

# **Submission for re-accreditation 2005-2010**

of the Interuniversity Graduate Research School WTMC,  
Wetenschap, Technologie en Moderne Cultuur  
(Science, Technology and Modern Culture)

Enschede, University of Twente, 22 December 2004

## **0. General and strategic considerations**

The interdisciplinary field of science and technology studies, sometimes also called science, technology and society studies, emerged in the late 1960s. Its three roots were the new interactions between history, philosophy and sociology of science, a new wave of science and technology policy studies, and the rise of critical analysis of science and technology, their role in our culture, and in modern society more generally. Scholarly journals were established already at that time, scholarly societies followed by the late 1970s. In the Netherlands, special government funding for an academic unit in science dynamics was important for the crystallisation of the emerging field. The Graduate Research School *WTMC* is firmly located in this interdisciplinary field. Its members publish in the core journals, function as editors and editorial advisers, play a role in the international debate, and function as board member or president of the international scholarly societies.

By now, four important developments have occurred in in ST(S) studies (following international usage, we use this acronym to indicate the continuum of Science & Technology studies and Science, Technology & Society/culture studies generally) which imply changes in its position:

*Mainstreaming*: studies of ST(S) are taken up in many disciplines, and approaches and insights pioneered in ST(S) studies are now used widely. An achievement, clearly, but also one which raises questions about the role of dedicated ST(S) studies: ST(S) is not alone anymore.

*Legitimacy*: what used to be seen as a critical or alternative approach in the 1970s (also with regard to policy and politics) is now taken up by establishments and some scientists and technologists, as it may help them solve problems.

*Normativity*: the analysis of normative aspects has evolved partly through increasing participation in decision making and practices of actors. Recently, there are also ELSA programs (in the Netherlands for genomics and nanotechnology).

*Demography of the field*: after the dip of the 1980s and early 1990s (less so in the Netherlands than in most other countries), a new generation has emerged and is successful.

These developments offer opportunities for WTMC. In fact, scholarly work and activities of WTMC members have played an important role in these changes, nationally and internationally. Now is the time to take up these challenges, but in a more concerted manner (that is also the advice, even request, our commentators and stakeholders give us). The new programmes within WTMC (and the focus on “Interfaces” in the Annual Conference 2004) are examples already. At the same time, it is important to maintain continuity with the earlier achievements.

## **1. The scientific mission of the Graduate Research School**

The scientific mission of the Interuniversity Graduate Research School *Wetenschap, Technologie en Moderne Cultuur* is the advancement and promotion of quality of research and scholarship into the ways in which science and technology are intertwined

(as to content, and organisationally and socially) with the development of modern, “rationalized” societies and cultures; and into the problems and challenges which go with the intertwinement, in particular for the development of, and our views about, science and technology as well as culture and society.

Thus, WTMC is not limited to academic studies of a complex object, viz. science and technology and their roles in modern societies. This is important, and the mission to promote the quality of such studies is essential, but other important components are reflection, critical evaluation, interaction with various actors. The combination of these activities will allow WTMC to contribute to the articulation and solution of normative, political, policy and regulatory questions (this is how our re-accreditation submission in 1999 formulated it).

Ways to realize the (extended) scientific mission are:

- Articulation and stimulation of a program of research and scholarship which shows synergy and added value of the research and scholarship conducted by the members of WTMC.
- Stimulation and occasionally initiation of research and scholarship to realize such a program.
- The training and introduction of beginning researchers into the interdisciplinary field covered by WTMC.
- Promotion of interaction with actors relevant to science, technology and modern culture.

Research and scholarship in WTMC is interdisciplinary, with history, philosophy and sociology as main contributories, but also anthropology, cultural studies, ethics, policy analysis, political science, innovation studies, and economics. This mix of disciplines is characteristic for the field of ST(S) studies internationally. A key task of WTMC (and by now recognized role) is to create spaces for interaction between the several disciplines which study aspects of the questions of science, technology and modern culture. The WTMC training program reflects this interdisciplinarity.

