

Delft Bioengineering Institute – *proposal for a second term*

Executive Summary

We request to be granted a second five-year term for Delft Bioengineering Institute, to be supported by the faculties 3mE, AS, CEG, EEMCS, AE and the Executive Board. Here we summarize our goals, why we believe the institute is needed to reach them, and an outline of the requested budget.

Goals BEI 2022-2026

- Uniting all TU Delft principal investigators who work on solutions in, with or for biology. We aim for our unique collaborative network to consist of 150 BEI PIs in 2026 (2021: 91).
- Increasing the potential of TU Delft as a biotech partner, creating the opportunity for the Netherlands to take a leading position in realizing bioengineering breakthroughs that help solve major human challenges (McKinsey: [The Bio Revolution](#), VNO-NCW: [Toekomstpact Biotechnologie Nederland 2025](#))
- Developing and deploying a strategy to increase external funding for participating BEI PIs.
- Developing and designing educational programme activities around bioengineering.
- Fostering interactions between leading bio-inclined PIs to act on opportunities in the bioengineering landscapes.
- Embedding with other TU Delft initiatives, such as DRI Health and Convergence Health & Technology.

Why as institute?

- Building and maintaining a network requires central coordination.
- To realize impact, continuity is key.
- This requires dedicated coordination, and even more importantly, a coordinator.

Budget outline (200k/year, in €)

- Support staff, 75k
- Connectivity programmes, 90K
- Workshops, 20K
- Sponsoring, 15K

We aim to tailor our activities to the existing demand of the participating researchers. A detailed multi-year budget will be created in consultation with the AS Department of Biotechnology, where BEI is embedded financially. BEI's first term ran from 1 September 2016 up and until 31 August 2021. Since the mismatch with the financial year causes unnecessary administrative problems, we propose to run the second term from 1 January 2022 up and until 31 December 2026. To cover expenses in the period 1 September 2021 up and until 31 December 2021, we propose to use a part of the remainder of the budget that has been accumulated over the first five years of funding (remainder est. 300-350k; needed for bridging est. 150-180k). We propose to add the rest of the remainder (est.: 120-150k) to the connectivity programmes the institute will run in 2022-2026. This will be included in the multi-year budget as described above.

On behalf of all members of Delft Bioengineering Institute,

Marcel Reinders, scientific director

Nienke van Bommel, coordinator

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Background

Delft Bioengineering Institute (BEI) was founded in 2016 to unite biology-related research at Delft University of Technology, as well as to improve the visibility of Delft in the domain of biological/life sciences. Adding to presentations given by the scientific director of the institute to the deans of the four supporting faculties (3mE, AS, CEG, EEMCS) and the Executive Board, and a final report over the first term, this short document is meant to inform their decision about the continuation of their support to Delft Bioengineering Institute.

Motivation

Revolutionary advances in biological sciences are propelled by an increasing ability to engineer biology, such as CRISPR-Cas9 to edit genes, long-read sequencing technologies to read entire stretches of DNA, or the creation of reference maps like the encyclopaedia of DNA elements (ENCODE) or the Human Cell Atlas. As a recent McKinsey [report](#) points out, current bioengineering breakthroughs could help us solve major human challenges, from reducing climate risk and strengthening food security to fighting pandemics. In [Toekomstpact Biotechnologie Nederland 2025](#), VNO-NCW reports McKinsey calculated that the Netherlands could earn 30 billion extra per year, if it were to optimally use the potential of biotechnology. VNO-NCW states the Netherlands can take a leading position in European biotech, but we need *collaboration* at all levels. The Delft Bioengineering Institute provides TU Delft with an answer to this proposition.

