice thing about the systematic series is that you don’t have to design using a model that has been dragged,” Dijkstra explains. “You create your own design based on your experience and the client’s wishes in terms of length, width and draught. This forms the operational profile of the yacht.

Using WinDesign (one of the VPPs, ed.) you then calculate the performance and iteratively modify your design until you reach the best compromise that meets the client’s requirements. If you base your performance calculations on this series, you’ll always know that your ship will sail properly.”

In fact, Dijkstra doesn’t take the velocities that WinDesign specifies for the various directions all too seriously. Due to the structure of the atmosphere and the wave pattern of the water the actual velocity will often deviate from the theoretical prediction. You’d be lucky to get a match within five percent. But, once again, it’s all about the mutual comparisons.

Handicaps
The same applies when using the systematic series to determine handicaps. As a researcher, Keuning is a member of the International Technical Committee of the Offshore Racing Congress. In this competitive world, the handicaps of the various yachts are determined using VPPs based on the Delft systematic series. “This enables us to apply a correction for the length or weight of the ship and establish who sailed best of all,” Keuning tells us.

Asked whether the series is to be extended, he answers with a sigh. Followed by: “There’s no money left for that.” Keuning would like to add lightweight, plane sailing yachts to the series. Dijkstra sometimes comes on to drag an extremely long, dimline model. “A twelve-metre yacht used to be quite spacious; nowadays a hundred metres is perfectly normal,” he explains. While these data are added to the series, clients prefer to keep racing yacht data to themselves. Contraire to what they were used to, the group now has to wait to see what they are offered in the way of drag testing.

‘If you base your performance calculations on this series, you’ll always know that your ship will sail properly.’

Largest measurement series in the world
After these nine models the Delft group wanted to continue, but the Americans pulled out: the money had run out. The research could continue in Delft as long as the researchers were still motivated enough and yacht builders were interested in the results. A new measurement series consequently followed in 1982, based on a design by Van der Stadt & Partners; in 1993 there was a series based on a model by Sparkman & Stephens and in 2007 a model by Jadel & Vrolijk was the last mother ship for the time being. The Delft Systematic Yacht Hall Series (SYTHS) comprises a total of seventy systematically varying and mutually comparable hulls, which makes it the largest systematic series in the world.

‘Whether a boat is 4 or 140 metres long, the series still applies’, Dijkstra says. The ship hydromechanics research group has hence written a bible for boats, which will serve as a standard for yacht builders and racing sailors for years to come. The data from Delft form the basis for the velocity prediction programmes or so VPPs that yacht builders use during the design stage. “The nice thing about the systematic series is that you don’t have to design using a model that has been dragged,” Dijkstra explains. “You create your own design based on your experience and the client’s wishes in terms of length, width and draught. This forms the operational profile of the yacht.

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‘If you base your performance calculations on this series, you’ll always know that your ship will sail properly.’
‘You must believe in the steps you take’

Paul Rullmann decided to leave TU Delft in April, after nearly eleven years on the Executive Board. He started his career as a musician in a folk band but ‘bounced on’, via a tutorship at a university of applied sciences, into policy. Under his leadership TU Delft grew from over 13,000 to more than 17,500 students and education changed drastically. But times were not always good.

Saskia Bonger

Did you ever imagine you’d stay this long, as a sociologist among the techies?

“I found myself in an entirely different kind of organisation to what I was used to, with a character all its own. It was far from certain that I would form a good combination with my colleagues, but that certainly worked out well. I really do understand technicians’ passion, how they can be totally absorbed by their research, how it can keep them awake at night. And, given half a chance, leap on their bikes at six a.m. to test whether what they devised in the night really works.”

Do you sometimes lie awake like that?

“I used to. I’d lie in bed building crystal receivers, wishing the night away, so that I could do some more soldering. So I do have technical streak. I took science subjects at high school. I went on to study pharmacy but didn’t complete the programme. I was very disappointed. Maybe it had something to do with the programme information back then. I had expected to be helping people with medicines, but it was much more of a combination between chemistry and retailer’s certificate. It was very far removed from medicine. But tinkering fascinated me. I could well have become a dentist or a watchmaker.”

Things turned out very differently. No tinkering, setting out broad outlines.

“It got here gradually, step by step. I was a member of a folk group called Crackerhash, meaning ships biscuits. It was a fairly uncertain living so I needed to earn a little more elsewhere. So I became a lecturer at a university of applied sciences. I taught social subjects: sociology, political science, social psychology, social skills. I became more and more involved in policy. I went from lecturer to lecturer coordinator, policy officer, Head of the Policy department to Secretary to the Executive Board and, ultimately, to Member of the Executive Board. I have never had a clear-cut career in mind, I just bounced on and on.”

Wouldn’t you secretly have liked to live a rock’n’roll life?