## **2. Changes in the training and in the research program compared with the previous submission.**

### *Training*

The goals and overall organisation of the national-level PhD training program have remained the same. The structure of the training program is shown in Table 1 (note that first and second year students jointly attend the workshops and summer schools):

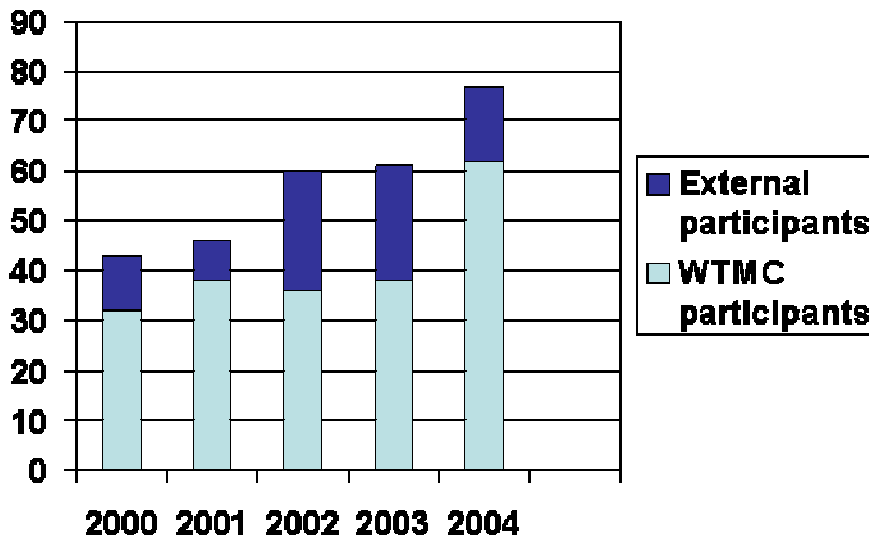
	<i>National-level component</i>	<i>Local component</i>
1st year	<input type="checkbox"/> Three-day Workshop <input type="checkbox"/> Three-day Workshop <input type="checkbox"/> Five-day Summer School	<input type="checkbox"/> Supervision of PhD research <input type="checkbox"/> Attention for individual deficiencies
2nd year	<input type="checkbox"/> Three-day Workshop <input type="checkbox"/> Three-day Workshop <input type="checkbox"/> Five-day Summer School	<input type="checkbox"/> Literature study & reading groups <input type="checkbox"/> Language courses
3rd year	Two-day Winter School	<input type="checkbox"/> Didactic courses
4th year	Two-day Winter School	Participation in colloquia

*Table 1 Structure of the Graduate Training Programme*

Separate administrative support was made available, which allowed the coordinator of the national-level training program (in fact, for this period the responsibility for the workshops and schools was shared by a team of two coordinators) to concentrate on the substance of the training. Quality assurance was pursued systematically for the components of the training (through regular evaluation and by developing training modules that could be re-used) and in monitoring progress of PhD students. In addition, the Scientific Director of WTMC fulfils a role as ombudsman when PhD students have problems, say, in their interaction with their supervisor. Particularly important is that the training coordinators discuss issues with the students during workshops and summer/winter schools – which are residential, so allow lots of informal interaction.

Over the last years, all training workshops have become English-language based (the Summer Schools with their anchor teachers from outside the Netherlands were already English-language based). The main reason was the increasing number of regular PhD students for whom Dutch is not their mother tongue. It also allows foreign students to participate, which is important for internationalization.

At present, there is a discussion about what might be an upper limit to the number of participants, so as to be able to maintain the interactive and focused character of the training. This is related to the growth of the number of participants in the training activities (cf. Figure 1), and the expectation that participation by own PhD students will grow to what is now the maximum number (25) of participants per activity.



