

## **Strengthening the position of early-career researchers in a changing funding landscape**

This document is addressed to the University Consultative Council and Executive Board of the TU/e

The Eindhoven Young Academy of Engineering (EYAE) is a network of young scientists, designers and engineers with a broad interest in science and engineering. All members are early-career to mid-career researchers, possibly in a tenure track, and typically eligible for personal grants at the Veni/Vidi/ERC Stg/ERC Cog level. As young academic researchers we observe a strongly changing funding landscape. On the one hand, there is an increasing stimulus to participate in public-private partnerships. While this has many advantages, e.g., from a research utilization perspective, there are also potential risks. On the other hand, funding for fundamental research has drastically decreased in recent years and is largely dependent on highly competitive personal grants. This is a major concern, since fundamental research substantially contributes to the development of long-term research agendas and high-impact scientific articles.

We therefore feel a need to strengthen the position of, and create maximal opportunities for, early-career researchers, and thereby enhance the research position and impact of the TU/e in general. In this document we provide recommendations to the board and consultative council of the TU/e on how -in our view- the TU/e can maximally benefit from public-private partnerships, while at the same time guard the scientific quality of its research and independence of its researchers. Our recommendations are addressing early-career researchers who are in a tenure track in particular.

### **Summary of recommendations to the TU/e executive board and consultative council**

#### **A. Facilitate new tenure track staff to develop a long-term research agenda with a balanced research portfolio and self-propelled funding through a start-up package. This start-up package will have the following advantages.**

- 1) Allow early-career researchers to directly address their research vision with maximal academic freedom and develop a unique scientific area of expertise.
- 2) Provide a stepping stone towards a personal grant application. This maximizes opportunities to attract highly competitive personal grants, which clearly enables long-term fundamental research.
- 3) Provide leverage to engage in public-private partnership projects. With a long-term, well-defined research expertise as the basis early-career researchers can maximize the scientific content of such partnerships while at the same time incorporate new ideas for use-inspired fundamental research.

#### **B. Increase the success of public-private partnerships and their connection to long-term research agendas through training and support**

Public-private partnerships are established either bottom-up or top-down. To ensure the success of such partnerships we propose to;

- 1) Offer training to researchers to establish bilateral agreements, including alignment with their long-term research agenda, negotiation of intellectual property, and contractual aspects.
- 2) Provide support for researchers to participate in large consortia.
- 3) Provide an open procedure for participation in top-down programs between the TU/e and partners, and involve researchers in the formulation of the scientific program content.

## Introduction

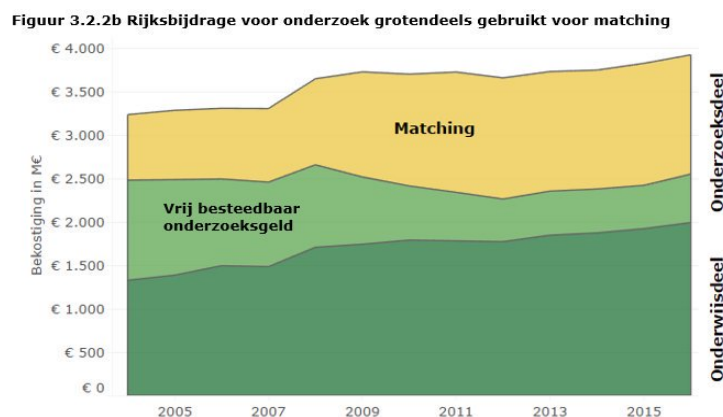
Funding of scientific research in the Netherlands has significantly changed over the last ten years. An analysis of NWO funding (Figure 1) reveals that in 2017 approximately 500 million euro was available for research that does not require any form of matching while almost 1500 million euro is available for research that necessitates matching, either by universities or in most cases companies.<sup>1</sup> In addition, universities have made significant investments specifically aimed to strengthen public-private partnerships, e.g., the IMPULSE and InSciTe programs at the TU/e. As a consequence, these partnerships contain a substantial part of applied research. In sharp contrast, personal grants provide large freedom and fundamental research.

For the TU/e in particular, public-private partnerships are an important mechanism to appoint new PhD students and therefore a key financial instrument. On average 40-60% of the PhD projects either involve matching or are fully paid by industrial partners. However, funding of projects varies substantially among the different departments and individual researchers within TU/e. Consequently, a large imbalance between fundamental and applied research between individual researchers may arise.

A discussion between EYAE members from all departments resulted in a number of observations from the perspective of early-career researchers, including the following:

- 1) a heavy dependence on highly competitive personal grants to develop a long-term research agenda,
- 2) an increasing pressure on early career researchers to focus on short-term industrial projects,
- 3) the scientific quality, originality, and depth of public-private projects,
- 4) lack of guidelines on the initiation and successful execution of bilateral agreements, e.g., joint academic/industrial PhD projects, and
- 5) difficulty to engage in large consortia within TU/e, and on national or European level.

At the same time, the allocation of projects within the departments is changing due the recent introduction of a PI model at some departments. This PI model stimulates smaller research units with on average less projects per unit. Consequently, the diversity of funding instruments per unit may substantially increase. This change has far-reaching consequences for early-career researchers and underlines the timeliness to address the concerns mentioned above.