“No. I really enjoy music, but a musician is something you have to be. It’s wanting to start playing the second anyone wakes you in the night. I had the choice: Friends of mine made a living for themselves as musicians, I preferred it to be a hobby. We formed Crackerhash in 1968. We lasted around 35 years. I’ve seen every youth club in the Netherlands. We played English sea shanties; later we wrote our own Dutch lyrics. Made a record, made a CD, and in 2004 we even played a farewell concert.”

What kind of lyrics did you write?

“Contemporary cabaret. Not too political as we wanted to be able to play a song for quite a while. They were often about the morbid side of life: things that go wrong or take a strange twist. ‘Things like love, or which till queue to join. Yes, you always choose the wrong one’.”

As the third member of the Executive Board, you were given the portfolio of Education. That was newly created. Why?

“There needed to be more focus on education and research. The education itself was good but it was very compartmentalized and not very exciting. We started with the report Focus on Education. This led to a whole host of changes: more projects during the degree programme; more use of ICT, the major/minor model. This has made education more attractive. Perhaps the most difficult thing was to create more cohesion within the teams of lecturers in how they thought about education. After a few years of the Bachelor/Master system, it turned out that it especially worked for us in terms of administration, but that there was no clear division in the study programme. We then implemented the Bachelor-before-Master rule. Other measures followed later, such as the binding recommendation on the continuation of studies, the introduction of guarantee months for study projects. All in all, education has livened up significantly. This has contributed to the continuing increase in the number of students. In 2002 there were over 13,000, there are now 17,500. A much needed rise as there is still a shortage of engineers in the Netherlands.”

Many of the students are from abroad. Are they not going to solve the shortage of engineers?

“Some of them certainly will work in the Netherlands. International students are extremely important. The Netherlands can keep all the doors firmly closed, thinking we can manage alone, but it doesn’t work that way. We need international companies and relationships.”

‘I really do understand technicians’ passion, how they can be totally absorbed by their research’

Photos: Sam Rentmeester
You have always been an advocate of digitalisation. Will the university eventually disappear as a physical location?

“In the Netherlands you don’t even really need digitalisation. We have a university or university of applied sciences on every street corner. But worldwide there are millions of people screaming out for knowledge. There are now countless institutions that provide digital materials, including really large ones like Stanford and MIT. They irrevocably. This is becoming so important that it will affect the reputation of an ‘ordinary university’. You have to be part of it.”

This also requires lecturers to make considerable changes. That’s quite alarming for them.

“That may well be, but take Collegena. It all started rather hesitantly but now we can’t meet the demand. Not that all the lectures included are good enough to publicise but the lectures are practising and improving. Research is now very highly valued internationally. The same cannot yet be said of lectures but they will soon have to fight international competition with very good online material. It places lectureship in a different light altogether, lecturers need to create a different kind of added value.”

Who is Paul Rullmann?

After leaving secondary school Paul Rullmann, born in The Hague in 1948, went to study pharmacy. Disappointed with this study, he switched to technology. Rullmann taught in higher education and held several management positions at the Haarlem University of Applied Sciences. Between 1990 and 1995 he worked as policy officer with the Netherlands Association of Universities of Applied Sciences. Rullmann then returned to Haarlem University of Applied Sciences. Among other things he was Secretary to the Executive Board (EB) and was appointed member of the EB in 2000. When the university of applied sciences was incorporated into the Inholland University of Applied Sciences, Rullmann moved to Delft in 2002. His function as third member of the EB entitled various secondary activities. Among other things he was a Board Member of Studentlink, Board Member of Studentenraad 131 and Chairman of the Supervisory Board of Academic Transfer.

As manager implementing the changes enforced by the OOD, you have to be able to handle criticism. How do you deal with that?

“I’m a die-hard optimist. My first reaction to the problems during the OOD was always: ‘OK well get that sorted. You must believe in the steps you take.’ Something I learned from Hans van Luijk (former President of the Board, ed.) was that you should be able to explain in one or two sentences why you are doing something. At OOD that was quite clear: we are to ensure that by providing less support, more money will become available for the scientific process.”

How did you get the Student Council to remain so constructive, even if they disagreed with your measures?

“In some respects, students can be very conservative. But you still have to convince them. How do I do that? With a lot of talking. I don’t have a hidden agenda. Students may know where I’m headed. I am apparently able to include them in the puzzles we face as Board. Students on the Student Council are exempted for a year so they can bombard you with questions. This has sometimes led to heated discussions, sometimes even to a dispute. I value their contribution. They know the organisation, they gather information which we would not otherwise be able to obtain. They spot any bottlenecks sooner.”

What do you consider the highlight of your time at TU Delft?

“The rise in the number of students and education being enhanced. The move to set up an independent department of Education and Student Affairs was a very good one. That was part of the OOD. This generated many incentives. The appointment of Directors of Education, one for each faculty, also helped. These eight directors can reach decisions and compromises far more easily than the room full of Directors of Studies that we used to have. It has led to more coherence with regard to assessment policy, timetables, regulation and educational renewal. There is a firm conviction that collectivity will help us more than division.”

