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Cursor

January 26, 2012 | year 54



Biweekly magazine of the Eindhoven University of Technology
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Student as small change

Last week, friend of both student and culture Halbe Zijlstra sent a bill to the House of Representatives that is to end the basic grant for master students. This group is having a hard time as it is, but now they're faced with an even heavier burden. They'll either have to borrow more money, or make more money on the side. The bill has not yet been accepted by the Senate, but I'm sure the minority the government and PVV has there will easily be turned into

a majority by SGP. The latter party already announced canceling the basic grant wouldn't pose any serious problems for them. You bet Halbe will make it.

I had to go and check out the website of these reformed brothers. All their positions, ranging from abortus provocatus to zpp'er (independent professionals) are neatly alphabetized. What's striking, is that they are in favor of having two-year master programs. That would be very convenient for TU/e, because that way you'd also be burdening arts & humanities students with an extra year of 'self-investment'. Right now, it's still the science student that will be running up the higher debt. So SGP, take a stand and defend that position. Unfortunately, I'm afraid it won't constitute the small change they'll be claiming with Rutte and his buddies. After all, that's what a student has become in this political game: small change for a party that still doesn't allow women to be on their directory.

Awesome

Last Saturday, my son and I were invited to TU/e's open day. Arriving at 2PM, we were late for an info bag, but just in time for the final lecture round: Computer Science & Engineering. Class on traffic lights and coffee machines. We looked around and saw 'clever-looking vwo-students'. All good. Still, it was in GEWIS' common area my son got really excited. What was so amazing, you ask? The sofa. It was held together with duct tape. "Awesome."



TU/e Technische Universiteit
Eindhoven
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◀ Rewwwind www.tue.nl/cursor

Our Rewwwind feature provides you with snippets of last week's news. What happened online after the previous Cursor magazine was published?

Rector Van Duijn stays for Bachelor College

Rector Hans van Duijn and Executive Board member mr. Jo van Ham can stay on after their current term. The University Council has decided on the matter earlier this month.

Van Duijn will be the first-ever Rector at TU/e to have served more than two terms. He's staying longer for the Bachelor College.

Molecular self-assembly makes Nature

Researchers at the TU/e Institute for Complex Molecular Systems (ICMS) managed to track and coordinate a process of molecular self-assembly via various routes. It was previously thought that molecules would automatically form the proper

structure, but this study proves self-assembly can in fact take several routes, thus generating various outcomes. In this case, the outcomes were either clockwise or counterclockwise polymer chains.

Study associations may be granted common area after all

On January 12th the Executive Board promised study association Van der Waals (Applied Physics) and Thor (Electrical Engineering) to look into the possibilities for a larger common area in their new construction plan. For now, the plan leaves hardly any

room for any area for drinks, according to the students. Their 'protest reception' in front of the Executive Board's office attracted hundreds of students and staff of both departments. The students presented over seven hundred signatures.

Christmas break: 319,703 kWh less energy consumed

The Christmas Challenge the Energyman urged TU/e to participate in has been a success. The challenge was to save more energy than the 9 per cent that was saved the year before during Christmas break: during this Christmas

break, spanning two weekends and five working days, TU/e managed to save an average of 12 percent on energy compared to regular weekend days. In total, 319,703 kWh was saved, which is about 33,570 euro.



Photo 1988 | Archive IEC



Photo 2012 | Angeline Swinkels

◀ Flashback

Open day 1988 versus 2012

Compared to 25 years ago, TU/e's open days have definitely become a bit more exciting. In 1988, visitors mostly watched an listened to an expert pointing at things on a poster. Today, guests can actually participate, and secondary schoolers are invited to work on a case. In the Auditorium all eyes were on the NAO robot last week, promoting itself as well as fellow robots AMIGO and the TURTLES.

What it is exactly the people in W-hal are informed about is unsure. The photo's caption mentions they're attending an informational lecture of the Department of Chemical Engineering.

The people pictured are not all that different as far as their posture is concerned. They're not asked to do anything, except drink coffee. Still, the 2012 batch does smile more. No wonder: a NAO is much more fun than a poster. (NS)

≡ Clmn Second chance



Recently, I finished my internship at my training company. First of all, it's been a great adventure to work with Dutch colleagues. I discovered new dimensions of Dutch culture I wouldn't have noticed had I been working with fellow international students only. The North Sea flood in Zeeland of 1953, the plot of 'New Kids Turbo', famous Dutch rock-bands from the 80's - getting to know these and many other details have enriched my understanding of local people. Furthermore, this internship has provided me with a second chance. My first year of the master program wasn't as good as I had expected. Failed exams, poor grades, negative feedback from straightforward

teachers - it all was a very harsh experience. In fact, it was tough to a point where I started blaming myself for choosing this country and university. Moreover, I lost much of my self-confidence and studying turned into an undesirable obligation rather than an enjoyable process.