Mission

External profiling starts with internal connectivity. The main goal of Delft Bioengineering Institute is to strengthen internal cohesion of TU Delft principal investigators who work on solutions in, with or for biology. Key stakeholders are early-career PIs, who currently make up about 70% of our collaborative network of over ninety PIs. When new bio-inclined PIs arrive on campus, BEI enables them to quickly connect with colleagues who share common or complementary research interests. This has proven to be of critical value to this important group of TU Delft employees, that contains the bioengineering leaders of the future. Even more than in the first five-year term, BEI will address the question of how early-career PIs can benefit more from the experience and contacts of established bio-inclined PIs within the network. Eventually, these efforts will strengthen TU Delft's grip on the bioengineering landscape.

Connecting the willing

BEI improves cross-campus connectivity by organizing itself horizontally across the existing departments and faculties. We value all members of the TU Delft bioengineering community, but since our resources are limited, we focus our efforts mainly on PIs, meaning assistant, associate, and full professors. We want all PIs who work on solutions in, with or for biology, to feel welcome. Across campus, faculty can self-identify as BEI PI: anyone who feels like he or she may gain something useful by joining the institute, can submit their profile and become a member. Also, we regularly invite BEI PIs to inform their new colleagues about the institute.

150 BEI PIs in 2026

Following this approach, we have built a collaborative network of over ninety PIs, representing six faculties and 22 departments in the first term. For the next term, our highest priority is to keep building and maintaining this valuable network and keep fuelling it, so it remains sparkling. If the appetite for bio continues to grow as it does, we expect the network to expand up to around 150 PIs in 2026, representing all eight TU Delft faculties. 3mE and Applied Sciences are expected to remain the largest contributors to the network in terms of number of PIs working in, with or for biology,

followed by CEG and EEMCS. Since the other four TU Delft faculties are less active in the bioengineering field, we expect their contribution will remain qualitatively significant, but small in numbers of participants.

External relations

Initially, BEI was not only intended to become an internal platform, but also to act as a portal for contacts with industry. The institute's goal was to increase the visibility of TU Delft as a major partner in the regional, national and international bioengineering arenas. As there was already a large and growing web of connections between TU Delft and external partners in place, it turned out to be difficult to funnel this through the institute. For a second term, key players of the institute also advise against directly approaching industry as the institute. Given these experiences, we now aim to support TU Delft on getting grip on bioengineering landscapes *with* the institute, not *as* the institute.

Small scale, bilateral contacts

Still, especially among early career BEI PIs, the need to connect with external partners remains, as does the need to develop and employ a strategy to increase external funding for participating BEI PIs, often requiring industry partners. Therefore, in 2022-2026 we will explore small-scale ways to improve this connectivity. Concrete ideas encompass inviting more external partners to BioDay (showcasing TU Delft's biodiversity), organizing BioDates (networking event for BEI PIs) with external partners, inviting senior BEI PIs to deliver master classes on how to work with industry, continuing organizing thematic workshops on hot topics and continuing to try and involve the valorisation centre more, as well as organizing events together with Planet B.io, Delft's biotech campus.

Working groups

As organizational structure for the second term of BEI, we propose to establish interfaculty working groups that get together several times a year, discussing how to join TU Delft bio forces on specific themes. The main value of these groups would be the actual meeting of the participants: seeing each other and getting a taste of what is going on at the other faculties in the bioengineering area.

BEI Core Working Group

The group of enthusiastic early-career PIs who formed the BioDay/BioDate Organization Committee in the first term of BEI will continue under the name BEI Core Working Group. This group will continue delivering useful and inspiring activities, creating a meeting place for scientists involved in bio across campus, making sure the BEI programme answers a need that actually exists. This programme now contains items such as BioDay, BioDate, thematic workshops and funding interdisciplinary bioengineering projects. These activities will be further developed. For example, at BioDay 2019, we already started attracting more external partners to the event, and we want to expand this. In addition, we want to explore the BioDate format with different external partners, such as industry, hospitals and other universities (for example with Utrecht's Science4Life initiative).

