

TPM QUARTERLY

FACULTY OF TECHNOLOGY, POLICY AND MANAGEMENT

NIAS FELLOWSHIPS FOR SABINE ROESER AND IBO VAN DE POEL

Philosophers go on a retreat



Two years ago, an international visitation committee designated the philosophers of technology from the universities of Delft, Eindhoven and Twente as 'excellent'. Fortunately, the philosophers in Delft did not see this as a sign that they could sit back and take it easy. On the contrary, they are still making serious headway. Sabine Roeser and Ibo van de Poel from the Philosophy section at TPM both managed to earn a fellowship from the prestigious Netherlands Institute of Advanced Studies (NIAS).

The fellowship will give Roeser and Van de Poel the opportunity to spend a whole year contemplating in a tranquil environment on the perimeter of the dunes in Wassenaar. The impressive NIAS buildings have room for some forty talented scientists from home and abroad. The scientists are thoroughly pampered to allow them to work on forthcoming publications without being disturbed. They all have their own study with a stunning view of majestic old trees, and NIAS staff cater to their every need: from library books and presentation rooms to good meals and accommodation.

Coincidence

The fact that Sabine Roeser and Ibo van de Poel both received a fellowship at the same time is sheer coincidence. They are both working on separate research projects. So what exactly do they intend to do with all that time, peace and concentration? Sabine Roeser: "I'm so excited to have time for my real passion: research. Four years ago, I was awarded a VENI grant from the NWO [Netherlands Organisation for Scientific Research] for my research into the role of emotions while assessing technological risks. I intend to expand this research during my time at the NIAS. Last year, I signed four book contracts, so I can certainly set to work on one of them in Wassenaar. I'll have plenty of time."

Van de Poel is also looking forward to the retreat. "I have been carrying out a lot of teaching and management duties over the last few years, including the job of general director of the 3TU Centre of Ethics (the joint research institute for the three universities of technology, ed.). I am really looking forward to spending a year contemplating and writing. At an academic level, it will also be interesting to meet people from other disciplines who are working on totally different projects." Both researchers will undertake a few additional duties as from

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Alumni meeting at TU Delft

Clean energy, a safe living environment, efficient traffic solutions, sustainable transport and a healthy old-age: our most pressing social problems often provide the most promising economic opportunities.

A meeting of alumni will be held on Tuesday 29 May from 16:30 to 21:30 at TU Delft. Starting in 2009, TU Delft will be focusing its attention on four socially urgent themes: Energy, Health, Infrastructures and Environment.

Several prominent Delft alumni will be asked for their reaction to the new Delft approach. Interactive sessions will be held to encourage participants to help think and talk about these topics, and mobilise their networks. You can apply for an invitation via <https://ares.tudelft.nl/webreg-nl.html>.

Prize for Jeroen van den Hoven

Professor Jeroen van den Hoven, scientific director of the 3TU Centre for Ethics and Technology and professor in the Philosophy section has won the IFIP-WG 9.2 Namur Award for 2010.

This prize is awarded for an outstanding contribution to the awareness of social implications of information and communication technology.

Van den Hoven will be presented with the prize during a meeting that will be held in the Belgian town of Namen in January 2010, where he is due to give a lecture. The prize was instigated as a way of drawing attention to the need for a holistic approach to the use of information technology, which takes account of the social implications.

IPSE partner in 'Slimmer werken'

IPSE Studies is set to partner the Ministry of the Interior and Kingdom Relations, the Netherlands Centre for Social Innovation and the Centre for Public Sector Labour Relations in the 'Slimmer werken' [Smarter working] project. The aim of the project is to help reduce shortages on the job market by means of more efficient working strategies, thereby highlighting factors that hamper or stimulate, and providing handles for implementation.

The initiative was prompted by the prospect of a shrinking job market and a society that makes increasingly higher demands on the quality and performance of the public sector and our communal involvement with the job market and the public domain.

'Embodiment crisis'

Engineers love models. And who can blame them? A model is a simplification of reality, which (thanks to its simplification) provides us with insight into the very aspect of reality that an engineer is researching.

TPM people are just as keen on models as other scientists. You can use them for simulations and for serious gaming. And TPM people enjoy applying the knowledge they acquire to, for example, support complex decision-making processes such as those concerning Maasvlakte 2, the area development for Scheveningen, land usage at Schiphol airport, mobility projects or the safeguarding of patient security in the radically changing logistic chains in hospitals. The possibilities are endless. The aim of applied practical research is to ensure systematically that the simplified, virtual reality also exists in practice. This empirical handwork is scientifically awkward. It is far less 'elegant' than a mathematical formula or a laboratory experiment, and is often less highly regarded among researchers. It is, however, essential to any form of science claiming to contribute to society.

So what happens when the real world drifts further away from the model-based imitation? You get embodiment: the model is mistaken for reality. People start trying to 'fix' a make-believe world, and accidents soon occur. An elegant acceleration of mathematical calculations only serves to advance 'niche-optimisation'. Civil engineers and mathematicians start devising financial products for banks, which are subsequently 'managed' by aerospace engineering specialists, but understood by no-one. The finance system transforms into an eight-headed monster that nourishes and controls itself in all its elegance and profitable niche proceeds. In systems theory, this is known as 'autopoiesis'. And yet the system was originally intended for important, worldly matters: building, owning and maintaining houses (and of course living in them). Elegant modelling enhances the usability and efficiency of the model, while the practical validity and reliability gradually disappear.

Right now, you are probably thinking about the credit crunch (which has long stopped being a credit crunch). But effects of this sort also occur in government and within universities. For many years for instance, the quality of business processes has been confused with improvement of business operations. Business operations within government have been elevated to a position above substantive policy-making. In a university, we should be focusing on the business process, which involves the 'warp & woof' of research and education, in that order. But it is business operations we talk about. All on the basis of a business model that assumes that this will in turn lead to improved business processes.

Business operational processes as the embodiment of business processes. It will all lead to tears. Civil servants are no longer responsible for the independent quality, continuity and reliability of decision-making. Universities are in fact being 'driven' towards niche optimisation, with no thought for the social impact. The real world has become remote. The credit crunch is actually an embodiment crisis, which has meanwhile had disastrous social consequences for many.

Let us ensure that the government and universities swiftly make business operations subordinate and subservient to the business process.

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Philosophers go on a retreat

September. Roeser will be taking over from Van de Poel as director of the 3TU centre, and they will both continue to supervise PhD students.

Direct understanding

Sabine Roeser, who attended the academy of arts in Maastricht, before obtaining a degree in philosophy and psychology and a PhD in Amsterdam, talks about her research subject with great enthusiasm. "I want to prove that ethics and emotions are not purely subjective, as claimed by followers of David Hume, or that emotions should be banished from moral debate on account of their presumed subjectivity, as propagated by followers of Immanuel Kant. Emotion and intuition can also provide objective truths. The insight they give is not based on arguments, but on a direct understanding of reality. For example, there are no arguments to support the moral principle that all people are equal. But the principle is correct; most people understand this intuitively."

In her research, Roeser shows that emotions such as sympathy, empathy, compassion, guilt and shame can reflect what is morally important to people, even during the process of weighing up technological risks. Engineers should not only make cost/benefit analyses and quantitative calculations, but should also take account of the ethical aspects when assessing risks. She explains: "A large proportion of the world's population will never be able to afford an air ticket, but will suffer the consequences of CO₂ emissions from air traffic. This is why eco tax was introduced, and why we are studying ways of developing 'cleaner' aircraft. An extra measure could be: make use of the emotion 'compassion'. Point out to people that if the entire population of the world could afford to fly, no-one would be able to do it more than once in their lifetime. Make it clear to people that they should not take their right to board an aeroplane for granted."

Roeser refers to empirical research that shows that the quantitative risk strategy adopted by experts does not fit in with the sizeable perception of risks as experienced by ordinary citizens. The general public takes qualitative aspects into account too. For example, citizens do not only consider the statistical chance of a meltdown occurring in a nuclear plant, but also the implications of any such meltdown. Experts who include the fear of the implications in their assessment will inevitably have a broader-based view. It forces them to think about the alternatives, for instance. Roeser: "Emotions are not only an instrument for enhancing or reducing support for technological innovation; they are also a source of knowledge. At the NIAS, I shall be thinking about how engineers can tap into this source."