*Figure 1: Participation in the three annual training events for first and second year PhD students (summarized over all three events)*

As to content, at the national level the emphasis will remain on (a) introduction into the broad area of studies of science, technology and modern culture, including getting acquainted with key (“classical”) texts and authors of the area, (b) some exposure to themes and studies at the research frontiers, if possible linked to work of participants in WTMC, and (c) training of academic skills and of research skills which are not covered in regular methodology and methods & techniques courses. The evaluations by participants are generally positive, with lots of constructive criticism. When looking back on the training, students also identify their interaction with other students (and thus community building) as important. This is a further argument to maintain the intense and residential character of the training events.

### *Research*

The research program of WTMC, as set out in 1999, was realized in terms of scholarly achievements. Two of the four so-called domain programmes were realized: The History of Technology in the Netherlands in the 20<sup>th</sup> Century (together with Graduate Research School Posthumus on economic and business history) was running already, and was concluded successfully by the end of 2003. Genetics and Society prepared the ground for a number of joint projects of WTMC groups, and also led to strong participation in the new national Centre for Society and Genomics (located at Radboud University). Studies of ICT and its role in culture/society continued strongly; there was no need to create an overarching program.

Seed money was available for workshops and activities promising added value for WTMC. The workshops (e.g. on objectivity and social sciences, on genomics and society, on technology ethics, on the constitution of technological society) articulated and increased the coherence of the research programme. The other aim of seed money, mobilization of new funding, was achieved (and extensively), but in response to new opportunities rather than on the basis of WTMC seed money. The Annual Conference of WTMC was an occasion for progress reporting and stock taking. More recently, specific themes, often in relation to interaction of WTMC research and WTMC members with scientific and societal actors, were put on the agenda.

Reflection and strategic discussion, including a discussion of the present and future profile of WTMC (cf. section 0), identified directions to go for the coming years. In line with the way we articulate our scientific mission (section 1, first bullet), the three so-called sub-programmes will be maintained as a framing of ongoing and potential synergies, and to structure the training programming:

1. Development of modern knowledge practices and research and innovation systems
2. Technological culture and regulation
3. Cultural roles of science and technology

While the three sub-programmes can be seen as covering the W (Science), T (Technology) and MC (Modern Culture) of WTMC, their titles refer to the kinds of research and scholarship that is actually done by WTMC members and indicate the nature of the questions that are addressed (in a non-exclusive way).

Research within WTMC need not be located exclusively in one sub-programme. Cross-cutting topics and approaches are important, and will continue to be addressed, also in workshops and (annual) conferences to increase synergy and coherence.

Whether cross-cutting or located within one of the sub-programmes, ongoing research activities and interactions with sufficient continuity can be made visible as WTMC programmes (what used to be called 'domain programmes' in the submission of 1999). The Genetics and Society programme will continue as a WTMC programme, and will coordinate with the Centre for Society and Genomics (funded through the National Genomics Initiative) in which a number of WTMC members participate already. A similar programme, provisionally called Nanotechnology and Society, is being started up on the basis of funding from the NanoNed programme. There will be some coordination with ongoing activities of the Rathenau Institute (for Technology Assessment). Both programmes must also address general analytical and normative questions, and will profit from ongoing work within WTMC and elsewhere.

Depending on opportunities, programmes might be set up with other Graduate Research Schools, or other institutes and networks, nationally and internationally. One candidate is the study of the construction of normativity in our scientific-technological society; this has been prepared by research and workshops in the period 2000-2004. Another candidate is multi-level and multi-actor governance of science and technology in modern societies. Again, work on this topic is being done already, often in collaboration with political scientists and policy analysts. It is also taken up in international collaborative projects and networks in which WTMC members participate, and collaborate with political scientists and economists (cf. PRIME, discussed in section 8).

Activities of WTMC members in relation to policy making, public debates, and interactions with scientists & technologists have always occurred (to varying extents). This has a research component as well: the need for quality contributions to policy, public debate and scientific and technological practices implies a challenge for WTMC research, and the possibilities to do field work on changing modes of knowledge production and governance of science and technology by participating in them are exploited. There are increasing opportunities to do so, which reflects the new appreciation, by societal actors, of the insights from ST(S) studies (even the pragmatical constructivist approaches).

