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TNO-rapport

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Enabling Technology Programme Behaviour and Innovation 2011-2014

Progress report for 2012

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Contents

1 Management Summary

The Enabling Technology Programme (ETP) 'Behaviour and Innovation' started in 2011 and develops generic knowledge about explaining and changing human behaviour in relation to system innovation. With a TNO-wide multidisciplinary and multilevel approach, models, methods and toolboxes are developed for effective behavioural influence, (community) interventions, system innovation and social change.

Specific social and economic issues are analysed on human (micro), company (meso) and system (macro) levels. The programme is executed along seven project lines, each of which produces generic knowledge with relevance to, and applications in, multiple TNO themes.

The following results were achieved in 2012, plotted against the ambitions for 2014 that are set down in the programme text for 2011-2014.

In accordance with the knowledge roadmaps that were drawn up in 2012, the micro level descriptive behavioural models that were developed have been largely converted into simulation models.

Level	**Ambition for 2014**	**Main output in 2012**
Micro	To be in a position to quantify and model human behaviour, on which basis we can develop personalized interventions.	Explanatory behavioural models and behavioural influence models that were developed earlier for various target groups and contexts have been converted into simulation models. An initial validation of models with datasets has been performed.
Meso	To provide insights and tools to raise organizations' performance and learning to a higher level.	A national monitoring instrument for flexible labour on industry level has been developed. An initial framework for PPP has been drawn up.
Macro	To develop and combine knowledge and methods to accelerate complex social innovations.	Complexity approach translated to multistep plan for large-scale transitions. Multilevel model and actor analysis translated to system dynamic model for mobility issue.

On the meso level, the development of the national monitoring instrument for flexible labour was finalized together with many national partners, and it will go live in 2013. On the macro level, the adjustment to more empirical validation and application of a complexity approach in large social issues was successful.

The results of the ETP projects were used in several national and international knowledge projects, and collaborations were established on various issues with many academic partners through shared PhD students, two LIFT professorships and collaboration in competitively acquired knowledge projects.

2 Introduction

The TNO Strategic Plan for 2011 – 2014 defines both TNO's demand-driven innovation objectives and the Enabling Technology Programmes (ETP). Besides the demand-driven knowledge development, TNO has several research programmes for more exploratory research, intended to strengthen the internal knowledge base: the ETPs.

The choices in the issues in the various Enabling Technology Programmes are based on an analysis from the perspective of the TNO themes: which breakthroughs will be needed for various TNO themes in order to achieve the theme objectives; and on an analysis from the perspective of the development of science and technology: which opportunities will arise in this area that could be tackled by TNO and developed into new concepts. The Enabling Technology Programmes that emerge from this process must:

- be oriented to technological breakthroughs with the potential to accelerate multiple themes towards the innovation objectives;
- lead to a medium-term world-class knowledge position (mass and focus), while being distinct from and complementary to knowledge partners (uniqueness);
- derive their strength from the combining of disciplines in order to achieve genuine breakthroughs (TNO's multidisciplinary strength).

The ETPs were started in 2011 and are devoted to six focused multidisciplinary programmes: Modelling, Sensor Networks, Materials Technology, Systems Biology, Behaviour & Innovation and Strategy & Change.

The ETP Behaviour and Innovation started on 1 January 2011 with a term of four years. The underlying assumption in the ETP Behaviour and Innovation is that the behaviour of individuals (micro), organizations (meso) and public authorities / business clusters (macro) determines the ultimate success of technological and social innovations[1]. The output of the ETP Behaviour and Innovation includes instruments (such as for monitoring innovation, models for understanding the determinants of human behaviour, and new methods for handling innovative processes for organizations) and tested interventions (e.g. 'virtual coaches' and the use of social media). This generic output will then be tested on an issue within a specific domain. Within this framework the ETP will contribute substantially to knowledge about social innovation.

This report first gives an outline account of the demand-driven programmes. As requested by the Ministry of Economic Affairs, TNO will post a specification of the projects involved and their output with a reasonable period on the TNO website.

[1] OECD Industry, Innovation, and Entrepreneurship committee report, New Nature of Innovation, 2009.

3 Objective of the ETP Behaviour and Innovation

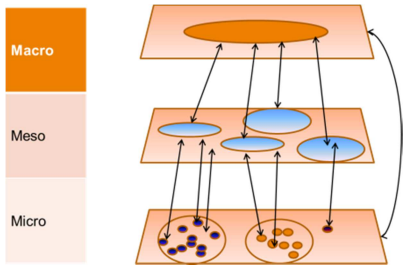
The Enabling Technology Programme (ETP) ‘Behaviour and Innovation’ develops generic knowledge about explaining and changing human behaviour in relation to system innovation. Models, methods and toolboxes will be developed using a multidisciplinary and multilevel approach for effective behavioural influence, (community) interventions, system innovation and social change.

The programme has two objectives.

- The first objective of the programme is to provide tools and methods based on an innovation management approach in order to bring innovations to practical application faster and more effectively. We know that this is necessary because it is all too common for innovations to become stranded in the chain that has to be traversed to reach the end-user (90% of innovation investment does not achieve the desired result). Insufficient understanding of the chain and methods of influencing progress through this chain play an important role, as does underinvestment (financing is mainly directed towards achieving and demonstrating the innovation).
- The second objective for the ETP is to develop generic instruments for use in influencing and modelling behaviour, and to investigate the rules of behaviour that govern the interaction between systems and individuals. The need for this is that there is insufficient knowledge of the forces that drive human behaviour in several major social problems that confront our society, and in the introduction of innovative technology.

4 Outline of the ETP Behaviour and Innovation

The ETP Behaviour and Innovation is structured along three different levels of research – micro, meso and macro – with a focus on specific breakthroughs in each level.



4.1 Micro level

The main lines of knowledge building in behavioural research are:

- *evidence-based interventions to change individual and group behaviour*: the projects focus on behavioural models for members of the public. The traditional approach is to persuade citizens through regulations, the design of facilities, and the provision of information. It is clear in various domains that measures of this kind are insufficient to move citizens to exhibit the 'desired behaviour'. Behavioural models have two important benefits: they permit measures to be calibrated and adjusted to the desired objectives; and facilitate the evaluation of interventions in a laboratory setting, which for most measures is impossible in a practical setting. Laboratory tests make it possible to explain why the envisaged effect was or was not achieved. A final element of these projects is the linking of behavioural models to the use of new media. New media permit measures to be tailored to the profile of the individual citizen. It is possible with a minimum of effort to develop tailored communication methods, as an alternative to the, hitherto dominant, universal communication. Tools and instruments with long-term commercial potential can be derived from the models;
- *optimizing natural human-system interaction*: an understanding of human-system interaction is important when setting out to improve this interaction (e.g. operator control of an automatic chemical process). The projects are compatible with fourth generation personified human-system interfaces. The objective is to build a fourth generation personified human-system interface for various sectors, in particular education (intelligent play room and classroom), and healthcare ('virtual companion for elderly people' and 'virtual coach' which assists and gives feedback to professionals).

