

TPM QUARTERLY

FACULTY OF TECHNOLOGY, POLICY AND MANAGEMENT

COEN VAN GULIJK (SAFETY SCIENCE GROUP)

"Safety and security problems cannot be solved with technology alone"

From left to right:
Rob van Vliet (Director of Technology), Coen van Gulijk, Ben Ale (Professor in Safety Science and Disaster Abatement, TPM)



Coen van Gulijk is the opposite of an ivory tower scientist. "There's no point shouting from the window that there is wrong in the world and then hide behind the curtains. You must have the courage to face up to the challenge". He has entered into a joint innovation contract with Centric IT Solutions.

Early this year Coen van Gulijk, Assistant Professor at the Safety Science Group, switched over from the Applied Research Institute TNO to the TPM Faculty. His initial training was as a chemical engineer, specialised in aerosol technology (airborne particles). In 2002 he obtained his doctorate at TU Delft for a ceramic filter that removes soot from diesel engine combustion gas. After that he joined TNO Defence, Security and Safety, where he carried out research into 'breathing protection devices' - which in military research basically means 'gas masks'. Next he conducted research into the protection of buildings against poison gas attacks. "I realised more and more that safety and security problems cannot be solved with technology alone", he says, "which is why I came here. At TPM I want to deepen my understanding of the organisation and policy side of security and safety."

Dirty bomb

One of the problems he faced in the world of building protection was that occupant safety is not necessarily the main concern of owners of buildings. "This is a really difficult issue. There is no point in developing advanced air filter systems without taking account of the customers' needs and wishes, let alone the needs of society. People want to know what they must do with these filters, where it must be placed, what it costs, what they need to do if anything happens or if it breaks down. The world around that small piece of technology is a lot bigger than us technologists

realise. As a technologist, it was hard to adjust at first but I am now convinced that technology alone is not enough. I recently heard someone of a security firm put it like this: coping adequately with a dirty bomb attack is 10% luck, 40% technology and 50% organisation. I couldn't agree more. Buying a nuclear detector is pointless if you don't make proper arrangements regarding its use and maintenance. It's this organisational and process-based approach that now has my full interest."

"Can the domains of safety and security be intrinsically united?"

Facing up to the challenge

Partly thanks to his experience at the market-driven research institute TNO Van Gulijk is the opposite of an ivory tower scientist. "TU Delft, too, should not cut itself off from the wider world.

Of course we need to strictly uphold academic standards, but we must also embrace outside partnerships. There's no point shouting from the window that there is wrong in the world and then hide behind the curtains. You must also have the courage to face up to the challenge. Business people may offer views that do not comply with scientific views. They might tell you to stop developing new solutions that you are working on. That can be hard and confrontational, but as a researcher you shouldn't shy away from these discussions."

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Elsevier Survey

Elsevier's university course special 2007 appeared on 11 October with the results of the 'Best Studies 2007' survey. The Systems Engineering, Policy Analysis and Management (SEPAM) Bachelor's programme again came out top within the SEPAM/Industrial Engineering cluster, scoring an average student rating of 7.5. Since 2003 SEPAM has been evaluated as best.



ICT for Crisis Management

TU Delft recently hosted a workshop on defining an agenda for research in Information and Communication Technology (ICT) for Crisis Management. The workshop brought together researchers and practitioners from diverse fields in engineering and science for two days of presentations and discussion. The workshop was organized around four thematic sessions: physical sciences, human factors, computing sciences and public policy.

Each session addressed three broad questions. What do we know about research in this area that is relevant to the role of ICT in crisis management? What do we need to know? How are we going to find out? Keynote speakers for the workshop were Donald Brown of University of Virginia (USA) and Erik Hollnagel of École des Mines (France). A total of forty individuals from nine countries participated, with lead session papers from Hsinchun Chen (University of Arizona), Priscilla Nelson (NJ Institute of Technology), Jan Maarten Schraagen (TNO) and Tom Birkland (North Carolina State University).

The results from the workshop will be published in a report in the coming months. A book with contributions from workshop participants is planned for fall 2008.

Student scoops prizes

Casper Harteveld, the SEPAM student who graduated Cum Laude with a final mark of 9.5, has won the Bakkenist Award for Young Talent with his Master's Thesis: *Balancing reality, pedagogy and game: the story behind the design of a serious game called Levee Patroller*.

The Bakkenist Award for Young Talent 2007



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"Safety and security problems cannot be solved with technology alone"



Joint Innovation

Of the various projects in the pipeline, one of the most noteworthy is the partnership with Centric, a large IT company with a strong security and safety arm, particularly in the field of disaster management. Among other many many other things, Centric supplies municipalities with disaster response software, such as registration systems and decision support systems. Van Gulijk: "IT is obviously vital in crisis situations, because you need to have the right information at the right time and at the right place. In this partnership with Centric we will jointly pursue innovation without laying down any specific aims or needs in advance. Our liaison can generate all sorts of research, which in turn may spawn further collaborations with other partners. It could involve technical innovations or process innovations, or product improvements and modifications for Centric. We could, for instance, use this platform to launch a transmission technology project with the Faculty of Electrical Engineering, Mathematics and Computer Science; or a project on process management and multi-actor systems with our TPM colleagues. Our only condition is that it must lead to scientific research, we are not a consultancy agency at TPM."

