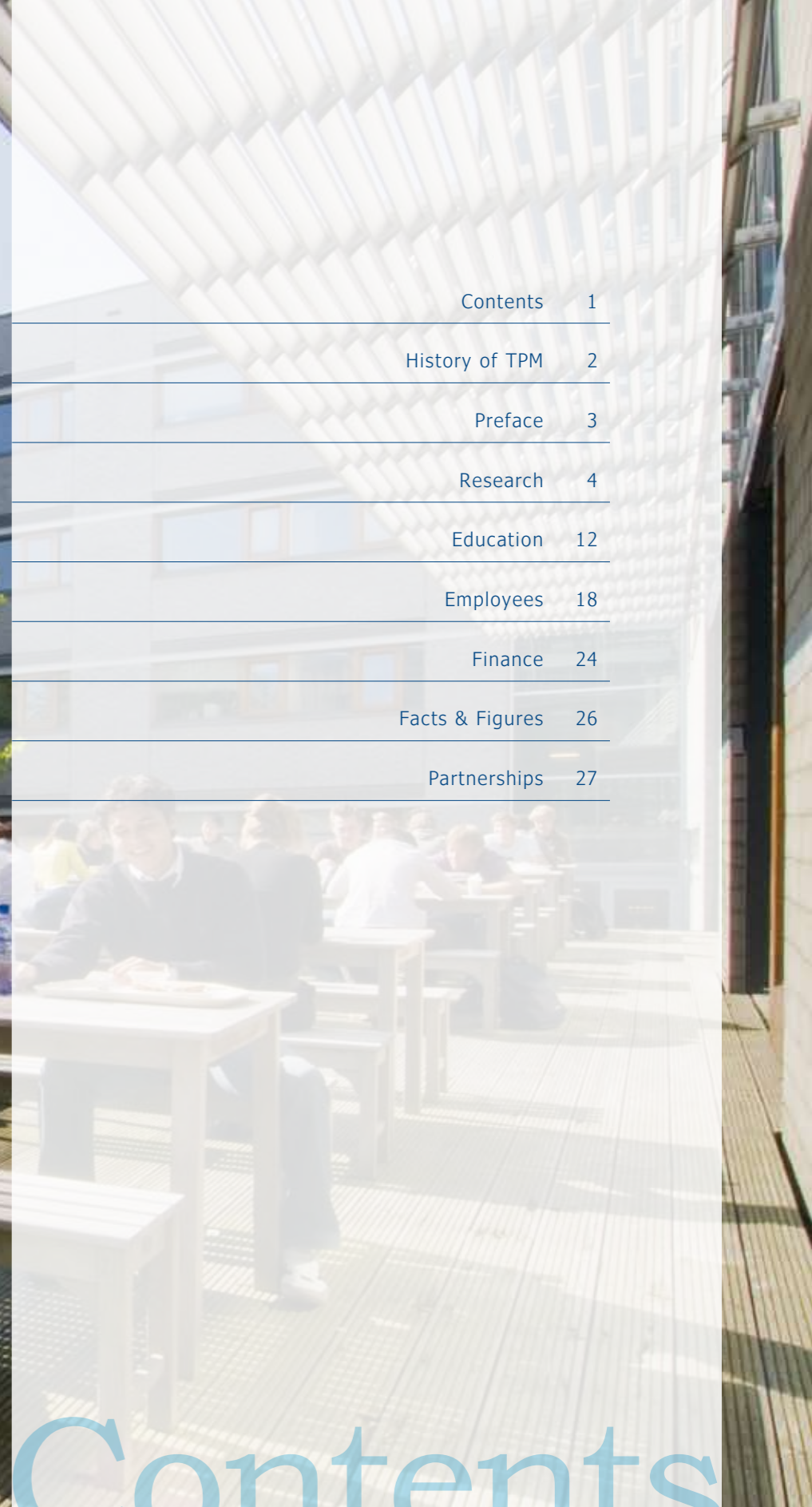


TPM
in

focus



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COLOPHON

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Contents

History of TPM

The Faculty of Technology, Policy and Management was founded on 1 November 1997 as the result of a merger between the Faculty of Systems Engineering, Policy Analysis and Management and the Faculty of Philosophy and Applied Social Science. Since its foundation, the following deans have headed the Faculty of TPM: Prof. H.G. Sol, 1 November 1997 - 1 July 1998; Prof. P.J. Idenburg, 1 July 1998 - 1 July 2000; Prof. H.G. Sol, 15 October 2000 - 1 September 2003 (deputised from July); Prof. H. Priemus, 1 September 2003 - 1 September 2007; Prof. T. Toonen, 1 March 2008 - the present day. 1997 saw the launch of the international MSc in Systems Engineering, Policy Analysis and Management, and in 1999, of the Master's programme in Engineering and Policy Analysis. In 2000, the Netherlands Organisation for Scientific Research awarded the Philosophy department a substantial subsidy for the international research programme entitled 'The Dual Character of Artefacts', a programme that applied itself to developing a coherent conceptualisation of technical artefacts and which was carried out in collaboration with four American universities. In March 2000, Wim Dik, former member of the KPN Board of Management, was appointed endowed Professor of 'Management of IT-oriented organisations'. 2001 saw the start of Studio, an e-learning application for the course 'Technology and Society' developed by the Faculty of TPM in collaboration with the Eindhoven University of Technology (TU/e) and Lost Boys. In 2002, the Master's programme in Management of Technology was started up; more than 70 students have since graduated in this specialisation. In 2003, the Faculty of TPM received its first research and education visitation since its foundation. The findings of the review were highly positive with a proviso that TPM's research portfolio should be more targeted. The annual Elsevier survey of 'the best higher education programmes' put the programme in Systems Engineering, Policy Analysis and Management at the top of the table in 5 consecutive years from 2003-2008 in its category. Delft students of Systems Engineering, Policy Analysis and Management were the most positive about their programme of all students of Systems Engineering, Policy Analysis and Management and Technical Engineering and Management Science. In late 2003, the research programme headed by the Faculty of TPM and entitled Next Generation Infrastructures was granted substantial subsidy from within the national research stimulation programme BSiK (a body providing funding for investments in the knowledge infrastructure). This programme corresponded directly with the Delft Research Centre 'Next Generation Infrastructures', of which Prof. Margot Weijnen was the scientific director. In November 2004, Frits Bolkestein was appointed Professor of 'Intellectual backgrounds of political developments' by TU Delft and Leiden University. The Bachelor's programme in Systems Engineering, Policy Analysis and Management was enhanced in 2004 with a fourth in-depth study area: Space; Use and Development. In 2004, a project group comprising TPM scientists led by Prof. Hugo Priemus was asked to support the temporary Lower House committee on infrastructure projects (the Duivesteijn Committee) by carrying out research and providing advice. The Master's programme in Engineering and Policy Analysis launched a double degree programme of the same name with the Harbin Institute of Technology in China in 2006. 2006 also saw the start of the Shell Project Academy; an advanced training programme for Project Management for Shell employees. The programme represents a collaboration between Shell, Cranfield University, the University of Texas at Austin, Queensland University of Technology and TPM. In 2006, Prof. Ernst ten Heuvelhof received the Leermeesterprijs, an annual prize awarded by the Delft University Fund. In 2007 the 3TU Centre of Excellence: Ethics and Technology was launched, with Prof. Jeroen van den Hoven as scientific director. In 2007 TPM launches the Delft Centre for Entrepreneurship. The centre stimulates both students and entrepreneurs to convert their knowledge into economical activity and provides education, research and further support in order to obtain these skills. In January 2008 the faculty appointed Milton Mueller as the first professor to occupy the XS4ALL-research chair. Internet provider XS4ALL is sponsoring this professorship as part of the Faculty of TPM. Mueller focuses on safety and privacy issues for internet users, particularly those on wireless networks. In addition to his part-time position in Delft, he is a professor in Telecommunications and Information Technology at the iSchool of Syracuse University, New York.

