

Call for proposals: 4TU research programmes 2018-2021

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1. Introduction

The 4TU.Federation, made up of the four Dutch universities of technology, is committed to strengthening and pooling technological knowledge in the Netherlands. The 4TU.Federation has developed an activity plan for research, teaching and valorisation for the period 2018 to 2021. That plan is the successor to the 3TU.Technology Sector Plan, of which the research activities will end in 2017. The overarching theme of the new activity plan is 'High tech for a sustainable future'. The 4TU.Federation aims to continue the network role of the current research centres, as well as to implement new theme-based research programmes. For these programmes a total amount of €3575k is available per year in the period 2018 to 2021. This call for proposals describes the process that will lead to these 4TU Research programmes.

2. Aim and scope

The aim of the 4TU research programmes is to stimulate cooperation between promising researchers of the 4TU's, and to launch substantial and ambitious programmes with a four-year running time. The 4TU.Federation encourages multidisciplinary collaboration proposals that transcend university and faculty¹ boundaries and that contribute to (inter)national societal and sustainability objectives. The programmes will be promising, innovative and scientifically challenging, and have the potential to deliver scientific breakthroughs. Although the scale of programmes may vary, each must be of sufficient scale to achieve academic excellence and build momentum for innovations and applications. Because of these characteristics, the researchers within each programme are expected to be able to attract external funding via (inter)national collaborations, grant applications and/or public-private cooperation. As a consequence, after a start-up period of four years, the continuation of the research programmes should be possible without substantial 4TU.Federation funding.

Programmes are expected to cover at least one of the following research themes (for a detailed description of the themes, see Appendix I):

- High tech to feed the world
- Sensing Science and Technology
- Robotics
- Health & Vitality
- Resilience
- Advanced Materials
- Energy Conversion & Storage.

3. Guidelines for applicants

3.1 Who can apply

All 4TU researchers can apply for a 4TU research programme as part of a consortium. Consortia of 4TU researchers should represent at least three, and preferably four, TUs. Researchers that are part of an existing 4TU research centre may also submit an application as a consortium. External researchers are not eligible for funds within consortia applying for research programmes.

3.2 What you can apply for

Consortia can apply for funding of a programme that covers at least one of the research themes presented in Appendix I. The programme must align with the UN Sustainable Development Goals², the EU's Societal Challenges³ and Key Enabling Technologies⁴.

- The programme scope should be between €500k and €1000k per year, including a joint cash contribution from the participating faculties of at least 25% of the programme budget. This means that programmes can receive a maximum annual contribution of €750k from the 4TU.Federation, over a four-year period.
- The total of the research programme budgets will reflect the proportion of the 4TU deposits of the participating universities (4-3-3, TUD-TU/e-UT). Wageningen University is still in the start-up phase in terms of financial participation in 4TU activities, budget has been reserved for participation in at least three 4TU research programmes in the period 2018-2021. The budget for WU researcher participation is €125k per programme per year maximum.

¹ Where the document refers to 'faculties', the text applies to science groups in the case of Wageningen University. The same goes for 'managing directors' when the document refers to 'deans'.

² For more information on the UN Sustainable Development Goals, see <http://www.un.org/sustainabledevelopment/sustainable-development-goals/>.

³ For more information on the EU's Societal Challenges, see <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/societal-challenges>.

⁴ For more information on the Key Enabling Technologies, see https://ec.europa.eu/growth/industry/policy/key-enabling-technologies/description_en.

- The equipment, consumables, publication and travel costs may contribute to a maximum of 50% of the total budget. The main costs are for personnel, preferably researchers with tenure track positions. In the application, a fixed cash contribution (4TU and the faculties) can be requested as a contribution to these salary costs (k€60 for postdoc positions; k€70 for tenure track positions). Personnel costs for PhD positions can *not* be included in the budget.
- An important aim of the research programme is to hire promising researchers for new tenure track positions. Existing tenure track positions will not be funded. The faculties offering a new position should guarantee that researchers that qualify for tenure can be offered a permanent position when the programme funding of the 4TU.Federation has ended.