BEI Education Working Group

Another pursuit that BEI PIs consider worthwhile is to explore cross-campus bio education opportunities. Besides sharing updates on what is going on in their educational domains, this group may, for example, explore the possibilities of a Bioengineering Minor, get involved in the TU Delft initiative to set up joint multidisciplinary MSc projects in Q5 of the MSc programmes, discuss about which TU Delft Dreamteams BEI should sponsor, align courses, and exploit developments in different educational programs. Also, several student competitions exist that may be attractive to multiple TU Delft faculties, such as the Bio-based Innovation Student Challenge-Europe (BISC-E). We believe it will prove helpful to have a group at hand where these initiatives are shared.

BEI Leading BEI-PIs Working Group

The third working group we envision brings together senior faculty members of BEI. Using BEI related activities as a starting point of the conversation, this group could come together about twice a year to share experiences and talk about developments in the field. This effort could lead to more insights on for example who is at which influential table in the Netherlands, and opportunities for joining forces could be identified.

MT BEI / Steering Group

In 2016-2021, representatives from the member faculties 3mE, AS, CEG and EEMCS got together three to four times a year to discuss bioengineering affairs going on around campus. Chaired by the scientific director and prepared and documented by the coordinator, these meetings proved to be useful, and we aim to continue this structure in the second term.

Supporting other TU Delft initiatives

BEI has a proven record in facilitating successful collaborations between especially early-career PIs. We aim to exploit this success by organizing stronger, more formalized supportive connections to already existing larger TU Delft initiatives, such as DRI Health and Convergence Health & Technology.

Booklets and webpages

One of our assets is that we collect the profiles of BEI PIs in a booklet and a corresponding webpage, and create tailored booklets (or pdf's) for specific events. These basic communication products have proven to be extremely useful, not only for internal purposes, but also for external partners who are looking for topical TU Delft technology, for example to invite speakers to a meeting. We will continue collecting these profiles and updating our [webpage](#). Also, we would like to continue our experiments with adding profiles of external partners to specific booklets, as we did for example with DSM partner profiles for the BioDay 2019 Booklet.

Institutional approach

The strength of BEI is that it is able to take over the practical aspects of building and maintaining a network and organizing activities that meet the needs of the members of the network. For these efforts to make a real impact, continuity and dedicated coordination are key. The network can only thrive with someone who knows its members, keeps track of their results, and follows up on points of action. Having a coordinator in place enables early-career PIs to take up positions in working groups without having to deal with the details of event organization. As it is enough to spend time to decide on the contents of the programme and engage their groups and departments, these PIs can really benefit from the institute.

Participating departments

<p>3mE</p> <ul style="list-style-type: none"> - Biomechanical Engineering - Delft Center for Systems and Control - Precision and Microsystems Engineering - Process and Energy 	<p>AS</p> <ul style="list-style-type: none"> - Bionanoscience - Biotechnology - Chemical Engineering - Imaging Physics - Radiation Science and Technology
<p>CEG</p> <ul style="list-style-type: none"> - Geoscience and engineering - Materials, Mechanics, Management & Design - Water Management 	<p>EEMCS</p> <ul style="list-style-type: none"> - Applied Mathematics - Intelligent Systems - Microelectronics
<p>AE</p> <ul style="list-style-type: none"> - Aerodynamics, Wind Energy & Propulsion - Aerospace structures & materials - Control and Operations - Space Engineering 	

Board members

<p>Steering Group</p> <p>Marcel Reinders (EEMCS – chair) Jules van Lier (CEG) Amir Zadpoor (3mE) Stan Brouns (AS/BN) Caroline Paul (AS/BT) Marcel Ottens (AS/BT) Luuk van der Wielen (AS/BT) Nienke van Bommel (coordinator)</p>	<p>BEI Core Working Group</p> <p>Caroline Paul (AS/BT – chair) Angelo Accardo (3mE) Joana Goncalves (EEMCS) Jovana Jovanova (3mE) Ralph Lindeboom (CEG) Kunal Masania (AE) Dimpna Meijer (AS/BN) Kristin Großmayer (AS/BN) Nienke van Bommel (coordinator)</p>
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