Preface

Technology, Policy and Management

Societal problems are getting increasingly complex due to their many facets: technical, organisational, political and social ones. At the same time it's getting harder to figure out who is in the lead, what the governing body is, or which authority is in charge. Take, for instance, the problem of traffic congestion, the challenge of improving electronic services, or cutting down on energy use in industry, how to make better use of the space in this country, coping with water in a large urban area below sea level (Randstad), or improving customer friendliness and battling patient security risks in health care. In most cases, there are various parties involved in these kinds of problems, parties that often have conflicting interests.

This diversity of people involved – a so called multi-actor system – is often necessary in finding effective solutions. Various values are at stake here, calling for 'value sensitive design', not in the least when it comes to creating robust, reliable and safe socio-technical systems. The question is how to get organised, how to come to decent decision-making and how to make projects and processes run more effectively and efficiently. Innovation, an entrepreneurial approach and technology management are the central concepts here. If technology truly seeks to live up to its reputation for effectiveness and problem-solving capacity, then social and managerial elements of the problem-solving process need to be merged with the practical side of things.

TPM offers new perspectives

The Faculty of Technology, Policy and Management (TPM) was founded in 1997, and offers academically grounded perspectives for innovative solutions for large societal problems by drawing from various sources of knowledge and turning that knowledge into institutional (re)designs, 'process designs' and management strategies. Technological, managerial and economical expertise are key here, and more specifically the interrelatedness of these disciplines. Combining various capabilities in a multidisciplinary approach is central to all of our programmes and research.

Research priorities for the future

TPM has come a long way these past ten years, and has built up an excellent reputation during this time. Students, researchers, social organisations and companies know where and how to find us. The faculty aims to expand this position in the coming years. To that extent, we have formulated three research priorities. First, our researchers will present TPM's concepts, objectives and findings – even more so than is the case right now – at national and international forums and ultimately publish them, thus arriving at a recognised improvement of the quality of our research portfolio from an international perspective. One way in which this quality improvement is reached will be through attractive and innovative research proposals coming from, for instance, the Netherlands Organisation for Scientific Research (NWO), leading to a considerable growth of government funding to the faculty through funding allocation agencies.

Our second research priority is to focus on improving cooperation with other TU Delft faculties, in particular by developing cooperative activities as part of the new Delft Research Initiatives, i.e. Environment, Energy, Health and Infrastructure. Our final research priority focuses on education and consists of a further professionalisation of PhD education and increasing the number of joint education programmes with other faculties at TU Delft. At TPM, it must be made possible for talented PhD students to be able to write their dissertations quickly and well and TU Delft students must have ample opportunity to further broaden their skills through better access to TPM courses.

This brochure sheds light on the various ways in which TPM contributes to research, economics and society. The TPM study into positive ways of embedding technological innovations in society serves as a confirmation of TU Delft's ability to distinguish itself from other universities. I am fully confident that we can provide good solutions for future societal problems and continue to yield the same good results in future as we have done in the past.

Prof. Theo A.J. Toonen
Dean of the Faculty of Technology, Policy and Management



research statistics:

Research

Academic staff at year-end 2007:

256

Including professors:

21

Number of doctoral degrees in 2007:

17

Academic publications in 2007:

742

The research performed at the Faculty of TPM is unique at Delft University of Technology. Engineering education and technical and scientific research can no longer afford to focus solely on technical and scientific knowledge and technological artefacts. Technological components and systems fulfil a role in society. Product design, innovation and use of technology increasingly require an understanding of the commercial and societal context in which they take place. Furthermore, many complex systems can only be designed and used effectively if technical, organisational, economic and other aspects are combined as they relate to and interact with one another. The research at TPM focuses particularly on developing knowledge of the interaction between complex technical systems and multi-actor processes and is organized into five programmes:

► *Design and Management of Infrastructures*

The mission of this programme is to create a generic framework for explaining and managing infrastructure development operations, thereby enabling users to systematically learn from experiences in other sectors. Through comparative analysis of infrastructures and developments in infrastructure sectors, the programme seeks to acquire fundamental insights into how technological, economic and institutional changes influence each other in the design of infrastructure development. The programme also seeks to obtain insights into design criteria for infrastructure networks, market structures and management models with a view to safeguarding the public interest in the reorganisation of infrastructure networks.

Programme Directors | Prof. Margot (M.P.C.) Weijnen and Prof. Ernst (E.F.) ten Heuvelhof

► *Multi-Actor Systems*

This programme aims to contribute to solving complex problems regarding decision-making and management in multi-actor systems by design and testing innovative concepts and theories, design guidelines and support methods and techniques. The programme fulfils this mission by achieving a creative synthesis between insights from policy and administration on the one hand, and insights from applied operations research and systems analysis on the other hand.

Programme Directors | Prof. Hans (J.A.) de Bruijn and Prof. Wil (W.A.H.) Thissen.

► *Innovation Systems*

Innovation Systems is a relatively new concept in economic and management literature. It not only focuses on the theoretical and empirical analysis of the complex relationships between actors and institutions but also on the development of new products, production processes and services.

Programme Director | Prof. Alfred (A.H.) Kleinknecht

► *Risk and Design*

This programme develops models and approaches that support directors and managers in predicting security risks, health risks and environmental risks, when selecting a comprehensive set of measures to reduce these risks at all levels within a system. These models and approaches also provide support when evaluating and improving such measures and in learning from their application, whether successful or unsuccessful.

Programme Director | Prof. Ben (B.J.M.) Ale

► *Reflection on Technology*

The aim of this programme is to help provide a better understanding of modern technology and the related ethical issues. From this analytical perspective, the programme contributes to the current discussion on the role of technology and its impact on society. The two main themes of this programme, the characteristics of modern-day technology and the related issues, show a strong interdependence: the way in which technology is conceptualised (e.g. as a collection of ethically neutral artefacts) can have far-reaching consequences for how we believe ethical issues relating to technological development should be handled.

Programme Director | Prof. Peter (P.A.) Kroes



A bright future ahead for TPM

Dirk Jan van den Berg

The chairman of the Executive Board of Delft University of Technology, Dirk Jan van den Berg, is very attached to the Faculty of TPM. "Technology on its own will not solve important social issues. Technological solutions must be firmly embedded in society. TPM has the expertise needed to do this."

"The research field at TU Delft is far broader than outsiders often suspect", explains Van den Berg. "For most people TU Delft conjures up two images; the prize-winning solar-powered racing car and activities relating to dykes and roads. In reality, there is a lot more going on and our research field covers the entire spectrum of technology. People are often amazed when I tell them that we also carry out research in the healthcare sector."

