

Application Form Kortlopend onderzoek 2006 Onderzoeksprogramma Netwerk van Netwerken

File number (Dossiernummer):

1. Applicant(s)

main applicant/contact person

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other applicants

names, titles, university and research school: Dr. T. M. Egyedi, Delft University of Technology, WTMC male
 female
Prof. dr. ir. W. E. Bijker, University of Maastricht, WTMC male
 female

Please enclose a short Curriculum Vitae of the main applicant (max. 300 words)

See 6d.

2a. Title of the research project

(in Dutch and English)

NL: Complexe interacties tussen internationale standaardisatieprocessen en nationale innovatieprojecten

UK: Complex interactions between international standardization and national innovation projects

2b. Short summary of the problem definition and objectives

ICT networks are increasingly international in nature, which makes it difficult for national governments to influence their development and use. The standards on which they run cater to shared international needs, while at the same time the call for customized, local and flexible network technologies is becoming more urgent. Hence, there is a tension between the desire for standards and stability on the one hand and flexibility and adaptation to local preferences on the other hand. This project investigates how national governments deal with this tension and aims at improving the policy-making strategies that can be employed by national governments to intervene in innovation and standardization processes with a strong international dimension.

To gain empirical insight into the interactions between international standardization and national innovation projects, we will carry out a comprehensive case study (based on in-depth interviews and archival research). In the early 1990s, several European governments started to think about the international coordination of their security policies. The Dutch government decided to build the C2000 network for the digital communication between emergency services. After years of negotiation and debate, it was decided to use the European Tetra standard for the C2000 network. In this process, the interactions between national policy makers and European standardization institutions (such as the European Telecommunications Standards Institute (ETSI), the Schengen Telecom Group and the European Conference of Postal and Telecommunications Administrations (CEPT)) played a key role. Developing standards like Tetra that facilitate the inter-connection of various national networks, the creation of an international “network of networks” in the field of safety and security was the ultimate aim. The development of the Tetra standard and the building of the Dutch C2000 network took place simultaneously in the 1990s. This project focuses on the interactions between these two processes and the sometimes troublesome character of their co-evolution.

Its theoretical focus consists of a detailed examination of two mechanisms that limit the policy space available to national governments in international standardization processes: (1) the tendency of standards to become *obdurate* (resistant to change) once they have been developed and implemented, and (2) the tendency of both standards and ICT networks to *drift* away from their initial scope and purpose.

Our analysis serves two aims: (1) it will lead to an improved understanding of the tensions between international standardization and local adaptation and the policy strategies that national governments can develop (and have developed) to deal with these tensions; and (2) it shows how the mechanisms of obduracy and drift limit the policy space available to national governments.

Thus, the scope of this project can be summarized by the following question:

How do national governments, in interaction with European standardization institutions, deal with the tension between the need for internationally accepted, standardized ICT networks (i.e. the European Tetra standard) on the one hand, and the desire to adapt these networks to national policies and preferences (i.e. the C2000 project) on the other hand?

2c. MaGW disciplines and max. 6 keywords

keywords: standardization, digital communication networks, security policy, obduracy, drift, policy space

54007 Interaction of technology and society

54002 Issues in science and technology

52503 Policy-making strategies

2d. NVN-theme

- Marktstructuur en mededinging (Market structure and competition)
- Gebruikers en toegankelijkheid (Users and accessibility)
- Standaardisatie en innovatie (Standardization and innovation)
- Beleid en instituties (Policy and institutions)

3. Proposed publications

The project should result in:

1. one international peer-reviewed article on the role of national governments in the decision making process about C2000 and the Tetra standard, to be submitted to *Technology and Culture (TC)*.
2. one international peer-reviewed article on the role of 'obduracy' in the process of the mutual shaping of Tetra and C2000 and the implications for the policy space available to national actors, to be submitted to *Science, Technology and Human Values (STHV)*.
3. one international peer-reviewed article on the role of 'drift' in the process of the mutual shaping of Tetra and C2000 and the implications for the policy space available to national actors, to be submitted to *Research Policy (ResPol)*.
4. one international peer-reviewed article in which the insights derived from this case study are compared with other cases of national roles in international standardization, to be submitted to *Technology in Society (TS)*.
5. one article for a Dutch professional journal in which the implications of this study for policy making are discussed, to be submitted to *Beleid & Maatschappij (B&M)*.

Draft versions of these papers will be presented at national and international workshops and conferences. The results will be discussed with academic audiences and with policy makers in the fields of security policy and standardization. To discuss the policy implications of our research we will organize annual workshops at the Ministry of the Interior (see 9.2 and 9.6).