### **3. Changes in the relationship with first-degree courses**

The strongest links with first-degree courses are in the University of Maastricht with its Bachelor degrees in the Faculty of Arts and Culture, and in the University of Utrecht with the Bachelor degree Science and Policy, in which the Department of Innovation Studies is heavily involved. In the University of Twente, the Bachelor degree Philosophy of Science, Technology and Society has been replaced by a Master degree with the same name. Similarly, in the University of Amsterdam, only a Master degree in Science and Technology Dynamics remains.

Through service teaching there are relationships with a variety of bachelor degrees. This is particularly wide ranging (and important for the WTMC members) in the Technical University of Delft, the Free University (Amsterdam), and the University of Twente.

Such an involvement supports the strategic choice of WTMC for closer interaction with scientists and technologists.

The involvement with Master degrees ranges from offering one course, to defining a Master degree (as is attempted in Maastricht). In time, there might be effects of research Masters on PhD training and research, especially when the second year of such a Master would count as the first year of a PhD project.

#### **4. Governance, organisational and administrative changes**

The charter and organisation of WTMC will remain the same, except for minor changes reflecting current practice, and for a change in the “founding institutions” with special rights (nominating their own member of the Board) and duties (financial contribution to overall infrastructure of the school), because the University of Amsterdam cannot continue as “founding institution” while the participation of two other universities (University of Utrecht and Free University) in WTMC has become sufficiently large for them to be invited to be “founding institutions” (see section 10 for the numbers). The new *Gemeenschappelijke Regeling* and *Overeenkomst* are being signed by the participating institutions, and will be submitted as appendix to this submission as soon as possible.

The office of *penvoerder*, now at the University of Twente, will move to the University of Maastricht. The Scientific Director will be Karin Bijsterveld, professor in the Faculty of Arts and Culture. The improved administration and internal governance (especially for the national-level training activities) achieved during 2000-2004 will be maintained in the next period, slightly adapted to the possibilities of the new *penvoerder*.

The composition of the Board of WTMC takes these changes into account. It will now consist of a chairperson (Professor Nelly Oudshoorn, University of Twente), four members for each of the “founding institutions” (Professor Rein Vos, University of Maastricht, Dr. Tsjalling Swierstra, University of Twente, Professor Eddy Houwaart, Free University, Professor Ruud Smits, University of Utrecht), a member for the other participating institutions (still to be appointed), and an external member (Dr. Véronique Timmerhuis, AWT).

#### **5. Collaboration within the School**

There are three types of collaborations. First, ongoing, often informal collaborations which were in place already and may, or may not, be enhanced by their occurring within WTMC. Second, collaborations which are induced by WTMC. Here, WTMC workshops play an important role (see section 2, research). Third, externally funded research programs which mobilize intellectual and personnel resources within WTMC. There are examples in life sciences and ethics, and in arts, and now also in genomics and nanotechnology. Thus, WTMC is important as providing intellectual frames, and as a pool of scholars.

#### **6. Tenured staff that are members of the School**

See Appendix 1 with list of members and their publications.

## **7. National position with respect to other Graduate Research Schools**

WTMC is an interdisciplinary Graduate Research School, and for that reason alone will have some overlap with other Graduate Research Schools. It covers almost all the research and scholarship in ST(S) studies in the Netherlands, an important part of qualitative innovations studies, science and technology policy studies and technology assessment, and some interesting work in arts and culture studies.

There is synergy and collaboration with NOB (the Netherland Graduate Research School for political science & public administration) at the level of projects and programmes, for example in the NWO-funded programme Rethinking Expertise. An earlier example of synergy and collaboration was the TIN20 project on the history of technology in the Netherlands, with the Posthumus Institute (the Graduate Research School for economic and business history). Further interactions, also with other Graduate Research Schools occur at the level of individual researchers. There is occasional consultation with the Graduate Research Schools CERES and OZSEthiek, recently also a joint activity with the Graduate Research School Art History.