Delft added value

"To banish this narrow view of our work and show the world just what we have on offer, we decided to divide our research into four basic themes. The themes are: Environment, Energy, Infrastructure and Health. Simply introducing these research themes, which we also refer to as Delft Research Initiatives, obviously does not distinguish us from other universities. After all, these themes are hot items at most universities. The 'Delft added value' is our focus on practicality and interaction with society. And this is where the Faculty of TPM comes in; interaction with society is one of our key strengths."

Bridging the gap

"TPM focuses on the governance of technology, which means ensuring that technology becomes firmly embedded in society. For a technical university where the emphasis is on developing innovative technology this is of vital importance, which shows just how much we need TPM. I am personally very attached to the Faculty. The staff enjoy a solid national and

international network, they know all the ins and outs of issues relating to governance and are in an excellent position to bridge the gap between the policy-based and the technological domains. And the countless paid assignments carried out by the faculty are proof of TPM's superb reputation outside the university."

Research plans


"To my mind, TPM can play an important role in developing the four research themes. We recently compiled an inventory of the current state of affairs within each of the four themes. The next step is to devise strategic research plans, which will include input from stakeholders. TPM is in a good position to point out which parties we should consult. I am also expecting TPM to make a significant contribution to the strategic planning process."

Professional field

"Education is another area in which TPM fulfils an important role. For example, courses provided in this faculty teach students from other faculties about the administrative environment with which they will inevitably be confronted during the course of their professional career. There is a lot of interest in subjects of this sort. This is not a surprise; all faculties know that engineers cannot work in isolation from society."

Golden era

"I think that the future is positively rosy for the TU as a whole, and for the Faculty of TPM in particular. We are gradually emerging from the era of societal problem analysis. We now know that the sea level is rising, our environment is under threat and fossil fuel supplies are running out. It is time to start developing solutions. I am convinced that technology has a huge contribution in resolving large-scale societal issues. So this could be the dawn of a golden era for a university of technology. And this includes TPM, because as I said, it is crucial that technological advancement becomes embedded in society."



Serious gaming is a valuable instrument

Igor Mayer

At least according to Igor Mayer, director of the Centre for Process Management and Simulation (CPS). This expertise centre of the Faculty of TPM conducts research into game simulations, serious gaming and virtual worlds. Various game simulations and serious games are being developed under the umbrella of the CPS for educational purposes and to support decision-making processes.

"Game simulations that use entertainment game technology, so-called serious games, are relatively new", explains Mayer. "However, game simulations themselves have been around for ages and have been used for decades. The good thing about simulations like this is that they provide a safe, interactive and controlled environment for experimenting with reality by, for example, simulating the possible consequences of new regulations or legislation or plans for new infrastructures."

Visualisation techniques

"The combination with game technology has increased the possibilities of game simulations enormously. 3D-visualisation techniques make gaming a perfect way of teaching people how to handle risky situations in a safe environment. The Dutch army, for example, uses serious gaming to prepare soldiers for dangerous reconnaissance missions such as in Afghanistan. You can also use gaming to train people for situations that only occur very rarely. The Deltares virtual training simulator Dike Patrol is a good example. The simulator was developed to train dike guards and water board staff. These people regularly inspect dams and dikes, looking for early signs of damage or even collapse."

Realistic conditions

Mayer continues: "The tricky thing is that under normal circumstances, you won't see the whole range of warning signs. So up until recently, water boards had to train dike guards using manuals and photos. The Dike Patrol simulator has changed this. The game allows a dike guard to inspect a section of dike under a range of different conditions. This includes abnormally high water levels and lengthy periods of drought. The trainer can choose to incorporate any of a number of damage scenarios into the virtual dike. This allows the dike guard to inspect the dike under realistic conditions, take measurements and practise communication with the crisis team. PhD student Casper Hartevelde, who helped design Dike Patrol, is currently carrying out research in this area."

Anticipate

"Gaming can also be useful for strategic decision-making. Together with Tygron Serious Gaming and the Port of Rotterdam Authority, PhD student Geertje Bekebrede developed Simport Maasvlakte 2. This game simulates the processes involved in the planning, organisation and utilisation of Maasvlakte 2. It is intended for use by teams of decision-makers, but can also be used for teaching purposes. The game allows players to feel the long-term implications of their choices and experience the importance of good communication. The aim of another game, the Global Supply Chain game designed by former PhD student Stijn-Pieter van Houten and Professor Alexander Verbraeck, is to teach managers how to organise logistic processes and stock management. The underlying idea in all these games is that the patterns involved in complex decision-making processes correspond with patterns from real life. This allows players the opportunity to anticipate."

High-quality instrument

"These examples show that serious gaming can be useful in all kinds of situations. However, it does not mean that gaming is always the right solution. The real question is whether gaming will actually enhance a scenario. This is what we are researching. We explore whether gaming helps people to understand why they should do certain things or ensure that they make more informed decisions. We also look at the best ways of using gaming as an instrument to help train people. So gaming itself is not a goal, but a high-quality and complex instrument used to improve decision-making and learning processes. An instrument that can only be properly designed in multidisciplinary teams. After all, knowledge of game technology is not enough; you also need specific intrinsic knowledge (like the insight into dam and dike behaviour with Dike Patrol), as well as thorough understanding of learning and decision-making processes."

Take emotions seriously when assessing risks



Sabine Roeser

They can give us a better view of the world, according to Sabine Roeser from the philosophy department of TPM. She is conducting research into the role of emotions when assessing the risks of technological applications. Her research is being funded by a Veni grant from the Netherlands Organisation for Scientific Research (NWO).

Roeser came to philosophy via a detour. After finishing high school, she started studying at art school in Maastricht. On realising just how difficult it was to find paid employment in the art sector, she decided to switch to philosophy and political studies at the University of Amsterdam. She graduated and embarked on a PhD research project at VU University Amsterdam. While writing her dissertation, she saw and applied for a job as assistant professor in the Faculty of TPM.

Objective truths

"My PhD project involved looking into the role of moral intuition and emotions. In my dissertation I defended the standpoint that we need emotions to be able to see objective truths. This subject continued to intrigue me, so on my appointment here, I applied to the Netherlands Organisation for Scientific Research for funding for follow-up research. My first application was refused, but the next year I re-wrote my research proposal and the funding was granted. This gave me a budget to carry out research into the role of emotions when assessing technological risks."

Morally acceptable

"My proposition is that you need emotions to estimate whether a risk is morally acceptable. Rational thinking is not enough on its own. Fear, for example, can actually be a good counsellor. If people are scared of something (and I'm not talking about a little spider, but fear of nuclear energy, for example) this might just be because it is dangerous. Emotions are not just a chance side-effect. They have a universal character and provide us with a better view of the world around us."

Numerical

"I think that scientists should take emotions seriously and ask themselves why people are, for example, scared of something. This has not been common practice up until now. Scientists usually rely on cost-benefit analyses or quantitative methods that define risks as a numerical entity, or in other words the chance of an undesirable occurrence multiplied by its consequences. This is certainly the case with the debate on nuclear energy. Citizens express their fear by referring to the possible catastrophic consequences of a meltdown, to which experts reply that the risk is negligible."