However, my second year started off with an internship. New people, new environment, new tasks - it all allowed me to start everything from scratch. All my previous failures were wiped out by new impressions and the help of my new colleagues. Being encouraged and inspired by my new team mates' enthusiasm I started enjoying the subject of control engineering again. By now I'm sure I chose the right university in the right country and I'm passionate about achieving my goals.

All of this wouldn't have been possible had I not been given a second chance at my internship. So, should anyone ever doubt applying for an internship, my advice is: just do it, because it's a great opportunity to achieve personal growth.

Sultan Imangaliyev, from Kazakhstan, is a student of Systems & Control at the Department of Mechanical Engineering

Professor Bert Snijder, Steel Constructions

Could vibrating guys at Hovenring have been prevented?

The Hovenring -the new junction between Eindhoven and Veldhoven- was only reopened to traffic for a week when it was hastily cordoned off by police once again. The guys (cables) of the bicycle roundabout hovering over the intersection turned out to start vibrating with even the slightest gust of wind, which may cause damage to the anchoring, and it could even break the guys. The public has been attributing 'Erasmus Bridge-like' qualities to the bridge, and called it 'a shame for Eindhoven Knowledge City'. What's wrong with those guys at the Hovenring, and could experts have prevented these issues?

"The Hovenring didn't suffer from a construction error, that's for sure", says Bert Snijder, professor of Steel Construction at the Department of Built Environment. He's one of the experts that was called in to review the guy issue. And although his group usually concerns itself with footbridges and vibrating floors, he's happy to try and solve this particular problem.

"Guy constructions often cause vibrations, but usually these aren't harmful to the construction. However, in some cases specific vibrations do cause trouble. You really can't calculate whether or not those harmful vibrations will occur, and if they do, it's hard to estimate the damage they may cause. And even if people had known beforehand the guys were to vibrate, it would have been really difficult to determine what precautions should have been taken. These things are hard to model, because you have to know the actual situation. The engineering firm had definitely taken into account the guys could cause trouble, which is why the city put aside some money to solve possible problems. No, there's no one to blame for the Hovenring." "Guy bridges are economical constructions and are used all over the world. Vibrations may occur, but these designs have so many advantages, too. Vibrating guys are being actively researched, and because of that there are already many ways to control possible problems. If you look up when passing under the railroad

bridge on the A12 at Nootdorp, you can see the guys have been covered in spirals. The Rotterdam Erasmus Bridge was made using dampers. A guy cable may start vibrating for various reasons, since no one bridge is alike. Every problem calls for a different solution. Still, a spectacular collapse like that of the US Tacoma-Narrows Bridge is very unlikely these days..." "It's still unclear what caused the vibrating at the Hovenring. The Italian professor Alberto Zasso will be carrying out several measurements his week, and the City of Eindhoven has asked Ton Vrouwenvelder of TUD and myself to advise on the matter. To determine the cause, figure out the best way to prevent the vibrations, but also to determine the anchoring fatigue. Based on the data we have accumulated so far, there seems to be a 'galloping effect': a wind-induced vibration occurring in asymmetrical constructions. These Hovenring guys are perfectly circular of course, but since they've been positioned at an angle, certain wind directions can definitely cause asymmetry. Alberto Zasso isn't



Professor Bert Snijder. Photo | Bart van Overbeeke

convinced yet and is still thinking of another problem, where wind swirls at the back of the wires cause overall vibration, a process that's known as vortex shedding. Still, there's a relatively easy solution to both problems: applying damping. So really, the problems aren't all that serious, but because we have to close a major road to solve it, people experience an inconvenience and suddenly have something to say. But they

can rest assured, because if this week's test results are good enough, the road may be open to the public fairly soon, possibly even before the final solution has been installed." (NT)

Parking pains



Impression of campus in 2020. Illustration | Masterplan Atelier Department of Built Environment

Right now, TU/e campus has **2,153** parking spaces, **1,900** to **2,100** of which are used during peak hours. Two years from now, after several major construction projects, **1,676** spaces will be left.

Of **3,300** TU/e employees **600** to **700** come to work by car every day. **50** percent of them lives less than **7** kilometers from university grounds.

Administration and maintenance for a single parking space in the parking garage university plans to build in the years to come is **120** euro a month. That's **4** times as much as the costs for a parking space on ground level. However, the city won't allow more parking spaces on ground level.

From March 1, departments and services will be paying **7.50** euro out of their own pockets whenever they want to provide guests with an exit ticket. It's discouragement policy: the regular rate for parking on campus is **5** euro. (MvdV)

Read more about TU/e parking policy at www.tue.nl/cursor and Cursor 11.