4.2 Meso level

The main lines of knowledge building on the meso level are:

- *an optimized development model for innovative capacity*: the current innovation models have insufficient detail on an organizational level. The existing models still approach the organization too much as a 'black box'. The ETP projects address this black box and try to fill it in. The model to be developed will help improve the innovative capacity of organizations and networks of organizations. For instance, organizations will be aware of the conditions to be safeguarded when implementing innovative change, as well as the process they have to go through to ensure that innovations take root. A set of tools that is linked to the model will be provided for the effective structuring of innovation processes within an organization or network of organizations, including:
  - diagnostic tools for innovative capacity;

- tools for interventions for the effective organization of innovative processes, taking account of the complexity and the dynamics of innovative processes;
- tools to monitor and learn lessons from innovative processes;
- tools for upscaling an innovation, in order to create more impact than a successful pilot.

4.3 Macro level

The main lines of knowledge building on the macro level are oriented towards developing an *innovation model on the societal level, based on a complexity and emergence approach*. The need for this approach is that existing models tend to assume uni-causal relationships (transition management, planned social change). This model will be supported by well-founded and effective methods and methodologies (i.e. a toolbox).

The toolbox will comprise the following:

- A tool for innovation diagnostics that identifies basic patterns in implementation processes: what opportunities and obstacles are to be expected?
- A design tool for an innovation strategy, based on the diagnosis and taking account of the complexity and dynamics of innovative processes.
- Tools for monitoring and evaluating an innovative process while learning. This will address one of the most important problems in the research: the actual ability to quantify the implementation, or use, of innovation. The 'learning' structure, with the participation of the most relevant involved parties, also creates an opportunity for continuous intervention in connection with complexity and emergence.
- Tools for intervention. These are mainly intended for influencing acceptance and use of product and service innovations on a micro level (end-users). Other interventions, such as 'living labs', or niche experiments, are appropriate as small-scale learning experiments in preparation for the upscaling and diffusion of innovations.

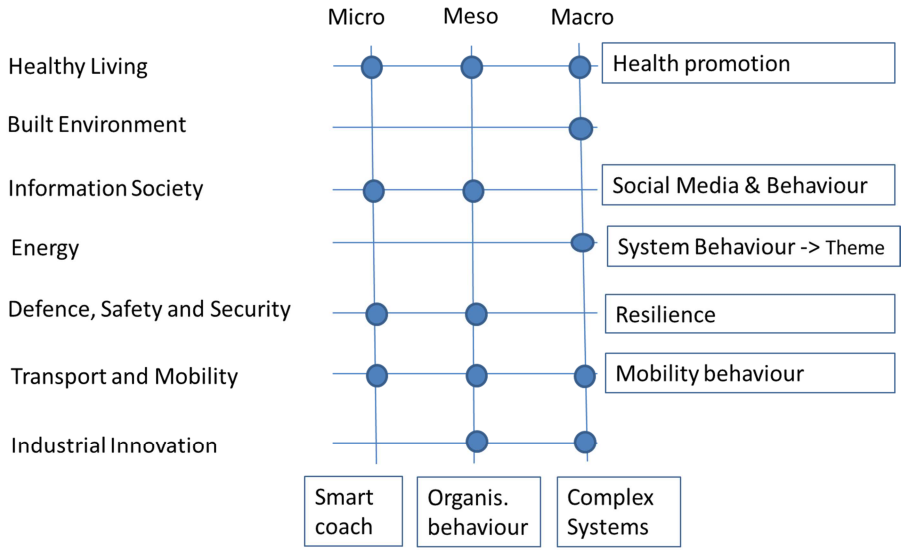
Cohesion
To link the three subsectors, an integrating theoretical and methodological framework will be developed, which integrates the *explanation of innovative behaviour on micro, meso and macro levels*.

5 Execution in 2012

5.1 Achievement against plan

The ETP Behaviour and Innovation has realized the main substantive and financial activities that were planned in 2012, within the programme budget of €3.7 million (down by €300,000 relative to 2011). In 2012 the System and Behavioural Change in the Energy Sector project was included as a research project in the energy top sector. A new project 'Smart Coach' also started in 2012.

Five projects within the 2012 programme approached knowledge issues coming from specific TNO themes from a behavioural change or innovation perspective. There were an additional three vertical projects with a more integrating objective, each with a case from a TNO theme (see Figure below).



5.2 Governance and interaction

There has been regular internal consultation with the steering group and ETP management. There has also been programme consultation with the contact person from the Ministry of Economic Affairs, Agriculture and Innovation, the Ministry of Health, Welfare and Sport and the Ministry of Social Affairs and Employment. There have been contacts from the various projects with national (e.g. the Netherlands Organization for Health Research and Development, Utrecht University, Erasmus University Rotterdam, Maastricht University) and international institutions (Massachusetts Institute of Technology, KU Leuven) and FP7 (Security, Socio-economic Sciences and Humanities).

5.3 Participation in consortiums and networks

Various projects have participated in joint initiatives and networks:

- the financing of trainee research assistant positions at universities (University of Groningen, TU Delft, University of Twente, Utrecht University, Maastricht University, Massachusetts Institute of Technology);
- LIFT professorships at universities (University of Twente, KU Leuven);
- international 'community resilience' consortium;
- 'self-reliance' centre of expertise;
- national self-reliance expert group;
- Mobility knowledge centre;
- Netherlands Centre for Social Innovation;
- Smart Work Smart Travel platform;
- Knowledge centre in formation. Behaviour-oriented health promotion (with Maastricht University).

5.4 Initiatives for knowledge development

Initiatives in 2012 included:

- proposals within FP7 calls (SSH Future Public; SSH Smart Specialization);
- development of two proposals with Belgian universities Cortexs and EUWIN;
- Social Affairs and Employment and ABU project financing within Economic Affairs, Agriculture and Innovation co-frameworks;
- specification of TNO participation in FuturICT proposal for European Flagship call;
- Economic Affairs co-research proposals 'Ambulantization in Healthcare';
- Netherlands Organization for Health Research and Development knowledge project proposal 'Consortium Instruments for Integrated Action';
- consortium forming and proposal submission 'Social Media in Emergencies', FP7 Security and Society;
- consortium forming and proposal submission 'Aftermath Crisis Management' (FP7 Security).

