

# CvB stukken voor agenda Universiteitsraad

Overlegvergadering d.d. : 17 december 2014  
Commissievergadering : OOS  
Agendapunt : TGS 2.0  
Bijgevoegde stukken : TGS 2.0 POSITION PAPER: AIMS, SCOPE, ACTIVITIES  
AND ORGANIZATION OF TWENTE GRADUATE SCHOOL  
2014-2020

Betrokken concerndirectie: S&B

Secretaris: van Keulen

Portefeuillehouder: Brinksma

paraaf: 

paraaf: 

paraaf: 

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## 1. Status agendapunt:

Rol URaad:

- Ter informatie
- Ter advisering
- Ter instemming
- Anders:

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## 2. Eerder behandeld in:

Naam gremium: CvP

Datum behandeling: 17 sept. 2014

Naam agendapunt: TGS 2.0

Conclusie toen: Het voorstel is akkoord. Er waren twee discussiepunten. De functietitel 'Dean' wordt vervangen door de titel 'academic director'. En de aanwijzing van de clusterleider wordt een gemeenschappelijk besluit van WD en decanen. Dit wordt in de notitie aangepast.

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## 3. Toelichting/samenvatting:

Vanaf 1 januari jl. geldt het nieuwe promovendibeleid en promovendistatuut aan de UT. De belangrijkste wijzigingen betreffen de registratie en monitoring van promovendi en de UT-brede coördinatie en ondersteuning van de promotie-opleiding. De nieuwe regelingen, procedures en de nieuwe taakstelling maken een herziening van de structuur en de organisatie van TGS nodig. In het nieuwe beleid wordt de promotieopleiding (van in principe 30 EC) en het opstellen van een opleidings- en begeleidingsplan verplicht gesteld. Verder wordt de promovendus geregistreerd en gemonitord in een promovendusvolgsysteem. TGS 2.0 voorziet in een effectieve en efficiënte organisatie.

Hiernaast worden de Graduate Programmes inhoudelijk geclusterd langs de lijnen van de onderzoeksinstituten en faculteiten. Op deze manier wordt een goede aansluiting op de masterprogramma's gewaarborgd. De clusters krijgen een zekere autonomie (Graduate School@UT) wat betreft invulling van de programma's en van de 30 EC.

TGS is verantwoordelijk voor de kwaliteit van de monitoring en registratie, en voor de kwaliteit van de opleidingsprogramma's. De kwaliteit van onderzoek blijft de verantwoordelijkheid van de faculteit, c.q. het CvB.

### **Summary: TGS 2.0**

To summarize the proposal is to implement TGS 2.0, with the following characteristics:

- TGS overall governance: Graduate Board, under the guidance of the Rector Magnificus, comprised of Scientific Directors and Faculty Deans (meets 1-2 times in the presence of TGS Academic Director). Main role: monitoring & stimulating decentralized TGS clusters and central TGS activities.
- The Doctorate Board (CvP) fulfils the role of Examination Board. TGS Academic Director is advisory member of the Doctorate Board and brings in TGS related topics for discussion and decision making.

- Decentralized clusters ('Graduate Schools') as described in section 3 and appendix, autonomously run their own MSc + PhD programmes, and are represented by a Cluster Leader who also facilitates the decentral MSc & PhD education activities within the cluster. In connection with operating autonomously, it is important that these clusters are structurally embedded within a faculty or institute.
- TGS Cluster Leaders meeting: fulfils the role of 'opleidingscommissie' and consists of the Cluster Leaders plus representative from the Student Council. Meets 4 times per year, chaired by TGS Academic Director.
- TGS Student Council: P-NUT board plus representatives of board-members of Ockham and ATLAS study association. Meets twice a year with TGS Manager PhD Policy and coordinator.
- TGS organizes a yearly meeting for all scientific staff who are involved in supervising final theses, in the presence of the Rector Magnificus (after a meeting of the Graduate Board).

#### 4. **(Voorgenomen) besluit CvB:**

##### *Gezien*

- het nieuwe promovendibeleid en het promovendistatuut
- de nieuwe positionering en rol van de TGS
- de wens om TGS programma's te clusteren rond zwaartepunten van faculteiten en onderzoekinstituten
- de behoefte om de organisatie van TGS meer effectief en efficiënt invulling te geven

##### *Gehoord*

Decanen en Wetenschappelijk Directeuren

##### *Overwegende*

De herstructurering van de TGS komt voort uit de implementatie van het nieuwe promovendibeleid en het promovendistatuut aan de UT vanaf 1 januari jl. Dit vereist een nieuwe positionering en rol van de TGS UT-breed met een focus op de registratie en monitoring van promovendi en op de coördinatie van de promotieopleiding. Inhoudelijk is een sterkere clustering van programma's mogelijk die nauw aansluiten bij zwaartepunten van faculteiten en onderzoekinstituten. Tevens wordt het moment benut om de organisatie van TGS meer effectief en efficiënt invulling te geven.