3.3 How you can apply

The assessment procedure consists of three phases.

Phase 1

Consortia of researchers can express their interest to participate in a research programme that covers one or more of the selected research themes, using the Expression of interest form in Appendix II. Individual researchers that are not (yet) part of a consortium can also express their interest via this form. The filled in form should be sent in an e-mail to 4TU secretary IJsbrand Haagsma: secretary@4tu.nl. The closing date for expressing interest is Monday 30 October, 11:59h.

Phase 2

All researchers that have expressed their interest in a research theme are invited to a matchmaking event on Friday 10 November 2017. The aim of the event is to inform interested researchers about the 4TU research programmes, and to bring together (future) partners that can together develop proposals for this call.

Phase 3

Following the matchmaking event, consortia are invited to apply for funding of a research programme. Applications can be filed by consortia using the Application form in Appendix III.

- The proposal should be written in English, font Verdana 8.5pt, and be at maximum 6 pages A4.
- The submission must be supported by all deans of the faculties involved. Therefore, the application must be accompanied by individual commitment letters from each of them. The commitment letters should state the cash contribution that the faculty will make, and together make up at least 25% of the programme budget.
- The application must be submitted by the envisioned programme manager, i.e. the coordinator of the consortium of 4TU researchers.
- The application form and necessary attachments should be sent as separate pdf-files in an e-mail to 4TU secretary IJsbrand Haagsma: secretary@4tu.nl.
- The closing date for submission of proposals is Monday 19 February 2018, 11:59h.

4. Assessment procedure

4.1 Eligibility

The proposals will be assessed for eligibility by the 4TU secretary and the support staff of the 4TU.Research Management Committee in the period 20-26 February 2018. They will advise the 4TU.Research Management Committee on the eligibility of each proposal; the members of the committee will then declare each proposal as (not) eligible. Shortly afterwards, the corresponding researchers of the consortia will receive an email, confirming whether or not the proposal complies with the following formal requirements:

- The budget includes equipment, consumables, publication and travel costs (maximum 50% of the budget) and personnel costs (via the fixed cash contribution from 4TU per researcher).
- The proposal is supported by permanent academic staff (professors, associate professors and/or assistant professors) from three or more 4TU universities.
- The programme is supported by the participating faculties of the participating universities, as evidenced by a decentralised financial cash contribution of at least 25% of the total programme costs promised in commitment letters.
- In the commitment letter the faculties should guarantee that researchers that qualify for tenure can be offered a permanent position when the programme funding of the 4TU.Federation has ended.

Proposals that are not declared eligible will not proceed in the assessment procedure.

4.2 Assessment criteria

The 4TU.Research Management Committee, comprising the rectors of the 4TUs, will assess the proposals that are declared eligible based on the following assessment criteria:

- the scientific quality and viability of the proposed research programme (science case);
- the alignment with the stated programme themes, the UN Sustainable Development Goals, the EU's Societal challenges and/or Key enabling technologies (policy case);
- the expected impact in terms of innovations and applications (innovation case);
- the quality of the plans for (inter)national collaboration with non-4TU universities, societal partners and/or industrial partners (partnership case);
- the quality of the plans and potential of long-term continuity of the programme (business case);
- the possible contribution to the teaching activities of the 4TU's (education case);
- the quality of the plans for a contribution to Open Science (open science case);
- the quality of the researchers and added value of their collaboration in the programme;
- the plans for linking the programme to the network activities of a current 4TU research centre, if applicable.

4.3 Decision-making procedure

The 4TU.General Board has mandated the 4TU.Research Management Committee to make the decision whether to grant a financial contribution to each of the proposed research programmes. The number of programmes that is awarded funding depends on the quality of the proposals and the budget requested by the consortia. The decision will be taken during a 4TU.Research Management Committee meeting in March 2018. Shortly afterwards, the corresponding researchers of the consortia will receive an email, informing them on the decision of the committee.

4.4 Evaluation and reporting procedure

If the 4TU.Research Management Committee has decided to grant a financial contribution to the research programme, a meeting between the committee and the programme manager is arranged. The aim is to come to an agreement about the details of the programme budget, the financial contribution of the 4TU.Federation and the governance structure and annual reporting procedure of the programme.