5.5 Coordination with other knowledge institutes

Coordination with other knowledge institutes took place through the six joint trainee research assistant positions (see table) and the two professorships.

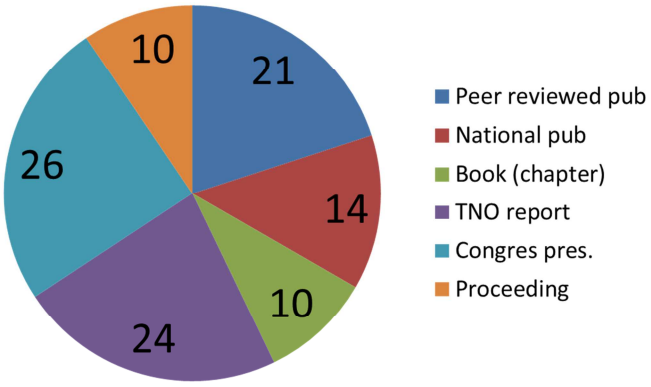
In 2012 the ETP financed Steven Dhondt's chair at KU Leuven. He also works in the Inscope platform together with Erasmus University Rotterdam (Prof. Volberda), Maastricht University (Prof. de Grip) and the University of Twente (Prof. Groen). In that framework Prof. Dhondt has authored the new 'Human Capital and Labour Market' (Social Innovation Infrastructure) programme of the Netherlands Organisation for Scientific Research (NWO). Jan Maarten Schraagen holds a chair in Applied Cognitive Psychology in the Faculty of Behavioural Sciences, University of Twente.

Erasmus University Rotterdam (Prof. Edelenbos)	Trainee research assistant Climate in the city
Massachusetts Institute of Technology	Trainee research assistant Conflict management surrounding ecosystem issues
Utrecht University (Prof. Hekkert)	Trainee research assistant Uncovering the strategies of new-technology entrepreneurs
Maastricht University (Prof. G.	Trainee research assistant Mobile-based

Kok)	ecological momentary assessment
University of Groningen (Prof. A. Boonstra)	Trainee research assistant Effect of disruptive Internet-based innovations on market interaction
VU University Amsterdam, Cognitive Psychology (Prof. J. Theeuwes)	Trainee research assistant En-route, route choosing behaviour

5.6 Knowledge dissemination

The knowledge acquired within the ETP Behaviour and Innovation is shared with our peers in a variety of ways (see Figure below). Alongside peer-reviewed publications (21) and books and chapters (10), there are publications in national professional journals (14) and presentations at national and international conferences (26).



For a detailed list of publications, please see Appendix A.

6 Highlights in 2012

The highlights of the research output in 2012 for the three ETP levels are presented below.

6.1 Micro level

6.1.1 Open Innovation Platform E-coaches

Many of the challenges in areas such as health, safety, and sustainability are connected with human (micro) behaviour. It is therefore impossible to achieve an impact in these areas without supporting behavioural change, such as developing a healthier lifestyle, different types of mobility behaviour, economical consumption of energy, living independently for a longer period of time, a lower school drop-out rate, and so on. It is difficult to start and to persist with behavioural change, and many traditional resources only have a limited or temporary effect. The provision of personally tailored and convincing information and advice, alongside coaching to start and continue with behavioural change, could break this pattern. Recent ICT tools, such as apps and social robots (e-coaches), may help, and they are being developed (to a certain extent in mutual isolation) in various domains within and outside TNO. The latest technical and scientific challenges reside in building up knowledge on convincing adaptive user interaction, evidence-based development methodologies, the integration of e-coaches with sensors and networks, behavioural and intervention models and interfaces, and knowledge about the most important social and societal conditions and constraints for successful application.

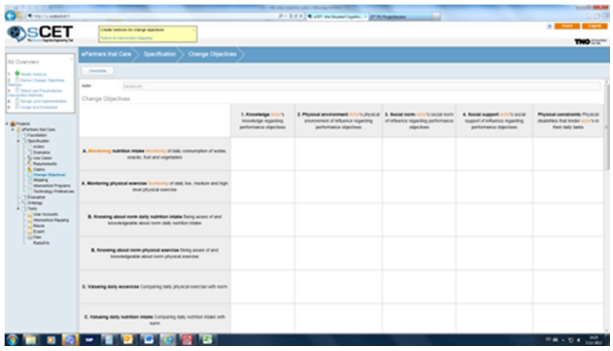


Figure 1: Situated Cognitive Engineering Tool for developing functional requirements of e-coaches

Progress was made in 2012 on the methodologies, software architecture and infrastructure, and with the development of a behavioural intervention tool aiding the design of a behavioural change application. In this Situated Cognitive Engineering Tool we have translated the theoretical knowledge in the area of intervention modelling into a structured analysis and decision environment for developing e-coaches. A laboratory has been set up at TNO's Soesterberg site to continue the development of e-coaches together with academic partners, based on an open innovation model. TNO and TU Delft have embarked on the design and construction of a research robot, which, together with existing robots and

e-coaches, will fill the open innovation lab. The existence of the lab will give a huge impulse toto follow-up research into future forms of e-coaches.

6.1.2 Citizen self-reliance

The government attaches great value to self-reliant citizens, based on the assumption that the government is unable to solve every problem that citizens are faced with, and that people are also willing to take their own responsibility. Overall, self-reliant citizens are less dependent on the government. Self-reliance could increase wellbeing, which will result in more affordable social care. An example from the safety domain is the conclusion that, despite the high standard of professional emergency services, the government will not always be capable of helping all victims in a timely and direct manner in the event of a crisis or disaster. To some degree, citizens must rely on themselves, and take initial action before the emergency services arrive at the scene to reduce the impact of the disaster or crisis. In other domains too, both the government and the public attach great value to self-reliance. For example, in healthcare much attention is being given to people's self-management, 'empowerment', freedom of choice and autonomy, so that they are able to take more responsibility for their own wellbeing.

A central question is how to activate citizens to actually take this responsibility (for themselves and each other), and how to support them in doing so. Our model explores the resources available to citizens for generating help or solutions, which we refer to as 'capital'.