##### *Besluit het CvB*

de Twente Graduate School te herstructureren met als doel een meer effectieve en efficiënte organisatie en een betere aansluiting bij de regelingen, procedures en administratie van het nieuwe promovendibeleid en promovendistatuut aan de UT. Het College stelt bovengenoemde vast onder voorbehoud van instemming van Decanen en Wetenschappelijk Directeuren.

#### **GRIFFIE URaad: (door griffie UR in te vullen)**

##### **Eerder in URaad aan de orde geweest?**

- Nee.
- Ja, op

Conclusie toen:

##### **Nadere toelichting:** (Voor als presidium/griffier vindt dat één van bovengenoemde punten nadere toelichting behoeft)

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# TGS 2.0 Position Paper: Aims, Scope, Activities and Organization of Twente Graduate School 2014-2020

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Gedurende de 2014 Twente Water Week is Enver Güler onderscheiden voor zijn artikel 'Micro-structured membranes for electricity generation by

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*Prof. dr. ir. Petra C. de Weerd-Nederhof*  
Academic Director Twente Graduate School  
September 2014

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**4. TGS 2.0 proposals for decision-making**

## Introduction

In 2014, the UT introduced a new PhD policy, adapted regulations, a new PhD charter, as a result of which the obligation to follow 30 EC of PhD education has become a condition of the PhD phase for gaining a doctoral degree at the UT. This new policy also ensures that all (new) UT PhD candidates are registered at the start of the phase in a PhD monitoring system known as ProDoc. Twente Graduate School was tasked with the intake and monitoring of UT PhD candidates as of 1-1-2014.

The idea of modernizing the organization of the Twente Graduate School itself came about as a result of the introduction of this new UT PhD policy, as well as the wish to keep the central TGS organisation (TGS Office) as an overall virtual UT unit as 'lean' and efficient as possible even though a considerable task was added. The Executive Board asked TGS to develop a position paper on this matter. Various versions of the proposals in this position paper have been discussed (based on PowerPoint slides) with:

- TGS Programme Committee (Scientific Directors, Dec. 2013 & Jan 2014)
- TGS Cluster leaders (representatives of TGS Programme Directors, Jan. 2014)
- TGS Educational Board (faculty deans, during the Doctorate Board/CvP meeting, Feb. 2014).

In the current manuscript, a review of the development of TGS between 2009 and 2013 is followed by a discussion of the most important activities for TGS as of 2014, and a presentation of the proposals for the renewed organization of TGS. The paper ends with a summary of the proposed changes for decision-making by the Executive Board (CvB). *On page 11, the proposal with the main characteristics for TGS 2.0 are summarized. Page 12 lists the proposed clusters for 2015 onwards.*

## 2. TGS development and activities 2009-2013

Twente Graduate School (TGS) was established in 2009. The organization of TGS as it was then intended can be found at <http://www.utwente.nl/tgs/organization/>. TGS was governed by a Dean who reported to the Executive Board (from 2009-2013 that role was fulfilled by Gerard van de Steenhoven, also faculty dean of TNW). The academic director of TGS managed the TGS Office, which is comprised of the secretariat, the ProDoc and PhD policy manager (since end of 2012) and the coordinator (since end of 2011). The Scientific Directors (WDs) formed the TGS Programme Committee that decided upon admission of TGS Educational Programmes. TGS Educational Programmes (MSc+PhD) were governed by Programme Professors who were united in the Chamber of Programme Professors. Lastly, the Educational Board was made up of faculty deans. The Programme Committee, Educational Board and Chamber of Programme Professors each met twice a year. No separate Student Council was formed although this was the original intention: the PNU board representatives (PhD Network of the University of Twente) fulfilled a sounding board function for TGS. Neither have the listed positions of Advisory Board and Student Admission Committee been filled.