Richer

"The quantitative approach to risk assessment taken by experts does not correspond with the richer perception of risks felt by ordinary citizens. When assessing risks, citizens clearly take the qualitative aspects into account, alongside or instead of the quantitative. This makes emotions a highly valuable instrument as they reflect our ethical and moral values. But it does not make emotions 'sacred'. Emotions can also be caused by a lack of information, which can soon be remedied by a healthy debate."

Jos Blank

Jos Blank is director of the Institute for Public Sector Efficiency Studies (IPSE Studies). This Faculty of TPM-based institute recently carried out exploratory research into the consequences of scale increases in the healthcare sector.

"Here at IPSE Studies, we conduct research into the efficiency of the public sector. We usually approach our work from a quantitative, econometric angle, collecting all kinds of data before carrying out a quantitative analysis. For instance, we recently examined whether increased bureaucracy in the education sector had given rise to a drop in quality. We gathered data from a large number of schools for this research, including information about pupil numbers, the social-economic background of pupils, pass rates and the number of managerial posts. We then examined whether schools with more managerial staff showed poorer achievements. Our research demonstrated that this is not the case."

Exploratory

"This spring, we carried out an exploratory study of scale increase in the healthcare sector. Various parties in Parliament were concerned that the numerous mergers in the healthcare sector were jeopardising quality, efficiency and accessibility. As we had little time, we based our exploratory study on existing research. This meant that we did not have access to all the information we needed for this type of research. However, we were able to draw some conclusions."

Efficiency in the care sector will not benefit from scale increases



Optimum scale

"Foreign research, for example, shows that the optimum scale for a hospital is between two and three hundred beds. Dutch research confirms this picture. Efficiency is at its highest on this scale. The numerous mergers that have taken place over the past few decades have increased the size of most Dutch hospitals. It is therefore expected that these hospitals are not operating as efficiently as they could. In many cases, increased efficiency was not the reason for merging. Acquiring a larger share of the market was often given as a reason, and the adverse effect on quality and efficiency were simply accepted."

Range of care

"There is less outward agreement about the accessibility aspect. Mergers do not automatically mean a drop in the number of locations providing care. Certain ancillary services are often merged, while the actual care locations continue to exist. If the range of care provided at the various locations also continues, scale increase will not necessarily interfere with accessibility. However, if the various locations decide to specialise, accessibility will suffer."

A good disaster always helps



Ben Ale

This is the somewhat cynical view put forward by Ben Ale, Professor of Safety Science and Disaster Management. According to him, one of the problems with safety issues is that people are largely unaware that things can go wrong. People become careless; they fail to take the necessary safety measures or forget about maintaining the measures that are already in place. It is an attitude that can have fatal consequences.

"Safety science is all about finding ways of preventing people from dying before their time and keeping systems in good working order. It covers numerous areas: chemical factories, transport systems, the evacuation of people from buildings or areas. In practice, it usually involves looking into ways of changing the way people and organisations think. People and organisations are inclined to deny that risks exist. This attitude is not helped by the fact that investing in safety can be a thankless task. If you do it right, nothing happens. It seems like a waste of time and money."

Wake-up call

"We look into ways of ensuring that people and organisations realise the immense importance of taking and maintaining safety measures. We analyse events from the past, study how organisations and people learn, make recommendations about rules and monitoring and introduce safety systems. Unfortunately, this is not always enough, and it takes a real disaster to make people open their eyes. This might sound harsh, and of course I always hope that a disaster will claim as few victims as possible, but sometimes it seems to be the only way of getting the message across. The disaster in Bhopal in 1984 serves as a painful example. Thousands of people died when toxic gases escaped from a chemical factory. With the benefit of hindsight, we could all see that the safety rules were seriously lacking, but the dramatic consequences were mainly due to the enormous quantities of hazardous substances being stored there. After the disaster, factories around the world drastically reduced the quantities of dangerous chemicals they had in stock. After all, what you haven't got can't escape, can it?"

Foolproof evacuation plan

"When you analyse why something goes wrong at a particular moment, you often see that it actually started going wrong at a far earlier date. Take the fire in the cell complex at Schiphol Airport in 2005, where eleven people died. Things actually started to go wrong three years before the fatal fire; the building was cheap, the evacuation plan was far from adequate and too few staff were put on duty. They probably thought 'why on earth would this burn down?' The fire in the Faculty of Architecture, however, was an entirely different matter. It is easy to say in retrospect that the building burnt down because a sprinkler system hadn't been installed forty years ago. But a conscious decision was made to compensate the lack of sprinkler system with a foolproof evacuation plan, which was practised regularly during all those years. As a result, everyone was able to leave the building in time. Of course having made this choice, you must not gripe about losing the building."

People and technology

"The fascinating thing about safety science is that it is always about people and technology. It's a perfect research subject for a faculty like TPM. An example: to guarantee the safety of a chemical factory, you have to know how the processes work and how the staff operate. Furthermore, you have to keep abreast of the implications of all new technology. In the past, the cranes in chemical factories were operated from the control room via a cable. Nowadays, most cranes have their own internet address and are controlled via a wireless system. A perfect solution under normal circumstances, but it can become a nightmare if the internet goes down and your entire factory grinds to a halt."

Helen Stout

Helen Stout is Professor of Law & Infrastructures. With funding from the Royal Netherlands Academy of Arts and Sciences, she has been researching technological innovations and legislation. She is exploring ways of making laws enduring and sustainable, without jeopardising technological innovation. And conversely, she is examining how technological innovation can render laws useless.

Looking for a new take on legislation

"Increasingly, we find that legislation no longer corresponds with the current situation", says Stout. "Take the Media Act. This law is based on public broadcasting companies that broadcast a range of programmes via ether or cable. The law lays down which mix of cultural, informative, educational, amusement and free choice programmes the companies may broadcast, and how much broadcasting time may be used for advertisements. The mix is based on a particular vision of the common good. Very soon, technological advancement will allow viewers to compile their own mix of programmes via the internet. The 'viewing components' that go to make up this mix are not programmes in the sense of the Media Act. The provisions of the Media Act do not apply to these compilations and so providers will be free to bombard us with unlimited amounts of advertising."

Public highway

"This is just one example, but there are many more. Take the Electricity Act of 1989, which needed replacing with a new law by 1998.

One of the reasons was that the legislation had not foreseen the development of combined heat and power installations, a technique that supplies rest electricity back to the national grid. Another example: it took two years for the Segway, a self-balancing passenger vehicle in which you stand between the wheels, to be allowed onto the public highway. The Segway did not come under any of the prevailing categories for passenger vehicles as specified in the Road Traffic Act."

Incisive laws

"Personally, I wonder why we regulate so much via legislation. Wouldn't it be more sensible to restrict the number of laws and only use the law to regulate those things that the law is cut out for in terms of its function and purpose as the highest level of social decision-making? You could ask yourself if it is really up to the legislator to devise the rules for road traffic. Should we be asking the legislator to make a decision about whether to drive on the left or the right? What does it matter as long as we all drive on the same side of the road? My research explores the possibility of compiling incisive laws. By this, I mean laws that cannot be used in politics to regulate absolutely everything. Laws that represent the true deliberations of the legislator as the highest body within our legal community."

