Research Review

Dynamics and Governance of Science, Technology and Innovation in Society (STIS-UT)

Report on the evaluation of the research programme Dynamics and Governance of Science, Technology and Innovation in Society (STIS) at University of Twente

Contents

Preface

This report summarises the results of the peer review assessment of the research programme Dynamics and Governance of Science, Technology and Innovation in Society (STIS) of University of Twente. The quality assessment was carried out by a review committee consisting of one chair and four members with expertise in the relevant disciplines and in the professional field.

The Committee wants to express its gratitude for the efforts made by all involved to provide the necessary documentation, before and during the site visit. This documentation contained valuable information and formed a very useful basis for an objective evaluation. The Committee also wishes to acknowledge the constructive atmosphere of the discussions during the site visit. All representatives were willing to share their opinions and concerns in an open manner.

The organisational and administrative support by QANU and by the department allowed the Committee to focus on the assessment in a well-organised manner.

As chair of the Committee I would like to thank my fellow committee members for their commitment and dedication to this evaluation process. We have worked together as a real team, open-minded and thoughtful. We all realised the challenge of this task, and I am pleased to be able to conclude that this report reflects the common opinion of the Committee.

Susan E. Cozzens, Chair

1. The review committee and the review procedures

Scope of the assessment

The Review Committee was asked to perform an assessment of the research programme Dynamics and Governance of Science, Technology and Innovation in Society (STIS), organised in the Department of Science, Technology & Policy Studies (STePS) at University of Twente. This assessment covers the research in the period 2008-2013. In accordance with the Standard Evaluation Protocol 2009-2015 for Research Assessment in the Netherlands (SEP), the Committee's tasks were to assess the quality of the research programme on the basis of the information provided by the institute and through interviews with the management and the research leaders, and to advise how this quality might be improved.

The review does not include an assessment of the institute level, i.e. the organisational setting, the funding, facilities, etc. The reason for this is that the institutes that are involved will be evaluated in a separate review process. The information provided in paragraph 2A only serves as background information for the research assessment.

Composition of the Committee

The composition of the Committee was as follows:

- Prof. Susan Cozzens, Professor of Public Policy, Georgia Institute of Technology, Atlanta GA, USA, Chair;
- Prof. Trevor Pinch, Professor of Science and Technology Studies and Professor of Sociology, Cornell University, Ithaca NY, USA;
- Prof. Bernadette Bensaude-Vincent, Professor of Epistemology, History & Philosophy of Science and Technology, Université Paris1 Panthéon-Sorbonne, Paris, France;
- Prof. Sabine Maasen, Professor of Sociology of Science, TU München, München, Germany;
- Prof. Frans Brom, Head of the Technology Assessment division, Rathenau Institute, The Hague, The Netherlands and Professor of Ethics of Technology Assessment, Utrecht University, Utrecht, The Netherlands.

A profile of the Committee members is included in Appendix 1.

Dr. Marianne van der Weiden was appointed secretary to the Committee by QANU (Quality Assurance Netherlands Universities).

Due to health reasons, Professor Pinch was not able to be present at the site visit on 29 September. The Committee profited from his input by e-mail in the preparatory phase of the assessment and from his comments on the clarity of the draft report, but Professor Pinch did not take part in the deliberations about the assessment itself.

Independence

All members of the Committee signed a statement of independence to safeguard that they would assess the quality of the research programme Dynamics and Governance of Science, Technology and Innovation in Society (STIS) in an unbiased and independent way. Any existing personal or professional relationships between Committee members and the programme under review were reported and discussed in the Committee meeting. The Committee concluded that there were no unacceptable relations or dependencies and that there was no specific risk in terms of bias or undue influence.

Data provided to the Committee

The Committee has received detailed documentation consisting of the following parts:

- Self-evaluation report of the unit under review, including all the information required by the Standard Evaluation Protocol (SEP), with appendices.
- Copies of key publications of the research programme.

