

DRAFT

Towards a Domain Plan and PI/Tenure Track/Professorship schedule Health@BMS

An interdisciplinary, faculty-wide exploration and Tenure Track/Professorship schedule

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1. Introduction

The BMS Faculty is currently engaged in a repositioning process. One goal of this process is to strengthen the 'Health' theme, thus contributing to a centralized University of Twente domain for interdisciplinary research and education. Thus, in the context of BMS, the subject of healthcare (and its transformation) is an integral part of the system. Major demographic, social and technological developments have triggered a series of developments in the health and healthcare sectors which, in many senses, are quite radical.

The basic principle is that expertise will be contributed by several different departments. Based on this, efforts will be made to identify ways of strengthening and renewing research, education and commercial knowledge transfer. In its 'BMS Under Steam' strategy, the faculty made a firm commitment to link up many different disciplines in the health domain, and to develop a long-term strategic agenda for this purpose. This would include research by departments such as PGT (Psychology), HTSR (Health Sciences), OMD (Data Analysis, Methods and Techniques) and IEBIS (Industrial Engineering, Industrial Engineering and Management). In many cases, these departments are already working closely together, in relation to other faculties as well. Within the faculty, existing relationships with other departments could and should be developed further, in the interests of the Health domain. These include management and organizational sciences, general business administration, constructive technology assessment, ethics, policy studies and exploratory (agent-based) modelling. In relation to other faculties – and at the university-wide level – a range of developments have been initiated in the field of Health, in the context of the UT2020 plan. BMS is closely involved in this through the Health 'discipline consultation body', and via the development of university themes and programmes, as well as 'new-style institutes'.

In the context of deciding on strategy within STEAM, an exploration of the existing professorial/Tenure Track (TT) positions has led to the conclusion that augmenting the Health domain at BMS – in relation to other faculties – is both feasible and desirable. This conclusion is supported by BMS's contribution to Health Education at the University of Twente.

(1) Firstly, there is existing expertise in financial engineering and in the field of Healthcare Systems Engineering. This development, which is considered to be an essential component

¹ This document is based on input and various resources and reflects the outcomes of a faculty-broad consultation and discussions at different levels over a nearly 12-month period. A Health-profiling meeting held on 2 May 2017 was devoted to these encounters, and was attended by: Torenlid, Veldkamp, Siesling, Hans, Sanderman, Van Gemert-Pijnen, Doggen, Bohlmeijer, IJzerman, Van Harten, Toonen, Van Iperen (report).

of the faculty's STEAM strategy, is related to the faculty's overall profile within the University of Twente.

(2) Secondly, a number of professorships will soon lapse. Replacing these, by redefining the fundamentals in line with the planned boost to BMS's contribution, can further consolidate the university's Health domain.

(3) Thirdly, with the development of the Health domain within BMS, an essential process of reinforcement has been initiated. This will increasingly involve seeking to establish structural links between BMS's research and tertiary clinical care hospitals with large patient populations. It is very important to have access to sufficient quantities of empirical material. Discussions with Rijnstate hospital in Arnhem have created a unique opportunity to appoint a joint professor of Health Services Research. The same goes for other social institutions. In the light of STEAM's aspirations within the University of Twente, a long-standing joint venture with the University Medical Center Groningen, in the field of Medical Psychology, can be further extended and reassessed. In relation to NEVI (the Dutch association for purchasing professionals) and the group purchasing organization Intrakoop (the largest non-profit collaborative purchasing organization for healthcare providers in the Netherlands) longstanding relations have led to the ambition to develop the growing field of purchasing management in and for the healthcare sector and co-fund a TT/professorship in the area of purchasing for healthcare and hospitals.

In addition to these plans and aspirations at the level of TT/professorships, it should be noted that BMS Under Steam envisages various investments at the level of PIs, Postdocs and Assistant Professors over the next few years, together with a gradual redirection of SIM (strategic research funding) in line with the development (or re-development) of BMS's research programme. Also, due to vacancies created by faculty mobility and to the growth/recovery of some teaching programmes with a strong health component, new talent will be recruited for the future development of the faculty. This will make it possible to develop an integrated, overall strategic HRM plan for the Health@BMS domain. Linking the recruitment of TT and Full Professors to the broader recruitment of new talent for the health domain at BMS will also strengthen UT's/BMS's position in the labour market.

One goal of this report is to provide an overview and to arrive at a more comprehensive strategic personnel plan from the perspective of the domain Health@BMS (including the university's developments in this domain). The report brings together a number of developments and aspirations in the area of faculty development, research, and teaching. It also gives details of the corresponding TT/professorship profiles for which candidates are currently being sought. A brief description of the existing situation will be given as a starting point (section 2). Next, we list the organizational concepts that BMS will use as a basis for integrating the various elements of research and teaching in the University of Twente's Health domain. We also give an indication of the developments we would like to deliver in the more extensive context of BMS's Strategic Framework Plan, from 2018 onward (Section 3). We will conclude this domain report with details of the profiles of the five above-mentioned TT/Full professorship positions. The Professorship in Finance and (Health) Engineering will be covered in the Domain report on Financial Engineering, which is being prepared in parallel to this report (Section 4).

1. Departure

Health is a domain that is sustained by every single cluster within BMS. What is needed is a digest of how everything is connected. Taking the current situation as a starting point, an

assessment can be made to determine what needs to be strengthened and developed. There is scope for investment. There is enormous student interest. The Health domain not only comes to its own in the context of independent educational programmes, it is also – increasingly – a focus and an area of application within the other educational programmes for which BMS is responsible, such as Industrial Engineering and Management, Psychology, Communication Studies, and Public Administration.