### *Graduate Programmes (MSc+PhD phases)*

In 2012 there were nineteen TGS Graduate (MSc+PhD) programmes. The programmes embody routes for getting on track for doctoral degree research during the master phase and a description of guidelines for 30 EC Academic Skills, Career Development, Broadening & Deepening courses in the PhD Phase. In addition to improving the quality of the PhD programme and improving the (content of) preparation for a doctoral degree phase, integrating the MSc and PhD phases is also expected to have a positive effect on P4 performance (time saved due to getting on track). The admission of individual students to a TGS programme is in the hands of the Programme Professor and the thesis supervisor/promotor, who can liaise with the TGS director whenever necessary.

### *Routes to becoming a researcher in the master phase*

All 19 TGS programmes include content-focused master routes and 'preferred' masters. The guiding principle is scouting for talented doctoral degree material in/after the bachelor phase and during the first master's year, so that students can get into the right lane for a doctoral degree phase ideally already in the second master's year. On the one hand by attending specific research-oriented courses and pursuing international research internships, on the other hand, for example, by allowing the master's final thesis to form the start of the doctoral degree research as research proposal. It is however still not often (only very occasionally) the case that students approach a TGS Programme Professor during (the start of) the master's phase. This is partly due to master's students delaying the choice or decision to pursue a doctoral degree until during the graduation phase, but also due to bridging problems (funding between the moment of MSc graduation and obtaining external funding for the PhD trajectory). The TGS Fund was created in 2011 in order to address these bridging problems. In 2013 the TGS Award (a price for the most promising research

proposal) was combined with the TGS Fund: 6 preselected TGS Award candidates are entitled to a maximum of 6 months funding for bridging. Around the same time in 2013, five foreign UT master students as potential doctoral PhD candidates were awarded a study grant for the second year (facilitated by collaboration with S&B Internationalization). In 2014 some of these students were competing for the TGS Award, have received a bridging grant and will likely stay at the UT for their PhD phase.

A number of recommendations, based on the Route '14 project Positioning and Quality Improvement of Master Programmes (PKM), will lead to activities for TGS in the period 2014/2015:

- improving and simplifying the master routes
- clearer external positioning of the integrated MSc + PhD programmes through clustering, development of a new website and brochures, and by highlighting 'preferred' masters for the programmes
- implementing a master excellence route called Research Honours for researchers-to-be, whereby the opportunity of including these extracurricular routes in the teaching part of the PhD phase is an important design parameter.

### *30 EC Education in PhD phase*

Also in each of the 19 TGS programmes, points of departure/guidelines have been drawn up by the research groups themselves for 30 EC courses per programme, to be used by the thesis supervisor/promotor and the PhD candidate to decide on an individually customized educational programme. For all programmes, the points of departure/guidelines are comprised of a combination of Academic Skills and Career Development courses, Broadening and Deepening Courses.

- *Academic Skills* and *Career Development* courses are offered by the Centre for Training & Development of the Directorate for Human Resources (which to this end collaborates with, among others, Educational Services (CES/OD) and the TCP Language Centre, EU Office, Kennispark and the Library and Archives Service Centre). In 2012 a joint portal was realized that provides a clear summary of all PhD courses ([www.utwente.nl/CTD](http://www.utwente.nl/CTD)). It is also possible to do (parts of) a UTQ (University Teaching Qualification). From the start, TGS has also collaborated with ELAN: within the framework of betacrosslinx/SPRINT it is possible to combine a doctoral degree phase with the first grade teacher training (Doctoral candidates and teaching), and doctoral PhD candidates can incorporate this, in part, in their educational programme.
- TGS itself offered an *Introduction Workshop*, and a *Research Management Seminar* (now integrated into the TGS 2-day workshop), plus five so-called *Broadening Courses*:
  - Entrepreneurship & Valorization.
  - Advanced Science Communication,
  - Ethics of Technology,
  - Philosophy and Methods of Science,
  - Research Management.

Most TGS programmes recommend PhD students to follow at least one of the Broadening Courses (or an equivalent elsewhere).

- *Deepening Courses*: A limited number of *Deepening Courses* are offered 'in-house' by the programmes themselves, e.g., by MESA+. Many deepening courses are, however, followed with national research schools or within a European context, sometimes including training courses in specific academic skills. Educational courses followed by PhD candidates appointed via e.g. the Foundation for Fundamental Research on Matter (FOM) within the framework of their FOM contract, are incorporated in the education obligation of the TGS programme concerned.

#### *Clustering of Educational Programmes*

The 19 TGS Educational Programmes were clustered in 2011/2012.