Procedures followed by the Committee

The Committee proceeded according to the Standard Evaluation Protocol 2009-2015 (SEP). Prior to the first Committee meeting, all Committee members independently formulated a preliminary assessment of the programme. The final assessments are based on the documentation provided by the Department of Science, Technology & Policy Studies (STePS), the key publications and the interviews with the management and the researchers of the programme. The interviews took place on 29 September 2014 (see the schedule in Appendix 3) in Enschede.

Preceding the interviews, the Committee was briefed by QANU about research assessment according to SEP, and the Committee discussed the preliminary assessments and decided upon a number of comments and questions. The Committee also agreed upon procedural matters and aspects of the assessment. After the interviews the Committee discussed the scores and comments. The texts for the Committee report were finalised through e-mail exchanges. The final draft version was presented to the Department of Science, Technology and Policy Studies, for factual corrections and comments. The comments were discussed in the Committee. The final report was printed after formal acceptance.

The Committee used the rating system of the Standard Evaluation Protocol 2009-2015 (SEP). The meaning of the scores is described in Appendix 2.

2. Research review Dynamics and Governance of Science, Technology and Innovation in Society STIS

Programme: Dynamics and Governance of Science, Technology and Innovation in Society (STIS)

Programme leader: Prof. dr. S. Kuhlmann

Research staff: 11.99 fte (4.01 tenured, 1.97 fte non-tenured, 6,01 PhD)

Assessments:
Quality:	5
Productivity:	5
Relevance:	4.5
Viability:	3.5

2A. Information at the institutional level

Introduction

This review does not include an assessment of the institute level, i.e. the organisational setting, the research policy, funding, facilities etc. The reason for this is that the Institutes that are involved, will be evaluated in a separate review process. The information provided here only serves as background information about the research programme.

The University of Twente (UT) profiles itself by combining technological and societal perspectives in its research and teaching. The research group Dynamics and Governance of Science, Technology and Innovation in Society (STIS) fits this profile: it combines the epistemological perspectives of Science and Technology Studies (STS) and Governance Studies, while it is embedded in a technical, design oriented university. The STIS research programme is embedded in the Institute for Innovation and Governance Studies (IGS), while relevant parts are strongly linked with the UT research institutes MESA+ (nanotechnologies) and CTIT (ICT).

The staff of the STIS group covers the disciplines of sociology, history, political sciences, policy studies and science & technology studies. They are part of the Department of Science, Technology and Policy Studies (STePS). The department staff teaches in a number of bachelor's and master's programmes and coordinates several master's programmes.

Mission and objectives

The research programme focuses on the dynamics and governance of science, technology and innovation in society. The group has the basic assumption that science, technology and innovation should be considered as social processes. STIS studies the nature and the actual development of science, technology and innovation, but also uses this focus to investigate modes of governance and of shaping science, technology and innovation in society. The programme aims to cover the whole spectrum of the 'life trajectory' of techno-scientific developments, ranging from historical to foresight and policy studies.

In the period 2008-2013 the research programme focused on three overlapping and strongly interlinked research themes:
1. Technology Dynamics & Assessment (TDA)
2. Governance of Knowledge and Innovation (GKI)
3. Long-term Development of STIS (LTD)

Leadership
Formal responsibilities for research activities of the institutes (IGS, MESA+, CTIT) rest with the scientific directors. Chairholders are responsible for the scientific direction of the research programmes linked to their chairs; they report to the scientific director of the institute under which a specific programme resides. In the period 2008-2013 the department STePS and the STIS research programme were chaired by prof. dr. S. Kuhlmann. Chairholders within the research programme were Prof. dr. N.E.J. Oudshoorn (Technology Dynamics and Healthcare), Prof. dr. S. Kuhlmann (Foundations of Science, Technology and Society), Prof. dr. R. Hoppe (Policy and Knowledge) and Prof. dr. L.L. Roberts (Long-term Development of Science and Technology).

2B. Assessment of the programme

1. Quality and academic reputation
Evidence of the quality of STePS' research is provided in the self-assessment report for STIS and each of its research themes, based on various criteria, such as key publications and their impact, prizes and awards, editorships, memberships of prestigious academies, research councils and review committees, the organisation of international conferences and the success in obtaining NWO and EU research grants.