Conflicting values

Ibo van de Poel's research does not so much focus on risk assessment, as on the more general role that moral values can play in the design process that engineers go through. Van de Poel is a technology ethicist. He studied for his degree and PhD in Twente and has been working at Delft since 1998. "Innovating also involves resolving conflicting values", he says. "Moral values like safety, durability, justice and freedom all play a role in the technological design process. But they sometimes conflict with each other. When designing a car that must be durable and affordable, you will invariably come up with a lightweight model, but this car will also be less safe. Unless we all start driving lightweight vehicles of course; then safety would again improve. So the question is this: what do moral values involve, and how do they interact?"

As an ethicist, Van de Poel thinks that engineers should not try to express all values in terms of money, but look for other ways to weigh up relative values during a design process.

At the NIAS, he will be exploring the various strategies that can be used to weigh up moral values while developing technological innovations. Like Roeser, his mission is to supplement the existing body of multi-criteria and cost/benefit analyses with philosophical considerations. "We think about various aspects that engineers are unaware of. Our critical reflection can be very useful, for example to make tacit decisions about values such as safety and durability explicit, and to take a critical look at them. On the other hand, engineers themselves can unify moral values by thinking up new technological solutions. The Oosterschelde storm surge barrier is a good example. It is a technological innovation of the highest order, a half-open barrier that takes account of two values: safety and care of the environment. I bring the world of philosophers and the world of engineers in contact with each other in a completely new way."

Innovative

Van de Poel has just put his finger on one of the reasons why NIAS has honoured him and his colleague Roeser with fellowships. Their research field is innovative. Of course their track record also played a role. But won't it leave a substantial gap in the department if two heavyweights more or less disappear for a year? Van de Poel puts it into perspective: "Well, the department will receive money from the NIAS to fund replacement teaching staff. And if we come back from this year in the dunes with good publications, it will reflect well on the philosophers in Delft."

The Ethics of Technological Risk



*In mid-February, Sabine Roeser and Lotte Asveld from the Philosophy section presented a compilation of articles entitled *The Ethics of Technological Risk*. The compilation was the result of a congress organised by Roeser and Asveld in 2006 about the role that ethics should play in risk assessment. They selected seventeen articles written by prominent international ethicists, psychologists and sociologists.*

Many people were interested in contributing, because up until now, very little has been published in this field. The authors of the seventeen articles answer questions such as: who benefits from new technological inventions, who picks up the bill and who is affected by the risks? Do people take these risks voluntarily? Are there alternatives for the invention and what are the implications if something goes wrong? Which morally legitimate considerations come into play when making risk assessments? Which other methods are useful when making an assessment, apart from a cost/benefit analysis? What role does the general public play?



Working on an up-to-the-minute issue

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illustration Benthem Crouwel Architecten



Should the tram arrive at the east or the west side of the new public transport terminal in Utrecht? ProRail and the Utrecht Municipal Authorities cannot agree about this. As part of the Process Management module, students taking the 3TU Master's programme in Construction Management and Engineering (CME) have devised various strategies for finding a solution. On Friday 16 January, they visited ProRail to present their recommendations to the parties concerned.

Utrecht Central Station is to undergo fundamental renovations in the next few years. The station is being converted into a High-Quality Public Transport terminal that will accommodate trains, buses, trams, taxis and bicycles under one roof. The specifications for the new terminal are nearly ready and ProRail is on the point of tendering out the building work. But one question still needs to be answered: on which side of the public transport terminal should the tram line between Utrecht and Nieuwegein be built?

Safety

The current tram line is on the east side of the station. The design for the new terminal building shows the tram line on the west side. The Utrecht Municipal Authorities were originally happy for the tram line to be relocated. But this changed when new plans emerged whereby the intended fast connection between the station and the university campus 'de Uithof' would be serviced by a tram instead of a bus. Building the tram line on the east side would make it easy to connect the future tram service to 'de Uithof'. Furthermore, tram passengers would have less far to walk to reach the city centre. ProRail is also in favour of linking the tram lines, but is sticking to the original plans. Safety is the foremost reason. According to ProRail, the east side does not provide the room needed to build a platform wide enough to be safe for passengers to get on and off the tram without getting in each other's way.

Opportunities

"We have been in discussion with the Municipal Authorities about a solution since late 2007," explains Marc Unger, project leader for

the public transport terminal with ProRail. "In September 2008, my colleague Marieke Koopmans was approached by Joop Koppenjan and Ellen van Bueren from TPM asking whether we had an interesting case for their module on process management. They were looking for an up-to-the-minute case that would prove a challenge to the students. Marieke suggested the tram problem and despite the sensitive nature of the issue, I soon agreed that this was a good idea. I had always intended to involve students in the public transport terminal project, and could certainly see the opportunities this offered. After all, the students might come up with interesting process proposals and their involvement would reaffirm our commitment to the city and the tram."

Deadlock

In early December, some fifteen students started working on the case in three tutorial groups. Their assignment was to formulate one or more process management strategies to end the deadlock. The condition was that the strategies had to be acceptable to all parties. To come up with a recommendation, the students studied the documentation that ProRail had collected and interviewed representatives from all the parties concerned. This eventually led to three different recommendations, all of which were presented during a meeting at ProRail.

Words of praise

The meeting generated a great deal of interest, and was attended by representatives from all the parties involved in the debate on the tram line. The recommendations were enthusiastically received. Marc Unger spoke words of praise. He was impressed by the high standard of the recommendations and the analyses, which had been compiled from a range of perspectives. The advice that was given only served to confirm his opinion that good process agreements were essential. The process proposal put forward by the second group was a real eye-opener to him. This group recommended that the protagonists of the eastern version should come with a good alternative for those who supported the west side, and the western protagonists should design an alternative proposal for the east side supporters. The alternatives should be assessed on the basis of a clear set of criteria. Other parties present also reacted positively to this idea. The project manager

Photo above: Joop Koppenjan, Martijn Leijten, Ellen van Bueren, Milou Beerepoot

Under: Marc Unger and CME students

Loek Waterreus from the Municipal Authorities, for example, wearily asked himself why this presentation had not been held in autumn 2007.

Inspiring

"I hadn't expected all those positive reactions beforehand", says Nikki Oude Elferink, one of the students. "When we started the assignment, I had trouble working out what would be realistic and how we should translate the information into a strategy. We learned as we went along. Before the presentation, we had no idea of how our recommendations would be received. It's so inspiring to see that people are interested, that they react enthusiastically and acknowledge that we have a number of really good points."

Joint Master's programme

The Master's programme in CME is provided by a collaboration of the three Universities of Technology (3TU), and was launched in 2007 in response to the Construction industry's need for a new breed of professionals. People who are not only technically trained, but who also have good communication skills and the ability to solve problems and manage change processes. The Faculty of CEG developed the Master's programme in partnership with TPM. TPM is responsible for teaching modules such as Project management and Process management. Programme manager is ir. Jules Verlaan, tel. +31 (0)15-278467, e-mail: j.g.verlaan@tudelft.nl

'Using the pc is good for your child'

These days, there is nothing unusual about children using computers. In fact, they probably couldn't get along without them! But just how good are computers for a child's development? Protagonists see nothing wrong with them, opponents see little right.

'THE FUTURE BELONGS TO HOMO ZAPPIENS'

Prof. Wim Veen



"Children who spend a lot of time in front of the computer can look forward to a glittering career. Computers teach them all the skills they need to go far in the business world. So do we now have a generation that is addicted to pushing buttons? And will it pass? No, absolutely not! It is simply the manifestation of an end to a shortage of communication and a lack of information. It is the perfect response to the globalisation of communication and the sharing of knowledge.

The new trend is clearly visible; there has been a shift from a system based on suspicion to a system based on trust. It can be seen in many large organisations (like Google, Interpolis and Nokia), where managers are gradually instilling more trust in their employees. In consultancy agencies, where everyone contributes his or her own field of expertise and everyone is equally important. All information is passed directly to everyone and not just to those at the top.