4. Research team

Name, titles	discipline/university	hours/week or fte
Dr. A. Hommels	History and sociology of technology, Arts and Science/University of Maastricht	0,6 fte
Dr. T.M. Egyedi	Standardization, ICT, Technology dynamics/ Delft University of Technology	0,4 fte
Prof. dr. ir. W. E. Bijker	History and sociology of technology, Physics/ University of Maastricht	0,4 fte
Junior researcher (to be appointed)	Preferred profile: European studies, policy sciences or Science, Technology and Society studies (STS)	0,4 fte

5. Duration of requested subsidy

(Please note that the maximum duration for short-term projects is 30 months!)

duration (years): 30 months

to commence on (date): January 1, 2007

6a. Requested personnel in duration of appointment and hours per week in €

Personnel: in duration of appointment, in hours per week and €			
	Duration of appointment in months	Hours per week	Euro
Postdoc	30	24	€ 86.070,00
Junior researcher	16	16	€ 27.264,00
Senior researcher 1	21	16	€ 54.740,00
Senior researcher 2	6	16	€ 15.640,00
TOTAL			€ 183.714,00

6b. Requested material goods in €...

(Please note that material costs may not amount above € 40.000. Furthermore for material costs exceeding € 10.000, a matching of 25% is obligatory.)

€ 10.000,00

6c. Total requested amount (6a and 6b) in €

(Please note that the maximum amount may not exceed € 200.000)

Total: € 193.714,00

6d. Specify and motivate the requested personnel (especially for senior researchers, see brochure page 43) and material costs (see brochure page 45)

Please enclose a short Curriculum Vitae for Senior Researchers and Postdocs (max. 300 words per C.V.)

This project has to be carried out by a postdoctoral researcher with input from two senior researchers, rather than by a PhD student, for a number of reasons. Because of the complexity of the problem it focuses on, this project requires extensive knowledge of an already existing body of theoretical literature. Moreover, standardization is not a monodisciplinary research area. We believe that an interdisciplinary approach is needed to investigate standardization – an approach that requires an integration of insights from different fields such as science, technology and society studies (STS), standardization studies, economics, political science and management studies. Finally, the constituency of a senior team more likely leads to internationally recognized contributions.

Dr. A. Hommels (postdoctoral researcher, main applicant) will mobilize and deepen her knowledge about processes of sociotechnical change and the role of obduracy (resistance to change) in particular. Moreover, her knowledge about the C2000 project, her contacts with policy makers at the Ministry of the Interior and Kingdom Relations (BZK) and her access to the relevant C2000 archives are necessary conditions for this project.

The project requires the additional input of two senior researchers. Dr. T. Egyedi is an international expert in standardization research. This project can benefit much from her broad experience in investigating ICT standards, policy trends in standardization, and the tension between standards and flexible infrastructures. Furthermore, Egyedi's contacts with engineers and other experts within European and international standards fora, help us to get the necessary technical input and access to the archives relevant for Tetra (ETSI archives). Prof.dr.ir. W.E. Bijker's knowledge about the dynamics of sociotechnical developments and the politics of

technological culture will be of much value for this project. Moreover his extensive knowledge about the policy and management of innovations and his wide experience in government consultancy will be beneficial for the policy component of this project in particular. His input will mainly be given in the final stages of the project (see 9.2).

The junior researcher (to be appointed) will assist in the first stages of the project, in making interview appointments, doing literature research, and archiving references and empirical sources.

The material costs consist of travel costs for the empirical research: interviews and the archival research (see 9.2). We will hold approximately 30 interviews and we will make a number of visits to the archives of ETSI and C2000. Because the ETSI archives are based in France, and many of the key actors and institutions to be interviewed are international, the travel costs will include air travel. The material costs also include travel costs for the annual workshops at the Ministry of the Interior.

Curriculum Vitae Dr. Anique Hommels (Postdoc, main applicant)

Anique Hommels (1972) is assistant professor at the Department of Technology & Society Studies, University of Maastricht (since 2003). She was trained in the interdisciplinary Arts and Science programme of the University of Maastricht (1991-1995). In her PhD thesis she concentrated on the resistance to change ('obduracy') in urban sociotechnical transformation processes. A book (*Unbuilding Cities. Obduracy in Urban Sociotechnical Change*), based on her thesis, has been published by MIT Press in 2005. After her PhD, she worked as a researcher at MERIT/Infonomics (Maastricht Economic Research Institute on Innovation and Technology) (2001-2004). Her research focuses on processes of sociotechnical change and resistance to change. Her work is interdisciplinary in combining perspectives from history, sociology and philosophy. At MERIT/Infonomics, her empirical focus shifted to the network society, but her theoretical focus on sociotechnical change remained. In 2003, she was awarded the Brooke Hindle Fellowship from the American Society for the History of Technology (SHOT). In 2005, Hommels was commissioned by the Dutch Ministry of the Interior (BZK) to monitor the final evaluation of the C2000 project, which will be presented to the Parliament in 2006.