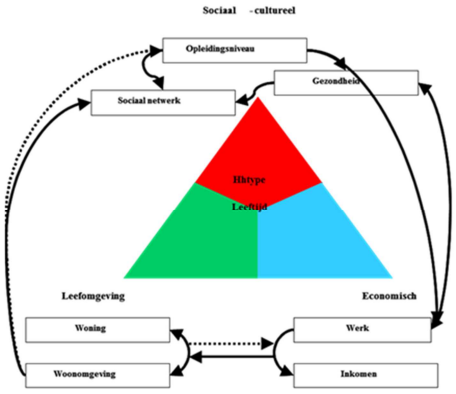


Figure 2: Model for citizen self-reliance

Based on a field analysis of two large-scale citizen initiatives, we performed further research in 2012 into the various levels of resilience, with interrelated sources of capital. It appears that the capacity to form networks is an important form of capital for individual resilience. This capital depends on various other forms of capital on an individual level (e.g. education), on a meso level (e.g. flexibility of institutions), and on a macro level (local authority policy).

The conditions and constraints for a successful citizen initiative can be defined based on the model developed in this project.

6.1.3 Influencing people's strategic travel behaviour

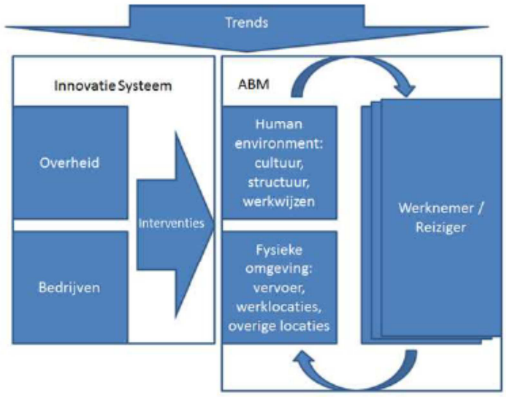


Figure 3: Structure of the mobility behaviour model

The scope within the mobility sector is shifting, with encouragement from the *Beter Benutten* (Better Utilization) programme of the Ministry of Infrastructure and the Environment, from pure dynamic traffic management measures to a combination of these and mobility management measures. For both these fields, knowledge of drivers' behavioural motives, and the opportunities for influencing them, are essential. In order to fill the gaps in knowledge about the behavioural determinants, the previously developed behavioural psychology models have been converted into an initial version of a semi-quantitative behavioural model. The model sets out to clarify and simulate mobility behaviour, and predict the effects of interventions.

We have taken into account behavioural determinants on micro (individual passenger), meso (organization in which a person works, the environment in which a person lives) and macro (legislation and legal aspects) levels.

We translated a generic system description into a multilevel model (with micro, meso and macro factors), and then worked out the psychological behavioural models that were developed into an agent-based model. We took the road network around Rotterdam as a simulation environment in order to visualize the impact of multiple factors on micro, meso and macro levels on individual travel mode behaviour. Validation of this simulation environment will continue against data from actual pilots.

The ultimate objective of this simulation model is to estimate which interventions will allow for the cost-effective influencing of specifically defined mobility behaviour, and which factors on meso and macro levels determine successful

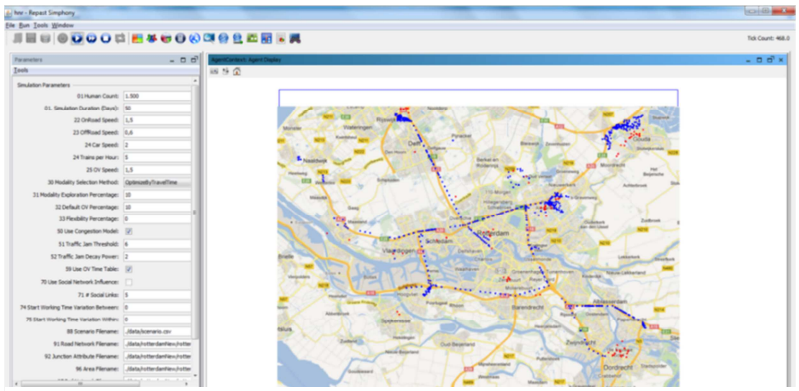


Figure 4: Simulation model of mobility behaviour in the Rotterdam region

upscaling of a (policy) intervention.

6.2 Meso level

6.2.1 Flexibilization of the labour market

Figure 5: Flex Barometer website

The most important labour market trend is the substantial extent to which employers are shifting the risks of training investment and flexibility onto employees. In the past, the permanent contract was a means of forcing employers to take employees' rights into account. The contours of this employer behaviour are only gradually becoming clear. The unanswered question is how employers will seek to bind employees to them in the future. These changes can be characterized as 'changes of the system'. The significance of the transition to more uncertainty is giving rise to different ways in which the labour market performs.

A national monitor has been developed together with many partners and stakeholders in order to be able to follow this flexibilization process. The Flex Barometer website allows a quantitative and qualitative insight to be obtained of the size, the rights, and the advantages and disadvantages of the various forms of flexible employment. When the website goes live in early 2013 it will provide a comprehensive understanding of the flexible labour market. The main importance of the Flex Barometer website is that a common framework is created to which all the parties in the sector have committed themselves.

6.2.2 Sustainable collaboration between organizations

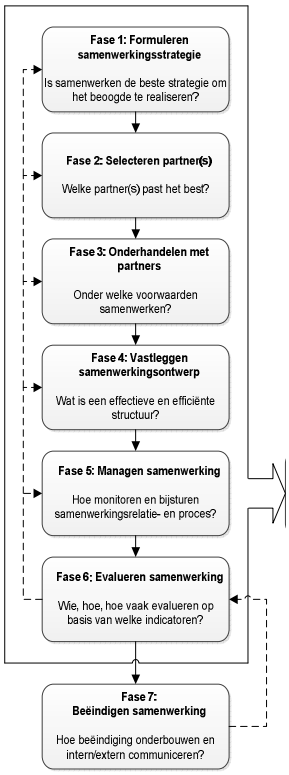


Figure 6: Model for sustainable public private partnership

Intersectoral collaboration is increasingly seen as an effective way of achieving and embedding societal issues (e.g. for improving public health, increasing social safety, and implementing innovation). Top sectors policy is an example of how intersectoral cooperation between companies, public organizations and research institutes can promote innovation. This kind of collaboration of involves voluntary long-term cooperation agreements between organizations from multiple sectors (e.g. public, private and nongovernmental organizations) aimed at achieving mutual strategic objectives and individual objectives through the sharing of resources.
Collaboration does not happen automatically. It is precisely these new interactions that form a breeding ground for conflicts between partners, miscommunication, sluggish processes, difficult coordination and decision processes, and mutual mistrust. In the situations that we have investigated, the parties and stakeholders involved were not always satisfied with the collaboration process itself, the final output achieved, and the envisaged impact on, say, health, innovation and social safety. The lack of a scientifically substantiated framework for setting up and monitoring public-private partnership led us to draw up an inventory of success and failure factors based on literature and case studies, and to develop a PPP model for creating, managing, evaluating and terminating collaboration. This initial model was enhanced with contextual, structural, process, and performance factors and indicators for successful intersectoral cooperation.