As a result, the business sector is crying out for independent-minded employees: experienced communicators, who are also creative problem-solvers, self-steering learners and 'digital thinkers'. Unfortunately, the present education system falls short of the mark in this respect. Hardly surprising, as it has been around for 150 years and aims to produce children that function optimally in a hierarchic system. They learn to be dependent on the teacher. The idea of a teacher who tells them exactly what's what is still dominant, and does nothing to challenge students. They are simply required to reproduce knowledge, just as we were all those years ago.

Giving the responsibility back to the child is a much better idea, and the computer is an excellent medium for doing this. The internet teaches children to make choices. They learn to select information, to share and to co-create. They also learn that it is all right to make mistakes. You don't die in the games; you simply get a new life. There is absolutely nothing wrong with this learning process; we all learn from our mistakes. But it does contradict the current system of education, in which the teacher does not trust

you as he checks your work. And mistakes are punished with a low grade!

It pays to share knowledge

The PC also teaches children that it pays to share knowledge: you get something back. We all have a deep-seated desire to share. As children, we want to show others how well we can build a sand castle. If it is appreciated, the child continues building. So learning can be linked to intrinsic motivation. And processes like this are greatly encouraged on sites like hyves and other interactive sites.

Moreover, the computer teaches children various social skills. They are never alone, as they are almost permanently in contact with each other via the internet. Their conversations may seem pointless, but this is not important at their age. Once they reach high school age, homework becomes a natural topic of conversation. Just as it would in 'real life'. So their behaviour is very much the same.

Another equally important trend is that the business world is steadily moving towards greater international cooperation. Nowadays, new cars are already largely designed in a virtual world. We practice this in Delft: a Ford dashboard was designed by students in Delft, students in Michigan took care of the financial side and students in Korea manufactured it. That's how it works in real life too. And this is where our education should be heading. The wall around PCs at school should be demolished as soon as possible. Start with the three-year-olds. Blinky Bill on the computer teaches them everything there is to learn in the reception year. And in a playful way. Anyone who says computers are bad for children has not fully explored the material."

Prof. Wim Veen is Professor of Education and Technology at the Delft University of Technology. He carried out research into internet use among children in years 7 and 8, and is interested in the development of new teaching concepts, particularly in the business sector.

'THE HIDDEN DANGERS ARE SERIOUS'

Prof. Ad Verbrugge



"I think we all agree about one aspect: the unrestricted use of computers can have an adverse effect on children. Consider all the inappropriate sites and ill-intentioned people. Children should be supervised. The main question is how to use a computer sensibly. Opinions differ, but to my mind, computers are over-estimated in the teaching situation. The main problem is that people tend to misunderstand the real meaning of the terms knowledge and learning.

Throughout history, we have always tried to understand mankind

in terms of the things people invent and use in any particular era. In the 19th century, for example, mankind was seen in terms of the steam engine. Over the last few decades, we see ourselves as an information processing system. But this has led to a misconception about the term knowledge: knowledge is thought to be information processing. Children should be taught to deal with information. They are no longer required to learn things by heart: why bother to remember all there is to know about the Siege of Leiden if you can look it up on the internet? It is a way of saving energy, which could be converted into creativity...

But this is not how I see it. Knowledge and information are completely different things. Knowledge is a sign of skill and expertise. It means that you are capable. A mathematician must be able to work with figures, a pen and paper, for example. This also applies to historical knowledge: a year only becomes meaningful within the context of certain events that took place. To be able to deal with information, you first need knowledge/skill. You must be able to remember things before you can put them to use. This has always been the case, and the PC has done nothing to change it.

The problem we are now facing is that children who use computers in the wrong way within the context of learning do not get round to the process of internalisation. They acquire less knowledge and are therefore less skilled. Learning columns, declensions and tables by heart is an essential first step. A PC only makes it easier to search for information.

Virtual biotope

Another important aspect is that humans are physical beings. A computer, on the other hand, is purely visual and auditory. It cannot be good for us to connect with the world using just two of our senses. Too much contact with the virtual world will impair our healthy development into physical beings. Movement is even crucial to intellectual development. What we are doing is creating a virtual biotope, in which we are becoming alienated from our human nature. Moreover, too many visual stimuli hamper the development of the neo-cortex, the source of our ability to think, be aware and concentrate.

But this is not all. Whatever a child goes on to do in the future, capacities such as concentration, discipline and awareness are essential. Take concentration: this is something you have to learn. In concrete terms, it means focusing your mental energy on one subject. But we live in a zap culture in which multi-tasking is a prerequisite. This is eroding our powers of concentration. Children carry out several tasks at once on a PC, surf all over the place and cannot settle to exploring one issue in any depth. This breaks them down, both practically and theoretically. It also creates the risk of people becoming so distracted that they are unable to cultivate a serious love/passion of anything else.

Discipline is the ability to carry out something you intend to do. The risk of unrestricted PC usage, particularly in a didactic context, is that it does not train discipline. And all of us, whether we are artists, joiners or scientists, need discipline. Discipline is another skill that we must learn from those around us. If you are always left to your own devices, you will eventually suffocate in your own freedom, swept away on a tide of stimuli! And awareness? This is the ability to open your mind to things that you do not immediately understand and which require further exploration. The danger of a PC is that a child will skip the phase of exploring things in greater detail. Laziness is lurking!

So to my mind, working with a PC can encourage certain attitudes that can have a negative effect in many areas. It can lead to alienation and a numbing of the senses. A sensible attitude to the PC is needed. It should never be allowed to replace 'tangible' human contact. And that is another potential danger: it can give children the impression that the virtual world is the same as the 'tangible' world."

Prof. Ad Verbrugge is Associate Professor of Social and Cultural Philosophy at the VU University Amsterdam. His other tasks include chairing the vereniging Beter Onderwijs Nederland [association for Better Education in the Netherlands].

SOUTH-AFRICAN ICT PROJECTS:

Technology does not work without a social context



TPM works closely with the Council for Scientific and Industrial Research (CSIR) in South-Africa. The aim is to improve accessibility and development of the country's rural areas. Graduates Martin Marijnissen (27) and Bart Wouters (28) spent six months in South-Africa in order to put their expertise to good use and help make a difference.

Martin and Bart's projects were an initiative of Sam Muniafu. Many people will recognise his name from his PhD time at Delft (ed: see Quarterly V/4, 15 December 2007, 'African talent obtains PhD under TPM wing'). "He suggested that we join him in South-Africa to do our graduation project as TP students specialising in System Engineering, Policy Analysis and Management. Unfortunately, Sam died two weeks after we arrived. It was an enormous shock! Johan Maritz took us under his wing."

The collaboration with CSIR worked well. "We were given all the facilities we needed and they even lent us two bikes to get to and from work. But there were also tricky points that needed special attention. We found that we couldn't put our theory into practice straight away. It took quite some time before we had identified the problems to which we could find a (sustainable) solution. A lot of people did not trust us and were economical with the information they provided."

They also found that although you cannot take it for granted, the continuity of a project is crucial. Martin: "Working in a developing area means that you forge ties with the local people. Speaking personally, I felt a social obligation to really achieve something for these people and not just use them for the purposes of my research. This makes continuing the project even more important. Sam's death obviously had repercussions in this respect."

Transport

Together with the Built Environment researchers from CSIR, Martin and Bart spent time exploring ICT solutions for different

purposes. Martin focused on the transport project *Logistics brokering in the rural environment of Kgautswane*. "This is an area in which 100,000 people live in about 15 small villages. The entire area is 60 square km and has just one long road. There is no proper way of travelling around. People are dependent on public transport: buses, taxis, trailers and private cars.

To bring about improvement, we decided to concentrate on taxis as a mode of transport. Although they are in great demand throughout the area, between 9:00 and 16:00 the taxis mainly drive to places where the infrastructure is good. So we looked for ways of introducing a system that would highlight supply and demand more clearly. And thanks to *Unstructured Supplementary Services Data (USSD)* technology, we were successful: passengers ring a number and request a taxi via a menu. A 'broker' collects all the requests and sends the taxis on their way.

The main problem that Martin encountered was short-term thinking. "For example, I suggested to the taxi drivers that they could apply discounts, but they were unable to see the long-term advantages of this." The strategy was tested last December. "Christmas did not make this the best time of year, but it was greeted with great enthusiasm. I would really like to go back to refine the project."