Safety/security

The research question that fascinates Van Gulijk in his projects is: can the domains of safety and security be intrinsically united? "Traditionally these areas are strictly separated", he says, "safety used to be associated with accidents and security with trespassing and other violations. But there are obvious overlaps between them and the working areas can learn a lot from each other. All sorts of management systems have been developed for safety, but less so for security. For example: if there's an accident at work, it is reported to the labour inspectorate. Reporting is much less common in the security world. The management structure in that area is more focused on immediate ad-hoc problem-solving, so it's much harder to form a clear picture of the most frequently occurring security problems." "Security, on the other hand, is extremely good at operational management that remains functioning under tough conditions. They know exactly who must be where and when, and how many people are necessary to tackle a particular problem. Safety staffing, by contrast, often depends on the available time and budget. The security world also has a stronger focus on developing resilience and recovery capability. If you know where systems are vulnerable, it's easier to protect them against malicious attacks. That is an area where the safety may have some lessons to learn."

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The debut of the EWI Debating Society

For six months now SEPAM students who have opted for the Energy, Water & Industry domain (EWI) have been able to take part in the inspiring activities of the EWI Debating Society.

The Board of the EWI Debating Society¹ aims to provide a mix of lively debate and equally lively socialising. Board member Silvia de Vaan: "The aim is to stimulate the exchange of knowledge, opinions and ideas between students, EWI lecturers and organisations from the three sectors. We do this by organising excursions and colloquiums where graduates, lecturers and PhD students have an opportunity to tell about their work. There are also more social events where we combine conviviality with more practical matters such as providing information on internships or graduation places. We are busy establishing contacts with companies who may be potential employers for EWI students. In short: we want to serve as an information and communication platform for everyone in and around the faculty with an interest in energy, water or industrial processes."

Propositions

Socialising is fun of course, but debating is what the society is really all about. The big day arrived on 15 November. A proud Margot Weijnen (Professor in Energy & Industry) welcomed everyone present to the 'debut debate' of the EWI Society. The theme was 'innovation within the energy, water and industrial sector'. A guest speaker had been invited from each sector to introduce the subject and pose a thesis. First up was Hans Knippels of the Rijnmond Environment Department who kicked off with the proposition: 'Without underground CO₂ storage, there is no sustainable future'. Next came Saskia Jouwersma of the Haaglanden Water Framework innovation programme. Her proposition was: 'In order to promote innovation, the Water Board must above all stick to its core tasks'. Wim Ploem of the energy company Essent Network closed the meeting with

the proposition: 'After 100 years of development no further innovation is possible in the electricity grid'.

Intervention

There was some vigorous debating, not only by the students defending or opposing the proposition but also by the audience. The 'industry debate' involved a detailed discussion of the pros and cons of CO₂ storage. Both parties agreed that this was a short-term solution. Despite its drawbacks, those in favour saw it as a welcome innovation in the transition to a sustainable energy system. The opponents, however, rejected CO₂ storage as a cosmetic exercise and advocated tackling the root cause (the burning of fossil fuels) as well as more innovation in sustainable energy.

The 'water debate' centred on the question as to what extent the prevailing culture within the water domain - pithily described by one of the debaters as: 'a world of civil engineers and farmers' influences the innovative capability within this sector. Saskia Jouwersma felt the debate could have focused slightly more on the fundamental question whether the Water Board should go to the market in order to get innovations carried through.

Liveliest of all was the 'energy debate'. Those who agreed with the proposition that grid innovation is no longer possible pointed the finger at the privatisation of the energy sector. This prompted an intervention from the moderator Margot Weijnen: "The grids are still in public hands. It is precisely in this area where substantial innovations requiring enormous investments are still possible" - a view that Wim Ploem confirmed in his closing comments. "We have a shortage of staff, but money is not the problem. With a turnover of 400 million euros a year, we spend less than 1% on innovation."

¹ The Board of the EWI Debating Society consists of: Mijndert van der Spek, Jean-Luc Eggen, Joris Groot and Silvia de Vaan.
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Microtraining for the effective transfer of sustainability knowledge

EUROPEAN LEONARDO DA VINCI MICROTRAINING PROJECT 2007-2009



TPM Technology Dynamics & Sustainable Development (TD&SD) and Edutec have started a new Leonardo project: Microtraining for effective learning. The project runs till the end of 2009 and is being carried out in collaboration with RWTH (Technical University of Aachen), UPC (Technical University of Catalonia, Barcelona), METU (Middle East Technical University, Ankara, Turkey) and KTH (Royal Institute of Technology, Stockholm, Sweden). The official launch meeting was on 19 and 20 November at the TPM Faculty.

The project is a sequel to an earlier project in the framework of the European Leonardo da Vinci Life Long Learning programme 2004-2007 in which TD&SD, together with two consultancies (Innovaders Amsterdam and Beco Rotterdam) and several Dutch companies, developed a method for improving the efficient transfer of sustainability knowledge in the day-to-day working environment. This method was tested in the Netherlands and Spain and virtually all participating companies decided to continue using it.

What does this method entail?

Due to day-to-day work demands, companies are often unable to free up time for knowledge transfer. Which is a problem. Because knowledge transfer on the shop floor is key to promoting sustainable development, the environment and safety. Within this project the current situation in the construction, chemical and machine-building sectors is being analysed in order to develop a Microtraining Support System that helps companies to put this training method into practice. The project is particularly aimed at the further development of the existing method and the evaluation of its effectiveness.