And what was the lowest谷?

“The SRC affair: a series of articles in NRC Handelsblad about claims by the Executive Board and the financial situation of the university. I felt it was disconcerting and was shocked that a journalist could arrange the facts in such a way with the intent of harming you.”

Are you looking forward to your retirement or worried you won’t know what to do?

“I would like to remain active in committees or boards but it will be lovely to have more time for things like music and sport.”

The most technologically advanced tram line in the Netherlands is to be built here. Worried about the magnetic field that the tram’s 1,000-amps DC would generate, the executive board examined measures to prevent diffuser fields. Prof. Lou van der Sluis (EEMCS) and Prof. Peter Kruit (Applied Sciences) found a solution and patented it. In the Mekel Park the electricity supply for the overhead wire is underground to minimise the loop between the feed and return current. Between every two conductors the overhead wire is fed from two directions.

Nonsense. We emphatically dismiss this as a myth. With these historic words, the NAM (Netherlands oil and gas company) initially quashed the theory of any possible connection between gas extraction and the earthquakes that have been shaking the north of the Netherlands since 1986. The hypothesis originated from provincial councillor for Drente Dr Meent van der Sluis. The NAM said it was ‘unfounded nonsense’. The oil company felt the same about TU Delft alumnus Willem Merkens’ warning at the beginning of the Groningen gold rush in 1963. The civil engineer – nickname ‘Willem Beton’ (concrete Willem) – warned of the downsides of gas extraction, such as subsidence. He stood alone. ‘Sochtersen’ is a fine example of the gaping hole between the authorities on the one side, with ‘their’ engineers and the justified need for proof, and the intuition and theories of firethinkers who don’t give a hoot about the common-sense opinions on the other. The problem, however, is not that the authorities want hard evidence; the problem is the sharpness and the disdain with which other opinions are rejected and their mouthpieces written off as idiots. That, in particular, created ill feelings, especially when it turned out they weren’t so ‘crazy’ after all. The authorities’ opinionated attitude undermines people’s confidence in them and hence their authority. As in the case in Groningen.

That people who think differently are often shot down in flames, is because they are outnumbered. With every initiative, the use of any new technology, or indeed a new use of an old one, there is always someone predicting Armageddon. Get used to it. Politicians, governments, scientists and engineers had all better get used to it. If only for the fact that in most cases there is at least an element of truth in their warnings. The awareness of this should be the first step towards an attitude where ‘conformists’ stand by the need for scientific proof while openly allowing for the possibility that all might not be quite what it seems. An attitude which openly admits that every technology, by definition, has its disadvantages, though possibly unknown when first introduced. Or, as the former US minister Donald Rumsfeld put it: “There are things we know we know. Then there are things that we know we don’t know. But there are also unknown unknowns: things we do not know we don’t know.” A wisdom worth bearing in mind during the forthcoming shale gas discussion. So should an ‘idiot’ submit a thesis that seems even shakier than the soil in Groningen, remember: That ‘idiot’ might just be right.
A case of discrimination or not? That was the question asked when TU Delft announced that it was going to look for talented women: scientists who would get the chance of a tenure track in Delft in order to accelerate their careers – the aim being to raise the dismally low number of female researchers in Delft.

Saskia Bonger

In 2012, women accounted for 24 per cent of all assistant professors, eleven per cent of all associate professors, and eleven per cent of full professors. The TU Delft scores in this area are notoriously low. This was ultimately the reason that the Netherlands Institute for Human Rights (the former Dutch Equal Treatment Commission) ruled that TU Delft was not discriminating illegally when recruiting for the fellowship. The ruling was in response to a complaint. In practice, the degree to which women lag behind is so great that giving them a helping hand is a matter of necessity. Of the ten women who have now been appointed, two are full professors, two are associate professors, and six are assistant professors. They are spread across seven faculties, all except Aerospace Engineering. As well as their salaries, they will be receiving three hundred thousand, two hundred thousand, and one hundred thousand euros respectively to set up their research projects.

Two-thirds of the costs of the fellowship are to which the scientists have been appointed. Two are full professors, two are associate professors, and six are assistant professors. They are spread across seven faculties, all except Aerospace Engineering. As well as their salaries, they will be receiving three hundred thousand, two hundred thousand, and one hundred thousand euros respectively to set up their research projects.