Healthcare

Meanwhile, Bart concentrated on *ICT Supported Healthcare in Rural Areas with the Leroro communities*. "Here, the chronically ill are cared for at home by volunteers. They keep an eye on the patient and are in contact with a nurse. This system does not work well in practice, as the volunteers do not have the equipment they need to examine their patients and do not write reports. This pushes up the death rate."

Once again, a solution was found in USSD technology (and interactive SMS). "All the volunteers were given a rucksack with measuring equipment. After checking the patient, the volunteer rings a special number. She then sends the readings she has noted down to a nurse in the clinic via USSD. This enables the nurse to monitor each patient via the internet and intervene

Graduates Martin Marijnissen and Bart Wouters at work with their colleagues in South-Africa

swiftly without the patient having to make unnecessary journeys to the clinic. I am even able to track the data here in Delft, so I can see that the system is being used!"

The project is still in the test phase. "It is only a prototype, so there is still a lot of room for improvement. The good thing about these projects is that they can both be applied world-wide. You find mobile networks all over the world these days, so there is enormous potential."

Martin and Bart both feel wiser after their adventures in South-Africa. "The main thing we learned was to consider the social context. If you take technology rather than social context as your point of departure, the project will be doomed to failure. For example: you have to visit the village chief before starting your research. He must give you permission, and so must the council. You cannot skip this ritual.

You must verify every single answer. For instance, someone might claim to visit a patient seven days a week, but in practice never works at the weekend. You have to realise that you can't force people to use something if they cannot see the advantages. So you have to look for solutions that will be of direct benefit to them. You must ask yourself at every turn: how does it work here?"

TPM's partnershi

Asia is in the lift, and TPM intends to stick close!

By: Dr Martin de Jong

Over the last few years, TPM has been putting a lot of effort into expanding its range of academic and educational contacts in the Far East. Recent world rankings have put Asian universities and institutes of education among the Times top 200 best institutes of higher education. By focusing on these institutes, the Faculty of TPM will inevitably benefit from valuable partnerships.

We found our first academic friends in the north-eastern corner of China: the Harbin Institute of Technology (HIT), a university that belongs to the top 10 in China. HIT and TPM have jointly devised a Double Degree Master's programme in Engineering and Policy Analysis (EPA), in which students work towards a double diploma. The Master's programme attracts students from both Delft and Harbin. Students undertaking this joint Master's programme spend their first year (first and second semester) in Delft, together with all the other EPA students, and then move to Harbin for the third semester. At Harbin, they specialise in applying policy analysis to the Chinese context, which allows students to broaden their cultural and institutional insight into the region. The students take modules in consecutive blocks lasting two to three weeks instead of taking a number of modules simultaneously during a single semester. The last Friday of each block is reserved for exams.

This third semester begins at the end of August and lasts until mid-December. The fourth semester is intended for the Master's thesis, which can be written at either location on the condition that both sides supply at least one supervisor. It is striking that not only EPA students want to take modules in Harbin, but also other Master's students studying in TPM (SEPAM and MoT). They gain much the same experiences as the EPA students, but the fact that they are taking part as international exchange students means that they are not entitled to a diploma from the HIT. After two years' hard work, the EPA students will have earned themselves both a Chinese and a Dutch diploma.

The HIT has campuses in Harbin and in Shenzhen. TPM has also negotiated a partnership for student exchanges on specific projects relating to entrepreneurship and knowledge cities with the Shenzhen Graduate School (HITSGS). Students have been travelling in both directions over the past few months and the partnership with the HITSGS is soon expected to expand. A number of TPM scientists will be taking part in a conference about knowledge cities, which has been planned in Shenzhen for early November.

But Asia does not stop at China. Japan and India are also political and economic forces to be reckoned with. Asia is in the lift, and TPM intends to stick close!



International partnerships with Lausanne and Paris

By: Dr Rolf Kunneke

During the last five years, our Faculty's Economics of infrastructures section has forged special working ties with Prof. Matthias Finger at the Ecole Polytechnique de Lausanne (EPFL) in Switzerland. This highly prominent university of technology operates as part of the federal Eidgenössische Technische Hochschule (ETH). TPM also works very closely with Prof. Claude Menard, Université Paris 1 Sorbonne-Pantheon in France.

Professor Finger occupies a chair for Management of Network Industries within the College Management of Technology. In the same way as at TPM, the liberalisation of infrastructures is a hot item there, but includes sectors that feature less prominently within our Faculty such as post, railways and aviation. The Sorbonne in Paris is an economic university of great international renown. Professor Menard occupies a chair in the field of institutional economics, where he focuses on issues relating to economic regulation and public-private partnership in the water sector. This fits in well with the special research activities at TPM into the areas of water and institutional design.

It began with keynote speeches at the annual conference, progressed into an appointment as visiting professor and has finally resulted in a broad-based working relationship in the field of education and research. Our faculty has joined Prof. Finger and Prof. Menard in a research project that revolves around the

reciprocal influencing of technology and regulation in the liberalisation of diverse infrastructures. This has naturally resulted in joint publications in scientific journals and books. Alongside this, the Delft Next Generation Infrastructures programme is funding a PhD student in Paris and a postdoctoral researcher in Lausanne. There are joint workshops, conferences and special sessions at major international meetings. Three years ago, a start was made on devising a joint PhD course in the field of management of infrastructures. This course is taught alternately in Lausanne, Paris and Delft. It has become a huge success in terms of both content and personal cooperation. With 35 participants last year, a solid basis has been created for joint research and education.

Co-editorship of the scientific journal 'Competition and Regulation in Network Industries' (www.crninet.com) has also been realised, along with a communal newsletter known as 'Network Industry Quarterly' (<http://newsletter.epfl.ch/mir>). The publication of an International Handbook Liberalization of Infrastructures is planned for 2010. Alongside this, a scientific monograph about the above-mentioned research programme is being prepared. Rolf Kunneke has been invited to the Sorbonne for the first semester of 2009 as visiting professor. Prof. Finger will once again be visiting professor in Delft. This partnership enjoys broad support from all staff working for the chairs concerned.

international ps

Summer all year round: Partnership with QUT

By: Prof. Hugo Priemus

In 2003, when Shell decided which universities would form the Shell Project Academy, the lucky four were: University of Texas in Houston; Cranfield University in the UK; Queensland University of Technology (QUT) in Brisbane; TU Delft, Faculty of TPM. The first two are mainly responsible for the business school, while QUT and TPM provide the engineering component. Shell and staff from these four universities take care of the project management training for a large number of Shell staff at different job scales. Herman Mooi is director of the Shell Project Academy within TPM. QUT and TPM staff discovered that they had a lot more in common than simply providing SPA training courses. In QUT, two faculties working together are responsible for SPA input: the Faculty of Built Environment and Engineering and the Faculty of Business. Martin de Jong has been TPM coordinator in the partnership with QUT since 2008. A student exchange facility has been established, in which the Master's programme in Management of Technology is particularly well represented.

QUT carries out a lot of research into airport management, the security policy at airports and the synergy between an airport, the infrastructure and the city. Brisbane Airport is a highly successful privatised airport that maintains close ties with Schiphol Airport. From within TPM, Warren Walker, Vincent Marchau and Odette van Riet (now transferred to the Netherlands Institute for Public

Transport Analysis at the Ministry of Transport, Public Works and Water Management) have made contributions to the partnership with QUT. Dough Baker and Ashanta Goonetilleke are the foremost contact people at QUT. QUT is also the headquarters of a research centre for asset management (optimum deployment of the infrastructure with regard to performance, risks and cost). A special partnership between QUT and the TPM section Energy & Industry has been established in respect of this theme.

Other TUD faculties are also involved in the partnership with QUT; they include Industrial Design Engineering and the Faculty of 3ME. One of the top priorities on both sides of the collaboration between QUT and TPM is the synergy between PhD students. The TPM Research Group and section Transport Policy and Logistics' Organisation achieved excellent scores in the NWO [Netherlands Organisation for Scientific Research] programme entitled Sustainable Accessibility of the Randstad. The programme also provides resources for funding international cooperation, which has created extra room for working together with institutes such as QUT. There are massive opportunities in the field of management of infrastructure in particular (which follows on from the BSIK [Investments in Knowledge Infrastructure Directive] programme, Next Generation Infrastructures): both QUT and TPM are already carrying out world-class research into this theme.