Curriculum vitae Dr. T. M. Egyedi (senior researcher 1)

Tineke Egyedi (1960) is senior researcher Standardization at the ICT/TPM Department of the Delft University of Technology. Since 1990 she worked, first intermittently and since 2000 permanently, at the TU Delft (researcher), for KPN Research (consultant, 1994), for the Royal Institute of Technology in Stockholm (researcher, 1995-1996), and for the University of Maastricht (researcher; 1997-1998). In these capacities she did policy studies for Dutch ministries (e.g. on trends in standardization), participated in European projects many of which dealt with IT standardization (ELECTRA, SLIM, Consortium standardization, SDOs & users, NO-REST, ICT standardization policy). Her current projects address the tension between standards and infrastructure flexibility (Next Generation Infrastructures), standards dynamics and interoperability issues (Sun Microsystems), standards education (IEC), and the EU's ICT standardization policy (EU project). Among other activities, she has coordinated the department's Infrastructure Research program, chaired IEEE standardization conferences and conference program committees and organized conference tracks. Currently she leads several research projects, is associate editor of the *International Journal of IT Standards and Standardization Research* (Idea Group), and member of the editorial board of *Computer Standards and Interfaces* (Elsevier). She has co-edited books, conference proceedings and special journal issues. Since June 2005 she is president of the European Academy for Standardization (EURAS).

Curriculum Vitae Prof. dr. ir. W. E. Bijker (senior researcher 2)

Wiebe Bijker (1951) is professor of technology and society (since 1994), was trained as a physicist (1976), and holds a PhD in the history and sociology of technology (1990). His research focuses on the historical and sociological understanding of the development of technology in relation to society. Research themes include the politics of technological culture, policy and management of innovation, and the role of technology in the knowledge society. Bijker is founding co-editor of the monograph series *Inside Technology* at MIT Press, was President of the Society for Social

Studies of Science, Director of the Netherlands Research School *Science, Technology, and Modern Culture* (WTMC), and Dean of the Faculty of Arts and Culture (Universiteit Maastricht). Bijker is member of the Executive Committee of the EU Network of Excellence PRIME. Bijker was visiting professor at the University of Oslo, and the Technical Universities of Vienna and Denmark. He chaired an advisory committee to the government's Science and Technology Policy Board (AWT) to investigate the possible contributions of the humanities to addressing problems of the information society (2001-2002). He also chaired the Royal Academy of Science (KNAW) committee to prepare an international research institute on e-science in the social sciences and humanities (2002-2003). This led to the start of the KNAW-Virtual Knowledge Studio on 1 January 2006. His latest book, published in Dutch, analyzes the role of scientific expertise, advice, and regulatory work in politics, using the case of the Health Council of the Netherlands: Bal, R., Bijker, W.E., & Hendriks, R. (2002). *Paradox van wetenschappelijke gezag. Over de maatschappelijke invloed van adviezen van de Gezondheidsraad, 1985-2001*. Den Haag. Bijker's current research concerns the relations between technology and politics, particularly focusing on the vulnerability of high-tech societies.

7. Has this application been submitted elsewhere?

no

yes, to:

8. Other funding for the project?

no

yes, to:

If positive, please indicate the kind of the matching and the extent in fte and/or €.

Please enclose the answers to questions 9 to the form (2000 words maximum, excl. literature references). Please answer in accordance with the subheadings 9.1-9.7

9. Description of the research project

9.1 Research topic, problem definition, theoretical concepts, conceptual framework

ICT networks often cross national borders and this increases the need for international coordination and standardization. At the same time, we need networks that are specifically adapted to local circumstances and preferences (Star & Ruhleder, 1996). Hence, there is a tension between the desire for standards and stability on the one hand and flexibility and local adaptation on the other hand. This project investigates how national governments deal with this tension and aims at developing policy-making strategies that can be employed by national governments to intervene more effectively in innovation and standardization processes with a strong international dimension.