Assessment
The Committee recognises the universally excellent quality of the work done in the previous years. The chairholders have a strong academic reputation, which is evidenced by their earning of academic prizes and substantial amounts of external funding. Their ability to attract PhD candidates is strong.

The programme is coherent. The strength of the programme follows from the integrated perspective on the governance of socio-technological developments embedded in a thorough analysis of the dynamics of these developments, in the light of long-term (historic and anticipated) changes. From this strong home base, the research groups work together with other disciplines, both within the UT (philosophy, public policy, business administration, nanotechnology, ICT) and with other universities (Maastricht, Utrecht). The Committee agrees with the research leaders that boundary work (between political judgment and science-based expertise) is the new key issue and that it is indeed wise to widen the audience to other disciplines such as medical sociology, human geography and innovation studies.

The quality of the scientific publications is excellent. The Committee is impressed by the quality of the key publications and notes that several of them have won awards. The average number of citations for the researchers in the group is 825 (ranging from 2 to 3133). The H-index varies from 1 to 25. Naturally, the variation across the group members is large, depending on the number of years of their research activity. The scores of the research leaders are high. The quality of the presentations by the PhD candidates of their work during the site visit was also impressive.

2. Resources
The self-assessment report provides data on the development of staff numbers (see Appendix 4, table 1). Overall, the number of staff and research fte's has shown a modest increase since 2008, with small fluctuations over the years. The self-assessment report describes the earning capacity of the group as strong. Researchers were successful in winning research grants from

major international and national funding agencies. An overview is provided in the self-assessment report. The total turnover of external research funding during the evaluation period (including projects starting before 2008) amounts to 7.5 M€.

Assessment
As regards human resources, the Committee notes with appreciation that there is a good range from senior to junior staff. Also, most tenured and non-tenured staff members work with more than one research theme, which contributes to the above mentioned coherence of the programme. The Committee confirms that the group's earning capacity is strong. The research facilities for staff and PhD candidates are good.

3. Productivity
The data on productivity provided in the self-assessment report are summarised in table 2 of Appendix 4. The self-assessment report also presents an overview of the number of publications in the top ten per cent of journals relevant to this interdisciplinary field.

Assessment
The Committee is impressed by the large number of forty to fifty publications per year, which include not only articles in high-ranked journals but also prize winning monographs. The articles appeared in different types of journals, representing a broad spectrum and reflecting the interdisciplinary outlook of the research programme. This is the more impressive since most journals still are discipline-oriented. The group has been strong in attracting EU projects and has an impressive PhD completion rate.

4. Societal relevance
The STIS programme strives to link analytical and normative perspectives. Research-based insights are communicated and used in practical contexts of policy-making. Indicators of societal relevance are commissioned research, practitioner-oriented conferences, memberships on advisory councils and committees, participation in the public debate and professional training programmes, including an internationally recognised course in research evaluation.

Assessment
The Committee recognises the active ways in which STIS creates value outside academia and valorisation in different organisations. To name a few interesting examples, the Committee mentions the upcoming exhibition on the history of recycling, including public lectures, in the Boerhaave Museum Leiden, the many stakeholder workshops with representatives of international companies, NGOs, funding organisations, universities and ministries, the use of user-panels to study the impact of innovation on consumers, including user collectives (which require a new methodology and new vocabulary), scenario workshops and the huge impact of the course set up for evaluators. Impact is also achieved by the work of STIS graduates who have found their way all over the world.

The STIS group is well aware of the many possibilities for societal and policy relevance and looks at new themes such as the governance discussion on rare earths. A small point of criticism is that the effort to create societal and policy relevance (valorisation) could be more systematic and based on a strategic impact agenda. The Committee is of the opinion that the potential is not yet fully used.

5. Strategy for the future

In 2012, the UT implemented a major budget cut of ten per cent. The self-assessment report and the discussions during the site visit made it clear that, as a consequence, there is a serious risk that the two chairholders who will retire in mid-2015 will not be replaced.