Two-thirds of the costs of the fellowship are being paid by the Executive Board, with the remainder being made up by the faculties to which the scientists have been appointed. Depending on the level at which they enter, the university will be making between 10.5 and 14 million euros available for a total of twenty fellowship participants. Another ten (at the most) female scientists will be appointed to the fellowship in 2014.
Dora will watch over you

A black box, but then in the operating room.
Meet the digital surgical assistant Dora. TU Delft is developing the system together with hospitals and businesses in the province of Zuid-Holland.
“We can learn a lot from aviation.”
Jos Wassink
Doctors tend not to report mistakes for fear of legal action

The Dutch Public Prosecution Service every year reports on medical mishaps. Over 200 cases of wrong medication, faulty equipment and hygiene errors, for example. For the remaining 1700 cases are apparently not reported. “Doctors tend not to report mistakes for fear of legal action”, observes Frans Hiddema, CEO of the Rotterdam Eye Hospital. He would nevertheless prefer to have all operations video recorded. Contrary to the aviation sector, where no stone is left unturned to find the cause of an accident, mistakes in the operating room are still often covered up. In this fairly closed culture people have grown used to the fact that equipment sometimes doesn’t work optimally and consider the fact that operations take longer than scheduled as inevitable as autumn rains. Dora is an attempt to improve through registration and transparency.

Checklist

The findings of the then trainee surgeon Dr Emiel Verdaasdonk were the starting point for the Dora project. In 2006 he had conducted an observation study into the practice of keyhole surgery to remove the gall bladder. In 86 percent of the operations there were one or more “incidents” with medical equipment and in 45 percent of the operations equipment was unavailable or not set up properly.

“But if you asked the operating room staff about this, they hadn’t noticed anything”, explains head of the Dora research project Dr John van den Dobbeleuten, of the Biomechanical Engineering department of the Faculty of Mechanical, Maritime and Materials Engineering (TUD). “They see that used to incidents with equipment.” Emiel Verdaasdonk compiled a checklist to be used before an operation commences to check that all equipment is available and in full working order. A tried and tested method applied in aviation. “Two minutes work for fifty percent fewer faults”, Van den Dobbeleuten summarises the effect of the list.

There was nevertheless some opposition to the checklist. Some felt it was for dummies while others felt there was nothing hi-tech about ticking off a checklist with a pencil. Was there no alternative?

Have you seen the coagulation machine?

An automated checklist is indeed under development in the Reinier de Graaf hospital in Delft. Clinical physicist Dr Jaap van Blaaderen is collaborating with TU researcher Aartje Guedon (TUD) and the company Double Sense to develop a system that uses radio chips (RFIDs) to check whether all necessary equipment is available. For the purpose of the test a hundred pieces of equipment, including anaesthetic equipment, laparoscopy towers, lasers and pumps have been fitted with an active RFID the size of a pillbox. It contains a registration button, a motion detector and a red LED light. If the piece of equipment is moved the RFID transmits a presence signal which is received by the central system. This is how Dora knows which piece of equipment is where. All being well Dora should soon also know which operation is scheduled and which equipment is required. She also knows the maintenance status of all the equipment.

Dora will only display a green light on the iPad on the wall if all the equipment present is in correct working order. “In theory, the operator is responsible for checking that the equipment is in correct working order”, Blaaderen says, “but in practice really doesn’t go round checking all the equipment and stickers himself.” New all he has to do is check whether Dora displays a green light.” Reporting faults has also been much simplified and standardised. The system was implemented in part of the hospital in October. “There were a hundred teething problems,” Guedon says smiling, “but at least it is being used.” Asked when the implementation would be a success, they both answer: “When we receive lots of fault reports.”

‘The patient has been in the corridor for an hour’

Just as with imperfect equipment, many hospital staff consider operation schedules running late an inevitable natural phenomenon. This does not apply for gynaecology Prof. Frank Willem Jansen (LUMC) and information scientist Dr Loubna Bouarfa, who recently obtained her PhD. “Hospital planning systems are extremely basic”, Bouarfa concludes in her doctoral thesis Recognising surgical patterns. “Practical data are not used to adjust the system and thus improve the efficiency of the system from the field.”

Jansen puts it slightly differently: “What we’d like is a Sat Nav in the operating room, so to speak, that automatically monitors the progress of the operation and dynamically predicts how much longer it will take.” A system that would be a blessing for the wards and patients, who could use it when their turn is about to be called at a board. It could alleviate the complex planning system by looking at a board. It could all be done better.

‘How much longer does Mother have to wait?’

In the Rotterdam Eye Hospital, it is not the duration of the treatment that varies as much as the patients’ waiting time. “One might be treated within five minutes while another has to wait an hour and a half to even be seen,” Safety & Quality advisor Dr Dirk de Korne says, summarising the problem. As measurement is the initial source of knowledge, the Eye Hospital has implemented a patient monitoring system. Upon arrival, every surgical patient (of which there are 14 thousand a year) is given a wristband with an RFID chip, which registers his or her location in the hospital. This enables family members accompanying the patients to see where they are (still in OR or has the operation finished?). Nurses can prepare their patients in good time, and many annoying telephone calls can be avoided. Over the coming period, data analysis conducted by TU Delft researcher Dr Linda Wauben should reveal how waiting time can be made more uniform and reduced.