To gain empirical insight into the interactions between international standardization and national innovation projects, we will carry out a comprehensive case study. Our case study focuses on the mutual shaping of the Dutch C2000 network for the digital communication between emergency services, and the European Tetra standard. In the early 1990s, several European governments started to think about the international coordination of their security policies. These initiatives fell within the Schengen Agreement (signed in the late 1980s). This agreement expressed the ambition to create a Pan-European network for public safety and security, and to enhance the cooperation between police services in different EU countries. By developing new standards (like Tetra) that facilitate the inter-connection of various national communication networks, the creation of an international "network of networks" in the field of public safety and security was

the ultimate aim. The interactions between national policy makers and European standardization institutions played a key role in this process. How did the Dutch government deal with the aim of developing a national digital communication network (C2000) that, simultaneously, conformed to international technological, institutional and political developments and decisions?

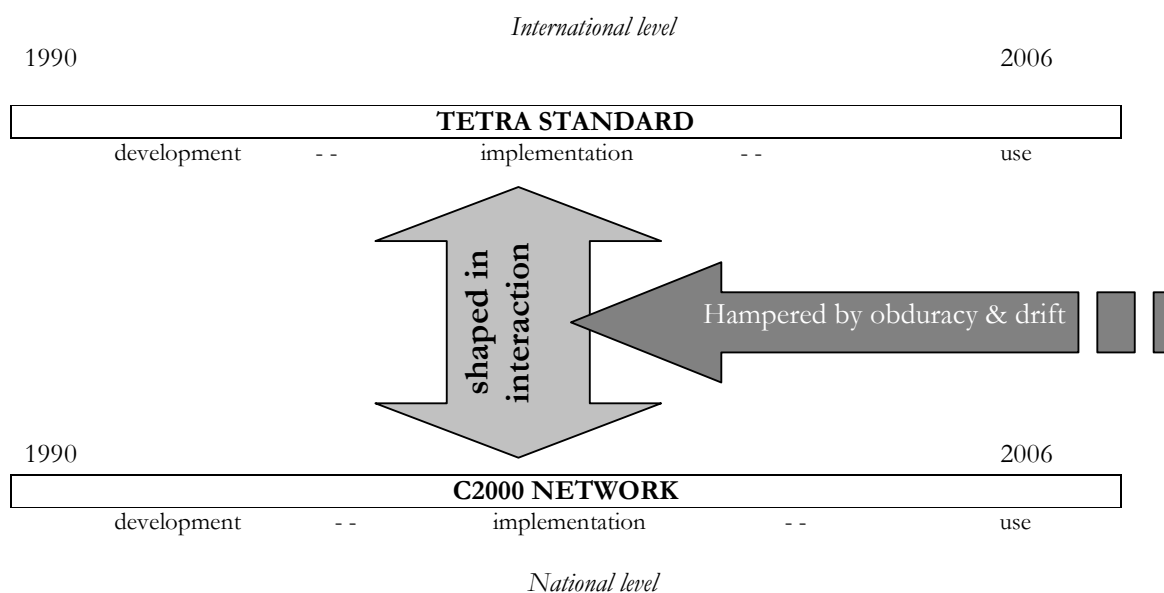
To improve our theoretical understanding of the tension between international standardization and national policies and preferences, we will focus on two mechanisms that limit the policy space available to national governments in international standardization processes: (1) the tendency of standards to become *obdurate* once they have been developed and implemented; and (2) the tendency of standards to *drift* away from their initial project scope and purpose. Obduracy means, for example, that standards become locked-in in a specific developmental path, which makes them difficult to change later on (Cowan, 1992; Egyedi & Verwater-Lukszo, 2005; Hommels, 2005). As a consequence, there is only limited time during which effective policy interventions can be made. Drift relates to the inclination of standards and technologies to shift away from their original scope and purpose (Sherif et al., 2005). This occurs for a variety of reasons and often outside anyone's deliberate influence (Ciborra, 2000; Snook, 2000). It may happen, for example, during standard development: the initial requirements of the standard change over time or need adaptation to local circumstances.

The empirical analysis of the co-evolution of C2000 and the Tetra standard serves as a clear example of the difficulties involved in aligning national and international preferences and of the ways in which obduracy and drift limit the policy space available to national governments in these projects (see Figure 1).

The following question summarizes the scope of this project:

How do national governments, in interaction with European standardization institutions, deal with the tension between the need for internationally accepted, standardized ICT networks (i.c. the European Tetra standard) on the one hand, and the desire to adapt these networks to national policies and preferences (i.c. the C2000 project) on the other hand?