6.2.3 Social media and the creation of collective emergent behaviour

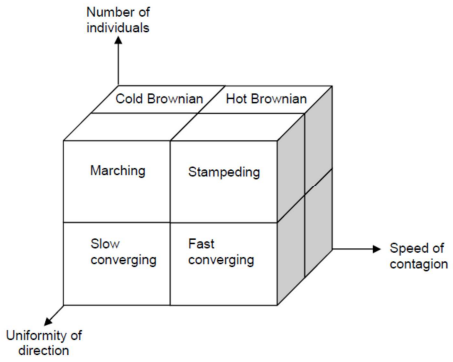


Figure 7: E-herding model for classifying Twitter messages

Collective emergent behaviour arises when social influencing causes the network relationships that people enter into become too complex to comprehend. Today, collective emergent behaviour of this kind is extremely conspicuous in the way hypes develop on social media. The speed and scale on which these networks develop is strongly enhanced and increased by social media. We may conclude that there is nothing alarming in the developments of actual ICT applications (social media), and accordingly the opportunity for online social influencing, but the impact on legislation (e.g. in relation to cyber crime), policy forming (e.g. cervical cancer vaccination), image management (e.g. 'Nestlé's Social Media Meltdown'), revenue models (e.g. peer-to-peer), innovative capacity, etc., is potentially disruptive.

In 2012 we succeeded in developing a model for describing online consumer mass behaviour ('e-herding'). This model consists of three basic dimensions: speed of spread; proportion of the population that displays a given behaviour; and degree of increasing uniformity of the mass behaviour. The mass behaviour that may be referred to as 'stampeding' usually follows a fixed pattern: the first to increase is the rate at which messages spread, then the number of people participating in the mass behaviour, and finally the uniformity of the direction in which the mass behaviour is heading. This model makes it possible for TNO to forecast certain online social media mass behaviour, because the transitions between conditions occur with a certain probability.

6.3 Macro level

Solving social issues is becoming increasingly difficult. Some of these issues may turn into 'wicked problems', which tend to crop up repeatedly. The problems are multi-party, require transformations of substantial (and sometimes international) systems, with long time horizons. The traditional answers provided by technology, modelling, regulations and top-down planning no longer work on their own. Most of the social renewal that is needed now becomes stranded in this complexity: an innovation paradox arises, and techniques fail to reach the market. Nontechnological factors, such as organizational and social innovation, have a major role in the success of transition processes.

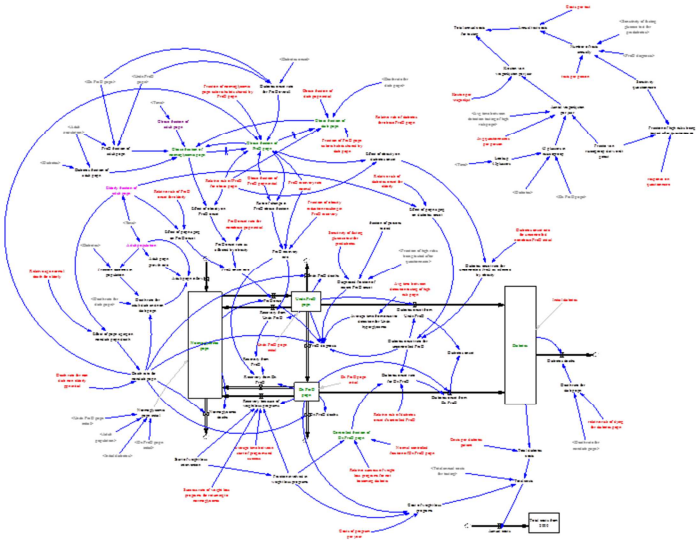


Figure 8: System dynamic model of diabetes care in the Netherlands

In 2011 we created a set of validated (process) methods and tools for analysing complex issues (innovation diagnosis), developing visions and defining paths (innovation strategy), setting up experiments (interventions) and monitoring experiments. In 2012 we investigated the advantages and disadvantages of translating the output of a qualitative complexity analysis of a social system into a quantitative system dynamic model. TNO aims with these methods and tools to develop knowledge about how a system approach to decisions about a major social issue might help, and how it could lead to specific (policy) interventions. We also wish to investigate the optimum implementation of the interventions. One of the relevant cases we chose is the system of diabetes care in the Netherlands.

We succeeded in using the implemented model to demonstrate that system dynamics provide insight into the impact of envisaged system interventions, and to quantify them. It is possible to model interventions at multiple points in the system, thereby identifying where investment would be most effective. The model can also provide insight into the social costs and benefits of the health interventions. Only an outline of these results is yet known. Therefore, further research is needed into the distinction between the effects on the levels of the patient, the healthcare organization, and the insurer.