Formality

"Apart from the fact that incisive laws like this would allow room for change, I can see another significant advantage: quality improvement. At present, we have an overwhelming number of administrative laws. Their sheer number entails a huge workload for the legislator and so most laws have become a mere formality. If you move to a system of more incisive laws, which only lay down the vital outlines, the legislator will have more time to concern himself with the intrinsic details of the most important issues."



education statistics:

Education

Student intake 2007:

231

Including Bachelor's:

145

Including Master's:

86

Total number of TPM students at year-end 2007:

861

The Faculty of Technology, Policy and Management offers one three-year bachelor programme and six two-year master programmes. The master programmes are taught in English. All the programmes share a common focus on the area where technology, policy analysis and management meet.

Bachelor of Science (BSc)

► Bachelor of Science (BSc) in Systems Engineering, Policy Analysis and Management

This programme teaches students to systematically analyse the technical possibilities of infrastructures such as railway lines, supply systems, dikes, fibre optic networks and energy networks. They are trained to become engineers tackling problems at systems level, and they learn how to indicate at the design stage precisely what requirements a design for a solution needs to meet. In the first year of the course students specialise in one of the following subjects:

- Energy, Water and Industry
- Information and Communication Technology
- Transport, Infrastructure and Logistics
- Space: Use and Development

Ivette van Wijgerden

Student of Systems Engineering, Policy Analysis and Management

"I decided to study Systems Engineering, Policy Analysis and Management because the combination of society and technology appealed to me. It was clear at high school that I would opt for sciences. But I couldn't get excited by the prospect of sitting around doing sums all day or spending hours working in a lab. Systems Engineering, Policy Analysis and Management involves both the societal side and the technical side: this is what finally persuaded me. The diversity of the courses is an added bonus. You really do study all kinds of different subjects. This is why it is so important to have clear links between the various courses. It gives the programme cohesion and allows students to organise their studies effectively. It is important to have broad-based interests. As a Systems Engineering, Policy Analysis and Management engineer, you have to be able to understand a lot of different things so that you can combine all the knowledge you obtain from specialists. The real challenge in this field is doing this to the best of your ability. I'm not sure what I will do after I graduate. I think I want to work in the corporate sector, but I don't have a preference for any particular branch. There are so many opportunities open to Systems Engineering, Policy Analysis and Management engineers. You could also start up your own company, for example, or work for a government organisation."

SEPAM involves both the societal and technical side

Master of Science (MSc) programmes

► MSc Management of Technology (MoT)

The MoT programme focuses on technology-management in high-tech environments, both within large multinationals and small start-ups. Modern technology plays a decisive role in corporate development and the competitive positioning of firms. Students are trained to become a new breed of technology manager: multidisciplinary problem solvers with an international orientation and engineering background that are equipped for competitive, technology-based companies.

► MSc Transport, Infrastructure & Logistics (TIL)

This MSc programme is provided in collaboration with the Faculties of CEG* and 3mE* and is the only Dutch inter-faculty programme in the broad area of transport, infrastructure and logistics. The programme educates students to become specialist in the field of traffic, transport, infrastructure and logistics and merges technological skills with knowledge of policy analysis and management.

► MSc Engineering and Policy Analysis (EPA)

The core of this programme consists of policy analysis, systems modelling, economics and management within public and private companies. With a strong international orientation, EPA places particular emphasis on comparative analysis and intercultural cooperation and project management. EPA students are part of an international student community. The EPA programme offers the possibility to obtain an international double degree with Harbin Institute of Technology in China. The EPA programme is also one of the three partners in the Erasmus Mundus Master's programme on Economics and Management of Network Industries together with Universidad Pontificia de Comillas and Université Paris-Sud.

► MSc in Systems Engineering, Policy Analysis and Management (SEPAM)

This programme is the logical next step for a student who has graduated with a BSc in Systems Engineering, Policy Analysis and Management and wishes to further develop his systems design and systems integration skills. Bachelor students with a mono-disciplinary background will have to complete the SEPAM minor in order to be admitted. The purpose of the SEPAM programme is to give students the ability to solve large and complex problems in which social, political, organisational and technical elements must all be given consideration. During the programme the students can choose the following specialisations:

- Energy, Water and Industry
- Information and Communication Technology
- Transport, Infrastructure and Logistics
- Space: Use and Development

► MSc Information Architecture (IA)

Modern digital information and communication technology (ICT) can facilitate dramatic improvements in the core business and organisation of any enterprise, whether private or public. This can be achieved only if there is an integral architecture to guide the redesign and the re-engineering of both the organisation and the business. The Information Architecture (IA) programme addresses both problems and is a so called virtual Master's that can be attended as a track within both the SEPAM programme of TPM or the Computer Science programme of the Faculty of Electrical Engineering, Mathematics and Computer Science.

► MSc Geomatics

This Master's programme is provided in cooperation with the Faculties of CEG* and Aerospace Engineering. Geomatics is the science and technology of the 3D acquisition, processing and visualisation of geo-information. This geo-information chain starts with the collection of raw data and ends with a geo-information product, often a visualisation. The programme educates interdisciplinary engineers who will contribute to the entire information chain, from data acquisition methods and data processing techniques to applications in decision-making processes.

In addition to the above mentioned Bachelor's and Master's programmes, the Faculty offers several minors, doctoral programmes and interfaculty elective courses for all students, PhD students and teachers at Delft University of Technology.

* Civil Engineering and Geosciences
** Mechanical, Maritime and Materials Engineering



The diversity of nationalities was a real bonus

Roeland started work as a seconded mechanical engineer where he tackled interesting projects. At the same time, he would often see managerial challenges outside his assignments which he couldn't work on because of his purely technical background. The decision was quickly taken; Roeland chose to register for the Master's programme management of Technology.

"We were an exceptional class; we were all highly motivated and had all deliberately chosen this particular programme. The diversity of nationalities was a real bonus. It turned out to be very useful during the study, but also offered a glimpse at daily life through others' eyes. This often resulted in some comical moments; I can still see the astonished expressions on the faces of our Asian class mates students when, once again, they were served bread at lunchtime: 'But bread isn't a meal, surely?'

Roeland now works with IBM Global Business Services as a business consultant. "IBM is a company with more than 330,000 employees worldwide, which is rather different to my previous jobs. Such a huge company takes some getting used to, but the advantage of a worldwide network is that I can get all the information I need with just a phone call. In my role as Consultant Technology Strategy, I help our clients set up their IT so that it supports and strengthens the company's strategy.

EPA is a relatively new programme and very up-to-date

Weiyu Du (China)
Student Engineering and Policy Analysis

Delft University of Technology has a good reputation in China and this MSc programme is new and up-to-date. That's the reason why I came here. In the beginning, I had to adjust to the working methods. Here, the teacher gives you a lot of information and assignments and then you have to work it out yourself. You attend classes every now and then, but you really have to be prepared for them. In China, you are in a classroom all day and the teacher tells you in detail what to do. So I have learned a bit of time-management on the side! Now I'm doing fine. I like the 'Technology and Society' courses most of all because I'm a big fan of macro-economics, and part of this course is about economics.

Discussion and collaboration with the client is vital

Frank wanted to work constructively and contribute to development – that’s why he chose Delft University of Technology. The Systems Engineering, Policy Analysis and Management programme matched his interests because it focuses on technology, applied to social and commercial issues.