Figure 1: Schematic representation of the project



9.2 Approach, research design, methodology, work plan (personal, financial, time planning), research resources, data

The research will be based on a combination of an empirical case study and literature research:

1. Empirical case study:

The case study will be based on a combination of interviews and archival research. This combination allows the verification of statements by using other sources (triangulation). The interviews will provide insight into the (historical) development of Tetra and C2000, the strategies the actors employed in dealing with the tensions between the national and international levels and the reasoning behind specific decisions made during the projects. The development of Tetra and C2000 was supported by a number of renowned standardization institutes (ETSI, CEPT) and became accompanied by the establishment of several new institutional arrangements. We will start by identifying institutions and key actors involved in the standardization of Tetra and the C2000 network. We will carry out approximately 30 in-depth semi-structured interviews with members of the ETSI RES-6 committee (responsible for defining the functional and technical specifications of Tetra), members of the Schengen Telecom working group (an advisory group to ETSI RES-6 in which the Netherlands had a seat), policymakers of the Ministry of the Interior (Project Office C2000), engineers at ISC (a subsidiary of the Ministry, responsible for the development of C2000), etc.

The archival research and document analysis aim at achieving insight into the institutional dynamics of the two projects and their interactions. Therefore, data mining will take place on the archives of the two main institutions involved in the development of C2000 and Tetra (the C2000 project archives at the Ministry of the Interior and the ETSI archives). We will analyze primary sources related to the development, implementation and use of C2000 and Tetra, such as minutes of the meetings of the ETSI RES-6 committee, the Schengen Telecom group, project plans, functional and technical specifications, correspondence between the national government and international standards agencies, minutes of Dutch parliamentary debates about the Tetra standard etc. The empirical investigations will cover the whole period between 1990 and 2006. Hommels has access to the C2000 archives. Egyedi has close contact with ETSI.

2. Literature research:

The literature review aims at elaborating and refining the conceptual framework of this study. The literature review will be focused on the concepts of obduracy and drift and on finding examples of other cases of national roles in international standardization. The literature will cover a variety of disciplines such as STS, standardization studies, management studies, political science and evolutionary economics.

In this project, empirical research and theory development are intertwined. By relating empirical insights to theoretical notions (such as obduracy and drift), we hope to generate insights that do more justice to actual political and institutional dynamics and practices related to standardization and innovation. Moreover, in this way, we hope to improve the policy-making strategies that can be applied to deal with the limited policy space of national governments in international standardization processes.

See Table 1 for a translation of our approach into a research plan.

Table 1: Research plan

Year	Empirical research	Theory development	Output	Personal
January-September 2007	Interviews Archival research and document analysis C2000 (C2000 archives)	Literature review	Submission article to TC Conference presentation	Hommels Junior researcher
October 2007-June 2008	Interviews Archival research and document analysis Tetra (ETSI) Analysis of mutual shaping of Tetra and C2000	Confrontation of theoretical models with insights from our empirical research	Conference presentation(s) Submission article to STHV Workshop at Ministry of the Interior (I) Submission article to ResPol	Hommels Egyedi Junior researcher
July-December 2008	Comparison with other cases		Submission article to TS Workshop at Ministry of the Interior (II)	Hommels Egyedi
January-June 2009	Analysis of policy implications of the empirical case study	Development of theoretical model for understanding the tensions arising from the mutual shaping of national and international ICT projects	Conference presentation(s) Submission article to B&M Workshop at Ministry of the Interior (III)	Hommels Egyedi Bijker

9.3 Scientific relevance (originality, innovation, international component(s), collaboration of disciplines)

This project relates to a number of debates that are currently prominent on the academic research agenda:

1. the (decreasing) influence of national governments in international developments (e.g. Castells, 1996; 2000)
2. the need felt in the fields of STS and economics to learn more about international standardization processes (Schmidt & Werle, 1998)
3. the discussion about the tensions between standards and system flexibility (Egyedi, 2001)
4. the interest in processes of the networking of Europe (see Misa & Schot, 2005; van der Vleuten & Kaijser, 2005).

This project thus draws on, and contributes to, academic work in a variety of disciplines. The project has a strong international orientation and explicitly aims at making contributions to international scholarship in these fields. Moreover, whereas most studies so far have limited their focus on the development of standards, this project gives us the unique opportunity to investigate all stages in a standard's lifecycle, from its inception to its use in the C2000 project.