Preferred partnership Eindhoven and Utrecht taking shape

“The chemistry is tangible”

Cooperation TU/e and UU and UMCU | Norbine Schalij

Illustration | Jeannette Bos

For over a year some of the noses at TU/e have been emphatically pointing north. That is where the colleagues and students are to be found who seem indispensable for the broadening and strengthening of the education and research profile that everybody continuously pursues. And the north is looking back. On January 3, 2011, Utrecht University, the University Medical Center Utrecht and TU/e decided to join forces at a strategic level, entering into a so-called preferred partnership. What is the status quo?

The focus in this cooperation is on sustainable energy, medical imaging, stem cells and regenerative medicine. Thanks to the so-called preferred partnership the participating institutes will have more access to each other's science parks, equipment and laboratories. The combination of a classical university and a university of technology with a teaching hospital is called unique. The partners have promised to invest in joint research, will reciprocally offer professors part-time appointments and grant students access to each other's education. In the next five years each

Utrecht and Eindhoven research shoulder to shoulder

partner will contribute over 1 million euro to the cooperation kitty. It is expected that by enhancing the quality of education and research the partners will have better odds of acquiring national and European funds. This cooperation links up with recommendations from various policy plans from the Ministries of Education, Culture and Science and of Economic Affairs, Agriculture and

Innovation. Universities are urged to select a profile and to work together. Thus, the further development of a joint knowledge infrastructure will contribute to a reinforcement of the competitive positions of Utrecht and Eindhoven alike. Says the billing. Where are we one year later?

Drs. Paul Bezembinder, appointed at TU/e as coordinator of the project: “We are well on track. Some activities have seen a concrete start while others are still in the exploratory stage. The latter is in keeping with our working method. Although the plan was received with a measure of reserve here and there at first, the cooperation between the three partners is really budding very nicely now. Everyone involved is enthusiastic.”

As is drs. Anje Bakker, Bezembinder's colleague in Utrecht. “Technological expertise is of great importance to us. A combination with a university of technology strengthens the areas that we are involved in jointly, such as Life Sciences and chemistry. For us Eindhoven has an advantage over Twente in that the links are more visible. Our four strategic themes (Life Sciences, Sustainability, Institutions and Youth & Identity, ed.) and the subjects they include largely form a good fit with the three strategic areas of TU/e. Another factor in the equation is that education at TU/e has come out best in the Elsevier survey.”

Meanwhile three research projects have started, cooperation is going on in three

Cross-fertilization for minor and curricula

educational areas and there are some smaller projects under way. Utrecht and Eindhoven are jointly putting their shoulder to the research wheel of sustainable energy, medical imaging and regenerative medicine. Three new curricula -two master's degree programs and a pre-med minor- are being drawn up. Of those, a master in Regenerative Medicine and Technology and a pre-med minor will already start in academic year 2012-2013.

And there is so much more that can still be developed. Bakker: “Wherever there is a demonstrable use, our Departments of Beta Sciences and Medicine are making appointments with TU/e to have students follow subjects from both sides. The benefit of this cross-fertilization for students is that they don't individually have to find out what the best combination is for their curriculum and minor. They can rest assured that the subject matter is geared to each other's universities and has been approved by the Examinations Committee.” TU/e employees professor Emiel Hensen and dr. Rene van Donkelaar, who are speaking at length about TU/e's relation with Utrecht on the next page, say that there have always been many ties between researchers from both cities. And surely students are not being asked for the impossible with a train link of fifty minutes, with four scheduled departures every hour. “By now these ties are so strong that Utrecht seems to be a logical partner for TU/e”, both agree.



New fuel for research into solar fuels

Professor Emiel Hensen from the Molecular Catalysis group of Chemical Engineering and Chemistry calls it a great opportunity to set up something new together with Utrecht University. The added value that he and his Utrecht colleague professor Bert Weckhuysen expect for research is in the complementary nature of the Eindhoven molecular approach and the Utrecht expertise in spectroscopy. Apart from that, they are looking for cooperation in the educational area. The Graduate Program Solar Fuels is an example in kind.