Today, Frank works as a Capgemini consultant, in a team which mainly provides advice about the rail world. This advice varies from logistics to project management. “We supported the NS (Dutch railways) in their decision-making on the high-speed rail line and ways of providing travellers with optimum travel information (using SMS services, in-train displays, wireless Internet). This was pretty difficult because there were both many departments involved within the NS itself as well as externally. In our projects we don’t just write great reports; we also often help with the implementation. My work mainly involves systematic thought from the client’s perspective; so discussion and collaboration with the client is vital. But intense collaboration with colleagues, and independent work, are also part of my work - skills I learned during my SEPAM studies.”



“The labour market has a great need for graduates with a broad set of skills”

“Both the Bachelor’s and Master’s programme in Systems Engineering, Policy Analysis and Management provide a perfect education for someone who is not only interested in technology, but also in how it relates to society, economics and law. The great thing is that you develop insight into the complexity of technical systems. After graduating, I joined TPM’s Department of Information and Communication Technology as a PhD student. I am currently studying how the information exchange between rescue workers can be improved during a major disaster. This issue unites technological, legal, economic and policy aspects, which means it has to be tackled by combining knowledge from several disciplines. The labour market also has an increasing need for graduates with a broad range of skills at their disposal. TPM allows students to develop such a comprehensive ‘toolkit’.”



Nitesh Bharosa
(Surinam)

Graduated
SEPAM - 2006



After completing her Master’s degree in Transport, Infrastructure & Logistics, Sanneke van Leeuwen started work as a technical trainee at Vopak’s LNG terminal. “The broad basis that TIL has given me means I can make a valuable contribution in a wide range of areas. That’s something that can open a great many doors. It has definitely given me confidence. One of the most useful things I learned within TIL is how to rapidly immerse myself in a new topic and come up with new ideas which have added value for the business sector. I would never have chosen the technical side of Vopak if I hadn’t taken TIL.”

In cooperation with Gasunie, Vopak is building a Liquefied Natural Gas (LNG) terminal on the Maasvlakte. The gas we use in Dutch homes used to come through a pipeline from Groningen. In future, it could come from as far away as Qatar or Algeria, where the gas will be cooled to -160°C before being transported by ship, reducing its volume 600 times. The terminal that Vopak is to build in cooperation with Gasunie will be a regasification terminal. The liquid gas will be stored there and heated to become gas which is then pumped into Gasunie’s network. “Thanks to the Master’s in TIL, I can opt for a technical or a commercial career. In future, I want to work for companies which are highly technical. The world of technology intrigues me.”



Sanneke van Leeuwen

Graduated Transport,
Infrastructure & Logistics - 2006

I can opt for a technical or commercial career

Case studies throughout the world



Mónica Altamirano *Graduated Engineering and Policy Analysis - 2006*

After her technical education in Nicaragua, Mónica started her first job with the Ministry of Education. That’s where she first developed an interest in problems and topics of not only a technical nature, but also social. “I wanted to continue my studies, so I started looking for a Master’s programme for engineers which considered broader social problems combined with technology. I found just two such programmes in the entire world. Eventually, I chose TU Delft in the Netherlands because of the study programme curriculum, the university’s reputation and my long-standing preference for Europe.

“One of the nice things about the EPA Master’s programme was the international composition of my class; it was really great to work with students from so many different cultures.” After her studies Mónica stayed with the TPM faculty and now works as a PhD student in the Energy and Industry section. The subject of her research is how various countries organise road construction and maintenance contracting. Little has been written about this topic, which is why Mónica is conducting a great number of case studies.

staff numbers:

Employees

Number of employees at year-end 2007:

310

Including academic staff:

256

Including administrative and support staff:

54

Number of PhD's:

115

Numbers in Full Time equivalent (FTE)

No drop in CO₂ emissions despite emission trading



Emile Chappin

For his final thesis in the Energy & Industry section, Emile Chappin carried out research into CO₂ emission trading. He examined whether this instrument had prompted electricity producers to adopt low-CO₂ production methods. Although in the long term this would appear to be the case, it will not lead to an overall drop in CO₂ emissions within the sector.

"CO₂ emission trading was introduced in an attempt to restrict the emission of the greenhouse gas, CO₂", explains Chappin. "The instrument works on the basis of trading a limited number of emission rights. An emission right entitles a company to emit a pre-determined amount of CO₂. The Government uses a distribution formula to allocate free emission rights to every company taking part in the scheme. If a company emits less CO₂ than its entitlement, it may sell the excess rights. A company that emits more than its entitlement has three options: it can buy extra emission rights, invest in environmentally-sound production processes to avoid the costs of buying emission rights or it can cut back on production."

Scenarios

"I looked into whether emission trading within the electricity sector had led to the adoption of low-CO₂ production methods. I devised a model that simulates the investment decisions of individual electricity producers, each with its own style of decision-making. I used the model to see what would happen in a number of different scenarios whereby I varied fuel prices, government policy, the number of available emission rights and the level of economic growth. Although emission trading will probably not give rise to low-CO₂ production methods during the first twenty years, it may well do so in the long term. The coal-powered plants that now emit large quantities of CO₂ will steadily be replaced with gas-powered plants, wind farms and biomass plants. Carbon capture will also be started at coal plants."

Uncertainties

"We shouldn't really expect to see much change during the first few years. It often takes thirty to forty years before an investment decision yields profits, while in the meantime, producers have to cope with numerous uncertainties. In this case: what will happen to climate policy after 2012, and how will the price of emission rights develop? Producers are biding their time and choosing the most flexible option when expanding their production capacity. And this is a coal-powered plant. It uses the cheapest kind of fuel, allows the option of burning biomass alongside coal and can probably be fitted with a carbon capture system in the future. Although these plants generate the highest CO₂ emissions, the cost of buying emission rights is negligible in comparison with the other costs."

Cruel twist

"So in the long term, assuming that the Government continues the current CO₂ policy and reduces the number of emission rights even further, investing in CO₂-extensive production technology is certainly an attractive prospect. The cruel twist, however, is that we will not see a drop in overall CO₂ emissions in the electricity sector, as the demand for electricity is continuing to rise. Technically we are already perfectly capable of converting a mix of fossil fuels into a single synthesis gas that can be used for all these energy products. This makes you less dependent on the unpredictable supply of specific fossil fuels. But to make this transition happen, we need a new type of energy infrastructure: a synthesis gas infrastructure." The realisation of such an infrastructure is a typical TPM issue.

Liberalisation of the electricity sector requires tailor-made rules

Hamilcar Knops



Hamilcar Knops studied law and theoretical physics in Leiden. He carried out his PhD research in Leiden and at the Faculty of TPM, looking into ways of designing a legal framework of rules for a liberalised market, while keeping sight of the specific technical properties of electricity.

"From time immemorial, the electricity sector has distinguished itself because of its technical complexity. For many years, this depth of complexity stayed concealed behind the doors of the electricity boards, which enjoyed a monopoly position from the electricity plants right through to the plug points. Moreover, central management made sure that aspects such as reserve capacity and investment in the national grid were properly taken care of."