## **8. International position**

Dutch research and scholarship in the field of science and technology intertwined with modern culture is internationally important, and recognized as such, because of its size and scope, its quality, and its dedication to combine scholarly quality and engagement with societal issues. The Graduate Research School WTMC has been able to reinforce and extend this position. An example is how being invited as anchor teacher for the WTMC Summer School is now seen in other countries as an indicator of scholarly and educational quality. We note in passing that individual members and groups are the source of most international activities and collaborations, and provide their substance. At the level of WTMC, there is collaboration with the sister Graduiertenkollegs in the University of Bielefeld and in the Technische Universität Darmstadt. Collaboration with the Centre Sociologie de l'Innovation at the Ecole des Mines de Paris, has profited from earlier stimulation through NWO funding, and has continued (e.g. the international workshop on the constitution of technological society, Rotterdam, September 2003). A promising new development is the participation of four groups within WTMC in the European Union's 6<sup>th</sup> Framework Program Network of Excellence PRIME (Policies for Research and Innovation in the Move towards the European Research Area). This will further strengthen the research in sub-programme 1, and link it with themes in sub-programmes 2 and 3, e.g. technology assessment and public debate. For PRIME, multi-level and multi-actor governance is the theoretical and practical entrance point. WTMC members participate in various projects in PRIME (often in a leading role), and interestingly, reinforce in this way their collaboration with Dutch political scientists who participate in PRIME. The WTMC Summer school functions as a PRIME Summer school when the topic is relevant for PRIME, and WTMC will participate in the PRIME Master degree which is being set up.

## **9. Overview of finances**

Formally, the research budget of WTMC is the sum of the research budgets of the members. The School has no decision authority over this budget, however. The overview of finances is therefore limited to income and expenditure for activities specific to the School.

Income of the School is based on contributions of members, and special support provided by the *penvoerder*. Membership contributions are calculated on the basis of staff research time and the number of PhD students participating in WTMC (above the guaranteed minimum level, for which payment is due anyway).

Apart from regular administrative costs, expenditures are on labour: (largely symbolic) compensation for the time of the Scientific Director, payment for administrative support and for the training coordinator; and on costs of the national-level training activities and costs of stimulating coherence of the research program (annual conference, workshops, seed funding).

External participants in the training activities pay the integral costs.

Over the period 2000-2004, WTMC has accumulated reserves, partly intentional (to finance the extra work for the submission for re-accreditation and the related strategy discussion) and partly because of under-spending and additional income (e.g. from external participants). For the period 2005-2010, expenditures will be higher (labour, Value-Added Tax) and income from members lower. A structural deficit is projected, but of such a size that it can be covered by the remaining reserves for four or five years. In general, WTMC's policy is to keep membership contributions as low as possible without sacrificing the quality of what it offers at the level of the School.

## 10. Guaranteed membership, PhD students and financial contributions for 2005-2010

The guaranteed (minimum) participation in WTMC is listed in Table 2. We have also included the actual numbers that can be expected for 2005.

Institution	Scientific staff (research fte)	PhD students (number)	Actual number of PhD students [+ assured new]
VU	2.5	4	2
UM	7.9	4	13 [+ 2]
UU	2.1	7	7 [+ 1]
UT	3.2	6	8 [+ 3]
UvA	1.0	1	0
Wageningen	0.3	0	0
Groningen	0.4	0	1 [+ 1]
Leiden	1.0	0	0
TU Delft	0.2	1	1
KNAW	[3.0]	0	0
<b>Totals:</b>	21.6*	23	32 [+ 7]**

\*(amounts to 60 to 70 persons;  
in addition, post docs and other  
temporary staff will be members)

\*\* (plus a few  
external PhD  
students)

Table 2: Guaranteed participation in WTMC (and actual PhD participation for 2005)

The financial contributions consist of annual fees proportional to participation (€ 908 *per* research fte, € 1500 *per* PhD student, and a contribution to infrastructure (€ 2723 for the four core institutions, € 454 for other participating groups)). In addition, the *penvoerder* institution contributes € 22 689 annually. We note that the fee *per* PhD student is relatively high, compared to some other Graduate Research Schools. This is related to the residential character of the workshops and Summer/Winter schools (which is important to achieve our training goals); the fee includes all the costs of the residential events.