India provides TPM with research questions they could only dream of

By: Prof. Margot Weijnen

The internationalisation of Next Generation Infrastructures is moving at a record pace. Ties with the US have been boosted by the appointment of Marija Ilic from Carnegie Mellon University as Professor of Control of future electricity network operations, and Dan Frey (MIT) as Associate Professor of Flexible infrastructures. Expansion is also progressing steadily in Europe, with partners in France, Switzerland, Italy, Norway, Spain, Germany and Belgium, both universities and businesses, particularly energy companies. In many of these projects our faculty is a partner and the students are finding it much easier to find internships and graduation projects abroad. The further from home and the more exotic they are, the more they seem to attract our students. Another piece of good news is that our infrastructure system research has been discovered in India. In Bangalore, a Laboratory for Next Generation Infrastructures has been set up similar to the programme that was launched from TPM. The initiative in India came from the Centre for the Study of Science, Technology and Policy (CSTEP), a ground-breaking multidisciplinary research centre that vastly resembles TPM in terms of its organisation and ambitions. This has led to a hive of activity between Bangalore and Delft, as researchers are travelling back and forth in search of inspiration. Our Indian partners come here to learn how we support strategic decision-makers in the public and private sectors using models, simulations and games. And India provides the people from TPM

with research questions they could only dream of. A good example is the infrastructure planning in Bangalore, a city that has grown out of all proportion. The city is plagued by congestion and may have to ration drinking water and electricity because the development of the infrastructure has not kept pace with the growth of the population and industry. Or: how can we develop a sustainable and affordable electricity infrastructure for India, including the rural areas? There are design requests for the Greenfield development of entire new cities, including all the infrastructures for transport, energy and water. In short, if ever an experimental garden required our best efforts in terms of simulation models and powers of imagination, it is India. By focusing research cooperation specifically on modelling, simulation & gaming, we can make optimum use of the abundance of IT expertise available in Bangalore. A stream of students is gradually emerging from the Indian Institute for Information Technology (IIIT), but elsewhere in India, students from the Indian Institute of Technology (IIT) have also discovered TPM; they are coming to TPM for periods of internship in increasingly larger numbers. And this is only the start. We are currently using SSN Lectures in Chennai (formerly Madras) to explore the possibility of a joint Master's programme. And, last but not least, the second International Conference on Infrastructure Systems will be held in Chennai, from 9 to 11 December 2009.

FORMER STUDENT DANNY MENKEN MAKES DAZZLING CAREER

'I must have been ambitious all along...'

The sum total of Danny Menken's first year in the Faculty of TPM was six ECTS credits, from a maximum of 42. A lot has changed since then.

The view from behind his desk is magnificent, even though the athletics track, football pitch and stands of the Olympic Stadium are deserted on this bleak February afternoon. But once the spring sun warms up the Amsterdam air, the place fills with people. Athletes in training fly past the windows. "Could you imagine a better background?" asks Danny Menken, managing director of Eurosport Benelux. It is meant as a rhetorical question.

Managing Director is printed on his business cards, although according to his passport, he is still only 29 years old. Ex-TPM student Menken is a special case. Since obtaining his degree in Delft six years ago, his career has developed at a record pace. "I studied Transport and Logistics, but was fortunate enough to have ICT professor Wim Dik as my supervisor. He gives his students a great deal of personal attention. For my graduation project, I spent time at Heineken looking into ways of optimising the supply process between wholesalers and the bars and restaurants they supply. My recommendations went down so well that I was immediately asked to put them into practice. I was put in charge of a team and we worked together on a project that earned Heineken millions of euros per year."

Something more dynamic

Although Menken was enjoying his time at the Netherlands' largest brewery, he soon decided it was time for a new challenge. "I learned so much at Heineken, and I shall be eternally grateful. But at the end of the day, beer is beer. It doesn't change. I wanted something more dynamic." Friends got him a job at KPN [telecommunications], where he started as a strategic buyer before turning his hand to developing digital and mobile television. His employer offered to send him on an executive programme at INSEAD, the prestigious business school in the French town Fontainebleau.

A little less than three years ago, thanks to a carefully constructed network of business relations and acquaintances, Menken made the move to Eurosport. "I was 26 at the time, and found myself in charge of an organisation that employed 85 people. Even my youngest colleague was years older than me." He has a multifaceted job at the European sports channel, which he summarises as 'to develop a strategy, and then to ensure that everyone implements this strategy as well as possible'. The company relies on distribution fees for its income, so the basic aim is to offer Eurosport in as many places and as many ways as possible.

Student days

Not many people would have predicted a glittering future for Menken during his first year in the Faculty of TPM. He put little time or effort into his studies, partied till dawn and finished

the year having earned six from a maximum of 42 ECTS credits. This sad state of affairs served as a wake-up call. "Since my primary school days, I had never had to lift a finger. I always sailed through exams without a hitch. But my very reason for choosing TPM was that the courses at TU Delft were known to be the most difficult in the country. So I must have been ambitious all along. As from the second year, I got down to some serious work and eventually completed the programme in less than the nominal study time."

Although his current job has little to do with what he learned at university, Menken claims he is still reaping the benefits of his time in Delft. This born and bred Haarlem man is not referring to the specific knowledge he acquired there, but his grasp of the underlying systems. "A lot of people from Delft are headhunted for their analytical aptitude. They are able to analyse complex processes and attach the right conclusions. This is what I recognise in myself. I'm good at setting up projects, structuring things."

Has making a career become an aim in itself? He takes time to think before replying: "Yes and no. Up until now, jobs have just come my way, although I have never lost sight of the overall direction I want to go in. By the time I'm forty, for example, I want to be manager of a board of directors somewhere. And apart from that, I'm really enjoying the networking side. Business events, parties, large-scale sports events; they all give me a healthy dose of positive energy."

TPM graduates are satisfied and find good jobs

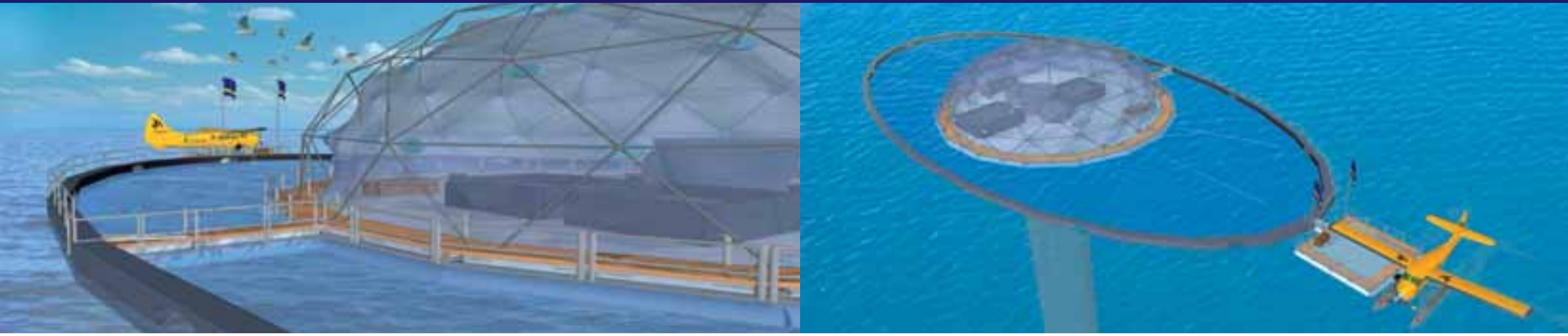
TPM graduates have given the faculty a score of 7.9 for its teaching. Ninety-six percent of TPM graduates would recommend the faculty of TPM to others, and 89 percent think that the teachers in the faculty are experts in their field. These good scores come from a survey of alumni held in November 2008. Subjects in the survey included the job market position of alumni, evaluation of the programme curriculum and its alignment with the job market. Three-quarters of those who graduated from the faculty think that the programme prepared them well for their job.