At least eighty per cent of on-the-job learning takes place in informal settings: in casual conversation with colleagues, meetings at the coffee machine, when doing jobs together, in communities of practise, and when consulting experts or the internet. Microtraining supports this unofficial, unplanned and ad-hoc learning process. In many cases transfer of 'tacit

knowledge' is important. Employees are activated to share their knowledge with others and to contribute solutions that benefit the company or organisation. An interactive approach ensures that the knowledge is genuinely absorbed and applied. Direct relevance is key. Employees must be able to put the new knowledge into practice straightaway: Just in time learning in the context of the tasks in hand.

The target group of Microtraining consists of people who work in fixed shifts or on location such as production staff, installers, builders, sales people, etc. In sessions of 15 to 30 minutes their basic knowledge is refreshed and expanded. Each session starts actively, followed by a demonstration or exercise, feedback or a short discussion, and ends with directions to further information and a brief preview of the next session. The trainers are usually supervisors, managers or plant managers.

Companies are seeking ways to increase the efficiency of the production process and achieve 'genuine sustainability'. Availability of knowledge and technological innovations play an important role in this respect. The Microtraining Project enables companies and intermediary organisations to exchange experiences. E-learning and shared platforms stimulate the exchange of knowledge and transfer of information.

More information

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THE MICROTEACHING APPROACH

EACH SERIES OF MICROTRAINING SESSIONS IS STRUCTURED IN THE SAME WAY

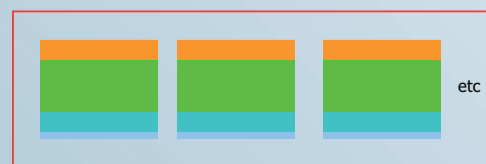
3 min	Active start
6 min	Demo / Exercise
4 min	Feedback / Discussion
2 min	What next? / How to retain

SESSIONS ON SUBTOPICS

Introduction



Sessions on subtopics



Rounding off



“Many forms of cyberinsecurity are economically rational”



On behalf of the OECD¹, TPM staff members studied how internet-based market parties deal with cybersecurity. Project Manager Michel van Eeten: “Part of the economic damage caused by malware does not demand government policy.”

“Considering how incredibly rich spam can make you, it’s hard to understand why we don’t get even more spam”. Michel van Eeten, Associate Professor of the TPM research group *Policy, Organisation, Law and Gaming*, spent the past period making an in-depth study of the phenomenon of cyberinsecurity and is full of juicy stories. “Ten years or so ago malware, the collective name for viruses, worms, spyware and so on, fell into the ‘nuisance’ category. Now, however, the proliferation of net-based services involving cash and goods transactions has made *hacking* interesting for criminals, including organised crime. There are links with the Russian mafia who have access to vast technological know-how. Apparently they use the services of unemployed Russian engineers. By way of illustration: last year a broken cable near Taiwan caused internet havoc in the whole of South-East Asia. Within five minutes spammers and managers of botnets, networks of infected computers, had shifted all their activities elsewhere, which was faster than any of the Internet Service Providers.”

OECD

Security firms estimate that about 10 to 20% of the computers around the world are infected. Google recently reported that 10% of all websites contain malicious codes with which visitors can be infected.

The economic damage of cyberinsecurity is put at tens of billions

a year. Making the internet a safer place is therefore one of the priorities of the Dutch Ministry of Economic Affairs. In 2006 Michel van Eeten carried out a study for this Ministry with a view to recalibrating the ICT security policy.

“Previously the Ministry had mainly sought advice from security people, whose main preoccupation is to eradicate all forms of insecurity. I tackled the problem from an economic perspective which, for obvious reasons, struck a chord with the Ministry. They felt this approach to the security problem deserved international attention and asked me to write a research proposal for the OECD. The request was granted and, to my surprise, I was even invited to carry out the research. The study spanned six countries: the Netherlands, the UK, France, Germany, the US

and Australia. The findings of our research team² are to be included in the official OECD policy document for the Ministers Conference on the Internet next year in June in Seoul. The full report (The Economics of Malware) will be published as an official OECD research report.”

Credit Cards

‘Put your money where your mouth is’: if all parties active on the internet adhered to this motto, a lot more would be invested in security. Van Eeten: “Financial service providers always put out politically correct statements that security is their no. 1 priority. But our research reveals a very different picture. After a hacking raid, banks quickly make small adjustments to their security system, but that’s all. Credit cards could have been made much safer ages ago. Why isn’t more money put into better security? The answer is that the costs of an attack are generally fairly small for a large bank. Criminals usually skim fairly small amounts of money from accounts, thereby making sure that they

remain under the radar of international investigators. And then they move on to the next bank. The banks’ biggest fear is that extra security measures - such as biometric authentication - might put people off online banking. It might make them less inclined to abandon traditional over-the-counter banking, which costs a hundred times more than online banking. Online-only providers, such as credit card companies, are paid per transaction. So they too stand to benefit from strong growth in online payments. In other words, their reluctance to tighten security is the consequence of a trade-off: it is a rational economic decision. Smart but minor measures are taken to keep the damage at an acceptable level compared to the growing profits from online transactions. And their policy of refunding direct damage to clients leaves them free to select the security level that they consider desirable. If the clients themselves were liable, it would be a completely different story.”