Besides aiming to improve efficiency and patient safety, Dora also raises questions about protection of the privacy of both patients and practitioners. As was evident during the working conference on Improving Operation Processes at Van-Deuff on 27 September. The conference called for more transparency by means of systematic data collection. Better analysis of the data collected and feedback of the findings to the practitioners. Director Hiddema (the Eye-Hospital) expects more transparency in the OR to coincide with the emergence of a different kind of doctor: a team player rather than a soloist. Quality advisor De Korne does not expect more openness until transparency has to do with fear claims or criminal proceedings. “The Dutch Public Prosecution Service wants to blame someone but, for us, the question is not who was wrong but what went wrong.”

Hiddema feels metics should follow the example of the aviation sector, which, in the event of an accident, gives priority to the Dutch Safety Board rather than criminal law.

Dora is the ultimate Big Brother machine in the operating room. She monitors patients from the moment they come in. She films the operation, registers the instruments used and identifies the equipment. Big Sister doesn’t miss the patients thing they come in. She films the operation, registers the instruments used and identifies the equipment. Big Sister doesn’t miss the patients thing they come in. She films the operation, registers the instruments used and identifies the equipment. Big Sister doesn’t miss the patients thing they come in. She films the operation, registers the instruments used and identifies the equipment. Big Sister doesn’t
Around 800 students, 30 professors and some 600 other staff from bionanoscience, chemical engineering and biotechnology will be moving to a brand-new building on Kluyverweg at the end of 2015. Construction is to start in September and must be completed exactly two years later. The building will have a floor space of 30,000 m², spread across three stories. Above these will be a fourth floor containing installations/plant. The building will contain ultra-high, vibration-free laboratories, fermentation labs, chemistry labs and practice rooms with lots of fume cupboards, as well as teaching and meeting rooms, offices, project rooms, two studio classrooms and a faculty meeting room.

Green space is provided in the form of a roof garden and two patios containing courtyard gardens, and the building will be set in park-like surroundings in line with the TU Delft campus. Kluyverweg itself will be car-free, but there will be 270 parking spaces. (SB)
The View

No to demolition - Yes to schools

Deprived neighbourhoods don’t have to disappear if Maarten van Ham, Professor of Urban Development, has anything to say about it. “There will always be poverty and poor people have to live somewhere too.”

Maarten van Ham received a lot of media attention after delivering his inaugural speech in December 2012. His message doesn’t matter that poor people live with poor people and rich live with the rich. As far as Van Ham is concerned, the government should stop demolishing cheaper homes to replace them with expensive ones, and tackle the actual poverty.

According to Van Ham, people don’t even want to live in a mixed living environment, they prefer to be surrounded by ‘like-minded people’. There will consequently always be neighbourhoods with relatively large concentrations of poor people. “It is impossible and indeed unnecessary to permanently oppose segregation. Mixing people would require constant intervention from the government, because ‘mixing’ seems to be a natural given. So studies reveal.” Furthermore, Van Ham continues, there will always be poverty. “Poor people have to live somewhere too. Mixed living won’t help combat poverty and towns need cheaper neighbours. The government has an important task in ensuring that every neighbourhood is clean and safe and that there are adequate and easily accessible amenities. Stop all that levelling out, taking money from the rich to give to the poor. Try investing in the future. A far better way of helping people is not expensive.”

Physics is not more real than your faith

Hydraulic engineer Dr. Olivier Hoes, in newspaper AD in connection with the computer model he approached. Would you want to stay there all night, up to your waist in water, at a temperature of 4°C? Would you want to stay there all night, up to your waist in water, at a temperature of 4°C?

If the Netherlands wants to grow into an innovation economy, the culture has to change to targeting good enough to best achievable.

If the Netherlands wants to grow into an innovation economy, the culture has to change to targeting good enough to best achievable.

Maarten van Ham: “In order to compete on the international stage, society has to change its culture. The culture has to change to targeting good enough to best achievable.”
Weijne Margot & energy systems engineering

The European Union has awarded a Marie Curie scholarship to Dr Phil Vardon, assistant professor of geosciences (CEG). Vardon will spend the next 25 years working as an independent entrepreneur and for organisations. Ms Smits of Oyen will succeed Merel van Vroomen.

TU Delft has a foot in the government's doorway. As of 1 January professor of process & energy systems engineering Margot Weijnen (TPM) has been appointed member of the Scientific Council for Government Policy [Wetenschappelijk Raad voor het Regeringsbeleid]. The appointment will run until 31 December 2017.

The underground ecosystem can prove useful during numerous socially relevant activities, professor Timo Heilmannvaara stated during his inaugural address on 1 February. The professor of geo-environmental technology conducts research into ways to utilise biological processes underground for geo-technical and civil engineering applications, among others.

NWO has awarded a Vici grant of 1.5 million euros to Dr Edouk Visser. He is currently researching programming languages at the Faculty of Electrical Engineering, Mathematics and Computer Science. With the Vici project ‘The Language Designer's Workbench’ Visser hopes to enable computer language developers to detect any reference errors at an early stage.

It is her duty to closely monitor the day-to-day functioning of TU Delft; it is her task to improve government services. This is Regeringsbeleid. The appointment will run until 31 December 2017.