Representatives of the clusters meet on 2 extra occasions per year, in addition to the 2 meetings of the Chamber of Programme Professors. The clusters were formed along the lines of the research institutes; there is a separate cluster for the ITC faculty, and there are two smaller clusters that are not limited to one research institute:

- MESA+, represented by Harold Zandvliet
- MIRA, represented by Bart Koopman
- ITC, represented by Alfred Stein
- IGS, represented by Bas Denters
- CTIT, represented by Jaco van de Pol
- Computational Science, Stefan Luding
- Ethics of Technology, Philip Brey

In 2013 the Faculty of Engineering Technology (CTW) proposed a new cluster, Science-Based Engineering, with Andre de Boer as cluster leader.

#### *Implementation of PhD candidate policy*

In 2011/2012 TGS supported the Steering Group on PhD policy that was set up by the Executive Board, by, among other things, creating 6 working groups to elaborate upon the various facets. The Steering Group's advice was published in 2012. In 2013 the most important activities of TGS in relation to implementing the PhD candidate policy focused on developing ProDoc (in collaboration with HR and ICTS): a web-based Training & Supervision Plan that allows the thesis supervisor and the doctoral PhD candidate to record the individual educational programme and to monitor its progress. In addition, the focus is on supporting the development of a PhD Charter and adjusting the regulations on doctoral degrees, whereby, among other things, a (30EC) education obligation will apply to *all* UT doctoral PhD candidates. All this has resulted in the activities described in the following paragraph for TGS as of 2014.



### 3. TGS 2.0 - as of 2014

#### *Main activities as of 2014*

As of 2014, due to the introduction of the new doctoral degree regulations and the PhD Charter, TGS has been given three (instead of 2) main activities:

1. Registration, progress monitoring & graduation protocol of - and for - *all* UT doctoral PhD candidates in ProDoc (in collaboration with HR and the Doctorate Board).
2. UT-wide coordination & facilitation of Doctoral Education & Study Guidance with optimum UT offers in Broadening, Deepening and Academic Skills & Career Development courses, and mentoring & coaching (in collaboration with the Centre for Training and Development, CTD).
3. MSc-plus-PhD routes for excellent MSc students/transfer students and PhD lateral intake students. This also includes such instruments as the TGS internationalization fund, TGS Award, and the master excellence routes.

#### *Central organization*

For TGS, 2014 is the year for implementing ProDoc further, and adjusting the central TGS organization according to the new main activities. It is proposed to replace the rather complex structure of a separate Dean, central Educational Board (Deans) and a Programme Committee (WDs) by **one Graduate Board, chaired by the Rector Magnificus** and comprised by faculty deans and scientific directors. The *Doctorate Board* (College voor Promoties - CvP, i.e.: all faculty Deans) could fulfil the function of **Examination Board** for TGS. The CvP is already the authority responsible for doctoral degree regulations and the PhD Charter, so this would seem a logical combination. The *P-NUT board* can continue to fulfil the role of **Student Council**, in principle with the addition of a representative (master student) from Ockham, the UT excellence association, and in a later phase also from ATLAS 'study association, meeting 1-2 times per year. The Student Council can delegate one (1) representative to attend **TGS Cluster Leader meetings** (4 times per year, which would be the equivalent of the '*opleidingscommissie*' for TGS). Once per year, TGS organizes a yearly meeting for all scientific staff who are involved in supervising final theses, in the presence of the Rector Magnificus (after a meeting of the Graduate Board).

The central TGS organization would then be comprised of:

- **TGS Academic Director**, responsible for overall strategic governance of TGS, leading TGS Office, and content wise focusing on the MSc + PhD routes and Broadening Courses; guidelines for 30EC certificates; TGS extra certificates, e.g. on Teaching and/or Entrepreneurship; chair TGS TGS Cluster leaders' committee; TGS Award and Guarantee Fund, MSc Research Honours; connection with ATLAS, PDEng; Marketing and Internationalisation (S&B). Advisory member of the Doctorate Board/CvP.
- **TGS Manager PhD Policy**, responsible for operational management ProDoc BackOffice, and focusing on PhD policy and ProDoc, contact person Joint & Double Degrees and Academic Skills & Career

Development courses. Member of Internationalization Portfolio-holders. Contact point for PhDs (mentoring, coaching, confidential advisor), P-NUT; HR, Controllers

- **Secretary's office/ProDoc BackOffice**, secretarial, organizational and administrative support for TGS activities; minutes of TGS meetings, data management ProDoc & contact point for users' questions.
- **coordinator/study advice** for
  - o individual registration (intake) of PhD candidates in ProDoc and advising on and reporting on PhD course plans in ProDoc,
  - o organization of TGS courses provided in Broadening Courses and Introductory Research Management workshop (the TGS 2-day course, will be offered 4 times a year for 2-300 starting PhD candidates a year (50-60 at a time), master routes, Guarantee Fund and TGS Award.
  - o also a member of fainco – group.