Incentives and externalities

In his research Van Eeten tried to find out how individual actors make decisions about information security. Expressed in economic jargon: what are the parties’ incentives to avoid malware costs? As everyone on the internet depends on the security choices of other users, the study also looked at how parties deal with costs that are caused but not borne by others (known as ‘externalities’). One notorious example concerns the damage that Internet Service Providers (ISPs) suffer from the unsafe behaviour of end users. Van Eeten: “Very little information about this was available in the public domain, which made it difficult for the government to formulate a suitable policy. We interviewed all parties involved, such as ISPs, software and hardware producers, security service providers and e-commerce firms (notably financial service providers). We also spoke to end users, varying from multinationals like Shell to hospitals and consumer associations.”

Conclusion

The conclusion of the research is that part of the economic damage caused by malware does not call for government policy. Van Eeten: “Financial service providers, like credit card companies, bear the consequences of their choices themselves, because they compensate the loss suffered by clients. Another development is that because malware affects everybody in the online world, certain players are starting to bear the costs of damage caused by other parties in the network. In other words, these costs are being internalised. In the past, for instance, ISPs refused to take responsibility for poorly protected home computers, but these days they are investing in infrastructure to isolate infected computers. This makes economic sense for them, because the costs of being placed on a blacklist are far higher. The market is sorting this problem out itself.”

Does this mean that the government can restrict itself to promoting ‘digi-awareness’ and fighting crime? Van Eeten wouldn’t go as far as that. “The incentive structure leads to economically rational outcomes in some fields, but there are also gaps. What’s more, independent supervision is no luxury. To what extent, for instance, do financial service providers honour clients’ claims? Not much is known about this.” A subsequent study for the OECD will be devoted to establishing what policy instruments can be used to create the right market conditions.

1 Organisation for Economic Co-operation and Development

2 The study entitled The Economics of Malware builds on the results from the Critical Infrastructures subprogramme of the Next Generation Infrastructures research programme. It was carried out in cooperation with guest professor Johannes Bauer, John Groenewegen and Wolter Lemstra (both Economics of Infrastructures), and Mark de Bruijne (POLG). Contact: M.J.G.vanEeten@tudelft.nl

BIVEC AWARD FOR CASPAR CHORUS

“Travellers decide more intelligently than thought”



Last February Caspar Chorus (30) obtained his doctorate Cum Laude with a PhD thesis on travel information. In late October he won the BIVEC Award for the best thesis on transport science in the Benelux between 2005 and 2007.

Dr.ir. Caspar Chorus (30) studied SEPAM at Delft (2002), while simultaneously obtaining his first-year diploma ('propaedeuse') in Econometrics at Erasmus University. After graduating he started his doctoral research entitled 'Traveller Response to Information' at TPM. "Briefly put, I studied how travellers deal with uncertainty, lack of knowledge and the travel information they get", says Chorus. "The uncertainty has to do with such questions as: Will I have a seat on the train? or What time will I arrive? And lack of knowledge concerns, for instance, the fact that many travellers only know a few routes, whereas there are plenty of alternatives."

Chorus incorporated theories from micro-economics, psychology, marketing and transport science into mathematical models of traveller behaviour. "These models allow you to answer certain essential questions, such as: to what extent do travellers actually use the information that's offered to them? Can they combine their existing knowledge with the new information to arrive at a sensible decision? And: do travel information services lead to better mobility choices? I also developed a computer-controlled experiment that simulates real-life travel situations, including traffic jams, time pressure and public transport delays. The choices that travellers made during these virtual trips were then used to test the models. "

Research into travel information was long overdue. "There is a lot of money involved in this field. Building and maintaining travel information services is enormously expensive. And the field is constantly moving forward. The current technology already offers huge potential and as things continue to advance travellers will soon receive a continuous flow of information, including advice on optimal departure times, routes and means of transport. With all

this sophisticated technology around, you would expect there to be stacks of knowledge on how this information is used. Not so, however. There's plenty of know-how on the technical side, but the behavioural aspect was still largely uncharted territory."

Chorus spent four years working on his research at TPM. He looks back on that period with pleasure: "I had great fun doing it, together with my PhD supervisor Bert van Wee and my day-to-day supervisor, Eric Molin. I also gained some personal insights. At first I wasn't sure whether my work would eventually lead to a job in the corporate sector. But after a year it slowly became clear to me: I wanted to make research my profession! And that feeling just got stronger and stronger."

Not herd animals

Of all his findings, the most important, according to Chorus, is that travellers are most certainly capable of making intelligent choices in complex travel situations involving multi-functional information services.

"The traveller is often underestimated and treated like a herd animal: why else would droves of people get themselves stuck in traffic jams over and over again? But it would be a big mistake to dismiss travellers as 'dumb'. The models I developed provide a relatively good description of traveller behaviour. And, more importantly, a comparison of the models and choices in the experiment showed that travellers make their choices in an intelligent manner."

The Benelux Interuniversity Group of Transport Economists was so impressed by the thesis that they granted it the BIVEC Award. BIVEC is dedicated to promoting cooperation in the field of transport economics between educational institutions and research institutes in the Benelux.

On 17 October Chorus received the certificate plus the monetary prize in Brussels. "I am delighted with this prize, particularly because it is a Benelux Award. What's more, I know some of the other studies and thought they were very good. I am honoured to have won."