In the first months of the research programme, the programme manager should develop a Research Data Management plan with the support of the 4TU.Centre for Research Data and present this to the 4TU.Research Management Committee.

5. Contact information

Contact person: IJssbrand Haagsma, 4TU secretary
Telephone: +31 (0)6 18 08 68 56
Email: secretary@4tu.nl

Appendix I – Overview of research themes

No.	Theme
1	<p>High tech to feed the world</p> <p>We are facing one of the greatest social challenges of this century: over the next forty years the global food demand will be equivalent to the total amount of food produced over the past 8,000 years. Applying high-tech systems and materials and new ICT possibilities will support the agrarian and food sectors to meet these major social challenges. Moreover, the competitive position of these sectors in the Netherlands will improve and there will be opportunities to export new systems using these applications. Conversely, high-tech sectors will be challenged to find solutions to the problems that have stood in the way of such applications until now, such as non-uniform products, the circumstances in which systems have to function and limited economic scope for innovation. It is essential that the sectors concerned work together intensively on these opportunities.</p>
2	<p>Sensing Science and Technology</p> <p>Smarter, cheaper, and more reliable sensors are required in various application domains such as smart industry, health, environment and agro-food. They are needed to develop advanced robots. We are at the forefront of developing the next generation of innovative sensing platforms and accelerating their introduction into the growing sensor market. Platforms will often be (wirelessly) networked, forming the basis for the next generation of the Internet of Things and the foundation for many smart society agendas.</p> <p>Development of innovative sensing platforms requires a cross-disciplinary approach, uniting scientific disciplines in developing new sensing functionalities, design and engineering of sensing systems/devices, communication networks, product design and development (including manufacturability), data management, interaction, and societal, ethical and governance aspects.</p>
3	<p>Robotics</p> <p>Robotics offers new solutions to societal challenges ranging from ageing to health, security, energy and the environment. The potential of robotics extends far beyond the factory. Service robots for professional or domestic use represent an emerging market with strong growth potential as robots become mainstream appliances and systems in many walks of life (work, home appliances, security, leisure, assistive technologies for physically disabled, medical equipment, etc.). Robots increasingly have learning and adaptive capabilities that will have a broad impact on all future ICT systems in a wide range of products and services. It is essential to advance current robot capabilities in terms of robustness, flexibility and autonomy so that they can achieve useful tasks in an efficient manner while operating in real-world, often unknown, unstructured and highly unpredictable environments. Typical technology clusters within Robotics are: Systems Development (better systems and tools), Human-Robot interaction, Perception, Navigation, Mechatronics, and Cognition.</p>
4	<p>Health & vitality</p> <p>Researching vitality in a broad sense has significant potential. These types of programmes go beyond 'vitality' alone and cover the whole health spectrum. One of the major challenges is the accurate measurement of an individual's health and well-being and then to intervene for the purpose of positively influencing this person's state. We need to develop more systematically an integrated and more complete approach to (remotely) measure, monitor, and act upon an individual's health and well-being, for example by:</p> <ul style="list-style-type: none"> • connecting sport-psychology theories with human performance to gain a deeper understanding of exercise and recovery on health and vitality • sensing and measuring technology to develop further integrated solutions for vitality • experimenting with innovative solutions in Living Labs • combining strengths from sensor technology, data science, design and psychology. <p>The combination of competences such as sensing and behavioural research can create added value. Various psychological orientations could be explored, extending from extrinsic to intrinsic motivation. Technology can play a role in motivating people with different lifestyles.</p>
5	<p>Resilience</p> <p>In today's complex and hyper-connected world, we face many huge challenges – from climate change to water and energy security, from securing complex food chains to creating liveable cities with increased IT penetration. We cannot deal with these challenges in the traditional way – by ex ante planning, by linear decision-making or by simply anticipating these challenges. Resilience will have to become a key component of strategies and designs to deal with these challenges and to achieve the UN Sustainable Development Goals.</p>