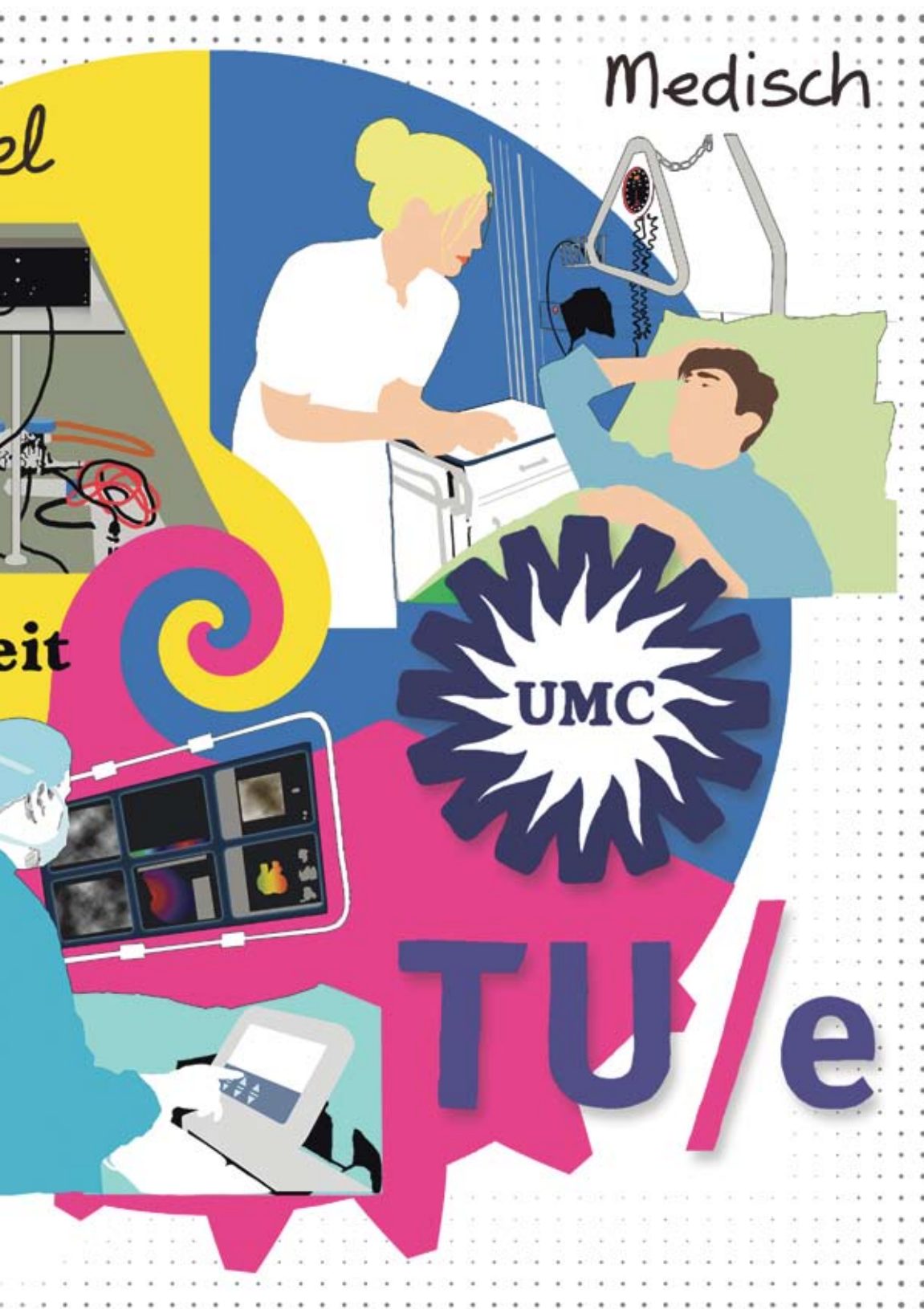
“Solar fuel such as hydrogen -obtained from the fusion of water- is difficult to store. We prefer to make liquid fuel from sunlight. The dream that we are nourishing is to take CO₂ from the air and use sunlight to convert that into a liquid fuel. Catalysts are essential for making these conversions possible”, Emiel Hensen explains to us about his discipline. Together with Weckhuysen he will be leading a research program that will focus on the realization of solar fuels before the end of this decade. “In the catalysis discipline the cooperation has already been properly organized”, says Hensen. “For one, we know the Netherlands Institute for Catalysis Research (NIOK), set up from TU/e by Rutger van Santen. Now Bert Weckhuysen is its scientific director. The NIOK has been instrumental in the setup of all kinds of major programs, of which the most recent one is CatchBio, one of the seven Smartmix programs. Solar fuels is new in the landscape, and is a hot topic.” It is going to be one of the research areas of the Dutch Institute For Fundamental Energy Research. DIFFER is a part of the FOM institute which is moving to the Eindhoven campus in 2015.

Weckhuysen is looking forward to this cooperation, because he thinks that Eindhoven has a very robust chemical engineering program. “There are three pillars that give TU/e a high score with me, as well as internationally. They are the Institute for Complex Molecular Systems of Bert Meijer, the cluster around the process technology and catalytic chemistry. Historically Eindhoven has a strong position in catalysis. The budget holder status of the NIOK lies in Utrecht and as a result there has for many years been a natural Utrecht-Eindhoven axis. The chemistry is very much tangible, popularly speaking.”

Hensen concurs and designates the complementary nature of each party's research as the golden opportunity. “At TU/e we are working on the understanding of catalysis so as to make better materials. We want to understand how CO₂ reduces to a liquid fuel and are making models for this.