Assessment

The Committee is concerned about this threat of loss of leadership and very disappointed about the lack of a strategic approach in the university leadership in making the cuts, instead allowing retirement dates to arbitrarily dismantle an area of excellence. The Committee finds the significant loss of two chairholders, i.e. of fifty per cent of all chairs at STIS, to be disproportionate. It is neither in line with the long and outstanding track record of the group nor with the importance of STIS for the mission of University of Twente ("The University of Twente is a research university which focuses on the development of technology and its impact on people and society"). Over three decades, the STIS group has built up a strong tradition of cooperation with engineering faculties, which is at the heart of the UT profile of combining technological and societal perspectives in its research and teaching.

The Committee recognises that new approaches to human resource development at the University such as the Tech4people initiative and the establishment of tenure track positions have the potential for building the STIS group over time. But the intellectual balance of the group has been achieved through its chairholders, who maintain its reputation with and connection to distinct audiences. The policy and long-term development themes will not form the same coherent whole without a senior person in science and technology dynamics. The Committee considers it crucial that at least one senior scholar with a broad perspective be appointed to ensure that the integrative aspect of the department's distinct character is maintained. The Committee cannot see how the department would ensure its high international standing if two chairholder positions were eliminated.

6. PhD-training and supervision

Per September 2014, nine PhD candidates are associated with the STIS research programme. Dutch government funding through NWO PhD grants seems to be declining, but the interest of international candidates with a fellowship is increasing. This group of external PhD candidates includes mid-career professionals. All PhD candidates participate in the Twente Graduate school and are usually supervised by a daily supervisor and their promoter. The PhD representatives told the Committee that contacts with their supervisors are frequent. There is also a large degree of peer interaction and mutual cooperation.

The Graduate school offers a wide array of courses, e.g. to achieve a teaching qualification, on project management, presentation skills or career planning. During their PhD project, candidates are able to build up a network through their supervisors and other members of the research programme. Other (national) research schools, such as the Huizinga Institute for Cultural History or WTMC (Graduate Research School of Science, Technology and Modern Culture), offer methodological seminars.

The management informed the Committee that there is no attrition: all candidates complete the programme successfully. The completion time for both internal and external candidates varies from 3.5 to eight years.

Assessment

The Committee notes that the PhD candidates are a diverse but strongly integrated international group, very enthusiastic and motivated. They are highly interconnected with other groups (technology, social and political science, history, computer science). The educational resources are well-organised. The success rates are very high, although the completion time is sometimes quite long. The Committee already commented positively on the quality of their work (see paragraph 1).

7. Conclusion

The STIS research group is an excellent group of impressive researchers who are excited about their projects and who work together well within STIS, with other groups at the UT and other universities, and with many stakeholders outside academia. The work of this group has been known for thirty years, which in itself is a solid foundation for a bright future. However, the future would be dim if at least one of the upcoming vacant professorial chairs were not filled by a strong and broadly oriented scholar.

Appendices

Appendix 1: Curricula vitae of the committee members

Prof. dr. Susan Cozzens (Chair) is Professor of Public Policy at the Georgia Institute of Technology, where she also serves as Vice Provost for Graduate Education and Faculty Affairs. Dr. Cozzens is active internationally in developing methods for research assessment and science and technology indicators. Her research interests are in science, technology, and innovation policies in developing countries, including issues of equity, equality, and development. Dr. Cozzens has been Director of the Office of Policy Support at the U.S. National Science Foundation; chair of the Committee on Science, Engineering, and Public Policy at the American Association for the Advancement of Science; and consultant to dozens of U.S. and international research organizations, in Africa, Asia, Australia, Europe, and Latin America. She is a recipient of Rensselaer Polytechnic Institute's Early Career Award, a member of Phi Beta Kappa and Phi Kappa Phi and a Fellow of the American Association for the Advancement of Science.