### 11. PhD productivity indicators

In the period 2000-2004, 37 students finished their PhD thesis. Two PhD students (Benschop and Halffman) obtained their PhD cum laude and several PhD students (Hendriks, Hommels) won prizes with their thesis.

With the small number of entrants into the training, especially in the earlier years, cohort analysis in terms of percentages is not meaningful, but one can trace the individual stories. Four types of stories can be distinguished: (A) regular students, finishing their manuscript in four years or a bit more and obtain their PhD on the average in five years; (B) students taking up a job and/or experiencing a delay, who then typically take seven years before they obtain their PhD; (C) “outliers”, students who because of special circumstances take ten years or more; (D) drop-outs, most often in the first year when the student realizes WTMC training is not suitable for him/her, or stops working on a doctorate altogether.

For the group of 37 students who after completing their training within WTMC obtained their PhD in the period 2000-2004, the duration between entrance into WTMC training and obtaining the PhD is shown in Figure 2. The three types can be recognized.

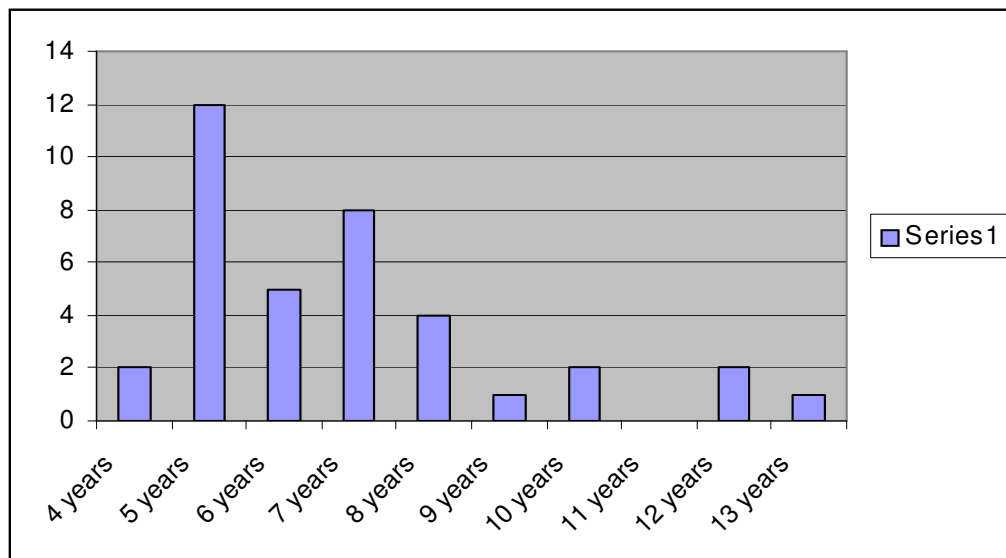


Figure 2: Duration of PhD, for students graduating in the period 2000-2004

The outliers are indeed extreme cases, often of students who because of circumstances could not finish their PhD, but found occasion to do so at a later stage. If we (conservatively) delete only the three furthest outliers, we can calculate percentages to compare with VSNU statistics (Table 3).