The Dean has established a working group to prepare this Health@BMS domain plan. Its work will be based on input from the various departmental clusters at BMS. The working group will draw on existing expertise at PI/TT/professorial level within the ranks of the faculty. The individuals in question, who are already cooperating with one another to a greater or lesser extent, are (in alphabetical order):

- *Bohlmeijer*: promotion of mental health care using technology, rehabilitation, outpatient treatment, intervention techniques, personalization of healthcare.
- *Doggen*: acute care, integrated care systems, accident and emergency, patient preference.
- *Van Gemert-Pijnen*: persuasive technology for patients and caregivers, safe care, infection management, behavioural influence in chronic care, involving technology, geo-health.
- *Hans*: development and optimization of the management of healthcare processes, facility management, logistics in major disasters.
- *Van Harten*: quality and safety management, healthcare technology, creating conditions for successful implementation technology, combining process improvement with technology.
- *Sanderman*: supporting health psychology with technology, E-health, behavioural support from both therapists and patients.
- *Siesling*: tailor-made cancer care, organizational care, variation in hospitals.
- *Torenlief*: macro health systems, network organization, local and regional care.
- *Veldkamp*: health analysis, health assessment, data/health analytics, decision-support.
- *IJzerman*: health services research (accessibility of organization, care systems), health technology assessment (testing new products and medications), significance for patient and healthcare provider, personalized medicine, molecular diagnostics, discontinuation of treatment, implementation of guidelines, compliance by physicians and patients.

In addition to these educational and research groups, there are various realms of expertise – in particular, in the domains of entrepreneurship, management, policy, security, resilience and the exploratory modelling of complex systems – that could be involved in the Health domain. These could be used in combination with the above-mentioned realms of expertise to make a major contribution to the university-wide development of this domain.

In general, at the present time, in this phase of development at the social level and in terms of policy, there is a place for every significant facet of health, healthcare and health technology within the faculty. This is a faculty that is assuming a strategically stronger position in the context of the University of Twente, as a bulwark of research-driven health-technology development, with a range of social impacts.

In most cases, expertise within the faculty can be effectively deployed wherever it may be needed. The University of Twente presents itself as an institution whose educational

programmes and research are closely intertwined with technology. In addition, BMS staff possess top-level knowledge and expertise in the use of mathematical and data analysis models.

Externally, within the more limited view from BMS, a wide range of partnerships and agreements have already been established. In addition to existing partnerships, the Psychology, Health & Technology (PGT) department has launched two new networks. These are: (1) the E-Health Implementation Academic Collaborative Centre and (2) the International Consortium in the field of E-health and Health. Structural partnerships with health centres, major hospitals (including Rijnstate), outpatient care, mental health care, rehabilitation ('t Roessingh), companies, insurers, local authorities, provincial authorities and other universities are being energetically developed. A more systematic exploration and digest is in preparation. Purely for purposes of illustration, this could be compared to the recently established cooperation agreement with Rijnstate hospital. Rijnstate hospital (which ranks fourth in the Netherlands in terms of clinical turnover, and which therefore has a large patient population) is keen to improve ties with knowledge institutions. A joint professorship with the University of Twente will help the hospital to bring the quality of its scientific structure up to the optimum level, and to keep it there. The major hospitals' network sets great store by decision support and data management. The cooperation agreement between the University of Twente and Rijnstate hospital is now ready for signing. A structure report for the relevant professor's position has been issued, and forms part of this domain report. The various preparatory steps can be completed in a very short period of time.

As far as the educational aspects are concerned, there is clearly a great deal of interest among students. The Science and Technology (TNW) Faculty is currently engaged in repositioning Health Sciences, with significant and substantial assistance from various BMS groups. In addition, the relevant Programme Directors (OLDs) have been asked to supply an accurate digest of all educational provision, not just those aspects relating to 'health programmes'. The goals are to spotlight potential opportunities for streamlining and to identify best practices. Besides the regular education channels, knowledge is transferred through international training courses and handbooks – an extremely popular E-health MOOC has been developed. One major theme involves learning new competences and skills in the context of the transformation of medical technology and healthcare. It forms an obvious link to the domain of postdoctoral education, the University of Twente's Life Long Learning (LLL) strategy.

In the information it provides to students at home and abroad, BMS wants to refine its Bachelor's and Master's recruitment strategy, complementary to existing Health Programmes. This will bring this into line with the unique combination of behavioural sciences and health technology, and the extensive openings that this offers to the labour market, by positioning it as an important application domain within BMS's other educational programmes.

Various leads, key issues and opportunities have been identified that can now be used to develop new relationships, programmes and initiatives. Key issues and opportunities, for instance, in connection with airport, local authority and Ministry of Defence (Humanitarian Base Twente), the Red Cross and the home care sector in Enschede and the surrounding area (Healthy Ageing and Safe Living). More generally, one goal that has been expressed concerns linking the domain more firmly with aspirations for social entrepreneurship, spin off, and a focus on the development of knowledge about the way implementation is

structured. The field of mental health care is strongly represented within BMS. It is currently experiencing enormous changes, under the influence of technology. A preliminary examination of a Technical Psychology track was initiated in the context of the broader discussion on technology and mental healthcare.

Given the current state of affairs and in view of potential developments, the faculty as a whole has expressed a desire for improved support for activities within the domain: scientific programmers, administrative assistance, good quality infrastructure. More use must be made of the joint facilities, networks and external visibility offered by the technical medical centre. A section of the faculty will also be housed there, to facilitate faculty-wide cooperation with other parts of the University of Twente. The Faculty Board has made resources available that can also be channelled into infrastructure / programmers / research development.

BMS's various research groups are very enthusiastic, for many reasons, about the prospect of all being housed under the same roof. The meetings associated with the Institute for Innovation and Governance Studies' (IGS) Health Research workshops, BMS's Research Day, and the joint activities within the Health@BMS domain working group are all very much appreciated. These activities can be seen as indicators of the momentum that characterizes the Health@BMS domain in its current phase of development.

2. Concept and Development

Within the framework of the 'New Style BMS' research programme development, and in the run-up to BMS's 2018 midterm research review, a research steering committee has been formed. Its task is to coordinate cooperation and programme development within BMS in the field of Health Research, and to productively link it with other Research Initiatives within BMS and throughout the University of Twente.