Prof. dr. Bernadette Bensaude-Vincent is Professor of Epistemology, History & Philosophy of Science and Technology at the Université Paris 1-Panthéon Sorbonne (since 2009) and is the chair of the Center for Study of Technology, Knowledge and Practices (CETCOPRA). She has been a visiting scholar at MIT and at universities in Jerusalem, Berlin, Valencia, São Paulo, Madrid, Bielefeld and Vienna. Her research areas are the philosophy of technosciences (materials science and engineering, bionanotechnology, synthetic biology), the history and philosophy of chemistry and the relationship between science and the public (historical perspective). She has been the principal investigator in the French/German (ANR/DFG) project "Biographies of technoscientific objects" and in the project "Biotechnologies et Nanotechnologies: enjeux éthiques et philosophiques". She was a partner of the ANR project "Nanotechnologie, épistémologie, éthique". She is a member of the French Académie des technologies and of the Comité National Français d'Histoire et de Philosophie des Sciences.

Prof. dr. Frans W.A. Brom (*1963) is Head of Technology Assessment at the Rathenau Instituut in The Hague (since 2007) and Professor in the Ethics of Technology Assessment at the department of Philosophy/Ethics Institute of Utrecht University (since 2010). Frans is also the chair of the external committee on scientific integrity of Wageningen University and Research Centre (since 2013), the chair of the Subcommittee on Ethics and Societal Aspects of the Netherlands Commission on Genetic Modification (since 2002) and Chair of the Global Research Ethics Advisory Group of Unilever (since 2009). He holds a PhD in ethics (Utrecht University, 1997). His research focuses on the ethical and societal impact of science, technology and innovation and on the interaction between ethics and political theory. He has a special interest in the status of public morality and public deliberation and in the role of trust in pluralistic democratic societies.

Prof. dr. Sabine Maasen (*1960) holds the Friedrich Schiedel Endowed Chair in Sociology of Science at TU München (since 2013) and is Head of the Munich Center for Technology in Society / MCTS at TUM (since April 2014). After posts at the Center for Interdisciplinary Research, Bielefeld, the Max-Planck Institute for Psychological Research, Munich, and a chair in sociology of science at the University of Basel, Switzerland, as well as various commitments in the realm of technology assessment, her current activity focuses on establishing MCTS as an interdisciplinary institution at the interface of technology & society in research, teaching and public dialogue. While research at her chair is devoted to the topic of

"Exploring TechnoSocieties" (e.g., on Citizen Science, BioFood, Social Robotics), her own research specialises on "the brain and its society – towards a sociology of the neuro sciences".

Prof. dr. Trevor Pinch was born in Northern Ireland and is the Goldwyn Smith Professor of Science and Technology Studies and Professor of Sociology at Cornell University. He holds degrees in physics and sociology. He has authored many books and numerous articles on aspects of the sociology of science, the sociology of technology, the sociology of economics, and sound studies. His books include *Analog Days: The Invention and Impact of the Moog Synthesizer*. He is co editor of the *Oxford Handbook of Sound Studies*. He is also a performing musician with the Electric Golem and The Atomic forces. He has an honorary degree from Maastricht University.

Appendix 2: Explanation of the SEP scores

Excellent (5)	Research is world leading. Researchers are working at the forefront of their field internationally and their research has an important and substantial impact in the field.
Very Good (4)	Research is nationally leading. Research is internationally competitive and makes a significant contribution to the field.
Good (3)	Research is internationally visible. Work is competitive at the national level and makes a valuable contribution in the international field.
Satisfactory (2)	Research is nationally visible. Work adds to our understanding and is solid, but not exciting.
Unsatisfactory (1)	Work is neither solid nor exciting, flawed in the scientific and/or technical approach, repetitions of other work, etc.

Quality is to be seen as a measure of excellence and excitement. It refers to the eminence of a group's research activities, its abilities to perform at the highest level and its achievements in the international scientific community. It rests on the proficiency and rigour of research concepts and conduct; it shows in the success of the group at the forefront of scientific development.

Productivity refers to the total output of the group; that is, the variegated ways in which results of research and knowledge development are publicised. The output needs to be reviewed in relation to the input in terms of human resources.

Societal relevance covers the social, economic and cultural relevance of the research. Aspects are:
- societal quality of the work. Efforts to interact in a productive way with stakeholders in society who are interested in input from scientific research, and contributions to important issues and debates in society.
- societal impact of the work. Research affects specific stakeholders or procedures in society.
- valorisation of the work. Activities aimed at making research results available and suitable for application in products, processes and services. This includes interaction with public and private organisations, as well as commercial or non-profit use of research results and expertise.