9.4 Social and policy relevance (addressing or resolving social and/or policy issues, or creating a new, or adapting an existing, application and/or product)

The social and policy relevance of this study is two-fold:

1. It increases insight in the policy-making strategies that can be employed by national governments in international standardization processes, and, vice versa, how national governments cope, when confronted with the impact of international (European) standards and standardization institutions on their national innovation policies. Particularly, a clearer insight into the ways in which the mechanisms of obduracy and drift limit the policy space of national governments, can help to devise new strategies that make intervention in international innovation and standardization processes more effective. The policy lessons learnt from this case study can also be applied to other innovation processes with a strong European dimension. Moreover, the development of the Tetra standard has not yet come to an end and the Dutch government still has an interest in being involved in its development. Therefore, the Ministry of the Interior has recently initiated a 'four countries pilot' (Netherlands, Belgium, Germany, France) to test the standard in an international environment (see Letter of the four ministers of the Interior to Mr. Frattini, February 2006).
2. By focusing on the C2000 case and the Tetra standard, this project addresses the policy field of international security and the international fight against terrorism. The Ministry of the Interior recently started to develop policies to strengthen the role of national governments in cross border cooperation for security and stability (Ministry of the Interior and Kingdom Relations, 2005; Inspectie Openbare Orde en Veiligheid, 2006). Moreover, the Brinkman committee proposed to adapt the operational security services to a more intense international collaboration (Gemengde Commissie Veiligheid en Rechtsorde, 2005). We expect that these national policy initiatives will experience limitations and strategic dilemmas similar to those analyzed in this project, because of the international context in which they try to intervene.

9.5 Target group(s)/users; dissemination of research results and/or transfer of knowledge

The results of this project will be interesting for different target groups:

1. the, so far, rather distinct academic research communities of scholars in the fields of STS, standardization studies, management/political science, and economics of innovation
2. EU and (Dutch) national policy makers in the fields of ICT R&D, innovation policy, and (inter)national security policy
3. the community of scientists and policy makers in (inter)national standardization institutes

The results of this project will be made available to these groups by presenting our work at (inter)national conferences, by publishing our work in national and international journals (see 3), and by actively involving (Dutch) policy makers in translating our results to policy (see 9.6).

9.6 Contact(s) with policy makers of the national or a local administration; presentation of the research results

We have established close contacts with policy makers at the Dutch Ministry of the Interior and Kingdom Relations (BZK), Directorate-General for Public Safety and Security, who are involved in the C2000 project. We will collaborate with the Department of Information Strategy, represented by Drs.ir. R. Slomp. This Department focuses on conducting a coherent strategic policy on public safety and security, the provision of information, and international affairs. We have received a letter from Mr. Johan Remkes, Minister of the Interior (dd. 3-5-2006, Reference nr. 2006-0000152106), in which he underlines the relevance of our research proposal for his policy domain, expresses his interest in the results of our research, and states his personal interest in participating in the workshops we plan to organize at his Ministry. These workshops are aimed at discussing the results and policy implications of our research with policy makers (see 3 and

9.2). Further, close contacts exist with high level representatives in the European and international standards bodies and with policy developers in industry and in the European Commission.

9.7 Literature references (max. 2 pages)

- Castells, M. (1996; 2000). *The Rise of the Network Society* (2nd ed. Vol. 1). Oxford: Blackwell Publishers.
- Ciborra, C. U. (Ed.). (2000). *From Control to Drift. The Dynamics of Corporate Information Infrastructures*. Oxford: Oxford University Press.
- Cowan, R. (1992). High technology and the economics of standardization. In M. Dierkes & U. Hoffmann (Eds.), *New Technology at the Outset. Social Forces in the Shaping of Technological Innovations* (pp. 279-300). Frankfurt, New York: Campus, Westview.
- Egyedi, T. M., & Verwater-Lukszo, Z. (2005). Which standards' characteristics increase system flexibility? Comparing ICT and batch processing infrastructures. *Technology in Society*, 27, 347-362.
- Egyedi, T. (2001). Infrastructure flexibility created by standardized gateways: the cases of XML and the ISO container. *Knowledge, Technology, and Policy*, 14(3), pp.41-54.
- Gemengde Commissie Veiligheid en Rechtsorde. (2005). *Veiligheid: Meer samenhang en slagkracht, betere informatie, minder beleidsdrukke (tussenrapportage)*. Den Haag.
- Hommels, A. (2005). *Unbuilding Cities. Obduracy in Urban Sociotechnical Change*. Cambridge, MA: MIT Press.
- Inspectie Openbare Orde en Veiligheid. (2006). *Progressie in Toezicht. Meerjarenbeleidsplan 2006-2008*. Den Haag: Ministerie van Binnenlandse Zaken en Koninkrijksrelaties.
- Ministry of the Interior and Kingdom Relations. (2005). *Final report of the High Level Meeting 'Governance & the EU'*. The Hague.
- Misa, T., & Schot, J. (2005). Inventing Europe: Technology and the Hidden Integration of Europe. *History and Technology*, 21(1), 1-19.
- Schmidt, S. & Werle, R. (1998). *Coordinating Technology: Studies in the International Standardization of Telecommunications*. Cambridge, MA: MIT Press.
- Sherif, M.H, T.M. Egyedi & K. Jakobs (2005). Standards of Quality and Quality of Standards for Telecommunications and Information Technologies, in: Tineke M. Egyedi & Mostafa Hashem Sherif (Eds.). *Proceedings of the 4th International Conference on Standardization and Innovation in Information Technology*, September 21-23, 2005, ITU, Geneva, Switzerland. Aachen, Germany: Wissenschaftsverlag Mainz, pp.221-230.
- Snook, S. A. (2000). *Friendly Fire, The Accidental Shootdown of US Black Hawks over Northern Iraq*. Princeton: Princeton University Press.
- Star, S. L., & Ruhleder, K. (1996). Steps Toward an Ecology of Infrastructure: Design and Access for Large Information Spaces. *Information Systems Research*, 7(1), 111-134.
- Vleuten, E. v. d., & Kaijser, A. (2005). Networking Europe. *History and Technology*, 21(1), 21-48.