7 Signatures

Soesterberg, 22 April 2013

A. Sanderman
MD TNO BSS

Placeholder

M. Holewijn
ETP Manager

A Publications

Peer reviewed

1. Bessems, K., van Assema, P. Crutzen, R., & Paulussen, T.W.G.M., de Vries, N.K., (2012). Examining the relationship between completeness of teachers' implementation of the Krachtvoer healthy diet programme and changes in students' dietary intakes. Public Health Nutrition, 1, 1-8.
2. Castaldi, C., Faber J. & M. Kishna (2012) Co-innovation by KIBS in Environmental Services A knowledge-based perspective International Journal of Innovation Management, International Journal of Innovation Management, accepted
3. Dusseldorp, E., van Genugten, L., van Buuren, S., Verheijden, M.W., & van Empelen, P. (2012). Combinations of techniques that effectively change health behavior. Submitted to Health Psychology
4. Dusseldorp, E., van Genugten, L., van Buuren, S., Verheijden, M.W., & van Empelen, P. (2012). Combinations of techniques that effectively change health behavior. Submitted to Health Psychology.
5. Kok, G, Marijn de Bruin, Gjalt-Jorn Peters, Rob Ruiter, Fraukje Mevissen, Pepijn van Empelen & Nanne de Vries (2012). Applying Health Psychology Theory to Prevention Programs: Intervention Mapping. Submitted Health Psychology Review
6. Kishna M., S. Negro, F. Alkemade & M. Hekkert (2012) Innovation System Building by Entrepreneurs in the Dutch Greenhouse Horticulture Sector, submitted to Industry and Innovation (under review)
7. Korthagen, I.A. & Meerkerk, I.F. van (2012). Mediatized legitimacy of local governance processes. A comparative case study on water management projects. Paper for the IRSPM Conference 2012, panel: Local Governance: Rome (2012, April 11 - 2012, April 13). [submitted to Local Government Studies, in review]
8. Koster, S.E., Aarts, O., Langley, D.J., & Hoeve, M. (submitted). Understanding online choice behavior: combining individual-level, information-level, and network-level influences.
9. Langley, D.J., Hoeve, M., Vecht, B. van der, Ortt, J.R. & Pals, N. (revision submitted). E-herding: patterns of online mass-behavior. Journal of Interactive Marketing.
10. Meerkerk, I.F. van & Edelenbos, J. (2012). The effects of boundary spanners on trust and performance of urban governance networks. [Submitted to Policy Sciences, in revision]
11. Meerkerk, I.F. van, Boonstra, B. & Edelenbos, J. (2012). Self-Organization in Urban Regeneration: A Two-Case Comparative Research. In European Planning Studies [In press, published online].
12. Meerkerk, I.F. van, Buuren, A.W. & Edelenbos, J. (2012). Boundary Judgments of water managers and adaptive governance. An analysis of the Dutch Case Haringvliet Sluices. [submitted to Water Resources Management, in revision]
13. Oeij P.R.A., Dhondt, S., Kraan K.O., Vergeer R. & Pot F.D. (2012). Workplace innovation and its relations to performance and effects for employees. (submitted: LLinE, Lifelong Learning in Europe)
14. Oeij, P.R.A., De Vroome, E.M.M., Dhondt, S. & Gaspersz, J.B.R. (2012). Can team mindfulness, psychological safety and learning repress defence

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15. Preenen, P. T. Y., Van Vianen, A. E. M., & De Pater, I. E.. To shrivel or to thrive on high or low challenging tasks: the influence of goal orientations (submitted to Journal of Managerial Psychology).
16. Prins, R.G, Brug, J., van Empelen, P., & Oenema, A. (2012). Effectiveness of YouRAction, an Intervention to Promote Adolescent Physical Activity Using Personal and Environmental Feedback: A Cluster RCT. PLoS ONE, 7, e32682
17. Steen, M., Arendsen, J., Cremers, A., Jong A. de, Jong, J. de & Koning, N. de (2013). Using interactive model simulations in co-design: An experiment in urban design, *CoDesign*
18. Theunissen, N.C.M., Bloeme, D.B.A., Gründemann, R., Stubbé, H.E. (2012).Five Level Ecology of Learning Framework (FiLELF): guidance for multi-level interventions for learning. Journal of Educational Change
19. Van Maanen, P-P., Vecht, B. van der, Boertjes, E., & Koster, S.E. (submitted). Understanding online persuasion: An agent-based modeling approach.
20. Vlasblom, E., Klein Velderman, M., Pannebakker, F.D., van den Dries, L., & Paulussen, T.W.G.M. & Reijneveld, S.A. (2012). Parenting behavior and preschooler outcomes: a systematic review of reviews. Submitted to Developmental Review

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1. Berg, H., van Hemert, D. & van der Kleij, R. (submitted). Gedragsverandering en Mobiliteit: Op weg naar een Interventietool. Tijdschrift voor Vervoerswetenschap.
2. Dhondt, S (2012). Japan heeft laten zien hoe het niet moet. Onderzoek Nederland. 30 March 2012, p.4.
3. Dhondt, S. (2012). Sociale innovatie, voorwaarde voor een duurzame economie. Rede uitgesproken bij de aanvaarding van het ambt van bijzonder gasthoogleraar aan de Faculteit Sociale Wetenschappen van de Katholieke Universiteit Leuven.
4. Dhondt, S., Goudswaard, A. (2012). Ondernemerschap uit noodzaak, uit keuze of uit toeval. Maakt dat wat uit?. ATOS Interim Management. Interim Index nr. 8. Utrecht: AIM.
5. Dhondt, S., Pot, F. (2012) Europese sociale innovatie? Opschalen van Vlaamse en Nederlandse ervaringen. Live Magazines, 25 October, p. 36 (http://www.flanderssynergy.be/live-magazine-congres-2012/)
6. Kerstholt, J.H. & Berlo, M. van (2012). Community resilience: de ontbrekende schakel tussen zelfredzaamheid en crisisbeheersing. Magazine Nationale Veiligheid & Crisisbeheersing, February 2012, 24-25.
7. Steen, M. Paradies, G. & Huisintveld, M. Verplaats je in burgers: Vijf stappen voor succesvolle burgerparticipatie. Submitted Sociale Vraagstukken.
8. Vos, P., Tubbing, L., Tjemkes, B., Keijsers, J., & Paulussen, T. (2012). Managen van publiek-private samenwerking: een PPS-managementmodel. Submitted Tijdschrift Sociale Geneeskunde.

Books (chapters)

1. Dhondt, S., Oeij, P., (red.) (2012). Sociale innovatie doe je zelf. Hoofddorp: TNO.
2. Edelenbos, J., I. van Meerkerk & E.H. Klijn (2013). Creating legitimacy in water governance networks through complexity sensitive management. Findings from survey research on water projects in The Netherlands. In: Edelenbos, J., N. Bressers and P. Scholten (ed.). Connective Capacity in Water Governance. Ashgate. [In press]
3. Kerstholt, J.H. & Berlo, M. (submitted) 'Chapter 10: A Dutch perspective on community resilience' In: Bach (ed.) 'Community Resilience', Wiley.
4. Kishna M., S. Negro, F. Alkemade & M. Hekkert (2012) Radical Innovation Strategies of Environmental-Technology Entrepreneurs in the Dutch Greenhouse Horticulture Sector, in: S. Underwood, R. Blundel, F. Lyon, C. Henry, S. Marlow & A. Schaefer (2012) Contemporary Issues in Entrepreneurship Research v.2: Social and sustainable enterprise – Changing the nature of business, Emerald Group Publishing Limited
5. Oeij P., Dhondt, S. & ten Have K. (2012). Sociale innovatie doe je zelf: inleiding. In: Dhondt, S., Oeij, P., (ed.) (2012). Sociale innovatie doe je zelf. Hoofddorp: TNO.
6. Pot, F., Dhondt, S. and Oeij, P. (forthcoming 2012) Social innovation of work and employment. In Franz, H-W. and Hochgerner, J. (Eds.) Challenge Social Innovation. Berlin: Springer
7. Steen, M. Er was eens een workshop over zelfredzaamheid, In: Peter Oeij en Steven Dhondt (eds), Sociale Innovatie.
8. Tjemkes, B., Vos, P, & Burgers K. (expected 2012). Strategic Alliance Management. Routledge, Taylor & Francis Group, Abingdon.
9. Wijk, E, Kooij-de Bode, H, Goudswaard, A. Flexibiliteit en ontwikkelmogelijkheden: perspectief van de werknemer. Hoofdstuk 3 In: TNO/CBS (ed), Dynamiek op de Nederlandse Arbeidsmarkt (forthcoming in 2013).