At UU one of the strengths is in-situ spectroscopy. They use light to see how a catalyst works at a molecular level. The sum of these styles will have a reinforcing impact on solar fuels research.” In the area of education Hensen and Weckhuysen are setting up a Graduate Program Solar Fuels for master students and PhD candidates. “That is a somewhat broader cooperation, for the University of Twente and Leiden University are participating too. The idea is for students to follow an optional package of Solar Fuels in order to prepare them for a doctoral candidate position for which they need to write an individual proposal. Students follow lectures at all four universities. Traineeship-like assignments and graduation projects at two universities will also form part of the program.”

Hensen expects that some twenty students from all partners will begin in September 2012.



“They have a hospital, we the technology”

Biomedical Engineering is almost ready to start a new master's degree program Regenerative Medicine and Technology (RM&T). The curriculum has been selected, as has the processing method, while the label 'special master program' has already been granted by the Eindhoven Executive Board. Now it is time to attract students, and to draw up timetables. In September 2012 the doors will be opened.

RM&T is a 'special master program' within the Biomedical Engineering master at BMT, and is independent of the master Medical Engineering. Together with professor Wouter Dhert, dr. Joost Fledderus and dr. Debby Gawlitta (all employed in Utrecht) professor Keita Ito, dr. Anita Driessen-Mol and dr. René van Donkelaar have designed this program for students with a BMT or a Life Sciences background.

They are aiming at thirty students, a number which Van Donkelaar deems easily achievable, judging by the enthusiastic reactions. If they bring a sound motivation letter - which is a requisite for every applicant - external students will also be welcome, provided they have completed a certain subject combination. This means that students with many different preliminary stages will be starting.

Van Donkelaar: “Students coming from Utrecht are quite different from those hailing from Eindhoven. They have a much stronger medical orientation instead of a technological one. They don't know our basic concepts and we don't know theirs. It is difficult anyhow to let those parties communicate.”

The following solution has been devised: for the first fifteen credits, to be gained within three months, RM&T students will be working on a big case in six mixed groups. The resulting interaction will make it possible for each student's knowledge to be shared. In this Introduction RM&T case each group will have a different subject. Think of kidney, cartilage or heart valve.

Embracing that subject, they will have to design a project proposal that will feature all aspects of regenerative medicine. “So it will have to deal with the use of stem cells, imaging techniques and computer models. Consideration must be devoted to animal tests and to the application to patients in hospital. All students will follow lectures on this and each group will apply those elements to their own theme. Every week the findings will be reported reciprocally. For example: what has the lecture on test animals contributed to our cartilage research?”

The case has been completely elaborated, the subject combination is ready. Now the time has come to find the right teachers. The idea is for teachers from both Utrecht and Eindhoven to give lectures to and supervise the students. For this purpose students and lecturers will commute. “We do try to arrange all contacts in Eindhoven on Monday, and in Utrecht on Tuesday and Wednesday. Thursday is earmarked for independent study and Friday for reporting in Eindhoven. Something like that.” This case will be followed by elective subjects, to be attended in both cities, and a traineeship, preferably abroad or with the partner university. The second and last year is intended for literature study and graduation. The diploma obtained by the masters will be issued by the departments where they are registered. They will include a mention of the cooperation with the partners. In the end there will be a combined diploma, Van Donkelaar expects.

Switching from one place to another has many benefits for scientists. The move of dr. Debby Gawlitta from TU/e to UU will also come in handy in the preferred partnership. Van Donkelaar knows her from her PhD stint in Eindhoven. Like him, she is now program coordinator for RM&T, but in Utrecht. “In 2007 I went to join the UMCU because I really like to work close to the clinical practice.

For questions of a biomedical nature I can easily turn to the UNMCU and UU, but for technological issues I go to Eindhoven. When for instance I needed a bioreactor that could bring about the perfusion of tissues and the mechanical load at once, I appealed to TU/e. And indeed, it is there that the specific bioreactor was developed and produced”, Gawlitta explains. In her opinion the cooperation is an enrichment for the education. “And this results in better research. Innovation arises when a theme is approached and studied from different angles.”

Supplement rather than attack at Studium Generale

In order to acquaint TU/e students and UU students with scientists from both institutes the Studium Generale (SG) agencies have organized a series of duo lectures. Four times two professors have been invited to present their views on the future and on each other's work. The performances were not electrifying, as the scientists supplemented each other rather than opposing each other as theoretical betas and engineers. The turnout was good, especially during the combination of professor Frank Miedema (UU and UMCU) and professor Carlijn Bouten (TU/e) about the perfectable human being and during the lecture on nanotechnology by professor Andries Meijerink (UU) and professor Bert Koopmans (TU/e).

Frank Miedema spoke as a scientist and as an administrator, warning against too romantic a view of science. On the basis of 'his' UMC he showed the complicated choices now facing hospitals in terms of specialization.

Professor Paul 't Hart (UU) and professor Sjoerd Romme (TU/e) both discussed how many things are changing and have changed in both public leadership and corporate culture. These changes are taking place so rapidly that politicians, as well as CEOs and higher management, have to switch gears much faster than they used to.