**Note:** The above-mentioned proposal replaces the separate (meetings of) Educational Board, Programme Committee and TGS Committee of Professors and cuts out the level of a TGS Dean (a role which was combined with by a faculty Dean). TGS itself can in this way retain the current limited numbers of staff, while becoming a more independent entity at UT. TGS staff continue to be employed by TNW (TGS is incorporated into this faculty as a virtual unit).

#### *Decentralized organization*

The decentralized organization within the framework of TGS 2.0 would be comprised of further development of the substantive clustering of current individual MSc+PhD programmes that commenced in 2012/2013. Clustering would content-wise be based on the current clustering, *harmonized as closely as possible with the research institutes and the faculties where the master programmes are embedded*. Good examples of clusters are the current MIRA cluster based on preferred master Biomedical Engineering (within which a special research route will be implemented), and the MESA+ programmes continuing to build upon Applied Physics, Chemical Engineering and Electrical Engineering, with MSc Nanotechnology as 'preferred' master for lateral intake students. Other existing clusters are those built on, in particular, masters Computer Science, BIT, HMI, Industrial Engineering & Management (CTIT), the social science masters (IGS), the ITC master (Space for Global Development). Two smaller clusters are Computational Science (MSc Applied Mathematics), and Ethics of Technology (based on master PSTS and partnerships in 3TU). **See appendix for the proposed set of 8 clusters per 2015. New clusters may be proposed by scientific directors and/or faculty deans and added after presentation to and decision making in the Graduate Board.**

#### *'Graduate Schools' @ TGS*

The point of departure is that TGS 2.0 clusters work autonomously as units that *themselves define their sub-programmes, 30 EC guidelines and master routes, with marginal monitoring by the Graduate Board, whereby the faculties and research schools will be responsible for the quality of research of the various research groups concerned*. If the TGS 2.0 clusters are based on the current set and

clustering of TGS Graduate Programmes as mentioned on page 6, a number of research groups will not be included. *In the first half of 2015 TGS can draw up an inventory - together with the research institutes and faculties - of which chairs do not yet participate in one of the existing clusters* (see appendix) and what possibilities exist for aligning with one of the existing clusters or whether one or two new clusters are needed.

#### *Decentralized structure*

For the TGS 2.0 clusters to act as autonomous graduate schools within an institute or faculty, it is important that a certain form of consultation structure exists within which harmonization and communication takes place about sub-programmes, master routes and guidelines for completing the 30EC, so that all promoters/thesis supervisors and daily supervisors involved are fully aware of the decentralized points of departure. After all, the individual thesis supervisors/promoters are the ones who, according to the PhD Charter, have to establish individual agreements in ProDoc, about programmes and supervision with their PhD candidates. Examples for structures already in place which might also serve this purpose are CTIT where SRO leaders regularly meet, the ITC Academic Board, and the CTW Chamber of Professors.

#### *Quality assurance, Examination Committee and TGS Cluster Leaders meeting*

TGS is responsible for the monitoring and registration, as well as the overall quality of PhD candidates' educational programmes. To facilitate this, per cluster, and within clusters per research field, guidelines could be established for the master routes and the 30 EC Academic Skills, Career Development, Broadening and Deepening courses in the PhD phase, within the template indicated in the PhD charter. These could serve as a basis for individual agreements to be made between promotor and PhD candidate. The autonomy of clusters in terms of the specific input for the 30EC for broadening and deepening courses is therefore of crucial importance. Individual customization can be agreed in close concordance with the theme and methodology of the research project, the judgment of the promotor, and the skills and competences gained by the PhD candidate. The TGS Cluster Leaders, meeting 4 times per year, form the body mainly involved in this, thus fulfilling the role of 'opleidingscommissie'. The Doctorate Board (CvP, acting as 'Examination Board') retains ultimate responsibility, and the Graduate Board (comprised of WDs and Deans), chaired by the Rector Magnificus, monitors the activities of Twente Graduate School as well as the decentral clusters.