Legal framework

"The liberalisation of the electricity sector has changed all this. Central management has disappeared and made way for a combination of market and monopoly activities. Aspects such as production, transport and grid management (which used to be controlled by just one party), have been separated out. This has shed light on the complexity of the sector and made it necessary to devise a legal framework of rules to regulate the behaviour of the various parties."

Design problems

"When devising this framework of rules, you have to take the technical properties of electricity into account. After all, the basic principle is that the system, in which various players represent different tasks, interests and responsibilities, works properly. I looked into the best way of devising the rules. I approached the issue like a design problem. This led to a structured design method that helps those devising the framework to ask the right questions."

Public interests

"I used the method to test whether the existing regulations provide long-term assurance for important aspects such as guaranteed supplies, investment in reserve capacity and maintenance of the national grid. This does not yet seem to be the case. The difficult thing is that in a free European electricity market, individual member states find themselves unable to vouch for a number of these public interests, while not enough has been regulated at European level."



Caspar Chorus

The range of information available to travellers has increased rapidly over the past few years. There are of course navigation systems for cars, but you can also find travel information on the internet or arrange to receive text messages about public transport. For his PhD research, former Systems Engineering, Policy Analysis and Management student Caspar Chorus, studied how travellers deal with travel information.

Travellers make smarter choices than was thought

"The travel information service market is all about money", says Chorus. "And companies are not the only ones investing in services of this kind. Government, for example, is investing millions to maintain, improve and expand the range of information services supporting the public transport network. The strange thing is that very little thought seems to go into asking whether people actually use all this information."

Mathematical models

"My PhD research was intended to bring an end to this hiatus. I looked into how travellers respond to travel information. First of all, I explored theories about choice behaviour from the fields of marketing, economics, psychology and transport sciences. I then used the insight I obtained to develop mathematical models that would describe the choice behaviour of travellers. Finally, I conducted an experiment to test whether the models I had created actually generated realistic predictions."

Experiment

Chorus continues: "For this experiment, I asked around three hundred people to sit at a computer and asked them to travel from A to B using a fictitious map. They were allowed to 'buy' travel information both before and during the journey. The information comprised details of possible routes and expected travel time, as well as things like whether they would be likely to find a seat on the train. Every respondent made approximately twenty of these journeys, whereby the circumstances kept changing. For example, the reason for the journey varied from a day on the beach or visiting friends to an important business meeting or a job interview.

Alongside this variable, anything could happen on the way, from traffic congestion to train delays."

Predictive value

"One of the most gratifying results is that the choices made by the respondents during the experiment largely correspond with those of the travellers in my models. This is a good sign for the predictive significance. Alongside this, within the complexity of our transport network, people seem to be making very smart choices. Car-drivers, for example, are willing to make a detour if they know that this will make their arrival more certain or that the route is faster. However, despite what the Government thinks, more and better information will not automatically persuade people to choose public transport."

International appreciation

Chorus rounded off his PhD research cum laude. The quality of his research was also recognised abroad. In October 2007, Chorus was awarded first prize for his dissertation (the BIVEC award) by the Benelux Interuniversity Association of Transport Economists, and in June 2008, he was presented with an international prize for transport dissertations by the Institute of Electrical and Electronics Engineers (IEEE).



Pieter Vermaas

How do engineers use the term function? This is the subject of research being carried out by analytical philosopher of technology, Pieter Vermaas. He is approaching the question of how engineers divide functions into subfunctions during design processes from the angle of the philosophical theory of part and whole. His research has been made possible thanks to a Vidi grant from the Netherlands Organisation for Scientific Research.

A philosophical dissection of functional decomposition

"When designing a new product, engineers usually start with what the customer wants to achieve. For example, a customer might want to connect riverbank A to riverbank B. The engineers do not immediately search for a final solution, like a bridge or a ferry, but begin by translating the objective into a technical function. The cross-river connection must be suitable for transporting x number of people and goods per day from one riverbank to the other. They then divide all the functions into subfunctions. They try to spend as long as possible on this reduction phase, as thinking in terms of functions and subfunctions will ensure that they have covered all the possible angles. Once all the subfunctions have been clearly identified, they start considering concrete solutions. The result can sometimes be unconventional, like the connection between Copenhagen in Denmark and Malmö in Sweden, which consists of a combination of tunnels and bridges for road and rail traffic."

New light

"The process of translating objectives into final concrete solutions via functions and subfunctions is known as functional decomposition. This technique is interesting from a philosophical point of view as it may shed new light on the question of part-whole relationships. Traditionally, this issue revolves around how physical objects can

be part of a larger physical object and how periods of time can be part of a longer period of time. How exactly is a tail part of a cat? Or, is the Twelve Years' Truce part of the Eighty Years' War? The way in which engineers divide functions into subfunctions in the process of functional decomposition defines an entirely new part-whole relationship, and this is the subject of my research."

Unequivocal definition

"I am now about halfway through my research project and one of the most challenging complications I have encountered during the past two-and-a-half years is the lack of an unequivocal definition for the term 'function' within the engineering world. Take the design methodologists; some of them use the term to define an objective, while others use it to describe behaviour. As a result, functional decomposition becomes a mishmash of different part-whole relationships. And what makes it even more challenging is that engineers and methodologists themselves do not seem particularly concerned about the lack of unequivocal definition, which is intriguing because one would expect that people can only properly communicate when definitions have the exact same meaning."



DCE stimulates entrepreneurship

Martijn Kuit

Spring 2007 saw the foundation of the Delft Centre for Entrepreneurship (DCE). The Faculty of TPM makes an important contribution to this university-wide centre. A good example is the faculty's close involvement in education and research at DCE. TPM's Martijn Kuit is director of the centre.

"The aim of the DCE is to promote entrepreneurship among students and to make them aware that they could become entrepreneurs after they graduate", explains Kuit. "We do this by providing activities in the areas of both education and research. Last year, the emphasis was on education and we are now well on the way to shaping the research side too."

Endorsement for entrepreneurship

Kuit continues: "In terms of educational activities, we have already achieved a great deal. In September 2007, we started a minor in Technopreneurship, and this year we will be offering a minor in sustainable entrepreneurship in developing countries. There will also be a series of lectures on entrepreneurship for students and staff. The lectures will be given by Ken Morse, endowed Professor at TPM and director of the Entrepreneurship Centre at the Massachusetts Institute of Technology (MIT). Alongside this, we are working on offering Master's students an endorsement for entrepreneurship if they earn a number of ECTS credits in entrepreneurship alongside their regular programme, and undertake entrepreneurial activities as part of their graduation project."

Effect of policy measures

"Now that the education side is progressing as hoped, we have started setting up a research programme. Initially, we will combine all the research being carried out within the various departments of TPM into entrepreneurship, but we eventually want to instigate a university-wide multidisciplinary programme. Our next job is to examine the effect of policy measures aimed at stimulating entrepreneurship. We also want to research the relationship between specific personal character traits of entrepreneurs and their success as entrepreneurs, and explore how universities of technology and entrepreneurs form regional networks for exchanging knowledge and innovations. Another research subject involves corporate social responsibility. We have appointed five PhD students to be responsible for all these research projects."