TNO reports

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2. Attema-van Waas, R., Torre, W. Weerdt van der, C.& Westerlaken, N. Analyse landlord-tenant dilemma: case duurzame lichtoplossingen. TNO Rapport
3. Beek van der, D., Hof, T. & Gorris, T.. Experiment Moby: Onderzoek naar de effecten van 'serious gaming' op rijgedrag in een Nederlands onderzoeksinstituut. TNO report.
4. Berg,H, van Hemert, D., Jonkers, E., Clignet, L. & de Goede, M. Gedragsverandering en Mobiliteit: Op weg naar een Interventietool. TNO Rapport.
5. Erp, J.B.F. van, Broek, E.L. van den, Schavemaker, J.G.M., Kranenborg, K., Penning, H.L.H. de, Blanson Henkemans, O.A., Tilburg, M.W.T. van, Bierman, E.B.P., Meulen, F.A. van der, Papp, Z., Haak, W.P. van den, Diggelen, J. van, Janssen, J.B., Witberg, R.R., Kraaij, W. (2012). ePartner architecture workshops. The Results. TNO 2012 M10391.
6. Esmeijer, J. en Plas van der A. Innovatiekaart. Empowered learning in de 21 eeuw. TNO Report
7. Gelevert, H., et al. Systeem dynamisch model Diabetes zorg. TNO Report

8. Houben, M., Bos, J., and Eric Groen. Potential non-pharmacological countermeasures for motion sickness. TNO Report
9. Kamphuis, W., Delahaij, R., Vorm van de J., & Preenen, P. Resilience on individual, team and organizational level: A multilevel approach. TNO Report
10. Kamphuis, W., Vos P. (2012). Chapter X. The LOCI-Method. TNO Report
11. Lindt, M., Paradies, G. & Emmert, S.. Netwerken rond maatschappelijke initiatieven: Succes- en faalfactoren. TNO Report 2012 R11190.
12. Looije, R., Neerincx, M.A., Paulissen, R., Paulussen, T.W.G.M. and Rypkema, J How to coach teachers for professional development. TNO Report
13. Neerincx, M., Theunissen, N., Paulissen, R. & Paulussen, T.W.G.M. (2012) E-coaching on teacher's competencies and situated lessons: The example of sex education. TNO Report
14. Simons, M., van Empelen, P. (2012). Evaluatie interventie 'Beweeggames'. TNO/LS 2012 R10213
15. Suurs, R., van der Vecht, B., van de Lindt, M., van Scheepstal, P., Clignett, L. & Jonkers, E. : FOUNTAIN: Doelstellingen, achtergronden en ontwikkelperspectief. TNO Report.
16. Thönissen, F.H., Berg, C. van den. Politiek handelen in coalities. Delft: TNO Report (versie: 11/2012)
17. Tubbing, L., Tjemkes, B., Vos, P., Keijsers, J., & Paulussen, T. (2012). Intersectorale Allianties: Een Literatuurstudie en Onderzoeksraamwerk. TNO/LS 2012 R10799
18. Verbiest, S., Kooij-de Bode, H., Preenen, P., Wijk, E. van, Goudswaard, A. Flexwerkers: Een empirisch literatuuroverzicht. Hoofddorp: TNO Report.
19. Vlasblom, E., Klein Velderman, M., Pannebakker, F.D., Van den Dries, L., Paulussen, T.G.W.M., & Reijnenveld, S.A. (2012). Parenting behavior and toddler behavior/outcomes/development: A systematic review of reviews. TNO Report.
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1. Bouma, H., Raaijmakers, S., Halma, A., and Wedemeijer, H. (2012). Anomaly detection for internet surveillance. Proc. SPIE, vol. 8408, 840807. http://dx.doi.org/10.1117/12.918573
2. Boertjes, E., Gerrits, B., Kooij, R., van Maanen, P.-P., Raaijmakers, S., and De Wit, J. (2012). Towards a social-media based model of trust and its application. In M.D. Hercheui et al. (Eds.): HCC10 2012, IFIP AICT 386, pp. 250–263.
3. van Erp, J.B.F. (2012). The ten rules of touch : Guidelines for social agents and robots that can touch. Proceedings of the 25th CASA workshop, Singapore, May 2012. Nanayang Technological University.
4. Langley, D.J., Hoeve, M., Ortt, J.R. & Pals, N. E-herding: patterns of online mass-behavior. Proceedings of the 41st European Marketing Academy Conference2, 22-25 May 2012, ISCTE Business School, Lisbon, Portugal
5. Oeij, P.R.A., De Vroome, E.M.M., Dhondt, S. & Gaspersz, J.B.R. (2012). Team dynamics in complex innovation projects. In R. Tuninga, T. Pasch & D. Von Bergh (Eds.), Proceedings of 2nd International PhD Conference. Bridging

[2] On the basis of the presentation of this paper, TNO has been invited by the chairperson of the 2013 European Marketing Academy conference to form a special interest group.

theory and practice (pp. 208-220). Breukelen: Nyenrode Business Universiteit and Open University of The Netherlands.

6. Suurs, R., van Scheepstal, P., van de Lindt, M., Clignet, L. & Jonkers, E. (2012, in press). Modelling a socio-technical transition towards ‘flexible commuting behaviour’. Proceedings of the 8th Conference of the European Social Simulation Association, September 10-14, University of Salzburg, Austria.