6	<p>Advanced materials</p> <p>We are on the eve of an extremely important development which will equip us with the tools to create customised new materials. Materials scientists are in an ideal position to implement solutions for the major challenges known to humankind in the fields of energy, raw materials, health and prosperity. They are able to develop new materials and achieve breakthroughs in the areas of:</p> <ul style="list-style-type: none"> • climate: completely sustainable energy from the sun • sustainability: a closed circuit for the usage of materials • health: artificial tissues and medical sensors for an ageing population • economy: a new manufacturing industry that makes smart products – made in Holland. <p>Research into these advanced materials could focus on the development of new classes of materials using nanotechnology or self-assembly. Gaining insight into the atomic and macroscopic behaviour of materials with new theoretical and spectroscopic techniques also falls within this main research area. Other challenges being addressed in this area include the development of advanced biodegradable and bio-based materials with specific properties and research that increases the understanding and control of complex forms of matter. Interactions between entities (molecules, cells) of complex organic, inorganic and hybrid systems lead to new features through self-organisation on a larger scale in space and/or time. Research within this research line includes physical chemistry, polymer chemistry, solid state chemistry and materials science, parts of organic chemistry, spectroscopy and theoretical chemistry, as well as soft condensed matter science.</p>
7	<p>Energy conversion & storage</p> <p>Energy conversion: This is in general the transformation of forms of energy provided by nature to forms that can be stored, transported and used by humans. Research into new converters is needed.</p> <p>Energy storage technologies are valuable components in most energy systems and could be an important tool in achieving a low-carbon future. These technologies enable the decoupling of energy supply and demand, in essence providing a valuable resource to system operators. There are many cases where energy storage deployment is competitive or near-competitive in today's energy systems. R&D work is currently underway with the primary goals of realising technology cost reductions and improving the performance of existing, new and emerging storage technology. Furthermore, many government and industry stakeholders are identifying and attempting to address non-technical barriers to deployment. Looking forward, the most important drivers for increasing the use of energy storage will be:</p> <ul style="list-style-type: none"> • improving energy system resource use efficiency • increasing use of variable renewable resources • rising self-consumption and self-production of energy (electricity, heat/cold) • increasing energy access (e.g. via off-grid electrification using solar photovoltaic (PV) technologies) • growing emphasis on electricity grid stability, reliability and resilience • increasing end-use sector electrification (e.g. electrification of the transport sector).

Appendix II – Expression of interest form

<p><i>Hereby I express my interest to participate in a 4TU research programme 2018-2021 and to take part in the matchmaking event on 10 November 2017.</i></p>	
1. Name
2. University	<input type="checkbox"/> Eindhoven University of Technology <input type="checkbox"/> Delft University of Technology <input type="checkbox"/> University of Twente <input type="checkbox"/> Wageningen University & Research
3. Faculty ⁵
4. Email address
5. My primary theme of interest is:	<input type="checkbox"/> 1. High tech to feed the world <input type="checkbox"/> 2. Sensing Science and Technology <input type="checkbox"/> 3. Robotics <input type="checkbox"/> 4. Health & Vitality <input type="checkbox"/> 5. Resilience <input type="checkbox"/> 6. Advanced Materials <input type="checkbox"/> 7. Energy Conversion & Storage
6. My other theme(s) of interest is/are (optional):	<input type="checkbox"/> 1. High tech to feed the world <input type="checkbox"/> 2. Sensing Science and Technology <input type="checkbox"/> 3. Robotics <input type="checkbox"/> 4. Health & Vitality <input type="checkbox"/> 5. Resilience <input type="checkbox"/> 6. Advanced Materials <input type="checkbox"/> 7. Energy Conversion & Storage
7. Are you preparing a research programme for this call?	<input type="checkbox"/> no <input type="checkbox"/> yes, the working title is:
8. If yes to question 8: who is the envisioned coordinator of the programme?	
9. If yes to question 8: please give a short programme description (max. 70 words)	
10. Would you like to give a short pitch during the matchmaking event?	<input type="checkbox"/> yes <input type="checkbox"/> no

⁵ Where the document refers to 'faculties', the text applies to science groups in the case of Wageningen University.