In total, 89 percent of alumni found work within six months of graduating. Of the 266 respondents (44 percent respondent rate), ten percent found themselves unwillingly unemployed. Fifty-two percent of all alumni who took part in the survey undertook management duties. Most of them (61 percent), are in charge of a small number of staff, and fifteen percent manage sixteen staff or more.

In terms of remuneration, TPM alumni are on average well paid. A third of graduates are already earning a gross salary of more than five thousand Euros per month. The majority (73 percent) have a permanent contract and 76 percent work full-time. Full-time should be taken to mean 95 percent of a full-time job of 40 hours or more. The company that employs the largest proportion of TPM alumni is TU Delft. According to recent figures, nineteen of our former students have found work at the university. The joint ministries come second with eleven alumni. They are followed by various big names from the Dutch business world, including KPN, Shell and major consultancies.

The top three sectors employing TPM graduates are: 1) consultancy, 2) transport & logistics and 3) government.





INSPIRATIONAL INNOVATORS

Second TUD Design Challenge launched

To demonstrate the strength and versatility of TU Delft to the outside world, while simultaneously giving students the opportunity to realise challenging, interdisciplinary innovations. This was the idea behind last year's first ever TUD Design Challenge. And it was an unmitigated success. Meanwhile, the second university-wide Design Challenge has been launched, and the Faculty of TPM has once again taken a leading role.

Lecturer Luuk Simons from the section Information and Communication Technology was the driving force behind the first TUD Design Challenge. He set it up as a module for second-year Master's students, and those taking part stood to earn twelve ECTS credits. "Of course the best thing about it is that it allows students to work on the realisation of a real project", says Simons. The selection of participants is strict. "We need good, well-motivated students, otherwise it will be impossible to finish the project within the limited time available."

The idea for the Design Challenge was based on a concept from

the American Stanford University. The basic principle is that groups of students from various disciplines and with different backgrounds spend six months carrying out an assignment for the business sector. The aim is to come up with innovative ideas, designs and solutions. The ideas are presented to a jury of renowned experts, who then decide upon the winning project.

Simons: "We have noticed that good managers are not always the most inspirational innovators. Increasingly more organisations are starting to realise that this is a job for other specialist groups, such as technicians or creative designers. But these people are not necessarily good at managing innovation processes. By allowing different groups to work together, you get the best of all worlds. The Design Challenge is our response to this development." The Challenge's success is reflected in the huge number of research assignments received. The companies pay for them and have to appoint a coach. Simons: "This keeps everyone seriously committed."

Ocean water

September 2008 saw the launch of a pilot project undertaken by three teams. Two of the assignments related to ICT: to develop document management services for major building locations

(Oce was the client) and to design Web 2.0 applications for better working relations in open company settings (Tam Tam). The team with the two TPM students (George Dodoros and Jody Verburg) was the winner. This group was commissioned by Ecofys to carry out a study looking for ways of generating energy from the temperature differences in the ocean. They designed a power station that would use cold water from the lower depths of the ocean for the air-conditioning in hotels in Curacao.

The idea of making use of temperature differences in the ocean has been around for two hundred years, but was up until now commercially unviable. The study claims to make a substantial saving thanks to the innovation of technological components, whereby investments would be recouped within five to seven years. This is reason enough for the client to think seriously about the commercial potential of a power station like this. This year, two new Design Challenges have been planned. The first one started in February with five new projects focusing on issues including sustainable technology, skating on plastic and strategic portfolio redesign. The next Design Challenge will start in September 2009.

For more information, visit www.DesignChallenge.TUDelft.nl

HANS DE BRUIJN SAT ON THE ADO DEN HAAG COMMITTEE OF INQUIRY

'A faculty that propagates practical application must be visible in society'

Last year, the Mayor and Aldermen of The Hague set up an independent committee to assess the decision-making processes surrounding the building of a new stadium for ADO Den Haag football club. What were the roles played by the Municipal Authorities, ADO Den Haag and the Stichting Stadion Ontwikkeling [Stadium Development Foundation] in trying to raise the football club to a higher level? Hans de Bruijn, Professor of Public Administration at TPM, had a seat on this committee.

The other committee members included PvdA top man, former Minister and member of the Upper House, Klaas de Vries, and expert from the world of sport, Peter Vogelzang. De Bruijn: "It is not unusual to include someone from the academic world in inquiries of this kind, as they have a good understanding of the complicated decision-making processes in the public sector. This is one of my specialist areas." It was not the first committee of inquiry that Hans had sat on. "A faculty that propagates practical application should not only carry out scientific research, but also make itself visible within society. TPM does this by

conducting contract research for government bodies and businesses. This is part of our work."

Double aim

In 1999, The Hague Municipal Authorities introduced policy designed to revitalise ADO Den Haag. Their point of departure was that the football club fulfils an important social function and should retain its place in the premier league, preferably in the top half. To achieve this, the Municipal Authorities created a double aim: to build a new stadium and to boost ADO Den Haag, so that the club could continue playing top-level football. But by the time the new stadium had been completed in 2007, ADO (which had meanwhile been relegated to the first division) was showing signs of collapse. De Bruijn: "This was the direct reason for the inquiry. How was it possible that after all the effort that had gone into revitalising ADO Den Haag, a situation like this could arise at the supreme moment?"

Achievement

The committee was happy with the ambitious aims that had been set by The Hague Municipal Authorities. "There is nothing wrong with aiming high. The Municipal Authorities obviously want what is best for The Hague, and the process was largely successful. The stadium was finished on time and within the budget. A great achievement, as large-scale infrastructural projects tend to take

longer than planned and usually cost more than was budgeted." The inquiry concluded that the Municipal Authorities remained closely involved in the actual building work. But the Municipal Authorities seemed to have distanced themselves from the way the club was run. "This is not unusual", says De Bruijn. "If you don't know anything about each other, you can't help each other. But it does go some way to explaining how things at ADO Den Haag were gradually able to go downhill. If you know that people will eventually blame the Municipal Authorities if ADO Den Haag goes under, and if you firmly believe that ADO Den Haag is important to the city, then you really must try to forge ties with the organisation concerned. The Municipal Authorities should have kept an ear to the ground and maintained a certain degree of involvement. This is a good way of avoiding nasty surprises. By joining forces, you can take advantage of the opportunities that come your way."

But before the findings and recommendations from the inquiry could be put into practice, ADO Den Haag managed to reach the play-offs and the club was promoted to the premier league, despite the financial and professional malaise. "This fickleness is inherent to decision-making processes like these", explains De Bruijn. "You can have a massive problem one day, and a day later it can be over. But of course the question that still remains is how were things able to get that bad in the first place?"

Dissertations



EVERT JAN VAN DE KAA, *Extended Prospect Theory*, Delft, October 2008

In Transport Sciences and other social sciences implementations of Utility Theory are commonly used for the description and prediction of choice behaviour. An alternative behavioural-economic model of choice behaviour is Prospect Theory. Van de Kaa proposes an extension of Prospect Theory with some assumptions from other social sciences. The most important differences between this 'Extended Prospect Theory' (EPT) and Utility Theory are: a person's preferences for one alternative over another are not stable but may change with the circumstances; people frame alternatives as changes compared to a reference state; they adapt that reference state almost immediately once a choice is made; and they attach a much higher value to a loss of, for example, leisure time compared to an increase of the same size.

Van de Kaa demonstrates that EPT explains the choice behaviour of people better than Utility Theory for the whole range of travel choice contexts. He also proposes a mathematical model based on EPT that, compared to a similar Utility Theory-model, appeared to offer a better prediction of the responses of Singapore's car owners to the introduction and changes in the road pricing fares from 1975 to 2005.

MARIEKE FIJNVANDRAAT, *Shedding light on the black hole*, Delft, January 2009

Several market studies have indicated that the roll-out of broadband has significant economic and social relevance. The investments in broadband infrastructures needed to realise these economic and social benefits are, however, high-risk. This is firstly caused by the fact that the roll-out of access networks is extremely costly and requires high initial investments. Moreover, the multidisciplinary environment and involvement of many actors with diverging objectives and interests cause high complexity. On top of that, the market for broadband is changing fast and continuously. Although broadband has been on the academic research agenda for quite some time, this has as yet not resulted in a structured insight into the decision-making process around the upgrading of broadband networks, seen from the perspective of private operators and taking into account the vast complexity of the surroundings in which this decision-making process takes place. Although broadband has been on the academic research agenda for quite some time, this has as yet not resulted in a structured insight into the decision-making process around the upgrading of broadband networks, seen from the perspective of private operators and taking into account the vast complexity of the surroundings in which this decision-making process takes place.