This is not his first prestigious prize. Previously Caspar was awarded a Fulbright Scholarship (May 2005), which aims to stimulate scientific cooperation between America and other countries. "It's a way of preventing different people inventing the same wheel in different countries. I won the scholarship for the Massachusetts Institute of Technology (MIT) in Boston. In the autumn of 2005 I spent four months there, researching my thesis. In that time I mainly carried out econometric analyses to

test whether the theoretical models I had developed provided an accurate description of traveller behaviour."

Better balance

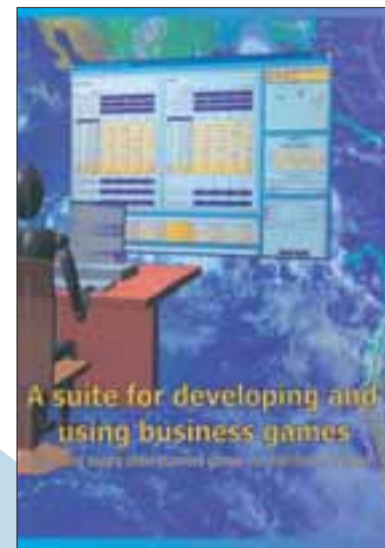
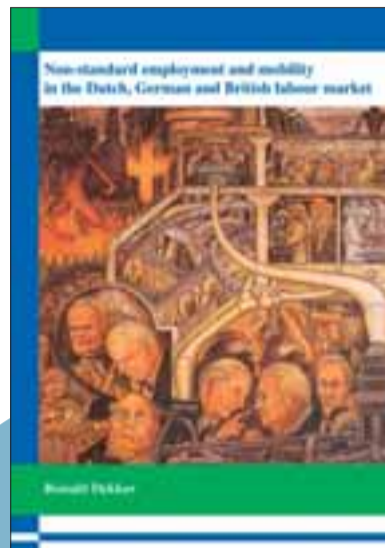
Chorus is currently working as Assistant Professor in Urban Planning at the Technical University of Eindhoven. But in September 2008 he will return to TPM as Assistant Professor in Transport

Policy & Logistics' organisation (TLO). Here he will carry out research into the modelling of mobility choices in order to predict how you can counter congestion and other traffic problems.

"The recurring theme in my future and current research is that I want to include the behavioural aspect, while retaining mathematical elegance. At the moment, mobility choice models tend to focus exclusively on the formal economic approach. We need a better balance. So I am going to try to combine mathematical elegance and behavioural realism in mobility models. That way, I hope to improve the models so that the mobility problem can be tackled more effectively."

"I am going to try to combine mathematical elegance and behavioural realism in mobility models."

Dissertations



CHIN, R.T.H., *Mainport planning suite software services to support mainport planning, November 2007, Delft*

Sustainable growth and the commercial success of 'Mainport Holland', located in one of Europe's most densely populated areas, is threatened by a lack of available land, a congested infrastructure, and an increasingly complex social, economic and political reality. To deal with these threats mainports, such as the Port of Rotterdam, are reengineering their planning processes. Instead of making plans based on an extrapolation of current trends, the aim is now to find answers to what-if questions which are applied to concurrent scenarios.

Adhering to the concept of studios, suites and services as introduced by Keen and Sol (2007), we introduced the design of a Mainport Planning Suite (MPS), i.e. a suite of services to support the actors in a studio-based planning process and improve their effectiveness in mainport planning. Mainport planning in practice was studied in two exploratory case studies. From the exploratory case studies we found that supporting mainport planning should be focused on visualizing the knowledge and information that is used and produced during a mainport planning process.

Based on the outcomes of the evaluation sessions, it is our strong conviction that an MPS is potentially useful and usable to improve the effectiveness of studio-based mainport planning. Future research might focus on the integration of simulation models in an MPS, the extent to which an MPS can support the automatic reporting of planning outcomes, the design of an approach for using an MPS, and the extent to which an MPS can be used in spatial planning in general.

DEKKER, RONALD, *Non-standard employment and mobility in the Dutch, German and British labour market, November 2007, Tilburg*

A temporary job can be a first step towards a permanent post, but flex-workers get paid less and can be more easily dismissed. And the low initial wage also acts as a drag on the employee's later salary in permanent employment. These are the main conclusions of the research of economist Ronald Dekker (Assistant Professor at Economics of Innovation), who obtained his doctorate on 30 November 2007 at Tilburg University. The number of people in temporary or part-time employment has increased in the past decades. But is flexible work a first step towards a permanent post or a dead-end with no prospects? Is it useful or problematic? These are the questions that Ronald Dekker posed in his thesis. Comparing flexible employment data from the period 1991-2001 in the Netherlands, Germany and Great Britain, he looked at the careers of individual employees and their mobility in the labour market.

His research showed that 25% of the employees with a flexible job move on to permanent employment within one year. So a

flexible job often serves as a first step towards a permanent post, but this depends on age, gender and marital status: very young or older employees and married women often have less chance of progressing to a permanent job.

One disadvantage of flexible work is that it pays less well than permanent employment. What's more, previous experience in a flexible job also has a protracted negative impact on the employee's later salary. In this respect flexible work can even be compared with a period of unemployment. In addition, employees with a temporary job are more at risk of becoming unemployed without this being compensated by a shorter period of unemployment. Also striking, according to the researcher, is that large differences between the labour market institutes in the Netherlands, Germany and the UK do not translate into large differences in the mobility of individual employees in these countries.