PhD obtained	within 5 years	within 6 years	within 7 years
Humanities and social sciences, overall (figures from VSNU 2001)	38%	71%	88%
WTMC (graduates in 2000-2004)	41%	56%	79%

*Table 3: Duration of PhD compared with humanities and social sciences general*

The stories of the drop-outs are varied. Especially in the early part of the period 2000-2010, a few students left because they wanted to focus on the specific training needs linked to their PhD topic, rather than go for the broad approach to the field offered by WTMC. Some others left because they stopped working on their PhD altogether. The numbers are comparable with the withdrawal percentages for humanities and social sciences, 10-15%, quoted in VSNU 2001. The extreme case where at a late stage, the PhD student's work is not approved by the supervisor, has happened twice. WTMC tried to solve the difficult situation, but was not successful (cf. also above, quality assurance). In the Dutch system, the students might be able to obtain their PhD with another supervisor.

It is too early to discuss the PhD duration of the present PhD students, but our impression is that the regular storyline (A) will dominate. An important reason is that most PhD students now work within the framework of a larger research programme (and often externally funded, which means that the research projects are more explicitly articulated).

## **12. Career perspectives and jobs of graduates**

Most of the graduates of WTMC now find jobs in academic positions, with groups participating in WTMC but also more broadly (cf. section 0 on "mainstreaming"). Of the 44 graduates in the period 2000-2010, 12 now have research and teaching jobs with university groups participating in WTMC, and 14 with university groups not participating (only 6 and 4, respectively, are temporary positions). The others have jobs with public research organisations (4), have a staff position in a scientific organisation (2) or in an agency (2), or are with a consultancy in the field of science and technology policy (1). While the ongoing expansion of the field created job opportunities in universities, this will not continue indefinitely. There will be a demand for our graduates in organisations outside universities, nationally and internationally. There will also be more competition.

## **13. Measures taken in response to critical comments to the previous submission**

*The organisation of the research programme was difficult to fathom:* The three sub-programmes are now positioned as frames of reference rather than coordinated programmes of research. Then, there is ongoing research of members including synergies

and collaborations. And the articulation of special WTMC programmes when there is sufficient investment and continuity (see section 2).

*Increase the number of PhDs awarded after four and five years:* This has happened, even if an appreciable number of students still required seven or eight years. Closer monitoring of progress has been introduced, informally, and the possibility of intervention by the Scientific Director (when there is cause for serious concern) was considered. Quality assurance of PhD supervision was identified as a key point.

*Increase the guaranteed numbers of PhD students in the School:* One route has been to have more institutional members; the participation of the University of Utrecht has been important in this respect. Another route was to negotiate with existing institutional members. Their possibilities to guarantee a higher number of PhD students are limited, however, especially at present, when almost all universities are introducing budget cuts. On the other hand, opportunities for external funding of WTMC-type research have increased, and this has led to a definite increase in the number of PhD students participating in the WTMC training programme (cf. Table 2, above). Groups in the Universities of Twente and Utrecht and the Free University now offer an *inspanningsverplichting* rather than a guarantee.

#### **14. Measures proposed in response to the external peer review**

The strengths in research and the leadership role signalled by the external peer review panel can be maintained and perhaps expanded without introducing other changes than entertained already.

The concern about inclusion of broader philosophy will be addressed through collaboration with the Centre for Society and Genomics led by Professor Hub Zwart (Radboud University). History of science and technology is already a significant area of research in WTMC, notably in the University of Maastricht. Existing participation in, and contacts with, the ESF-funded Tensions of Europe project led by Professor Johan Schot (Technical University of Eindhoven) will be strengthened, and contacts with the Institute for the History and Foundations of Mathematics and Science (Professor Bert Theunissen, University of Utrecht) are being established. The choice of anchor teacher Professor Tom Misa (historian of technology, Illinois Institute of Technology) for the 2005 Summerschool is an opportunity to flag history of technology and its links with contemporary issues.

The comment on deficiencies of incoming PhD students will be considered given the diversity of the students. With the increasing numbers, it might indeed be cost-effective to have a “foundational course” rather than leave the compensation of deficiencies to the local training. While delays and drop-out are a concern and we will continue monitoring so as to be able anticipate, there is no one remedy given the widely different causes. With the new generations of PhD students, more embedded in research programmes, we expect fewer problems.