#### *TGS 2.0 courses offered*

The Academic Skills and Career Development courses offered by CTD will be reviewed in 2014, in consultation with the TGS Cluster Leaders and PNUT, and for each course the number of ECTS will be explicitly allocated. The clusters/'Graduate Schools' themselves may offer substantive deepening courses, or courses can be followed with national research schools or international partners. The courses/activities offered by TGS will be limited to:

- a small number of Broadening Courses that can also be part of the
- extracurricular master excellence track Research Honours, (allowing potential PhD students to already follow these courses in their master phase)

- the TGS 2-day course (strongly advised for all PhD candidates, offered 4 times a year) that forms a comprehensive introduction to the PhD courses offered at the UT, including workshops in Scientific Integrity, Planning & Supervision and an introduction to Research Management.
- The TGS Award trajectory combined with the TGS Fund bridging grant opportunities, will further enhance TGS instruments for stimulating the integration of MSc and PhD phase.

*Additional activities*

TGS additionally employs activities relating to

- PhD mentoring & coaching
- harmonization with PDEng and ATLAS (as of 2016)
- Best Practices for master routes (for example Biomedical Engineering) and for parts of the PhD Charter (such as, for example, the Qualifier)
- revamping the TGS website and developing specific cluster/'Graduate School' brochures
- the quality and education of PhD supervisors/new promoters
- TGS also has its own facebook page which attracts many visitors.
- In collaboration with M&C and S&B, an approach regarding visits to PhD fairs & other international promotion activities is being worked out.

#### **4. Summary: TGS 2.0 for decision-making**

To summarize, based on the above, the proposal is to implement TGS 2.0, with the following characteristics:

- **TGS overall governance: Graduate Board, under the guidance of the Rector Magnificus, comprised of Scientific Directors and Faculty Deans (meets 1-2 times in the presence of TGS Academic Director). Main role: monitoring & stimulating decentralized TGS clusters and central TGS activities.**
- **The Doctorate Board (CvP) fulfils the role of Examination Board. TGS Academic Director is advisory member of the Doctorate Board and brings in TGS related topics for discussion and decision making.**
- **Decentralized clusters ('Graduate Schools') as described in section 3 and appendix, autonomously run their own MSc + PhD programmes, and are represented by a Cluster Leader who also facilitates the decentral MSc & PhD education activities within the cluster. In connection with operating autonomously, it is important that these clusters are structurally embedded within a faculty or institute.**
- **TGS Cluster Leaders meeting: fulfils the role of 'opleidingscommissie' and consists of the Cluster Leaders plus representative from the Student Council. Meets 4 times per year, chaired by TGS Academic Director.**
- **TGS Student Council: P-NUT board plus representatives of board-members of Ockham and ATLAS study association. Meets twice a year with TGS Manager PhD Policy and coordinator.**
- **TGS organizes a yearly meeting for all scientific staff who are involved in supervising final theses, in the presence of the Rector Magnificus (after a meeting of the Graduate Board).**

## Appendix: 2015 set of clusters & Cluster Leaders

1. *Nanotechnology (MESA+)*. Preferred (research) master: MSc Nanotechnology. This is a KNAW-approved research school. Also MSc Applied Physics and Chemical Engineering. **Harold Zandvliet**
2. *Biomedical Engineering (MIRA)*. Preferred master route: researcher's route Biomedical Engineering. Also Technical Medicine, Health Sciences, Mechanical Engineering and Electrical Engineering. **Bart Koopman**
3. *Information Technology and Communication (CTIT)*. Preferred masters: Computer Science, Electrical Engineering, Human Media Interaction and Business & IT, but also Applied Mathematics, the 3TU masters of EWI, Industrial Engineering and Management, and the one-year masters in Communication Studies, Education Science & Technology and Psychology. **Jaco van de Pol**
4. *Social Sciences, Innovation & Governance (IGS)*. Preferred masters: the one-year behavioural and social science programmes for which routes leading to research master versions will be developed (Public Administration, Business Administration, Health Sciences and Psychology), whether or not in collaboration with other universities and research schools, but also Civil Technology & Management and Philosophy of Science & Technology Studies. **Bas Denters**.
5. *Geo-Information Science and Earth Observation (ITC)*. Preferred master: the ITC MSc programme, but also possible via a number of other UT programmes. **Alfred Stein**
6. *Science-Based Engineering (CTW)*. Preferred masters: Mechanical Engineering, Industrial Design Engineering, Civil Engineering & Management, but also the 3TU masters of CTW. **Andre de Boer**
7. *Ethics of Technology (3TU Ethics)*. Preferred master: Philosophy of Science and Technology Studies (small cluster) **Philip Brey**
8. *Computational Science & Engineering*. Preferred master: Applied Mathematics. (small cluster) **Stefan Luding**