The entrepreneurial spirit that won Geert-Jan Witkamp the Entrepreneurial Scientist Award is unlikely to make him rich. The company EFCseparations, where he is chief technology officer, is owned by TU Delft. An ideal situation for the professor of process equipment, because he can spend plenty of time on his research.

It is not very inviting: the building of Mechanical Engineering for Process Technology, which looks more like an inverted bathtub. At the door a half-frozen smoker, just inside an empty hall. ‘It’s easiest if you ring when you get here’, Witkamp had written in his mail. After that telephone call, warming costs and rubbish, we go into the lab, where the four staff members of EFCseparations spend much of their time.

The scientist who won the prestigious Dow Energy Award in 2011, who conducted ground-breaking research that led to several spin-off companies, and who in December 2012 received the Entrepreneurial Scientist Award from incubator YodDelft and the TUValorisation Centre turns out to be a modest man who talks about his profession with passion. We stop at a test setup of Witkamp’s most important work, a crystallizer used for the energy-efficient purification of industrial freezing solutions, or extractive freeze crystallization. This technology proved to work so well that Witkamp set up EFCseparations in 2009. TU Delft is the owner, the Valorisation Centre takes care of the management, and Witkamp is the CEO (chief technology officer). This means that he can work on the fundamental aspects, although this is by no means about lab work. ‘I do a great deal with regard to acquisitions, recruit staff, seek to create value. I see myself as an entrepreneur’.

‘Families depend on this company’

2013 will be an important year for EFC. ‘We hope to find a launching customer this year for a large installation. Until now, companies have only ordered test equipment or have us perform the testing. Luckily we have the TU behind us so we can have staying power than an ordinary company’

All the research projects relating to extractive freezing have involved a total sum of seven million euros, money from the business community. Large investments were needed for installations, one of which can be hoisted onto a truck so it can go to companies to purify industrial waste water. The company employs four people and plans to employ two more in the near future. ‘Families depend on this company, Witkamp says, without pride. It doesn’t bother the man with twenty patents to his name that his company hasn’t yet made a huge profit. “We do break even now, in terms of out-of-pocket expenses, that is, and not those 7 million. In that case we have a positive balance of ten thousand euros.” That amount could increase very quickly if they could secure that large customer. (SB)
**edX:** online free courses of MIT, Harvard, and TU Delft

TU Delft is to offer courses as ‘Massive Open Online Courses’ (MOOCs) on edX. EdX is a non-profit platform for online education through which MIT, Harvard and others, make a range of courses accessible to anyone, anywhere in the world, who has access to the internet. The free courses are open to everyone, without prior education or entry examination. In the coming months, six courses of TU Delft will get started on its first MOOCs: Water Treatment Engineering, Solar Energy and Introduction to Aerospace Engineering. The complete material on these courses will be posted on edX in addition to video recordings, course material and trial examinations. MOOCs will be taught just like courses on the campus: in a fixed period of eight weeks and with opportunities for interaction between fellow participants. The modules come with homework and a certificate of participation may be issued by the DelftX on completion. EdX recently announced that MIT-professor and TU Delft alumnus Walter Lewin will also be adding a course. Already courses like Quantum Mechanics, Introduction of Computer Sciences and Programming and Artificial Intelligence are available on edX www.edx.org.

**TU Delft alumni in 107 countries – World of Alumni**

Since 2010 the alumni website has included the ‘World of Alumni’. This is an interactive map of the world, clearly indicating where all the TU Delft alumni are. The map currently shows some 40,000 alumni, spread all over the world. Shown per country and per degree programme. In addition, nearly 350 alumni have registered as contact person. Because they’d like to stay in touch with fellow alumni. Or because they’d like to help other students.

Top 10 countries with the most alumni

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<thead>
<tr>
<th>Country</th>
<th>Alumni</th>
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<tbody>
<tr>
<td>Netherlands</td>
<td>36384</td>
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<tr>
<td>United States of America</td>
<td>440</td>
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<tr>
<td>Belgium</td>
<td>429</td>
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<tr>
<td>Germany</td>
<td>267</td>
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<tr>
<td>Great Britain</td>
<td>262</td>
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<tr>
<td>Indonesia</td>
<td>218</td>
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<tr>
<td>France</td>
<td>200</td>
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<tr>
<td>Switzerland</td>
<td>146</td>
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<tr>
<td>Canada</td>
<td>97</td>
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<tr>
<td>Spain</td>
<td>96</td>
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</table>

However, alumni can be found in practically every corner of the globe, in 107 different countries.

If you would like to know more about the TU Delft alumni near you or you would like to be a contact person, visit www.worldofalumni.tudelft.nl.