The objective of this research was to provide a unifying theory combining technical, economic, market-related and regulatory factors with regard to an evolutionary, flexible approach of network upgrading viewed from the perspective of decision-makers in the telecommunication industry. The result of this research is a robust, explanatory, parsimonious model for the impact and outcomes of broadband roll-out. This model can serve as a starting point for further research projects and provides a certain degree of stability in this multidisciplinary, unpredictable and highly dynamic research field.

GEORGE VAN LEEUWEN, *Innovation and performance. A collection of microdata studies*, Delft, January 2008

There are still many puzzles to be solved concerning the relation between innovation and firm performance, in particular concerning the distinct roles of information and communication technology (ICT) and Research and Development (R&D) in creating new or improved products or production processes. This thesis provides evidence that both instances of innovation are important drivers of productivity and, thus, economic growth. The thesis consolidates the results of empirical work covering about 10 years of research on firm-level data that was aimed at understanding the importance for firm performance of innovation in a broad sense. Using econometric methods, the several chapters investigate the distinct contributions to Total Factor Productivity (growth) of R&D and ICT and after controlling for the contributions of other inputs. Special attention is given to the interaction between technological and non-technological innovations and the role of ICT-related network externalities. It is shown that, especially in service production, ICT is an important driver of productivity (growth) and also an important enabler of other (non-technological) innovations. The cumulative-ness of innovation is demonstrated by showing that firms that combine technological and non-technological innovations are among the most productive firms.

AUGUSTINE NNADOZIE AJAH, *On the Conceptual Design of Large-scale Process & Energy Infrastructure Systems: Integrating Flexibility, Reliability, Availability, Maintainability and Economics (FRAME) Performance Metrics*, Delft, February 2009

Change seems to be the only constant parameter in our lives - people change, our needs change, our environment change, our world change...

In the same way, the environment in which large-scale process and energy infrastructure systems operate is increasingly becoming more dynamic and subject to various uncertainties and disturbances. These challenge the engineers and designers to provide solutions and designs that are not only reliable but are adaptive to a wide range of future conditions and requirements.

In addressing these challenges, the thesis explores how the key performance metrics- Flexibility, Reliability, Availability, Maintainability and Economics (FRAME) can be integrated early in the conceptual design phase of large-scale process and energy infrastructure systems. Frameworks and mathematical models, deeper than is usual in the domain, for integrating these metrics early in the conceptual design process have been formulated. Solution methods for these mathematical models have been explored. And their applicability, utility and relevance have been demonstrated through thoughtfully designed contemporary process and energy infrastructure systems.

The novel, structured and systematic conceptual framework and models that the thesis provides will be of great relevance to designers, owners, managers and users of large scale process and energy infrastructure systems. Also government agencies, policy makers, researchers, consultants, students and design teachers will benefit from the thesis.

EKKI KREUTZBERGER, *The Innovation of Intermodal Rail Freight Bundling Networks in Europe. Concepts, Developments, Performances*, Delft, December 2008

The innovation of transport bundling is about finding best compromises between the maximisation of vehicle loads, transport frequency and network connectivity on the one hand, and minimising operational impedances on the other hand. Direct transport services have the smallest impedances, but the transport volumes are often too small to fill the trains on the required frequency level. Complex bundling as in hub-and-spoke or line networks may be a solution. And technical innovation may enable to reduce impedances in complex bundling networks.

The study wants to contribute to a better understanding of bundling and a better decision making in this area by analysing and structuring the bundling issue in multiple and innovative ways. The study presents the so-called bundling kite model, which describes the inescapable quantitative relation between the central bundling variables. The kite model is also discussed as a fundament to improve the structure of the theory of scale and scope economies. Other subjects are the interaction between bundling and transport time, and the innovation of bundling in seven European countries and the performances impacts.

The study confirms that adding bundling networks with container transshipment at intermediate exchange nodes will increase the competitiveness of intermodal rail transport, and recommends operators to invest into such networks. Recommendations to the public sector are to support complex bundling by privileging their train paths, and to coordinate the planning of competing intermodal bundling rail networks.

ROGERS WOD'OLOBO OKOT-UMA, *Improving International Relations Conferences through Virtual Interactions: Embodying a Multi-Agent Z Specification Framework*

This study investigates virtual interactions in distributed collaboration, with the aim to improve international relations conferences through virtual interactions. This is done by, first, addressing the problems and issues of operation, context and strategy, that frequently affect international relations conferences, and second, preserving conference deliberations.

The study deploys a qualitative inductive research approach, based on the deployment of a finite number of case studies, comprising Virtual Embassy, Terrorism: Focus on 9/11, and Internet Governance.

The key to the empirical research phase was, first, to set up of a distributed WAN with nodes worldwide; second, to run a series of virtual sessions on case study themes; and, third, to capture data as fragments of textual transcript, analyse using a coding schema, and formulate states-as-actors concepts and behaviours. The findings demonstrate, empirically, the existence of states-as-actors behaviour. A formal specification language, Z, is invoked, which is used to model states-as-actors behaviour, in a goal to provide a broader generalisation, theory and framework as a core research outcome.

Professor Profile

NAME

John Groenewegen

POSITION

Professor of the Economics of Infrastructures and head of the Section Economics of Infrastructures

Private life?

"I am married, and a father of three children. We have a daughter (30), who owns a restaurant in Rotterdam, a son (28) who studied civil engineering at Delft and is now a consultant and another son (25), who is studying communication."

Favourite pastime?

"I enjoy running and playing tennis, but I have had to stop because of an Achilles tendon injury. These days, I work up a sweat on the home trainer in my cellar. I hate it, as I'd much rather train outside, but I manage to distract myself and set a good rhythm by playing old Elvis Presley songs. My wife and I also bike long-distance cycle routes, to Rotterdam, for example, or The Hague or Scheveningen. City trips are another favourite pastime, preferably to Paris and Barcelona."

High point of your career?

"On starting at university in 1967, I was inspired by Professor Henk Lambers. Later on, I became his student teaching assistant and employee. He taught Institutional Economics, which was at the time a much maligned field: it was sociology, not economics! This was the area I was interested in, but despite my resistance, I found myself steadily being sucked into the mono-disciplinary field. Institutional economics did not really gain a respectable place on the Dutch curriculum until the 1980s and 1990s. The best part is that in 1999, I was appointed Professor of Institutional Economics: the first chair since Lambers! And during the ceremony, there he was in the front row!"

The best thing about your work?

"The fact that TPM is an interdisciplinary faculty. The main challenge is linking economics into other areas of science. You explore hard technology, as well as the social sciences. This side was new to me, but I really enjoy it. I also like teaching economics to technicians, so that they can talk about it and incorporate the knowledge they acquire into their technological background. The field also recognises many different ways of thinking, all of which work well together. For instance, I'm used to thinking in terms of economic models, while other people have different thinking patterns. But working together on the same product forces you to open your mind to other lines of thought. This approach is unique in the world."

Best quality?

"I don't know about that. Let's say I very much enjoy working with students. I am always open to other lines of thought. For example, I try not to instil just the standard theories into my students' minds. I always hope that students will give me a hard time by coming up with complicated problems that we can spend

time debating. This keeps me on my toes. We do this with colleagues during a colloquium every Friday, at which other sections are also welcome. We discuss research and articles in order to learn from each other and give others an opportunity to take a critical look at our work. We do this at international level too, during our international conference in Delft, for example. Representatives from government, business minds and international scientists all trying to push back the boundaries. I love it!"

Least good quality?

"The fact that I am open to other ways of thinking means that I tend to take on a thousand and one things at one time. So I sometimes make gaffes. But as I always say: you can't make an omelette without breaking eggs. On the other hand, I am usually fairly well organised and never miss my appointments. But if I find myself with too many appointments, it becomes a matter of give and take. This can be difficult for those around me and a nightmare for my secretary! I am sometimes jealous of mono-disciplinary economists who are able to really sink their teeth into one single area. Unfortunately this isn't me, although I must admit, I sometimes find myself exhausting."