In their lecture about the modernization of the cow, professor Bert Theunissen (UU) and professor Harry Lintsen (emeritus TU/e) showed the public how technological progress and pressure from the Ministry brought about a totally different type of dairy cow. Whereas it is much more productive, it is also highly susceptible to diseases.

Computer science: optional courses for students of UU and TU/e

“Utrecht is the place to be in the area of gaming”, says dr. Marloes van Lierop, Program Director for the bachelor of Computer Science at TU/e, “and here we are strong in cryptography. Although we still have to put the flesh on the bones, in a joint consultation meeting with UU we have expressed the intention to offer our students optional courses.” In the master's degree program both sides are exploring which subjects are suited for this. They will be officially recognized and will actively be brought to the attention of our own students. For the bachelor's degree program minor packages are offered at UU to TU/e students, while elective subjects at TU/e will be open to UU bachelor students. In addition, we are working out the possibility of a joint annual Student Research Conference for graduating students.

“We’re going to have to make do”

Cuts in board grants | Judith van Gaal
Illustration | David Ernst

It was bad news for the university’s many study and student associations: as of next academic year, board grants will be cut to slightly over half of this year’s budget. In other words: board members receive less pay, and it will be much harder to fill board positions. The fact grants had to be cut was already obvious last year, but it was only recently that students realized there was no way they were going to see any extra funding. Last week, the associations, the Executive Board and STU reached a compromise.



From the 2012-2013 academic year onwards, Eindhoven study and student associations will only receive 300,000 euro (the equivalent of 1000 months’ pay) to carry out their board tasks. This academic year, that sum was still 545,000 euro (the equivalent of 1850 months’ pay). When the Executive Board announced the cuts last year, students were outraged.

It was clear from the start the budget was fixed, but students were told the distribution of the demands could still be discussed. A previous proposal was met with much resistance. Sports associations were only to receive money for Thêta and the Hajraa Outdoor Tournament, and students could only fill board position had they passed at least ninety percent of their courses.

Representatives of the various umbrella organizations talked to the Executive Board, and STU to determine where the proposal might be altered. Last week, the parties came to an agreement.

For the 2012-2012 academic year, student associations will receive a total of 504 months. The social associations (Demos, ESC and SSRE) have 111 months to distribute, sports associations (umbrella board ESSF, Thêta, Hajraa, Hajraa Outdoor Tournament, Fellenoord, Totelos, Asterix, Pusphaira, Nayade) get 207 months. Cultural associations have 70 months to distribute between umbrella Scala, Quadrivium, Doppio, and Footloose.

Finally, other associations, most notably BEST, AEGEE, Wervingsdagen (recruitment days), Bouwkunde Bedrijven Dagen (Built Environment business days), Integrand and UniPartners Eindhoven have been granted 108 months. That means that for every umbrella, months have been cut by almost half compared to this academic year (see box). The selection is especially based on the associations’ importance for both university and the outside world.

“It could have been much worse”

On top of that, the rules for applying for a grant will become stricter in the years to come. Today, students have to have passed their first year in order to be eligible for a board grant. For 2012-2013, they’ll have to have passed three-quarters’ of all their other courses as well. For 2013-2014 that percentage will be eighty, and for 2014-2015, ninety percent of courses must be passed. These percentages are subject to change, should the annual evaluation prove them to be unrealistic. The student’s progress will also be monitored. Current master students should have at least 12 ects. For Bachelor College students, the standard’s even higher: they need at least 15 ects.

Of course, they’d rather seen more money, but all umbrella representatives and

student parties agree they ‘have done all they can’ and feel the months have been distributed fairly. Simon Bus, representative of the ‘other associations’ umbrella: “Initially, only the Wervingsdagen were to receive anything, now all associations will. Personally, I think it’s a major improvement compared to the original plan.” Tom Corstjens, representative of the Eindhoven Students Sports Federation (ESSF): “We can now distribute the months among nine associations. We looked at the associations’ size and character. For example, athletics association Asterix will receive part of the grant. Although it’s relatively small, it does organize important events such as the Batavierenrace.” Alwin Penterman (Scala): “It could have been much worse. Quadrivium was initially the only association to receive some of the grant. We understand cuts have to be made some way or another.”

As far as the demands for application and progress are concerned, opinions vary. Simon Bus: “It’s a shame slower students will no longer get a chance to gain board experience. The demands concerning progress are tough as well. Students doing a board year would have to pass one course every trimester at least. Looking at our current board, I don’t think any of us would be allowed to stay.” Lotte de Koning (Compositum, the umbrella for Demos, ESC, and SSRE): “The demands are very strict, but there’s

no way around it; students have to start studying harder and faster.”