B Media exposure 2012

1. Martens, P. Langer werken. ‘We moeten naar actieve werkplekken’. (Interview met Geert Van Hootegem en Steven Dhondt). Knack Magazine March 2012.
2. ETP-project Gedrag & Prestatie in discussie met parlementen. Gesprek van de Tweede Kamer Commissie voor Sociale Zaken met Anneke Goudswaard, 25 May 2012.
3. Rondetafelgesprek over flexibiliteit en zekerheid. Kamernieuws. Tweede kamer der Staten generaal. http://www.tweedekamer.nl/nieuws/kamernieuws/newspage2001_rondetafelgesprek_flexibiliteit_en_zekerheid.jsp (genodigde Anneke Goudswaard).
4. Ronald Dekker. ‘Dutch Design’: Flexconferentie op Papendal. Zoeken naar een nieuwe balans tussen flex en zekerheid. Zipconomy, 6 June 2012. http://www.zipconomy.nl/2012/06/dutch-design-flexconferentie-op-papendal-zoeken-naar-nieuwe-balans-tussen-flex-en-zekerheid/ (guest Anneke Goudswaard)
5. Flexconferentie Dutch Design. Factor Vijf, 4 June 2012. http://www.factorvijf.eu/wp/?p=1165 (guest Anneke Goudswaard)
6. Goudswaard, A. Flexibiliteit in bedrijf – op zoek naar de juiste balans. Congres Strategische Flexibiliteit, Leusden, 10 October 2012.
7. Telefonisch interview met Paulien Bongers (Thursday 25 October 13:00) ten behoeve van een kort artikel (350-400 words) voor Uitzendwerk, het relatiemagazine van de ABU. Onderwerp van gesprek is de Flexbarometer.
8. Goudswaard, A. (2012). De luchtdruk rond Flexwerk. P&Oactueel. (te verschijnen in 12/2012)

C Congress presentations / invited lectures / workshops

1. Aarts, O., Maanen, P.-P. van, Ouboter, T., Schraagen, J.M.C., Online Social Behavior in Twitter: A Literature Review, Proceedings of The Special Workshop on Social Media Analysis and Mining (SMAM), held in conjunction with the 2012 IEEE International Conference on Data Mining (ICDM), IEEE Computer Society Press, Brussels, Belgium, December 10, 2012.
2. Berlo van, J. Community resilience in the Netherlands. At symposium 'Community Resilience' in New Zealand, December 2012.
3. Dhondt, S. (2012). Sociale innovatie, voorwaarde voor een duurzame economie. Rede uitgesproken bij de aanvaarding van het ambt van bijzonder gasthoogleraar aan de Faculteit Sociale Wetenschappen van de Katholieke Universiteit Leuven.
4. Dhondt, S. Discussion on workplace innovation as driver for economic growth, Brussels, August 30th 2012. (Discussion with: Ingrid Lieten, Vice-Minister-President of the Government of Flanders, Flemish Minister for Innovation, Public Investment, Media and Poverty Reduction, and with Mr Peltomaki Antti, Deputy Director General, DG Entrerprise and Industry).
5. Dhondt, S. and Pot, F. Sociale innovatie in Europa. Slot-event van het Nederlands Centrum voor Sociale Innovatie. Delft: 22 March 2012.
6. Dhondt, S. Groei ZZP en uitdagingen voor CIO's. Masterclasses - CIO Day – Session D People. (Noordwijkerhout, http://www.cioday.nl/CioDay/12580/PROGRAM.html), 12 November 2012.
7. Dhondt, S. Invited keynote speaker for the 'Lohnhallengespräch 'Stand und Perspektive der Beschäftigungsfähigkeit im Rahmen des ESF in Nordrhein-Westfalen'' on 21 June 2012. Bottrop, Germany. Title: 'Einordnung des NRW-Ansatzes in das Spektrum europäischer Politikansätze'.
8. Dhondt, S. Meeting on social innovation at SFS Dortmund, 26-27 April 2012.
9. Dhondt, S. Organizer Mini Symposium 3 – Workplace innovation: learning from Belgium and The Netherlands - 'Delivering Workplace Benefits through Wellbeing interventions', 2nd International Wellbeing at Work Conference, 25 May 2012, Manchester.
10. Dhondt, S. Organizer Plenary Session 4 – Workplace innovation and wellbeing - 'Delivering Workplace Benefits through Wellbeing interventions', 2nd International Wellbeing at Work Conference, 25 May 2012, Manchester.
11. Dhondt, S. Presentation Dortmund/Brussels Position Paper on Workplace Innovation to Entreprise Policy Group and DGs Industry Europe, Brussels, 28 June 2012.
12. Dhondt, S. Presentation of Dortmund/Brussels Position Paper on Workplace Innovation to the Director-General (Mr Calleja) of DG Enterprise & Industry, at the meeting of the Enterprise Policy Group on the new Industrial Policy of Europe. (Brussels, 28 June 2012). (http://ec.europa.eu/enterprise/policies/innovation/policy/social-innovation/index_en.htm)
13. Dhondt, S. Sociale innovatie, een voorwaarde voor een duurzame economie. Presentatie aan Flanders Synergy, algemene vergadering, 17 April 2012.
14. Dhondt, S. Workplace innovation as a part of social innovation in Europe. Statement European Parliament, Brussels: 16 May 2012.

15. Dhondt, S. Workshop ‘Supporting social invitation in the workplace’ on 30 May 2012 in Brussels organized by the European Commission (Directorate General for Enterprise and Industry) and by the Government of Flanders (Flanders Synergy).
16. Dhondt, S., Horizontale organisatie, mensgericht management: een bouwsteen voor de toekomst in je bedrijf. Presentatie aan SyntraWest Kortrijk 14 September 2012.
17. Dhondt, S., Zorgen over zorg. Wat kan innovatieve arbeidsorganisatie voor de zorg betekenen? HRM in de Gezondheidszorg: Samen Bouwen aan de Toekomst van de Zorg, Brugge, 8 March 2012
18. Jonkers, E., Martens, M.H., Van de Lindt, M.C., & Vonk, T. Identification and modeling of travel behavior determinants in order to find successful interventions The 5th International Conference on Traffic and Transport Psychology took place in Groningen, The Netherlands, on 29-31 August 2012.
19. Goudswaard, A. Innoveren door werkenden - een koppeling van uiteenlopende invloedssferen. Bijdrage aan ‘De canon van Sociale Innovatie’, Symposium on 26 november 2012, De Burcht/Vakbondsmuseum, Amsterdam
20. Kerstholt J. & Roelofs. Workshop op congres ‘zelfredzaamheid’ over actief burgerschap, November 2012
21. Oeij,P. TNO (peter.oeij@tno.nl) (with Ernest de Vroome, Steven Dhondt & Jeff Gaspersz). Managing teams performing complex innovation projects. ICIM 2012. 9th International Conference on Innovation and Management 14-16 November 2012 - Eindhoven - the Netherlands (Best Western Premier ART Hotel)
22. Suurs, R., van Scheepstal, P., Van de Lindt, M., Clignet, L. & Jonkers, E. Modelling a socio-technical transition towards ‘flexible commuting behaviour’. ESSA 2012 – 8th Conference of the European Social Simulation Association, University of Salzburg, Austria