Working with others?

"That is fantastic here. Everyone respects and appreciates each other and the organisation is extremely flexible. You can organise a lot yourself. In this respect, it's almost paradise. On the other hand, a lot is required of you. The organisation makes huge demands. I suppose you could say it's more of a vocation."

Sources of inspiration?

"In the Netherlands: Jan Tinbergen and of course Henk Lambers. Internationally: John Kenneth Galbraith, economic advisor to President Kennedy and Ambassador of India. As a multi-disciplinarian, he too looked beyond the boundaries. He wrote a lot, including a book about the Great Crash in 1929."

Outlook on life?

"There's no time like the present! Ask yourself what really matters every single day, and more importantly, how you intend to enjoy each day!"



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Curius

You may have noticed a lot of Curius posters hanging in the Faculty at the moment; posters promoting activities from the TB-Café to various company outings, and from Carnaval in Veghel to the TB dictation. Curius has had a busy few weeks.

It all started with the grand opening of the TB Café. The Dean of Faculty, Theo Toonen, outlined the Café's intentions, after which the large crowd was treated to celebratory drinks. The tone for the rest of the year was set by the students and staff, who joined together to toast the new TB Café with glasses of freshly tapped beer. Everyone is welcome for a drink in the Café every other Thursday afternoon from four-thirty onwards. To book the TB café and for more information about usage and costs, please send an e-mail to: TBcafe@curius.nl.

A few days later, the TB Café was the setting for a large-scale activity for the whole faculty; the TB dictation, which had been organised by Curius and the Institute for Technology and Communication. More than 50 participants pitted their wits against this professionally-compiled dictation, trying to complete it with as few mistakes as possible. The event was hosted by NOS anchorman Jeroen Overbeek. With an average of thirty mistakes, most of the participants agreed that the dictation had been difficult enough. But praise where praise is due: Martijn Wackers won the dictation with just 9 mistakes. The words and sentences were chewed over later during post-dictation drinks. To recap; it was a chthonic evening with a Lucullan after-party.



But there was more to come for Curius members. On Wednesday, a busload of first-year SEPAM students left for Brussels for a peek behind the scenes of the European Commission. After an informative presentation, they were given a guided tour of the network of corridors that houses the European Parliament. In the afternoon, they visited the cultural highlights of Brussels and the day concluded with a fine Belgian beer.



Fortunately the year is not yet over for the Curius members. More will follow shortly. But in the meantime: we look forward to seeing you soon in the TB café!

The 16th Board of SVTB Curius

TPM's educational programmes

- BSc Systems Engineering, Policy Analysis and Management ('Technische Bestuurskunde', TB)
- MSc Systems Engineering, Policy Analysis and Management (SEPAM)
- MSc Management of Technology (MoT)
- MMSc Engineering and Policy Analysis (EPA)
- MSc Transport, Infrastructure and Logistics (TIL) (in cooperation with the Faculty of Civil Engineering & Geosciences and the Faculty of Mechanical, Maritime and Materials Engineering)
- MSc Information Architecture (IA) (in cooperation with the Faculty of Electrical Engineering, Applied Mathematics and Computer Science)
- MSc Geomatics (in cooperation with the Faculty of Civil Engineering & Geosciences and the Faculty of Aerospace Engineering)

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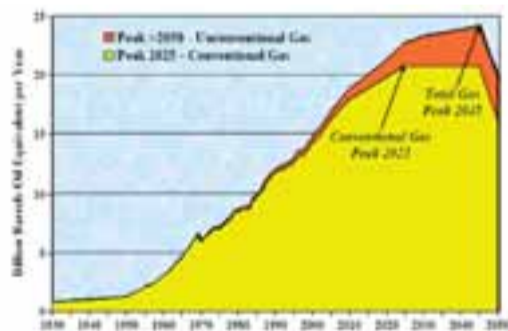
Did you thoroughly read the available information and are you considering enrollment in a TPM-programme? Are you not sure your educational background is sufficient? Then please contact one of our study advisors:

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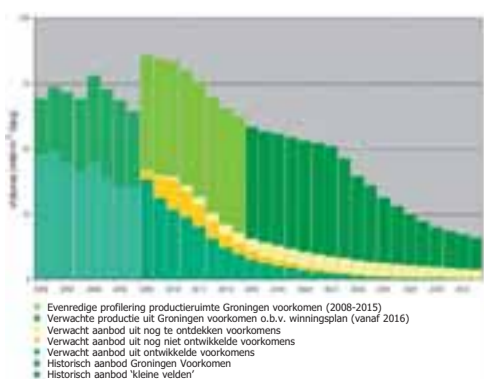
ASK TPM

What should we do when natural gas runs out?

This is a question that features regularly in the media. The latest prediction is that our natural gas will run out on 17 September 2027 at a quarter past seven in the morning in Schildwolde¹, while cooking a pan of porridge. But could we give a more accurate answer to this question? Aad Correljé, policy researcher in the area of energy and water in the section Economics of Infrastructures and Rob Stikkelman from the section Energy and Industry, interested in the Port of Rotterdam's role in the Dutch energy infrastructure, make an attempt.



David Hughes, Geological Survey of Canada, Data from C.J. Campbell, 2005



An analysis of the question shows that it could be formulated more precisely. If it is referring to all sources of natural gas in the world, the quick answer would be: never. There will of course come a time when it will no longer be viable to use natural gas in preference to other sources of energy. But gas will always be there in the earth. Rather like peat, which we no longer cut despite the fact that it is still widely available. If we are talking about the extractable world-wide gas stocks, this could be a good first opportunity to spin the Gas-Runs-Out wheel of fortune. Using the most recent estimates from 'realistic' supply and demand curves, on the basis of a Peak Gas curve (Figure 1)², gas shortages can be expected sometime between 2050 and 2065. The question is how the supply and demand curves will develop in the long term. They depend to a large extent on all kinds of unpredictable technical, economic and political developments on both the supply and the demand side, for gas as well as for other sources of energy. Figure 1 is therefore nothing more than a rough indication of how much gas there is still left to extract.

The question of when Dutch gas will run out sounds altogether more alarming³. Figure 2 represents an attempt to answer this question. It is fairly certain that at some point between now and 2030, an energy equivalent comparable to the estimated stock of Dutch natural gas will run out. But don't panic! Dutch gas is perfect for integrating with foreign gas. Pipelines are already making sure that the Dutch natural gas infrastructure is steadily

becoming integrated with the European network, connecting to the rest of the world via LNG tankers and terminals. The foremost effect of Dutch natural gas running out would be a drop in income from natural gas felt by the Dutch Treasury.

Developments in supplies from other sources of energy will inevitably affect the 'depletion' process for natural gas. Some of these alternatives will be able to make use of the natural gas infrastructure. Methane, for example, can be extracted from other raw materials. Alternatives include biogas or SNG (Synthetic Natural Gas). Although the contribution from both these alternatives is currently negligible, future economic and technological developments may well change this state of affairs. Alongside methane, another possibility is mixing with alternative gas-based sources of energy such as hydrogen gas or synthesis gas. According to the authors, alternative gases will not play a substantial role in terms of household application. But system innovation can be expected in industrial processes, particularly if alternative gases can be produced from coal.

So "What should we do when natural gas runs out?" is a non-sensical question. It would be better to ask: "When will natural gas lose its dominant universal role in the Dutch energy economy?" The answer involves many different factors. At present, there are sufficient world-wide gas supplies. 'Dutch natural gas' running out is largely irrelevant. Supplies from other sources of energy along with developments on the demand side are the determining factors. So we will have to defer giving a precise answer. We don't know. Ask us again on 17 September 2027, but preferably not at a quarter past seven in the morning, as Aad and Rob will still be enjoying their porridge.

¹ Pietje Precies, Journal of What People Like to Hear, pages 22-87, 2009

² <http://www.energy.state.or.us>

³ TNO (2008) Oil and gas in the Netherlands: Annual Report on Prospecting and Extracting 2007