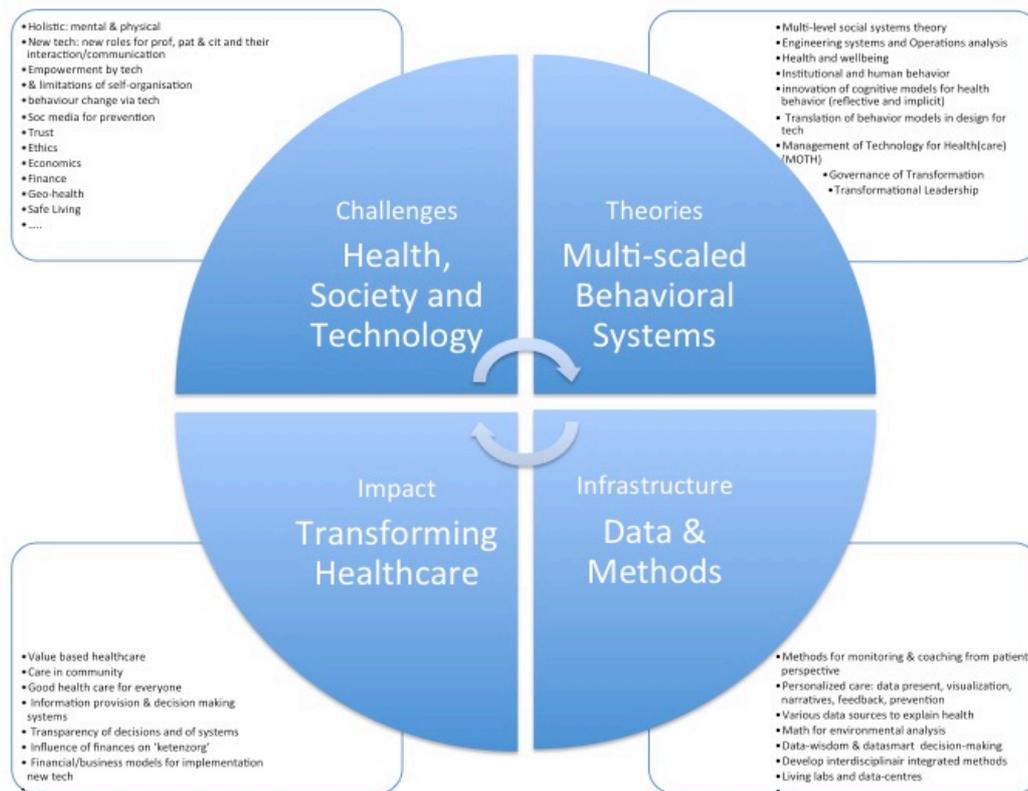
Ideally, in the first instance, the mission statement should be broad enough to cover the faculty-wide (and inter-faculty-wide) links and opportunities for cooperation. This is followed by a question relating to focus and profiling.

The programme is now being energetically developed. In terms of organization and content, this development and the work of giving substance to this programme are both dependent on the type of appointments that we can realistically make at the University of Twente in the foreseeable future. Based on the preparatory activities in the IGS Research Workshops, the general concept (on which our work and ideas are currently based), the roadmaps and the research development can be summarized as follows:

Figuur 1 op de volgende pagina

The above concept, which is in line with the 2015-2021 SEProtocol guidelines (research lines, contribution to society (impact), scientific contribution and (sustainable) research infrastructure), represents a work in progress. It is an edited and supplemented version of 'The Pitch for the Dean'. This was one of the deliverables at the IGS Research Workshops that took place in the first six months of 2017.

The second half of 2018 will be used for further development and refinement, and to develop the umbrella framework for a variety of groups within BMS and throughout the University of Twente. The aim is to submit the preliminary research programme for interim evaluation by an International Mid-term Research Review Committee, in the spring of 2018. To that end, we will need a clear view of the workforce and staffing required for the proposed programme in the subsequent period, leading up to the SEP Review in 2020. The planned new TTs and Professors will, of course, play a crucial part in the further development, content and design of the Health@BMS domain.



Technical psychology

This autumn, under the guidance of Ernst Bohlmeijer, a survey will be conducted into the available options for developing Technological Psychology at the University of Twente. The approach will be analogous to that used for Industrial Engineering and Management and Technical Health Sciences, based on a series of exploratory talks about mental health care and technology. This is an element of the strategy to strengthen links between medical technology/health technology and the institutional, organizational and behavioural science components within BMS.

Technological developments in the organization and structure of mental health care and psychiatry are obvious levers for the development of a Technical Psychology programme. The use of sensors in combination with apps, virtual technology, persuasive technology, and so on is transforming clinical work, not only in the medical sector but also in the area of mental health care. This is the largest specialism within the healthcare sector. It treats more

people than any other health domain. In terms of cost, mental health care is also the biggest cost item for society.

3. Recruitment

The Steam Strategy (and the long-term agreements with the University of Twente's Executive Board that are based on it) provide for investments to strengthen the health domain within BMS, in relation to developments at other faculties and 'New Style' University of Twente institutes. In various places, short-term and medium-term vacancies will arise as a result of lapsing contracts or of specific innovation incentives that have been announced. Talent development is key. The way is now open. This takes the form of tenure tracks, as well as career pathway arrangements with individuals who do not hold tenure track positions, and efforts to attract new staff. Its appeal lies in the ability to offer enormous freedom and extensive facilities, self-evidently broad themes, an effective infrastructure, and the opportunity to operate within a large group that has sufficient 'mass' to give prominence to a focus at national and international level. Based on existing fields of focus, a number of levers have been established to enhance expertise in the field of health, from a faculty perspective:

A TT/Professorship in Healthcare Systems Engineering provides a broad base for the transformation of healthcare. It can also provide the requisite connection with the Faculty of Geo-Information Science and Earth Observation (ITC), in terms of GeoHealth and Geo-information sciences. BMS excels at research into the service and system side, especially technology assessments of developments at all stages of the translational research chain. In the Health domain, there is also a greater need than ever before for new strategies for coordination and other forms of system integration (a term which, unjustly, seems to be mainly reserved for the energy sector, but which certainly also applies to other distributed systems, such as emerging forms of modern healthcare). In this connection, the subject of analysis is evolving in the direction of community-based distributed systems and networks for healthcare. This evolution is being driven by technology and by the individualization of care and services.

2. A 2016 advisory report by the Health Council of the Netherlands, entitled 'Research that makes you better' stated that University Medical Centers (UMCs) are increasingly focusing on rare diseases and high-tech interventions, and that a growing number of patients are being treated elsewhere. For this reason, many are advocating the formation of 'academic research networks'. In this way, public health research funding can achieve a much greater impact. The University of Twente favours access to patients, organizational issues, patient data and patient material, dependent on the level of cooperation with various organizations, especially hospitals. Top-level institutes contribute to this development by strengthening their research infrastructure and by pursuing cooperation with UMCs and Universities of Technology. A Professorship in Data-Driven Research in Teaching Hospitals has great significance and added value both for the parties in medical practice and from the point of view of modern health analytics.