50 years RID

This year, during a week of festivities in April, the Reactor Institute Delft celebrates the 50th anniversary of the Hoger Onderwijs Reactor. Part of this celebration is an open day for students and alumni of the Reactor Institute Delft. This day is all about highlights from the past, present and future. If you completed your MSc or PhD project at the Reactor Institute Delft, please take a minute to mark this afternoon and evening in your diary. More information can be found on www.rid.tudelft.nl/50highlights.

**Recognition for your work’**

In 2010 Vera Kreuwels (Architecture) won second prize in the UfD-Strukton Master Awards, which rewards graduation projects based on their ability to empathise, sense of initiative, innovativeness and CO2 reduction. She researched the possibilities of planning sustainable temporary accommodation in the form of tent villages.

The idea was conceived while setting up the site for the First-Year Introduction Week (Owow). Kreuwels realised that the temporary tent constructions being erected there were not sustainable but did have the potential for longer term sustainable use. From temporary settlements, such as those in slums and disaster areas, she arrived at the more urban problem of the homeless in Seattle. Kreuwels was surprised to be one of the winners. “My graduation project had nothing whatsoever to do with civil building engineering, Struktur’s field, it was about social sustainability. This proved to appeal to the jury”

Immediately after graduating Kreuwels was offered a job in the natural disaster funds in Haiti. She emigrated for six months. The UfD-Strukton Master Award carried a prize of 2,500 euros, which was very useful. Kreuwels: “As I had a job and didn’t have to set up my own business, I was able to invest this prize money in a new computer and camera. That would come in very handy in Haiti.”

Neighbourhood improvement

With Cordaid, Kreuwels worked on the earthquake reconstruction programme as urban planner. She soon noticed that the disaster had worsened the problems in Haiti, especially in the slums. Besides new houses, the residents wanted neighbourhood improvement. She was involved in urban planning, elementary infrastructure, permanent tailored housing and sanitation facilities. After eighteen months, she had finished her work with Cordaid. Kreuwels didn’t think twice when fellow organisation Care offered her a similar position as Program Manager Neighbourhoods, once again in Haiti. Kreuwels: “I went for six months. We’re now two years on and I’m happy to go back.”

Kreuwels is still pleased she submitted her thesis for the UfD-Strukton Master Award. “Not only did the lecturers appreciated the scope I chose for my graduation project. Now it is clear that people do recognise and appreciate my work, both in the academic world and in the business community. So if you take a chance that doesn’t pay off straight away, it could still prove fruitful later. The nice thing about awarding prizes from the University Fund is that it spotlights students for their achievements. The award also looks very good on my résumé. I operate in an international context and our university is highly valued here, also by people from MIT and Berkeley. An UfD-Strukton Master Award second laureate goes down very well with all Americans.”

Would you like to support TU students? Please contribute as a ‘Friend of TU Delft’, universiteitsfonds.tudelft.nl

**Teacher training programmes in computer sciences, mathematics, physics and chemistry**

Can you get excited about explaining technology to someone? Do you enjoy working with young people and would you consider it a challenge to introduce them to science and technology? Then perhaps you’d like to become a teacher and teach one of the sciences. The Master’s programme Science Education and Communication (teacher training programme) leads to a qualification to teach in upper secondary education. www.tsd.tudelft.nl, info-sec@tudelft.nl or come to the Master Event on 25 April.

**Alumni Activity Calendar**

Details of a wide range of alumni activities organised by TU Delft, the student societies and the faculties can be found on the website www.alumni.tudelft.nl. Below is a list of forthcoming events:

• 21 March 2013: IDEA Longa Pars
• 23 March 2013: Alumni Day Mechanical Engineering
• 27 – 28 March 2013: IDEA Masterclass Contactmapping
• 25 April 2013: Master Event TU Delft
• 26 April 2013: Reactor Institute Delft Alumni meeting
• 4 + 5 April 2013: Open days for TU Delft BSc Programmes

**More alumni news at alumni.tudelft.nl**

**Questions or suggestions?**

alumni@tudelft.nl
(015) 2789111

School of Mechanical, Maritime and Materials Engineering
Delft University of Technology has eight faculties, each of which is engaged in education and research in one or more disciplines. The University was founded in 1842 by King William II. With 13,000 students, 2,800 scientific staff members and 2,000 technical and administrative employees, it is the largest university of technology in The Netherlands.

### Disciplines
- **Aerospace Engineering**
  - Kluysterweg 1
  - nl-2629 HS Delft
  - Telephone +31 15 278 2058

- **Applied Earth Sciences**
  - Mijnbouwstraat 120
  - nl-2628 BC Delft
  - Telephone +31 15 278 1423

- **Applied Physics**
  - Landbergstraat 15
  - nl-2628 CE Delft
  - Telephone +31 15 278 4184

- **Architecture**
  - Berlageweg 1
  - nl-2628 CR Delft
  - Telephone +31 15 278 4184

- **Chemical Technology & Bioprocess Technology**
  - Julianaanlaan 136
  - nl-2628 BL Delft
  - Telephone +31 15 278 2667