10. Past performance

10a. Publications list(s) of applicant(s) and researcher(s) (max. 10 references per applicant/researcher (*authors, year, title, pages, journal/publisher*))

Dr. A. Hommels

Lundestad, C. & Hommels, A.M. (forthcoming 2006). Software Vulnerability due to Practical Drift. *Ethics and Information Technology* (issue 3, Fall).

Hommels, A.M. (2005). *Unbuilding Cities. Obduracy in Urban Sociotechnical Change*. Cambridge, MA: The MIT Press.

Hommels, A.M. (2005). Studying Obduracy in the City: Toward a Productive Fusion between Technology studies and Urban studies. *Science, Technology & Human Values*, 30 (3): 323-352.

Hommels, A.M., Hoven, J. v. d., Nekkers, J., & Grootendorst, F. (2004). *Even geduld aub! De kwetsbaarheid van de informatiesamenleving. Oorzaken en gevolgen van verstoringen in de ICT-infrastructuur*. Den Haag: Rathenau Instituut.

Hommels, A.M. (2003). De (on)maakbare stad. De hardnekkigheid van het maakbaarheidsdenken in de ruimtelijke vernieuwing van de Bijlmermeer. *Nieuwste Tijd. Kwartaal tijdschrift voor eigentijdse geschiedenis*, 2(7), 57-67.

Hommels, A.M. (2003). Book Review: STS and the City. *Social Studies of Science*, 33(6), 945-950.

Hommels, A.M. (2000). Obduracy and Urban Sociotechnical Change. Changing Plan Hoog Catharijne. *Urban Affairs Review*, 35(5), 649-676.

Dr. T. Egyedi

Egyedi, T.M. & P. Heijnen (2005). Scale of Standards Dynamics: Change in formal, international IT standards, in S. Bolin (Ed.), *The Standards Edge: Future Generation*. Felton, CA: Bolin Communications, pp. 289-308.

Egyedi, T.M. & J. Hudson (2005). A Standard's Integrity: Can it be Safeguarded?, *IEEE Communications Magazine*, 43/2, 151-155.

Egyedi, T.M. & Z. Verwater-Lukszo (2005). Which standards' characteristics increase system flexibility? Comparing ICT and Batch Processing Infrastructures. *Technology in Society*. 27/3, 347-362.

Sherif, M.H, T.M. Egyedi & K. Jakobs (2005). Standards of Quality and Quality of Standards for Telecommunications and Information Technologies, in: Tineke M. Egyedi & Mostafa Hashem Sherif (Eds.). *Proceedings of the 4th International Conference on Standardization and Innovation in Information Technology*, September 21-23, 2005, ITU, Geneva, Switzerland. Aachen, Germany: Wissenschaftsverlag Mainz, pp.221-230.

Wendel de Joode, R. van & T.M. Egyedi (2005). Standardization and Other Coordination Mechanisms in Open Source Software. In K. Jakobs (Ed.), *Advanced Topics in Information Technology Standards and Standardization Research, Vol. 1*, pp.67-85.

Zachariah, J.L., Egyedi, T.M. & K. Hemmes (2005). From natural gas to hydrogen via the Wobbe index: The role of standardized gateways in sustainable infrastructure transitions, in: H.Coenen, J. Groehndal, K.Jakobs, & T. Valdlo (Eds.), *EURAS Proceedings 2005*, pp.161-179. Aachen, Germany: Wissenschaftsverlag Mainz.