The researcher concludes that further stimulation of flexible employment in the Netherlands need not necessarily lead to a more efficient labour market. A well-developed flexible segment of the labour market improves the opportunities of the unemployed but has negative effects in terms of remuneration and job security, also in the longer term. The labour market policy should focus on improving the content of flexible work and promoting progress to permanent employment. This would limit the negative consequences for individual employees.

MEIJER, MACHELDT, *Intertwining uncertainty analysis and decision-making about drinking water infrastructure*

Infrastructures, generally designed to have a long service life, are particularly vulnerable to long term changes that can influence their functioning. Therefore it is important that uncertainties are taken into account as much as possible from the beginning of the planning process of infrastructures.

The main objective of the research was to answer the following question: Can the identification and handling of uncertainties in the Dutch drinking water infrastructure planning process be improved? And if so, how? To answer this question, first a literature study was performed, which was used as a basis to develop both a descriptive and a normative framework for the analysis and evaluation of case studies.

This thesis focuses on drinking water infrastructure. This type of infrastructure is characterized by a long life expectancy. Changes in the supply of materials (for instance source water, energy, space for building underground networks), technology, and demand for the end product can be expected, but are difficult to predict. These changes can lead to high cost for society when they lead to system failure or obsolescence of the existing infrastructure.

The planning and decision-making process concerning the Dutch drinking water infrastructure is being closely examined using the

developed frameworks as its basis. By looking at four case studies, researchers explore how uncertainties are dealt with within this sector and how this method could be improved. The most important conclusion of the cases was that drinking water companies are very aware of uncertainties and a lot of action is taken to handle them. However, some suggestions can be made to improve the analysis and handling of uncertainties. Therefore a list will be presented, based on findings from theory as well as practice.

VAN HOUTEN, STIJN-PIETER, *A suite for developing and using business games, Supporting supply chain business games in a distributed context, November 2007, Delft*

Managing today's multi-actor systems, such as supply chains, is becoming an increasingly challenging task given developments in the markets, e.g. globalization, and in technology, e.g. the Internet. Today's managers are faced with increasing competition and globalization in an ever increasingly complex and dynamic system. Multiple tools exist to support managers in gaining more insight into these kinds of systems, such as simulation models or case-studies. Business games are another tool that can be used to support managers. A leading question in the development and usage of business games concerns the effectiveness of these two activities, e.g. development may take too long, or the business game does not address its intended purpose.

During this research we have designed and implemented a suite of software services that support the development and usage of business games in a distributed, Internet-mediated context. With the games we support players in getting prepared for today's management challenges. This is among others accomplished by supporting the games to be played in a continuous fashion, and the usage of computer-controlled actors to increase the games' complexity and dynamics. The games that we developed with this suite have been played at numerous universities and business schools in a variety of settings, among which a global competition played at the same time with 11 universities. The students' educational levels that played the games developed with our suite vary from undergraduate to (Executive) MBA.

The games that have been developed with our suite can be accessed online and played with at <http://www.gscg.org>.

African talent obtains doctorate under TPM's wings

TPM boosted two African PhD graduates this year: Nora Mulira from Uganda and Sam Muniafu from Kenya. These talented academics both focused on ICT issues in developing countries. Mulira studied the problems surrounding the emerging networks of public organisations, while Muniafu concentrated on ICT-enabled (logistical) services.

Nora Mulira



Nora Kasirye Mulira was born in 1961 in Kampala, Uganda. She studied at Makerere University in her native country and at the London School of Economics (LSE), where she obtained her Master's degree in Management Information Systems. Since 2001 she has served as ICT Director at the Directorate ICT Support (DICTS) of Makerere University. She is specialised in

the development and management of information systems and is known as an excellent manager and innovative thinker.

Last September she obtained her PhD at TPM with her research into 'Implementation of inter-organisational services - an approach to emerging networks in volatile environments'. Volatile means: very dynamic and therefore often uncertain. "The focus was on inter-organisational networks that are being developed at higher educational institutions in emerging economies. I have now developed an approach that provides support in improving the efficiency and reliability of the implementation process of inter-organisational services in a volatile context."

The subject arose from the fact that public organisations in developing countries are slowly but irrevocably changing through innovations in ICT. "Due to the formation of business networks between these organisations, they are becoming increasingly interdependent. Solutions are also being sought to safeguard strategic interests and to extricate the competitive position from a downward spiral. Emerging networks of public organisations in developing countries find themselves in an unpredictable environment and need to work with scarce resources. This can give rise to obstacles when seeking to improve the implementation methods of such networks."

This is important research, says Mulira. "The conventional approach is unable to improve the reliability and efficiency of the implementation methods, while this is badly needed for the business networks that are taking shape in the 'emerging' economies. The new actor networks must be capable of withstanding a volatile environment. In addition, they must be able to deal with the complexity that comes into play when working in a multi-actor environment."

Unique opportunity

Mulira is delighted that she could do her PhD research at TPM. "This gave me the unique opportunity to carry out my research under the supervision of renowned professors at a world-class university. What's more, I received support from an experienced and resourceful research team at Service Systems Engineering. Fortunately I had a flexible programme, so that I could carry out the work as a part-time researcher in Delft as well as in Uganda. At my age and with my many responsibilities at home, I simply could not be a full-time PhD student abroad."