To what extent these measures will mean the end for some associations, is hard to say, according to the umbrella representatives. But one thing’s for sure: finding board members will become harder than ever. Sebastiaan van Zelst, representative of the Federation Study Association Eindhoven: “There will always be people who want to do a board year, but more and more students will be reluctant as well. Not only does the pay get worse, nationwide measures such as the fine for prolonged studying are added to the picture. We’ll have to see whether we’ll have to start working with part-time board members, or pass on certain tasks to committees.” Alwin Penterman (Scala): “Personally, I expect the measure on prolonged studying to have a stronger impact.”

“It’s a shame slower students will no longer get a chance to gain board experience”

“We’re going to have to make do”, says Tom Corstjens, representative of ESSF. “We may be able to merge associations,

or we could limit responsibilities, or have the sports center take care of certain tasks. We’ll be talking to the sports associations and see what options we have.” Compositum wants to try and recruit more Fontys board members, says Lotte de Koning. “So far, boards have been made up of TU/e students mostly.”

Student parties and the university council have played a supporting role in the process. Whereas last year they strongly opposed any budget cuts, they now realize they won’t get another penny. Rob Kleijnen of the Eindhoven Student Council: “There’s no reason for us to keep fighting, especially since the umbrellas have come to an agreement with the Executive Board and STU.” About the stricter demands: “First, we thought the measures were exaggerated, but then we saw some of their ideas weren’t half bad. I can imagine there’s no choice but to increase the requirements to prevent students and universities from having to pay fines. I’m glad the new plans are implemented gradually, though.” Sandra van Tienhoven attended the meetings for student party Groep-één. “As long as the umbrellas are happy with the 300K-distribution, we’ll support the plan. The distribution between the umbrellas is clear, and that’s a good thing. It’s a consistent plan regarding who gets what.”

Distribution board grants

	2011/2012 (number of available grants, final distribution yet to be confirmed. Grants for <i>italicized</i> associations will expire in the next academic year)	2012/2013
Federation Study Associations Eindhoven:	840 months <i>AnArchi, Mollier, KOers, of Course!, SERVICE, SUPport, VIA, ODIN, Interactie</i> , Umbrella FSE, Cheops, Lucid, Thor, J.D. van der Waals, Simon Stevin, J.P. Minckelers, Protagoras, Intermate, Industria, Gewis	504 months Umbrella FSE, Cheops, Lucid, Thor, J.D. van der Waals, Simon Stevin, J.P. Minckelers, Protagoras, Intermate, Industria, Gewis
Compositum:	210 months Demos, ESC, SSRE	111 months Demos, ESC, SSRE
Eindhoven Student Sports Federation:	400 months <i>All Terrain, Attila/Euflex, Avalanche Boarders, Boreas, Concorde, Da Vinci, De Club, Don Quishoot, The Elephants, ESAC, Icehawks, Isis, Okawa, Oktopus, Panache, Quatsch, Samourais, Squadra Veloce, Suca, Tamar, Tantalus, Taveres, Vertigo, Weth, Zes, GNSK, Buitenwagen compagnie Thêta</i> , Umbrella ESSF, Thêta, Hajraa, Hajraa buitentoernooi, Fellenoord, Totelos, Asterix, Pusphaira, Nayade	207 months Umbrella ESSF, Thêta, Hajraa, Hajraa Outdoor Tournament, Fellenoord, Totelos, Asterix, Pusphaira, Nayade
Scala:	85 months <i>Kinjii, Dekate Mousa, The Knights of the Kitchen Table</i> , Umbrella Scala, Quadrivium, Doppio, Footloose	70 months Umbrella Scala, Quadrivium, Doppio, Footloose
Other umbrella:	312 months <i>Mosaïc, de Asfalthappertjes, Ichthus, VGSEi, IEEE Student Branch Eindhoven, Stack, PF</i> , BEST, AEGEE, Wervingsdagen, Bouwkunde Bedrijven Dagen, Integrand, UniPartners Eindhoven	108 months BEST, AEGEE, Wervingsdagen, Bouwkunde Bedrijven Dagen, Integrand, UniPartners Eindhoven

What the flap is that fluid flow up to?

The tiny cilia researchers use to transport fluids and mix them into micro channels, are invisible to the naked eye. In order to accurately and properly calculate their functioning, PhD student at Mechanical Engineering Michiel Baltussen developed a new numerical method.

Paramecia use tiny cilia to move around in water. Similar cilia can be found in the lungs, driving mucus out of the body. Scientists have now copied these examples from nature, resulting in artificial cilia. With the help of elastic 'flaps', fluids can be transported and mixed on a microscopic level, which could be ideal for the development for a 'lab-on-a-chip' (LOC): a cheap, independent and fast 'lab' the size of a credit card for which a single drop of blood or saliva is enough to calculate certain levels.