Egyedi, T.M., & A. Dahanayake (2003). Difficulties Implementing Standards. In: Egyedi, T.M., Krechmer, K., & K. Jakobs (Eds.), *Proceedings of the 3rd IEEE Conference on Standardization and Innovation in Information Technology*, SIIT 2003, October 22-24 2003, Delft, the Netherlands, pp.75-84.

Egyedi, T.M. & A.G.A.J. Loeffen (2002). Succession in standardization: grafting XML onto SGML. *Computer Standards & Interfaces*, 24, 279-290.

Egyedi, T. (2001). Infrastructure flexibility created by standardized gateways: the cases of XML and the ISO container. *Knowledge, Technology, and Policy*, 14(3), 41-54.

Egyedi, T.M. (2000). The Standardized Container: Gateway Technologies in Cargo Transport. In: Manfred Holler & Esko Niskanen (Eds.), *EURAS Yearbook of Standardization, Vol.3/ Homo Oeconomicus XVII(3)*. Munich: Accedo, pp.231-262.

Prof.dr.ir. W.E. Bijker

Bijker, W. E. (2006). The Vulnerability of Technological Culture. In Nowotny, H. (Ed.), *Cultures of Technology and the Quest for Innovation* (pp. 52-69). New York: Berghahn Books.

Bijker, W. E. (2005). Why and How Technology Matters. In R. Goodin & C. Tilly (Eds.), *Oxford Handbook of Contextual Political Analysis*. Oxford: Oxford University Press.

Bijker, W. E. (2003a). Engaging Humanities. Problems of the Information Society Not To Be Left To Engineers. In K. R. Kegler & M. Kerner (Eds.), *Technik Welt Kultur. Technische Zivilisation und kulturelle Identitäten im Zeitalter der Globalisierung* (pp. 103-139). Köln: Böhlau Verlag.

Bijker, W. E. (2003b). The Need for Public Intellectuals: A Space for STS. *Science, Technology & Human Values*, 28(4), 443-450.

Bijker, W. E., Schürer, K., Stronks, E., Uszkoreit, H., Wittenburg, P., & Woolgar, S. (2003). *Building the KNAW International Research Institute on e-Science Studies in the Humanities and Social Sciences (IRISS)*. Amsterdam: KNAW.

Bal, R., Bijker, W. E., & Hendriks, R. (2002). *Paradox van wetenschappelijke gezag. Over de maatschappelijke invloed van adviezen van de Gezondheidsraad, 1985-2001*. Den Haag: Gezondheidsraad.

Bijker, W. E. (2002). The Oosterschelde Storm Surge Barrier. A Test Case for Dutch Water Technology, Management, and Politics. *Technology & Culture*, 43, 569-584.

Bijker, W. E. (2001). Social Construction of Technology. In N. J. Smelser & P. B. Baltes (Eds.), *International Encyclopedia of the Social & Behavioral Sciences* (Vol. 23, pp. 15522-15527). Oxford, Amsterdam, etc.: Elsevier Science Ltd.

Bijker, W. E. (1997). Demokratisierung der Technik—Wer sind die Experten? In M. Kerner (Ed.), *Aufstand der Laien. Expertentum und Demokratie in der technisierten Welt* (pp. 133-155). Aachen: Thouet Verlag.

Bijker, W. E. (1995). *Of Bicycles, Bakelites and Bulbs. Toward a Theory of Sociotechnical Change*. Cambridge, MA: MIT Press.

10b. Previous and current applications to NWO (main applicant or co-applicant)

file number: TKC-A02-01

title: Sound technologies and cultural practices (Prof.dr.ir. W.E. Bijker with Prof.dr. J.F.T.M. Van Dijck, UvA)

file number: W96-190

title: Ultrasound in Ghana. The politics of medical technologies in a new cultural context, NWO-WOTRO (Prof.dr.ir. W.E. Bijker)

file number: 360-51-020

title: Paper and Virtual Cities (Prof.dr.ir. W.E. Bijker with Dr. C.M.J.M. Van den Heuvel)

file number: TKC-B02-05

title: Transformations in Perception and Participation: Digital Games (Prof.dr.ir. W.E. Bijker with Dr. R. van de Vall)

most important publication: None of these projects has been finished yet.

X I hereby declare that I have completed this form truthfully

Name: Anique Hommels

Place: Maastricht

Date: 09-05-2006