The practical application of the approach resulting from her research gives her cause for satisfaction. "I have already presented manuals to institutions that are engaged in system implementations. I hope that there will be a lot of interest in it and that I can refine it further in the future." She intends to continue her research work for at least five more years while also remaining ICT Director at Makerere University: "Africa offers tremendous opportunities for additional research in innovative technology. But I sincerely hope I can also continue working with my colleagues at TU Delft."

Sam Muniafu



Simaati (Sam) Mwenya Muniafu was born in 1967 in Nairobi. He studied Information Science at Moi University in Eldoret (Kenya). After graduating he worked there as a teacher in Information Technology, before doing the Master's degree programme in Technical Informatics in Delft. Upon completing his Master's in 2001, he returned to Kenya to resume his work as a teacher. In 2003 he started his

PhD research at the TPM Systems Engineering research group. Last October he obtained his PhD with his dissertation entitled 'Developing ICT-enabled services in transition countries'.

The research project was aimed at the development of ICT-enabled services in developing countries, with a specific focus on rural South Africa. "The aim was to devise an approach that offers effective support in the development of ICT-driven services in developing countries. For this purpose I used logistics brokering in rural areas as a domain for testing my ideas."

The research sprang from the idea that logistical services are essential to economic development, particularly in rural areas of developing countries. There, however, you encounter many problems for which ready-made solutions have in principle been developed in the western world and in urban regions, but which require extensive adaptation to rural needs and circumstances. Offering services that make use of ICT can considerably accelerate the development of rural areas according to Muniafu.

"I wanted to help deploy ICT solutions that are available all over the world in order to improve the livelihoods of the rural population and logistical service providers. The fact that many people in rural African areas have access to ICT equipment, in this case mobile telephones, makes it interesting to explore ways of using mobile phones for purposes other than just making and receiving calls."

Enthusiastic

He looks back on his research period with pleasure. "That is mainly because I was involved via the Council for Scientific and Industrial Research (CSIR) in South Africa in a project that introduced relatively new ideas for services in rural areas. This is what gave me the idea of using mobile and other ICT-enabled equipment for the supply of logistical services. The team I worked with was extremely enthusiastic about my approach and asked me to give two workshops. That was an extra incentive to continue with my research, because it became clear to me that those involved could immediately make use of my work. Some of the findings, incidentally, are already being put into practice in ongoing projects in South Africa."

At present Muniafu is working as an assistant professor at the Systems Engineering Section in Delft. From mid 2008 he will start as a senior researcher at CSIR in Pretoria on a 5-year contract.

"There I can continue where I left off and can hopefully develop into a top researcher. And because I enjoy teaching, I am also going to give lectures in the Netherlands and Africa, among other places."

continuation of page 1

News in brief



State Secretary Ms J.M. van Bijsterveldt-Vliegthart receives the IPSE Studies Report on bureaucracy in secondary education

On Wednesday 17 October State Secretary Ms J.M. van Bijsterveldt-Vliegthart of the Ministry of Education, Culture and Science (OCW) was presented with the IPSE Studies report *Overhead of*

Onderwijs: Een benchmark van de allocatie van middelen in onderwijsinstellingen voor voortgezet onderwijs. Last summer IPSE Studies (together with the research agency ECORYS) was commissioned by the Secondary Education Council to carry out research into overheads at secondary schools. Under the watchful eyes of many interested onlookers, including members of the Ministry of OCW, the permanent OCW parliamentary committee and the press pack, Dr Jos Blank of IPSE Studies unveiled the most important outcomes of the study. One of the main conclusions is that on the whole there is no question

of superfluous overheads at secondary schools. After the presentation the state secretary expressed her enthusiasm about the initiative of the Secondary Education Council. The chairman of the Secondary Education Council praised the researchers for the unique relationship they made between educational performance and employed resources. The report also provides a basis for the further development of a bureaucracy benchmark to provide secondary schools with valuable management information. IPSE Studies (together with ECORYS) also expects to publish the results of a similar study for primary schools some time soon.

At www.vo-raad.nl you will find the full report entitled '*Overhead of Onderwijs, een benchmark van de allocatie van middelen in onderwijsinstellingen voor voortgezet onderwijs*'.

Ir. Luuk Simons wins a two-yearly innovation award for innovations in the design approach to Quality Function Deployment (QFD).

He was awarded for his PhD thesis entitled '*Multi-channel services for click and mortars - Development of a design*' (dated

3 October 2006 with the late Prof. René Wagenaar, day-to-day supervision Dr. Harry Bouwman). The presentation took place at the start of December in Kassel (Germany) at the QFD symposium.

Prof. Wil Thissen (Policy Analysis research group) appointed as a member of the Board of Governors of the IEEE Technology Management Council (TMC).

From 1 January 2008 this council will succeed the current IEEE Engineering Management Society, of which Thissen was already a member. In addition, this council publishes the magazines '*Engineering Management Review*' and '*IEEE Transactions on Engineering Management*'.

Thissen's role in the board of the council will be to act as the representative of the IEEE Systems, Man and Cybernetics (SMC) Society, in which he has held various administrative positions. Whilst the SMC Society focuses mainly on 'systems technology', the TMC places a much stronger emphasis on the management side.