Vitality and feasibility. This dual criterion regards the institute's ability to react adequately to important changes in the environment. It refers to both internal (personnel, research themes) and external (developments in the field, in society) dynamics of the group. On the one hand, this criterion measures the flexibility of a group, which appears in its ability to close research lines that have no future and to initiate new venture projects. On the other hand, it measures the capacity of the management to run projects in a professional way. Policy decisions and project management are assessed, including cost-benefit analysis.

Appendix 3: Programme of the site visit

Monday September 29, 2014

9:00-10:00	Committee meeting	- discussion of preliminary assessments - preparing questions for the interviews	
10:00-11:00	Meeting with the management: organisational setting, research management (short presentation followed by interview)	Topics to be evaluated: 1. Leadership 2. Mission and goals 3. Strategy and policy 4. Adequacy of the resources 5. Funding policies 6. Academic reputation of the institute 7. Societal relevance of the institute 8. Balance of the strengths and weaknesses of the institute	Prof.dr. S. Kuhlmann Prof.dr. R. Hoppe
11:00-12:00	Theme 1 **Governance of Knowledge and Innovation** Theme leaders: Prof.dr. Stefan Kuhlmann & Prof.dr. Rob Hoppe	Short presentation, followed by interview. Topics to be evaluated: Quality, Relevance, Productivity, Viability	Prof.dr. S. Kuhlmann Prof.dr. R. Hoppe Dr. H.G. Ordóñez-Matamoros Dr. A. Pelizza
12:00-13:00	Lunch		
13:00-14:00	Theme 2 **Technology Dynamics and Assessment.** Theme leader: Prof.dr. Nelly Oudshoorn	Short presentation, followed by interview. Topics to be evaluated: Quality, Relevance, Productivity, Viability	Prof.dr. N.E.J. Oudshoorn Dr. K.E. Konrad
14:00-15:00	Theme 3 **Long-term Development of STIS** Theme leader: Prof.dr. Lissa Roberts	Short presentation, followed by interview. Topics to be evaluated: Quality, Relevance, Productivity, Viability	Prof.dr. L.L. Roberts Dr. A. Weber
15:00-16:00	PhD-students (group interview, posters)	● their research projects ● their supervision	Drs. A.W. Walhout Msc. C. Alvial Palavicino Msc. J. van Driel Msc. J. Luo Ir. I.J.H. Maathuis Msc.. J. Katomero Drs. M.A. Tejada Gomez
16:00-16:30	Committee meeting with scientific director IGS, and Dean BMS		Prof.dr. C.W.A.M. Aarts Prof.dr.ir. A.J. Mouthaan
16:30-17:00	Committee meeting	Conclusions and scores; task division towards report	

Appendix 4: Quantitative data

Table 1. Research staff (allocated fte and numbers)

	2008	n	2009	n	2010	n	2011	n	2012	n	2013	n
Tenured staff	3.97	11	3.89	11	3.28	10	3.32	10	3.23	9	4.01	11
Non-tenured staff	0.00	0	0.00	0	0.42	2	0.45	2	2.07	4	1.97	4
PhD students	6.39	10	7.93	13	6.70	11	6.62	12	7.82	9	6.01	10
Total	**10.36**	**21**	**11.82**	**24**	**10.40**	**23**	**10.39**	**24**	**13.12**	**22**	**11.99**	**25**

Table 2. Main categories of research output

	2008	2009	2010	2011	2012	2013	Total
Refereed articles (academic)	13	14	15	16	20	13	91
Non-refereed articles (academic)	3	5	1	6	3	7	24
Books: Monographs (academic)		1	1	2	2		6
Books: Edited volumes		3	2	2			7
Book chapters (academic)	12	18	19	12	21	5	87
PhD theses	3	2	6	5	2	4	22
Professional publications	9	2	10	7	7	9	44
Publications for general public	1	2	1	3	3	2	12
Editorship special issue/journal		3			2		5
Total publications	**41**	**50**	**55**	**53**	**59**	**40**	**298**