3. Within psychology, the levers for innovation are based on the ongoing development of E-Health, in conjunction with Health Psychology and Persuasive Technology. The proposal is to give the current E-health professor the specific task of profiling Health at BMS. They will be asked to prepare a vision of the future and of matters pertaining to succession in consultation with the head of department and the Dean, and in cooperation with current

members of staff and researchers, as well as with the professors who are to be appointed. This will also involve the issue of succession (and of upgrading to a full-time appointment) for the current and vacant professorship in Health Psychology, such that Prof. J. van Gemert-Pijnen's field of study is fully integrated.

Lisette van Gemert-Pijnen already handles various ambassadorial tasks in E-health. She can extend these still further in the upcoming years, in cooperation with other University of Twente ambassadors. The proposal is that, during the transition phase in the upcoming years (at least until the summer of 2019), Prof J. van Gemert-Pijnen's responsibilities will include that of trailblazer for a stronger Health domain profile. This will involve:

- Adding depth to the Health domain for BMS, and projecting its profile
- The relationship to be established between the various domains (e.g. Learning-Health)
- Linking medical technology with health technology in education and research
- Boosting cooperation with stakeholders (University Medical Centers (UMCs), mental health care institutions, insurers, local authority care and welfare organizations)
- Boosting cooperation with regional companies in the health domain
- Boosting cooperation with international organizations and with universities that have a proven track record in Health and Innovation (MIT, Stanford, etc.), and exploring the options for double degrees

A structure report is attached concerning a modified full-time professorial position in Health Psychology that needs to be filled in the near future.

4. Many countries are faced with high and ever-increasing healthcare costs (Van Raaij, Schotanus, Van der Valk, 2013). This is an important factor – and a major driver – behind the transformation of the healthcare sector in the Netherlands and in numerous other countries. A comprehensive understanding of these developments requires a full appreciation of the legal, economic and management aspects inherent to the technology-related transformations involved. In addition to the relationships in the field of systems analysis and care logistics, which are already being energetically developed, business management and public administration provide a genuine opportunity to strengthen cooperation in the area of health procurement. The latter, an increasingly important and strategic variable in the distributed healthcare system, is currently being energetically developed. In response to substantial healthcare costs, several countries have introduced systemic changes, as well as managed competition in healthcare. In the Netherlands, this has resulted in the introduction of purchased healthcare (e.g., the purchasing of surgical care, paramedical care, elderly care, etc.) by healthcare insurance companies, local authorities, and others. This has boosted the influence of healthcare purchasers on the cost and quality of services delivered by healthcare providers. The following are some examples of the ways in which healthcare purchasers are influencing healthcare providers:

- Selective contracting of healthcare providers, to reduce costs and/or increase quality;
- Contracting based on output, outcome, and/or volume;
- Increasing influence of insurers on how healthcare providers purchase products and services, (e.g., implants, etc.);
- Et cetera.

At the same time, healthcare providers (e.g., hospitals, nursing homes, etc.) are increasingly focusing on their procedures for procuring materials, medical equipment, technology, services, etc. The procurement-related operating costs of Dutch healthcare providers amounted to €17.3 billion in 2012, and they are increasing each year (by more than 8% in

2012) (Intrakoop, 2013). This indicates that there is scope for cost savings and/or quality improvements, if healthcare providers can find more efficient ways of procuring products and services. Healthcare providers' plans for reducing procurement costs and/or improving quality include:

- More group purchasing by autonomous healthcare providers (see also the attached letter from Intrakoop);
- Improved supplier selection processes;
- Greater interaction between the healthcare providers' procurement and logistics processes.

As yet, no institution in the Netherlands has a professorial-level management science position that focuses on the socially and economically relevant domain of 'improving purchasing operations in the healthcare sector'. The development of this subject area at the University of Twente builds on the work of one of its founding fathers, Prof. Jan Tellegen, who is due to retire in the near future. The further development of this field can take place in the context of an established network that includes Utrecht University (Law) and Erasmus University Rotterdam (Business Administration). A full professorship position (supported by an external endowment) will tackle research into – and the improvement of – healthcare operations. As a result, it will be well placed to build bridges between the Departments of Health Technology and Services Research (HTSR), the Centre for Healthcare Operations Improvement and Research (CHOIR; a multidisciplinary CTIT research centre) and the various departments within Business Administration. With this TT/full professorship, the University of Twente can realistically expect to become the central node for procurement in Dutch healthcare research.

4. Profiles

A. "Data-Driven Health Systems and Services Health"²

Re.:

- a. full-time Tenure Track/Professorship position in 'Healthcare Systems Engineering'
- b. part-time/cooperation with 'Health Services Research' associate professorship/professorship position in cooperation with Rijnstate hospital

Strengthening Health & Biomedical Technology at the University of Twente, from the BMS Faculty

From the broader perspective of the University of Twente as a whole, adding the Tenure Track/Professorship positions of 'Health Services Research' and 'Health Systems Engineering' is an enhancement:

- for the BMS faculty, this is an ideal area in which to excel and in which links can be established with other chair holders and with other faculties;
- it is the 'High-Tech Human Touch' response to the role of new medical technology; after all, evaluating new technology from the micro level is too limited when it comes to the systemic impacts involved;

²Draft Prof. Maarten IJzerman and Prof. Wim van Harten, April 2017

- it is a field of study where, together with the Faculty of Electrical Engineering, Mathematics and Computer Science (EWI), a huge impact can be achieved through a combination of big data and healthcare analytics (including the BIT programme);
- An 'engineering' perspective in the social domain is essential to the University of Twente's branding (design oriented) and to projecting its profile;
- In addition, augmenting Health Services Research with a focus on data management and optimal utilization delivers innovative approaches to data mining, and new opportunities for outstanding research.

Augmenting educational programmes in the Health domain (Health Science, Technical Medicine)

In addition, this boost is enormously important in terms of the health cluster's development plans and, by extension, for the European TechMed Center/Technohal.

- The Health Science programme, which is in the process of redevelopment, is establishing a differentiation into three tracks;
- There was a relatively substantial demand for the health operations management specialization, to which various chairs contributed. The chair in Industrial Engineering and Business Information Systems (IEBIS) makes a particularly important contribution in this respect. However, there is a recognition that 'operations management', as a distinct field of study, is insufficient. It is essential that health services research and the quality and safety of care be included in the educational programme, at chair level. This task can be assigned to the health systems engineering chair.