Appendix III – Application form

1. Title of the programme

Please provide the title of the envisioned 4TU research programme.

2. The research theme(s)

Please tick the boxes of the proposed research theme(s) the programme focuses on.

- 1. High tech to feed the world
- 2. Sensing Science and Technology
- 3. Robotics
- 4. Health & Vitality
- 5. Resilience
- 6. Advanced Materials
- 7. Energy Conversion & Storage

3. Programme description

Please describe the proposed research programme, including at least:

- *The main research questions that will be addressed;*
- *The research designs and methods that will be used;*
- *The motivation to propose this programme;*
- *The short- and long-term goals of the research programme (formulated SMART);*
- *Science Case: the scientifically challenging aspects of the research programme and the scientific breakthroughs that can be established;*
- *Policy Case: the connection with the selected research themes, the UN Sustainable Development Goals, EU societal challenges and Key enabling technologies;*
- *Innovation Case: a description of the impact of the programme on new innovations and/or new applications in the medium term (including a description of the relation to 4TU.Valorisation activities, if applicable);*
- *Partnership Case: the prospects for the 4TU to create a profile that is distinct from other universities or to initiate new collaborations with non-4TU universities, societal partners and/or industrial partners (including a description of the relation to 4TU.Valorisation activities, if applicable);*
- *Business Case: the plans and potential of long-term continuity of the programme (including a description of the relation to 4TU.Valorisation activities, if applicable);*
- *Education Case: the possible contribution to the teaching activities of the 4TU's, e.g. a specialised minor or a Master's track (including a description of the relation to 4TU.Education activities, if applicable);*
- *Open Science Case: a description of the ways in which the programme contributes to Open Research (e.g. open access publications), Open Education (e.g. open education materials) and/or Open Innovation (e.g. open source software development).*

4. Programme participants

Please discuss the programme participants, including at least:

- *The names, positions, affiliations and email addresses of all programme participants;*
- *The names of the faculties⁶;*
- *The expertise and scientific reputation of all involved 4TU researchers (please attach a CV of 1 page A4 maximum per researcher);*
- *The additional value of the collaboration of the involved 4TU researchers as compared to their existing research activities;*
- *A motivation of the proposed programme manager;*
- *If you plan to collaborate with non-4TU universities, societal and/or industrial partners, please provide a short description of their background and additional value to the programme.*

5. Programme planning

Please provide a rough planning of the various activities of the research programme until 2022.

⁶ Where the document refers to 'faculties', the text applies to science groups in the case of Wageningen University.

6. Financial information

Please specify the total programme funding (in €k) per year (insert/delete rows for faculties if necessary):

	2018	2019	2020	2021	Total
4TU funding (max. 75%)					
Faculty contribution (min. 25% cash)					
(Name faculty 1)					
(Name faculty 2)					
(Name faculty 3)					
(Name faculty 4)					
(Name faculty 5)					
Total					

Please specify the types of costs (in €k) per year:

	2018	2019	2020	2021	Total
Personnel costs					
TU/e					
TUD					
UT					
WUR					
Material costs					
TU/e					
TUD					
UT					
WUR					
Shared					
Total					

7. Research data management

Please describe the research data management plan (including whether data will be kept at the 4TU.Centre for Research Data, and if not, an explanation why this is not possible).

8. Ethical aspects

Please describe the ethical aspects of the research programme. If the research involves human subjects and/or animals, indicate whether prior approval of ethical committee(s) is required (and if this approval has been given, please attach the relevant letters of approval).

9. Other relevant information

Please provide any other information that is relevant to the proposed research programme.

10. Signature

Please read and sign the information below.

By submitting this form I, the envisioned programme manager, on behalf of all participants in the consortium, declare to:

- have completed this form truthfully;
- satisfy the (inter)national standards for scientific conduct, as stated in the Netherlands Code of Conduct for Scientific Practice;

- have attached the necessary commitment letters of the deans⁷ of the faculties involved.

Name:

Place:

Date:

Signature:

⁷ Where the document refers to deans of the faculties, the text applies to managing directors of science groups in the case of Wageningen University.