Although several simple LOCs are already being used today (for diabetics to test their blood sugar, and for police to conduct drug tests in traffic), researchers are still looking for much needed improvements. One of them is Michiel Baltussen of the Department of Mechanical Engineering. His research is part of European collective ARTIC. Dutch participants include the universities of Delft, Groningen and Eindhoven, and Philips. "The European project elaborates on research of my supervisor, Professor Jaap den Toonder. He developed artificial cilia that move with the help of an electric field. The downside is that the fluid that sits in between has to be electrically isolating for the flaps to work. If they don't, we can't transport blood or saliva either."

It's why ARTIC has been searching for a way to magnetically activate the cilia. What Baltussen did was develop a numerical model to accurately calculate the fluid flows near the cilia.

"I started from an existing model, the Fictitious Domain Method, in order to describe the interaction between fluids and solids. Although the results were nice enough, they turned out not to be sufficiently accurate, especially near the flaps."

Baltussen's next step was to fix the model and create a new version. It was a major challenge. "As soon as the cilium, the solid, shows substantial movement, it's very tricky to accurately describe the fluid. In the existing model, a kind of grid is used that moves along with the flap to calculate the fluid flow (see illustrations above). I opted for a static grid. For each of the grid's corners I calculate the fluid flow's speed. The problem is, you have to accurately attribute boundary conditions to both fluid and solid in order to be able to properly connect the two domains mathematically." The researcher didn't validate his approach with experiments, simply because these are not yet available. He used the Arbitrary Lagrange Euler Method, which is accurate for minor movements.

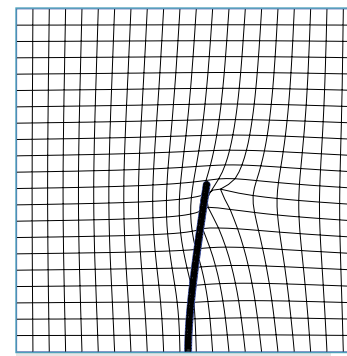
Now, with Baltussen's improved method, fluid flows can be accurately calculated whether the cilia show major or minor deformations. It's quite special, since we're talking microscopic data.

"Artificial cilia are not the best method for lab-on-a-chip"

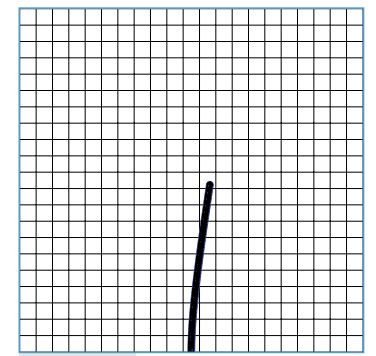
The flaps measure no more than two to ten micrometers in height, and approximately ten to a hundred micrometers in length. They're active in fluid channels measuring one by one millimeters at the most. "My method isn't just meant for decelerating Newton fluids such as water, but also for non-Newton fluids like saliva, lymphatic fluid and blood, on a micro-level, all having elastic attributes. While developing the numerical model, I deliberately focused on those. A large number of scientists in the field of microfluidics only study systems that

work with water, in experiments as well as numerically. But to what extent do their findings retain their relevance when you know the fluids that are analyzed on a LOC display a behavior that's very different from water? It makes you wonder if that's realistic."

Baltussen is equally down-to-earth when asked about the future of artificial cilia. "It's a beautiful and elegant way for transporting and mixing fluids. Unfortunately, I have to confess it's not the best method for LOCs. We can make other, more reliable, integrated pumps that are air-driven and work with membranes. For actuating small flaps you need a fairly large magnetic field. You'll have to create a much bigger device for actuating something tiny, which is a serious limitation when it comes to creating a manageable LOC. It's too bad, but that's the reality we're facing. We can't change it overnight. Cilia just can't be made a hundred times more sensitive to a magnetic field." Nonetheless, Baltussen is fairly confident his numerical model will be used. He says the method can be applied to more than just the calculating of fluid flows around cilia. "It's a numerical model to accurately describe fluid or air flows near a moving elastic object, even if the object shows a major deformation. One may use it to determine the flows caused by airplane wings. Or for gauging



A grid that moves along with the flap.



A static grid.

flows near cardiac valves. In blood vessels, it's very important to be aware of the shear at the wall, since it's what activates all kinds of chemical processes to heal wounds, for example. If you can't determine that, there's no way to determine what will happen in the blood.

"Numerical model can be used for gauging flows in cardiac valves"

Researchers at the Department of Biomedical Engineering (BMT) are said to be especially interested in using

my method. It adds to the so-called 'finite-element package' that's been developed and maintained by associate professor Martien Hulssen of the Department of Mechanical Engineering." Baltussen hurriedly adds the package is only meant for those who 'know what they're doing'. "A help desk is not included," he says, laughing. "In Eindhoven, the package is used by some ten PhD students and a number of master students at BMT and Mechanical Engineering." And he uses it too, of course, being a materials researcher at DSM in the south of Limburg, where he was recently hired. (FVO)



Michiel Baltussen. Photo | Bart van Overbeek