- **Civil Engineering**
  - Stevinweg 1
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- **Electrical Engineering**
  - Mekelweg 4
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- **Geodetic Engineering**
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- **Industrial Design Engineering**
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- **Life Science & Technology**
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  - 2628 BC Delft
  - Telephone +31 15 278 8271

- **Marine Technology**
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  - nl-2628 CD Delft
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- **Materials Science**
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- **Mechanical Engineering**
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- **Computer Science**
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  - Telephone +31 15 278 4568

- **Applied Mathematics**
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  - nl-2628 CD Delft
  - Telephone +31 15 278 4568

- **Technology, Policy & Management**
  - Jaffalaan 5
  - nl-2628 BX Delft
  - Telephone +31 15 278 7100

- **Multidisciplinary Centres**
  - **Adhesion Institute**
    - Kluysterweg 1
    - nl-2629 HS Delft
    - Telephone +31 15 278 5353

  - **Biotechnological Sciences Delft Leiden (bsdl)**
    - Julianaanlaan 67
    - nl-2628 BC Delft
    - Telephone +31 15 278 51402342

  - **Centre for Co-operation and Appropriate Technology (cicat)**
    - Mekelweg 2
    - nl-2628 CD Delft
    - Telephone +31 15 278 3612

  - **Centre for Transportation Engineering**
    - Stevinweg 1
    - nl-2628 CN Delft
    - Telephone +31 15 278 6634

  - **Dutch Institute of Systems & Control (DISC)**
    - Mekelweg 2
    - nl-2628 CD Delft
    - Telephone +31 15 278 7884

  - **Koiter Institute Delft (Institute for Engineering Mechanics)**
    - Kluysterweg 1
    - nl-2629 HS Delft
    - Telephone +31 15 278 5460

  - **Netherlands Institute for Metals Research (NIMR)**
    - Mekelweg 2
    - nl-2629 CD Delft
    - Telephone +31 15 278 2535

  - **Wind Energy Research Group**
    - Kluysterweg 1
    - nl-2629 HS Delft
    - Telephone +31 15 278 5170

  - **Reactor Institute Delft**
    - Mekelweg 15
    - nl-2629 JB Delft
    - Telephone +31 15 278 5052

  - **OTB Research Institute for Housing, Urban and Mobility Studies**
    - Jaffalaan 9
    - nl-2628 BX Delft
    - Telephone +31 15 278 3005

  - **Building Working group (obom)**
    - Berlageweg 1
    - nl-2628 CR Delft
    - Telephone +31 15 278 5400

  - **Delft Institute for Microelectronics and Submicron-technology (dimes)**
    - Feldmannweg 17
    - nl-2628 CT Delft
    - Telephone +31 15 278 3868

  - **Interdict Delft University Clean Technology Institute (otteheurnegeweg 145)**
    - nl-2628 AL Delft
    - Telephone +31 15 278 7233

  - **J.M. Burgerscentre**
    - Mekelweg 2
    - nl-2628 CD Delft
    - Telephone +31 15 278 3322

  - **Centre for Fluid Mechanics**
    - Mekelweg 2
    - nl-2628 CD Delft
    - Telephone +31 15 278 3216

  - **Netherlands Schools for Advanced Studies in Construction**
    - Stevinweg 1
    - nl-2628 CN Delft
    - Telephone +31 15 278 3322

  - **IASD**
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  - **IAST**
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  - **NIP**
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  - **NIST**
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  - **NIT**
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### Information
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  - **Information office**
    - p.o. box 5
    - nl-2600 AA Delft
    - Telephone +31 15 278 5404

- **Information on facilities for foreign students:**
  - **Student Advisory Office**
    - Jaffalaan 9a
    - nl-2628 BX Delft
    - Telephone +31 15 278 4670

- **Liaison between business and research:**
  - **Liaison Office**
    - Mekelweg 2
    - nl-2628 BX Delft
    - Telephone +31 15 278 1500

- **Information on research fellowships:**
  - Mrs. M.Y.M. Spierkmaer-Middelplaat
    - Stevinweg 1
    - nl-2628 CN Delft
    - Telephone +31 15 278 3773

- **General information on university education in the Netherlands:**
  - **Min. of Education, Science & Culture**
    - Central Information Dpt.
    - p.o. box 16375
    - nl-2500 BJ Den Haag
    - Telephone +31 70 412 3456

### (Post Graduate) Courses
- **Delft TopTech**
  - (vocational courses)
  - Mekelweg 2
  - p.o. box 612
  - nl-2600 AP Delft
  - Telephone +31 15 278 8019
  - Fax +31 15 278 1009
  - www.delft-toptech.nl

- **Institute for Biotechnology Studies Delft Leiden (bsdl)**
  - Julianaanlaan 67
  - nl-2628 BC Delft
  - Telephone +31 15 278 2355

- **For information on courses in the Dutch language:**
  - **Language Laboratory**
    - Jaffalaan 5
    - nl-2628 BZ Delft
    - Telephone +31 15 278 4124