**Figure 1:** Government contribution for scientific research is increasingly being allocated to projects that require matching from industrial partners.<sup>1</sup>

**A. Facilitate new tenure track staff to develop a long-term research agenda with a balanced research portfolio and self-propelled funding through a start-up package.**

The requirements for early-career researchers to successfully complete their tenure track include successful supervision and graduation of at least one PhD student and acquisition of research funding. Hence, a fast acquisition of research funds is essential for the timely graduation of PhD students and the successful completion of the tenure track. There are several options to acquire research funding, including personal grants such as Veni-Vidi-Vici (VVV), ERC, and industrial collaborations. The personal VVV/ERC grants are highly competitive with success rates in the range of 7-14% and an acquisition time of approximately one year. By contrast, public-private partnerships or industrially funded PhD projects generally have a higher success rate and a shorter acquisition time.

Consequently, there is a huge pressure for early-career researchers to engage in short-term public-private partnerships. However, an imbalanced research agenda at the early stage will have major consequences the long-term research impact. In contrast to personal grants, which essentially involve the formulation of a research statement of the researcher, public-private projects have a strongly applied character and do not allow early-career researchers to develop a fundamental research program. However, such a fundamental research program is essential for their development into independent researchers, and for their chances to acquire prestigious personal grants. Moreover, for most early-career researchers the opportunity to do fundamental research is the main reason to pursue an academic career instead of an industrial research position.

Based on the above considerations, we recommend a startup package for newly appointed early career researchers that includes funding for at least one PhD student and material costs. Such a start-up package would 1) allow early-career researchers to directly address their research vision with maximal academic freedom and develop a unique scientific area of expertise and 2) provide a stepping stone towards a personal grant application. This maximizes opportunities to attract highly competitive personal grants, which clearly enables long-term fundamental research. However, given the importance of public-private partnerships, we would also recommend to have a mechanism in place to stimulate new PIs to develop a balanced research portfolio that includes a clear vision on the applicability of their scientific discoveries. This could be in the form of a short document (for instance, 2 pages maximum), which should include the research statement of the PI as well as an analysis of the fundamental and utilization possibilities of their research on different time scales. As a consequence, this will 3) provide leverage to engage in public-private partnership projects. With a long-term, well-defined research expertise as the basis, early career researchers can maximize the scientific content of such partnerships while at the same time incorporate new ideas for use-inspired fundamental research.

Of course, a startup package has a certain financial cost connected to it, yet not implementing a startup package also has consequences, including financial ones. The financial cost of implementing a startup package is rather concrete and directly measurable on a short term, and has an immediate advantage of attracting top scientists. The advantages of implementing a startup package are diffuse and will have major implications on a longer time horizon, and, as outlined above, it may increase tenure-track success rate, increase long-term research impact, high-impact publications and a higher chance in the acquisition of research funds.

## **B. Increase the success of public-private partnerships and their connection to long-term research agendas through training and support**

Early-career researchers at the TU/e are expected to participate in public-private partnerships, initiated either via bottom-up or top-down initiatives. Often, these public-private partnerships are characterized by restrictions on dissemination of scientific knowledge and have a strong applied character. Examples of top-down programs include IMPULSE, InSciTe and e/MTIC which present unique opportunities for the university to collaborate with industrial partners. Moreover, engagement in national and international consortia are key for a successful career in academia.

However, many early-career researchers have been trained in PhD programs with an emphasis on individual research, scientific content, and free dissemination of knowledge. Consequently, early-career researchers often lack the skills and know-how required to initiate and participate in bilateral or multi-lateral public-private programs. In addition, their local network is often still limited which complicates their involvement in larger consortia.

Based on the above considerations we recommend to 1) offer training to staff to establish bilateral agreements. This training should include leading negotiations on the research content including the alignment with the long-term research agenda and the balance between science and utilization. In addition, practical aspects such as IP rights, contracts, and best practices should be explained. At the department level we 2) suggest to provide support for researchers to participate in large national and international consortia. Practically, this could be accomplished by installing program officers with a large (inter)national network who are well aware of both funding opportunities and the research carried out at the department. To improve the scientific content of top-down initiatives we recommend 3) to install a scientific panel consisting of respected scientists from outside the TU/e with a broad view on science. Such a panel should guide the board of the TU/e in deciding on promising future directions. In the implementation phase of these top-down programs, early-career researchers should be involved in the formulation of scientific program content. These measures will result in a balanced research program with ample support by the broad TU/e community.

<sup>1)</sup> [https://vsnu.nl/nl\\_NL/nieuwsbericht/nieuwsbericht/467-universiteiten-kwaliteit-op-orde-knelpunten-vragen-nu-om-urgente-maatregelen-lange-termijn-vergt-investeringen.html](https://vsnu.nl/nl_NL/nieuwsbericht/nieuwsbericht/467-universiteiten-kwaliteit-op-orde-knelpunten-vragen-nu-om-urgente-maatregelen-lange-termijn-vergt-investeringen.html)