Augmenting the Department of Health Technology & Services Research

The HTSR department connects two (three) major autonomous areas of research, each with its own dynamics and international network:

- Health Technology Assessment / Diagnostic Outcomes Research
- Health Services Research / Quality of Healthcare

In addition, there are a number of specific research areas such as 'intervention cardiology', 'laboratory diagnosis', and 'cancer outcomes research'. These areas have been developed by the holders of temporary, endowed chairs.

- HTSR currently has a 0.5 full-time equivalent (FTE) structural professorial position (IJzerman), whose research focuses primarily on Personalized Medicine and Health Economics/Technology Assessment. The research focuses on the increasing availability of molecular diagnostics capable of optimizing treatment (effects, efficiency) across the integrated care system. In this connection, the chosen approach tends to favour systemic analysis rather than trial-based analysis.
- The BMS faculty's unique positioning and cooperative ventures in the more quantitative domain (e.g. with IEBIS, or Stochastic Operations Research (SOR) at EWI), where links can be made to more far-reaching developments in terms of the governance and organization of care (Torenvlied PA, Veldkamp OMD and financial engineering) offers a clear-cut niche for a new professor in health systems engineering.

For HTSR, a professorial position in the field of Health Services Research (HSR) would be an essential enhancement. This would signify a much clearer choice in terms of boosting healthcare research, including the quality of care and research into care pathways. The distinctive aspect of a combination of a part-time HSR professor and

a large tertiary medical teaching hospital (STZ) like Rijnstate is that it links more epidemiological research to social-community issues.

Profile for a full-time Tenure Track/Professorship position in ‘Healthcare Systems Engineering’

“Health Systems Engineering or Health Engineering (often known as “Healthcare Systems Engineering” or “Healthcare Engineering”) is an academic discipline that approaches the healthcare industry and other constructs affecting health and safety as complex systems, and identifies and applies engineering design and analysis principles in such areas.”

Here, the field of study takes the system as a starting point rather than the individual care-provision units. This systematic approach can be selected at various aggregation levels, such as the hospital perspective (care pathways), the healthcare facility perspective (integrated care system) and the macro perspective (efficiency of care systems). Within this broader area, the primary focus of the new professorial appointment will be at the level of multiple healthcare facilities (meso), from a multi-level, multi-actor system and network perspective. One of the options is to focus on comparative public health systems, but this is still quite far removed from the University of Twente’s other research areas. However, it could be developed in relation to ITC.

Health Care Systems Engineering has a number of qualitative aspects (legal, ethical, cooperation, quality of care). With regard to the technical, medical and health technology fields of focus within the health domain at Twente and in view of the relationships to be established with other groups and faculties, the university is mainly interested in a more quantitative interpretation (relationship with operations research, computer science, and decision sciences).

Effects:

This is a full-time Tenure Track/Professorship position within the BMS Faculty, to be embedded in the HTSR department. The University of Twente is providing 100% of the funding (education and research, STEAM – strategic investment).

2. Profile for a ‘Health Services Research’ associate professorship/professorship position in cooperation with Rijnstate hospital

“Health services research (HSR), also known as health systems research or health policy and systems research (HPSR), is a multidisciplinary scientific field that examines how people get access to health care practitioners and health care services, how much care costs, and what happens to patients as a result of this care.”

Rijnstate is one of the country’s larger general hospitals. It aspires to excel in a number of defined fields, to which it wants to link Research and Development. To this end, a clear science policy has been established. The hospital is investing in the quality of internal support, while data warehousing and scientific data management will be boosted to a high level of efficiency. Each year, members of staff at the hospital co-author about 155 peer-reviewed papers. They also play an important part in the development of scientific operations within this tertiary medical teaching hospital. The joint appointment of a scientific coordinator with ‘professorship capabilities’ who, as a professor, further develops

the field of 'data-driven research in clinical research practice' can yield strategic benefits for both organizations. For the University of Twente, this would provide access to large patient numbers, research-oriented medical specialist, and advanced data management. Rijnstate would obtain access to the academic environment and a boost to its in-house scientific infrastructure. Importantly, this would also provide access to the new partnership (mProve) of five tertiary medical teaching hospitals, and the creation of a €1.4 million innovation fund with Chipsoft (for a period of seven years).

Effects:

An agreement has been reached between Rijnstate hospital and the University of Twente for the appointment/secondment of a senior researcher (associate professor), with the option of advancement to the level of professor.

The post will be jointly funded by Rijnstate hospital and the University of Twente (each providing 50%).

B. STRUCTURE REPORT ON PROFESSOR IN HEALTH PSYCHOLOGY AND PERSUASIVE TECHNOLOGY

General

A professorship in Health Psychology and Persuasive Technology involves the continuation and expansion (part-time to full-time) of the appointment/successor to Prof. R. Sanderman at the Department of Psychology, Health and Technology. It is an interim position, pending the retirement of Prof. J. van Gemert-Pijnen. The objective is that, in the near future, the new professor of Health Psychology will pursue the same field of work as Prof. J. van Gemert-Pijnen. The professor will be responsible for Research and Education in the field of Health Psychology, from within the Psychology, Health & Technology (PGT) Department.

Description of teaching and research remit

The aim of the professorship is to link health psychology with technical developments in healthcare (E-health), in a way that fully reflects the Human Touch in the University of Twente's High Tech profile. The professor of health psychology and persuasive technology will operate in the area where social sciences and engineering sciences intersect. Accordingly, this will require a multidisciplinary approach in education and research. This is in line with social developments and with the research agenda (Dutch National Research Agenda, Horizon, etc.), to personalize health-related work. E-health is considered essential in this regard, in terms of supporting the promotion of tailor-made healthcare. The proposed TT/Professor builds on current developments in E-health. The goal (with the help of members of the public, patients, professionals and other stakeholders) is to develop innovative, motivational and user-friendly solutions for personalized care. Here, technology will serve as an instrument for the promotion of self-management and co-management. The programme delivers the methodology needed to design technology that is user-oriented, and to use technology as a way of collecting, analysing and translating data in the context of self-management strategies.