Subsidy

"We are surprised and very pleased with the fast pace of all these developments. Last year, I was on my own here, whereas the DCE team now consists of thirteen people and another five PhD students are due to join us after the summer. We have achieved success in another area by acquiring a large subsidy from the Ministry of Economic Affairs to set up activities together with the Erasmus University in Rotterdam and Leiden University to look into entrepreneurship. There would appear to be plenty of interest in our educational activities. I think we have a good chance of ensuring that every student leaving TU Delft after 2011 will have a good basic knowledge of entrepreneurship."

Financial statement:

Result at year-end 2007 (x1000€):

3.272

Government funding (x1000€):

18.533

Indirect funding (x1000€):

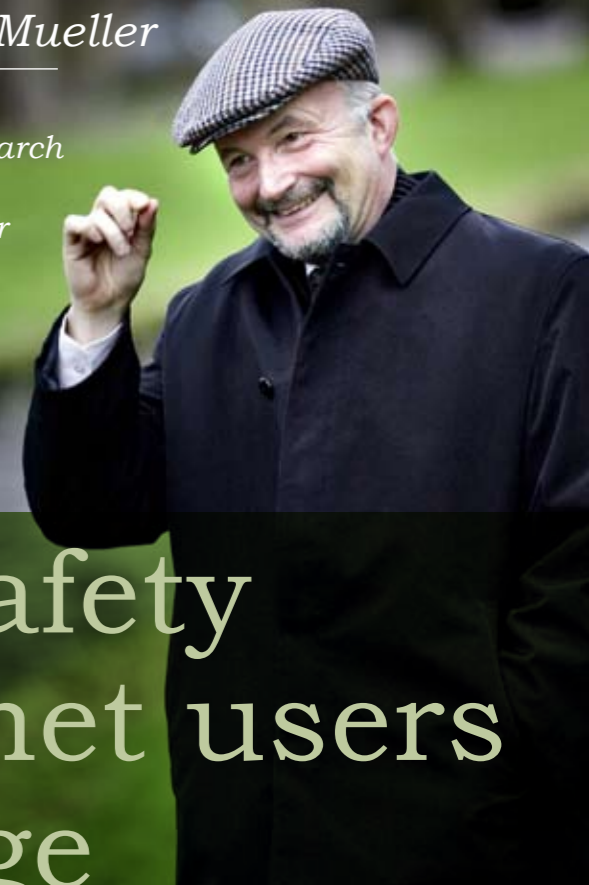
150

Contract funding (x1000€):

7.979

Milton Mueller

So says the American researcher Milton Mueller. He is the first professor to occupy the XS4ALL-research chair. Internet provider XS4ALL is sponsoring this professorship as part of the Faculty of TPM. Mueller focuses on safety and privacy issues for internet users, particularly those on wireless networks. In addition to his part-time position in Delft, he is a professor in Telecommunications and Information Technology at the iSchool of Syracuse University, New York.



Privacy and safety of internet users under siege

"When you look at privacy, a lot has changed since the World Trade Center attacks," says Mueller. "For instance there have been all sorts of new laws and regulations expanding government powers to monitor and use data from telecommunications and internet usage. Plus you see all types of laws being passed to store data from telephone conversations, texts, and e-mails for very long periods, under the guise of anti-terrorism and crime prevention. These developments have led us closer to a Big Brother situation. At the same time, there are various technological developments that make privacy for internet users increasingly vulnerable."

Spying

"For example, you have software that lets you gather digital information on one person from various sites. There's also face-recognition software. So you search for several pictures of a certain person online. These could be photos someone has posted themselves on a website or that other people have taken, or even photos from a business meeting. Then the photos are analysed and the entire internet is searched for photos of that person. You see how anyone could quickly discover everywhere you've been and who you were with. In English we'd call that democratisation of surveillance, but it pretty much means these days anyone can be a spy."

Ongoing battle

"In addition you've of course got the usual problems with spam, viruses, phishing and identity theft. I do research into how governments and companies cope with these kinds of issues. The encouraging thing is that new, informal forms of web management are coming into being. Internet service providers and network administrators have joined forces to fight spam, viruses and phishing. They compile blacklists and block the senders' addresses. It's an ongoing battle to protect their customers from any damage caused by these sources."

Post-secret

"Another topic I'm studying is dpi, which stands for 'deep packet inspection'. All online traffic is transmitted from one router to another in little bundles of information. Deep packet inspection allows people to investigate the content of these information bundles. It can be useful, say if you want to determine if it's a phone call or an e-mail. Telephone calls must go through immediately while an e-mail could wait a few seconds. But dpi has other capacities. You can also see the content of the bundles – which amounts to breaking the confidentiality of the mail. Together with a PhD student, I am looking into who uses dpi and in what ways. Another question is if, and how, you can regulate dpi use."

Useful information

"The difficult aspect of privacy and safety research among internet users is how to actually gather useful information. Parties who violate individual privacy are not exactly advertising themselves. And internet service providers who unite to fight spam don't usually want their enemies to know who they are. In that sense the cooperation with XS4ALL is a welcome change. This progressive and critical internet service provider has given me access to a host of useful information for my research."

Facts & Figures

During their studies about 30% of TPM students do a project abroad or study at a foreign university. Since 2006 TPM provides courses for the Shell Project Academy; an advanced project management training programme for Shell employees. Shell, Cranfield University, University of Texas at Austin, Queensland University of Technology in Australia and the Faculty of TPM participate in the programme. TPM started the TU Delft Centre for Entrepreneurship in 2007. The centre stimulates students and researchers from the TU Delft to become entrepreneurs or engage in entrepreneurial activity through education, research and additional support. In the beginning of 2007 the 3TU Centre for Ethics and Technology was started as a partnership between the TU Delft, the TU Eindhoven and the University of Twente. Its field of work is the interaction of ethics, philosophy and technology. TPM Professor Jeroen van den Hoven is the scientific director of the centre, which focuses on moral issues involved in the innovation of technology. In January 2008 the faculty appointed Milton Mueller as the first professor to occupy the XS4ALL-research chair. Internet provider XS4ALL is sponsoring this professorship as part of the Faculty of TPM. Mueller focuses on safety and privacy issues for internet users, particularly those on wireless networks. In addition to his part-time position in Delft, he is a professor in Telecommunications and Information Technology at the iSchool of Syracuse University, New York. TPM provides advisory services to government agencies or businesses on a regular basis. In March 2008, for example, Pierre Koning of IPSE Studies participated in a Dutch parliamentary hearing on the effectiveness of reintegration (in response to the Reintegration Policy Report commissioned by the Ministry of Social Affairs and Employment). In 2007 a project group of TPM staff led by Professor Ernst ten Heuvelhof and Associate Professor Joop Koppenjan, conducted a study for Stadsgebied Haaglanden on The Hague's participation in the RandstadRail project, following the derailment of two RandstadRail trams in November 2006. 72% of TPM alumni end up in industry; 17% find jobs in government and 11% go on to study for a PhD degree. The BSc course in Systems Engineering, Policy Analysis and Management rates highly each year in Elsevier's education survey, scoring particularly good marks for 'attention to academic attitude and skills', 'linkage between secondary school and university' and 'first year feasibility'. TPM offers companies and organizations the opportunity to organise computer-aided brainstorming sessions in its Group Decision Rooms. Using special software, each participant can contribute ideas anonymously, and then all the participants together can select the best ones.