Curius



Silent disco

The Curius Year is well underway. The first excursion with 84 first-year students to Schiphol is already behind us; Curius's biggest excursion ever. The anniversary activities are also in full swing. After the presentation of the theme, the anniversary was officially opened on 12 October. The kick-off took the form of a Float-In: an outdoor film screening that the audience could view from little boats while enjoying a leisurely beer and a tub of popcorn.

During the gala event on the Pier in Scheveningen the music of Spuit 11, the Virgiel Big Band and DJ Clever F kept the dance floor filled all night long. A lot of international students also turned up, which was good to see.

The alumni career day was held on 30 November. The day filling programme for Master's students consisted of six company presentations followed by two workshops. In the evening the alumni joined the proceedings with Jan Dekker, former chairman of the Board of Management of TNO, as speaker. Next Els van Daalen and Wander van der Berg filled in the audience on the latest developments in the SEPAM degree programme. The anniversary activities will be rounded off in mid-December with a whopping party, bringing the anniversary activities to a spectacular end.

One positive development within the TPM Faculty concerns the creation of the EWI Debating Society. It is primarily for SEPAM

students, but third-year bachelor students are also welcome. Curius commends this initiative, particularly as it clearly meets a demand. For this reason, it is currently looking to start up a TIL Debating Society aimed primarily at SEPAM Master's students, but also at TIL Master's students and third-year Bachelor's students.

The ultimate aim is to set up a Debating Society for each domain. Suggestions from students who are interested in setting up a similar society for the ICT or RGO (Space: Use and Development) domains are encouraged. In addition, the current Master's Committee will continue to focus on all Master's students to guarantee the contacts within the various Master's degree programmes. The essential difference between the Debating Society and the committees is the greater autonomy within the Curius structure. If you have any questions or ideas about this change in structure, feel free to drop by in the 'Curius hok'.

Upcoming activities

The first TPM Dictation will take place on 19 December, with students and staff competing to see who are the top TPM jargon spellers. There will be some great prizes for the winners. The committee's annual Christmas lunch is on 20 December. In the afternoon we will welcome the winter with a glass of mulled wine and present the theme of the 15th Curius Annual.

As the fifteenth Board we are delighted that the anniversary activities have been such a success so far. And we are also looking forward to all the other activities for the coming months!



The 15th Board of S.V.T.B. 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)
- MSc 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:

Drs. Marja Brand (m.j.c.c.brand@tudelft.nl)
Ir. Daniël Holt (d.holt@tudelft.nl)

It all became clear in November ...

... when the days were shortening and a cold wind started to blow. The new minister of Higher Education Ronald Plasterk reduced the fixed budget of the universities. This intervention will eventually also affect the budget of TPM. But we have been very effective in acquiring external funding, so it is relatively easy to accommodate a harsher financial regime.

TPM's future is bright, because we have a socially highly relevant research profile: the study of socio-technical systems in all their aspects. There is an increasing respect and demand for our research. Many stakeholders inside and outside of our university gradually start to realize that we cannot hope to deal adequately with the engineering challenges of the 21st century if we do not adequately deal with the human, social and institutional aspects of technology in connection with their technical aspects. We must provide the tools to say sensible, reliable and helpful things about them.

Our challenge is to demonstrate how all these radically different aspects of socio-technical systems hang together; how law, regulation, ethics, organisation, infrastructures, processes, artifacts, materials, molecules and human beings fit into the big picture. That is a fascinating challenge!

Jeroen van den Hoven,
Interim Dean

ASK TPM

According to the 2007 National Budget we will all be less well-off this year. Prof. dr. Alfred Kleinknecht says it's better to be brainy than brawny.

Alfred Kleinknecht is Professor in Economics of Innovation at TU Delft. He belongs to the select group of European scientists engaged in knowledge development in the innovation economy. Shunning the well-trodden paths, he explores new directions in the border area between general and business economics.

"According to the Budget the Dutch will on average be a quarter per cent less well-off next year. So there were lots of complaints around Budget Day about the higher costs facing the 'hard-working' Dutch worker. I wish we could have been speaking of the 'smart' Dutch worker instead. Unfortunately, we would evidently rather be brawny than brainy. We are still not using technology in a smart way. That explains why, in order to grow our National Product by one percentage point, we need to increase our working hours by two to three times more than our neighbours. If you're not smart (with technology), you (unfortunately) have to be hard-working!

And because of this there's a good chance that we will soon be confronted with a very tight labour market, just like in the nineties. Work harder and longer: that's the government's magic cure. But no matter what we do to mobilise more workers, our extremely labour-intensive economic growth inevitably means that labour will sooner or later become scarce again. And an elementary economic law tells us that what's scarce, becomes more expensive. The consequence is rising wages, rising inflation and, consequently, worsening international competitiveness and contracting growth.

So perhaps we should be thankful that the gloomy outlook presented on Budget Day will serve to slightly dampen the economy. And the debt crisis in the US and a weakening dollar may also lend a

helping hand. That will reduce the inflationary pressure. So in a sense we may actually gain from less purchasing power. And as a further consolation, we will be getting better public services in return for the higher costs.

In summary I would say: let's make production in the Netherlands more knowledge intensive, so that our productivity growth accelerates. To achieve this, we must invest heavily in education. Because only then can we create and maintain a prosperous knowledge economy. Ideally, we should get robots to do the work for us. After all, it's better to be brainy than brawny."