Description of the field of study

Health psychology is an interdisciplinary field of study that deals with the application of psychological knowledge and methods to health, illness and healthcare. The basic principle

of health psychology is the biopsychosocial model that defines health and disease as the product of a combination of factors. These include biological variables (such as genetic predispositions), behavioural factors (e.g. lifestyle, stress, health views) and social and physical environmental conditions (including cultural influences, family relationships, care technology). In health psychology, psychological processes and human behaviour are studied in relation to disease and health (i.e. health in general, both physical and mental health). The goal of health psychology is to contribute to the promotion and maintenance of health, to the prevention and treatment of diseases, to identifying the causes of (and factors related to) health problems and illnesses, and to the analysis and improvement of healthcare and health policy.

Education and research in health psychology at the University of Twente is characterized by a design-oriented approach. The aim of this is to develop, evaluate and implement innovative E-health technologies focused on the personalization of health information, empowerment, self-management and healthcare – to promote health and well-being. This is typified, first of all, by the strong link between technological innovations and innovations based on behavioural science theories concerning health promotion and disease management. The processes used when designing technology-psychological products and services are based on human-centred design and persuasive technology principles. Also, patients, healthcare providers and other stakeholders are strongly involved from the very start of development, to optimize implementation. In addition, the link between behavioural science frameworks and technology is expected to expedite the development of powerful models for behaviour and health. This will have important implications for the advancement of psychological theory and for efforts to deliver more effective interventions.

Secondly, there is the health assessment approach. This is used to measure significant health outcomes in a valid and technologically innovative way, and to assess behavioural interventions in a broad sense, in terms of health, welfare, safety and the cost benefits involved. Accordingly, the chair's research encompasses a broad spectrum of research methods, involving the development and validation of methods for measuring emotions, cognitions and behaviour, and determinants of behaviour and health outcomes. In addition, health is measured from the user's point of view. Work is currently under way to develop internationally accepted Patient Reported Outcome Measures (PROMs) and technologically innovative measurement methods, such as computer-adaptive measurement technology to link technical innovation to health assessment. The research is multidisciplinary in nature, with input from psychology, health sciences, and medicine, as well as from information technology and communication technology. The design approach is characterized by an iterative, stakeholder-focused, phased approach to the analysis and diagnosis of health problems, development, implementation and the evaluation of interventions.

Education

Health Psychology represents excellent, inspiring and involved education at the Bachelor's and Master's level (Master's track: Health Psychology & Technology). Students graduating from the Master's track can look back on a fascinating, educational and enjoyable period of study. They feel sufficiently well-equipped and self-confident to work as a *'health psychologist and persuasive technology expert'* in the rapidly changing landscape of the public healthcare sector. They can be used to boost the effectiveness of health-psychological interventions or to better identify processes of change in behaviour, emotions, cognitions and outcomes. Our students' enthusiasm for the programme is infectious. They are greatly valued by those working in the field, due to their unique combination of multidisciplinary

knowledge and skills in the area where psychology, health and technology intersect. The following paragraphs briefly describe the key core values involved.

Link between psychology and technology. In education, there is a strong focus on the relationship between psychology and technology. On the one hand, it explores ways in which insights from psychology (and health psychology) can help to improve the use, adherence, effectiveness and implementation of E-health. On the other hand, it investigates ways of using new technologies to strengthen psychological processes and to influence behaviour. This involves factors such as persuasive systems, smartphones, sensors and wearables that allow big data to be collected for the purpose of tailored personal coaching. This is fully in keeping with developments in personalized health. The students learn how to operate in a multidisciplinary context (by means of the High-Tech Human Touch minor). They are trained to apply innovative design and research methodologies that are in line with a rapidly changing healthcare sector.

Close relationship between research and education. The added value of the link between research and education is the basis. Thus, in education, there is a major focus on current research projects. This can take the form of guest lectures by PhD students, and of teaching staff discussing their own research during regular lectures. The aim is also to enable students – during their internship or graduation research project – to participate in ongoing research programmes. The aim is not only to provide students with up-to-date scientific knowledge, but also to instil in them a passion for research.

Applied and realistic. The education provided is deeply anchored in everyday practice. Active links are sought and maintained with those working in the field (both professional and academic). In this way, we aim to achieve a valuable two-way flow of knowledge and skills. It also enables us to project an image of the scientist-practitioner model to the students. On the one hand, topical problems, issues and challenges are fed into the programme by those working in the field. For our part, we ensure that the education provided is fully in keeping with this practical input. On the other hand, together with our students, we can feed up-to-date scientific insights and innovative methodologies (including research methodologies) into institutions engaged in everyday practice. Contact with those working in the field takes the form of internships and external research assignments, for example, as well as guest lectures by professional practitioners and the close contacts maintained with alumni. In this way, students get a reliable impression of their future field of work. Also, in the course of their assignments, they can work on solutions to issues or problems that ‘are really relevant’.

Specific focus on professional skills. A good health psychologist not only has sound knowledge and academic skills, but is also able to operate professionally in the complex field of work that is the healthcare sector. The ability to identify relevant stakeholders and to negotiate with them, to work in interdisciplinary teams, to take due account of the context in which you operate, and to see other people’s interests and visions from their own viewpoint are essential professional skills possessed by all good health psychologists. Self-knowledge and the ability to reflect on your own professional practices, plus the self-management of your own professional development, form the basis of an independent position as a professional. For this reason, during the educational programme (both in the coursework and in the assignments) there is a specific focus on professional skills, which are assessed as integral parts of the relevant subjects.

Internationalization. Its unique profile makes this a highly relevant and appealing educational programme for both Dutch and international students. For this reason, the Master's has been taught in English since 2014. In addition, the upcoming years will see further investment in international programmes and online courses. At the moment, we are actively working to provide a vehicle with which to promote the group. We are also conducting a highly active recruitment campaign at home and abroad.

Research

Our research, which is positioned within BMS's Health domain and programme, is also in line with the Resilience domain (in the BMS and 4TU (a federation of the four universities of technology in the Netherlands) context). The chair's research focuses on:

- (a) The development of methodology to influence behaviour and welfare, with a view to improved health and healthcare;
- (b) Designing technology to support the monitoring and coaching of psychological and behavioural processes (both implicit and explicit) in members of the public, patients and professionals. This involves the use of technologically innovative and motivational measurement methodology;
- (c) Use of technology as a way of collecting, analysing and translating big data in behavioural interventions.

The research thus builds on current research lines and on experience in the areas of chronic care, health literacy, resilience and self-management skills supported by technology. It also builds on current theories of health psychology, positive psychology, persuasive technology and social psychology.

The Twente approach to Psychology is guided by the participatory development approach used in the CeHRes Roadmap. This method was developed to provide a useful and effective design for E-health. Underpinned by a methodical and iterative approach, this involved analysing the context and health problems or health problems in the healthcare sector. This work included an analysis of the *determinants* (environment, role of psychological factors), the *design* (involving all stakeholders, user-centred and persuasive designs), the *planning and incorporation of iterative evaluation cycles* (formative evaluation) and the integration of *implementation strategies* in the design at an early stage (business modelling). This approach can, therefore, apply both to patients and to professionals.

In that sense, the essence is not so much researching a problem *using* E-health technology, but rather to do research *into* – and *using* – E-health, based on a given problem. This also means that our research is based on an iterative and dynamic participatory development approach, and not on a linear research protocol. The aim is to come up with solutions capable of tackling problems in healthcare (and in the health service) by means of E-health technology.

By the application of persuasive technology strategies and user-centred design principles, the research group has already established a solid scientific foundation for the acceptance, adherence and effectiveness of technological interventions. The user-oriented design approach, involving the use of innovative technology (to measure patient-reported health outcomes) and technological interventions, as well as process-oriented analyses of the users and usage of technologies in everyday practice, deliver relevant and challenging concepts for a powerful projection of the human dimension in technical design.

Role of the professor in research and education

As head of the section, the professor will clearly communicate the technological profile of home-grown health psychology throughout the University of Twente while striving to expand existing partnerships with technical research institutes. This is important in terms of exploring innovative information and communication technologies. Besides promoting behaviour and welfare, these technologies can help to lay the foundations for a new social-technical design approach. This, in turn, will promote the unique character of the University of Twente, while strengthening our profile in grant applications and boosting the commercial knowledge transfer from research. The research also offers ample opportunities for cooperation with relevant groups at the University of Twente and throughout the region in the field of public health and secondary/tertiary healthcare. This approach could involve building on the current research lines in psychology, coupled with a major focus on links to the domains of Health and Resilience. For the outside world, the professor will be a recognizable face representing health psychology at Twente. He/she will project its image throughout the academic world, both at home and abroad, and in the professional field of healthcare and technology. Also, technology is strongly intertwined with every aspect of our work in health psychology, which clearly sets us apart from other universities. In addition, the candidate is expected to have a clear vision of education. Where necessary, he/she will develop and implement innovations in education. Operating within the technological environment provided by the University of Twente, health psychology occupies a position that is unique in this branch of science. This technological embedding must be exploited to the full, to attract more students from all over the Netherlands, and from other countries inside and outside the EU.

Inter-university cooperation and internationalization

The professor in question will help to expand cooperation with institutions such as the University Medical Center Groningen (UMCG) / the University of Groningen (RUG) and other knowledge institutions in the Netherlands. In addition, it is important to further expand current international and transatlantic cooperation. Among other benefits, it is hoped that this will boost the group's recruitment capacity, while attracting talented students to the Master's in Health Psychology and Technology.

Management tasks

The professor is responsible for both research and education in the field of health psychology, and for managing the staff of the Health Psychology group. The professor will be part of the department's/cluster's management team, and will confer with the president on work within the department.

Scale, level, duration and embedding

The appointment is for a full-time (1 FTE) position of unlimited duration. The professor in question will take up their post within the Department of Psychology, Health and Technology. The Professor of Mental Health Promotion, Ernst Bohlmeijer, holds a related post within this department. This department also includes the professorship of Persuasive Technology (Prof. J. van Gemert-Pijnen) and the part-time professorship of Rheumatology and Society (Prof. M. van de Laar). The department already maintains structural relationships with 't Roessingh.

Proposal concerning the membership of the Structure Committee / Advisory Committees on Appointments

To be completed based on current guidelines and in keeping with a closed procedure.

C. Full-Professor Healthcare Procurement

(0.6 – 1.0 FTE)

1. Introduction

Focus

The main focus of the TT/professorship will be knowledge creation and knowledge transfer in the area of healthcare procurement. In addition, the appointment can further strengthen relationships with (and between) the departments of Health Technology and Services Research (HTSR) and CHOIR, by tackling research into – and the improvement of – healthcare operations. Research in this area is also very much in keeping with the University of Twente's vision of High Tech Human Touch. With any given procurement process, it is crucial to involve the end user, in order to meet the actual purchasing requirement. This is especially the case when purchasing complex new technologies or when using new technologies (E-marketing; high-frequency computerized trading) in purchasing and procurement strategies.

2. Research

Healthcare procurement staff have to deal with a range of unique and complex circumstances. On the one hand, this is caused by specific items of legislation and by the constraints of the financing system. On the other hand, it is due to factors such as:

- The strong position of partnerships (in Dutch: *maatschappen*) in most hospitals;
- Shortage of professional purchasing expertise among small or medium-sized healthcare providers;
- Managed competition in the care sector, which makes group purchasing by competing healthcare providers more difficult;

One of the complicating factors faced by healthcare procurement staff is that users of care (patients) generally do not have to pay directly for the care they receive (i.e. triad purchasing). However, most purchasing theories were developed to deal with situations in which the users of a service pay for that service themselves (i.e. dyadic purchasing).

Developments in the healthcare sector, coupled with the unique situation surrounding the purchase of healthcare (and purchases within healthcare), have attracted the interest of academic communities. For instance, the annual International Purchasing and Supply Education and Research Association (IPSEERA) conference introduced a separate healthcare purchasing track in 2013.

The TT/professorship is intended to pursue high-quality research in the following two mainstays of purchasing in the healthcare sector:

1. *Group purchasing in the healthcare sector*

The first mainstay encompasses research into the operations (and ways of improving them) of purchasing groups consisting of various healthcare providers. By combining forces, providers can obtain economies of scale and similar advantages in terms of processes, and/or information. In line with previous research by (a) the University of Twente on group purchasing in general, (b) on process improvements, and (c) US/UK research on group purchasing in the US/UK healthcare sector, the following potential research topics have been identified:

- How does group purchasing contribute (potentially or actually) to the quality and availability of healthcare in the Netherlands?
- What types of materials, technologies, and other products and services are best suited to group purchasing?
- What methods can best be used to improve the roles of – and cooperation between – those involved in group purchasing (material committees, medical staff, etc.)?
- How should the costs and benefits derived by a purchasing group be allocated among the members of that group?
- What is the best way of organizing group purchasing in the healthcare sector?

2. *Purchasing process improvement in the healthcare sector*

The second mainstay involves research into improvements to the process of purchasing healthcare (and of making purchases within healthcare). Building on previous research by the University of Twente into (a) aspects of public procurement such as supplier selection and population-based purchasing and (b) healthcare logistics, the following potential research topics have been identified:

- How can we improve selection processes for suppliers that deliver materials, technology and/or other products and services?
- How can the coordination between healthcare logistics and purchasing processes in the healthcare sector be improved?
- What changes need to be made to suppliers' roles and actions to improve healthcare provider logistics?
- What impact does population-based purchasing in the healthcare sector have on healthcare processes?
- What would be the effect of using more selective purchasing processes, based on output/outcome quality indicators, instead of volume?

Multi-method approaches will be used for both mainstays. This is in line with established University of Twente and BMS interdisciplinary research into these topics. For instance, the matter of the contribution (actual or potential) made by group purchasing can be explored using quantitative methods. Questions concerning ways of improving the roles of (and cooperation among) those involved can be explored using qualitative methods. Such research could draw on psychological expertise from elsewhere in the faculty. In the case of research into population-based purchasing, an experimental approach would be more suitable. Finally, mathematical methods would be the best way of allocating the benefits and costs involved.

We plan to publish our research results in various academic and professional journals. These include *Public Administration Review*, *Journal of Purchasing and Supply Management*, *International Journal for Quality in Health Care*, *The European Journal of Public Health*, *Deal!* and *Zorgvisie*. Previous University of Twente research into group purchasing has been published in (or recently submitted to) these journals, and has received several best paper awards. By opening up the TT/professorship position and acquiring new PhDs, we aim to give a boost to the number of new publications and to enhance their academic and practical impact. We also want to launch a campaign for long-term external funding from national and international science programmes. After all, under the impact of far-reaching technological developments and conditions, the domain in question is increasingly being seen as one of the grand challenges in international socio-technical and socio-economic development.

3. Education

The University of Twente offers a Master's programme in Finance and Healthcare Purchasing. This programme is intended to provide an overview, and an appreciation of the relevance of purchasing in the healthcare sector, together with some guidance on the procedures involved in – and the management of – professional purchasing in this sector. The programme is not designed to teach students how to become operational purchasers. It is intended to help students understand finance and healthcare purchasing as a management issue: both from the perspective of a healthcare provider and from that of a healthcare insurer/local authority/community. The programme addresses issues such as: How can contracting healthcare help to cut healthcare expenses and/or improve the quality of healthcare? How can healthcare providers use their purchasing role to deliver more efficient and effective contracts with suppliers?

4. Level

The candidate should have a proven track record in the area of purchasing management (or healthcare purchasing management), as demonstrated by publications in high-ranking journals, teaching records, PhD supervision and professional services. The candidate should have an international reputation and an extensive personal network spanning both the academic and business worlds, as well as a clear strategy regarding the future research agenda. The candidate should have the capabilities and ambition required to establish a nationally and internationally recognized centre of excellence for purchasing in the healthcare sector.

5. Institutional embedding

The purchasing focus involved will enable the professor to cooperate extensively with members of the department of Business Administration (BA). It is envisaged that there will also be cooperation, in the form of knowledge sharing, with Technology Management and Supply (TSM). Professor Schiele's research focuses on topics such as collaborative innovations arising from interactions between purchasers and suppliers in the private sector. The Professorship in Purchasing in Healthcare will focus specifically on the public sector and on the domain of civil society. This is yet another way in which it will differentiate itself from existing activities in the area of procurement and supply management. Rather than focusing on 1-to-1 relationships between purchasers and suppliers, the TT/full professor's research will address group relationships and the general effects and conditions associated with healthcare purchasing (and group purchasing) in community-based healthcare initiatives. This will encourage cooperation with the department of Public Administration (PA).

The Master's programme in Finance and Healthcare Purchasing will be presented jointly with the department of Health Technology and Services Research (HTSR). This cooperation will extend to the supervision of Master's graduation assignments, and to healthcare-focused programmes (gezondheidswetenschappen). These are not the first such cooperative ventures. For instance, there is the research being carried out with Dr Precivil Carrera into group purchasing. Another such project, with Dr Sabine Siesling, is exploring the use of quality indicators for healthcare purchasing.

The successful candidate will be able to engage in significant cooperative projects with the department of Industrial Engineering and Business Information Systems (IEBIS). This is in keeping with the trend towards a greater focus on Finance and Engineering, particularly

within BMS and IEBIS. Various members of staff at IEBIS are currently engaged in related research, involving logistics in healthcare and healthcare process improvement. These researchers include Prof. Erwin Hans, Dr Ingrid Vliegen, and the CHOIR/ EWI consortium).

External cooperation and programme funding

NEVI and Intrakoop have indicated that they may be interested in pursuing structural cooperation. They have also stated that they might be able to contribute funds to the development of a joint programme, headed by the successful candidate for the proposed professorship. Talks are currently in progress to explore the potential nature of any such future relationship.

The TT/professorship will serve to consolidate ongoing collaborative work with the staff of various other institutions, including the Rotterdam School of Management (RSM) and Utrecht University. A joint healthcare purchasing study is currently being conducted with the RSM. Furthermore, RSM is currently presenting a series of guest lectures here, on purchasing management (and healthcare purchasing management), and we are doing the same for them. In the context of the Public Procurement Research Centre (PPRC), Utrecht University and the University of Twente have enjoyed a long-standing collaborative relationship in the areas of research and education. While the details of this relationship need to be re-evaluated, it nevertheless presents a strategic opportunity for cooperation with Utrecht University's Law group, which is active in this domain. At international level, the planned programme will build on the existing research links with Cardiff University and with the Stevens Institute of Technology. A series of articles has already been published, reporting the results of a joint research project into purchasing management in the healthcare sector. Future joint research will focus specifically on healthcare procurement by hospitals.