

## Review of the EU agenda for the modernization of higher education systems

### EuroTech Universities Position on current & future EU instruments for doctoral education

#### Summary

This paper represents the joint position of the EuroTech Universities Alliance on EU cooperation instruments for doctoral education. It highlights our shared views on the current EU instruments and makes concrete suggestions for their future development on the basis of best practice.

The paper is organized as follows:

1. Introduction to the EuroTech Universities Alliance – Innovative Doctoral Training in practice
2. Reflections on EU cooperation instruments for doctoral education – MSCA, EIT and ERASMUS+
3. Calls for new types of action in the future:
  - Dedicated funding for more ambitious interdisciplinary projects at doctoral level
  - More flexible models to promote international and intersectoral networking
  - Alternative models to the joint doctorate

#### 1. EuroTech Universities Alliance – Innovative Doctoral Training in practice

Established in 2011, the EuroTech Universities Alliance is a **strategic partnership of four leading European universities of science and technology**: Technical University of Denmark (DTU), Ecole Polytechnique Fédérale de Lausanne (EPFL), Eindhoven University of Technology (TU/e) and Technical University of Munich (TUM).

As a core part of their mission to contribute to addressing societal challenges and to educating the workforce of tomorrow, leading universities of science and technology have developed **innovative models of doctoral training**:

- Development of personal, professional and interpersonal skills, including entrepreneurship
- Interdisciplinary research options
- Exposure to industry and connection to regional eco-systems
- International networking

The EuroTech Universities are constantly adapting their **doctoral training to address the increasingly diverse variety of research-based careers** – in academia, industry, public sector, or as an entrepreneur. Doctoral graduates from our universities have little difficulty finding jobs. According to a 2015 survey conducted by the analysis company Epinion,<sup>1</sup> 96% of DTU doctoral graduates from 2010-2014 were gainfully employed, with 47% of these working in the private sector, 39% employed at a university and 11% employed in the public sector. Likewise, at EPFL, exactly one year after the PhD: 92% are at that moment gainfully employed, from which 54% in the private sector, 36% in an academic environment, and 10% in the public sector.

The EuroTech Universities offer a number of **successful models of doctoral education developed in close collaboration with industry**, combining highest scientific standards with high practical relevance and immediate

<sup>1</sup> <http://www.dtu.dk/english/News/Nyhed?id=bc8d32b7-936a-4b30-b63c-06c098479983>



technology transfer. At TUM, this comprises various models – from the mere involvement of an industry partner in a project via industry-funded doctoral candidates at the university up to so-called external doctorates<sup>2</sup> where doctoral researchers are paid by industry and also spend a major part of their time there. At EPFL there are doctoral researchers fully financed – and based in – industry. Such doctoral researchers typically have two supervisors, one from the university and one from industry.

DTU collaborates with a many companies in educating doctoral researchers and offers two options:<sup>3</sup>

- Industry co-funding a doctoral researcher to explore a specific problem. The funding covers salary, tuition fees and university overheads for a short defined period e.g. one year (employed at a university)
- Industrial Doctorate administered by Innovation Fund Denmark to further R&D and innovation in the Danish business community (employed in industry)

In collaboration with strategic industrial partners, the **TU/e IMPULS programme<sup>4</sup>** has co-funded **250 additional doctoral researchers in 2014-2015**. The programme aims to strengthen research partnerships and innovation potential in areas such as energy, health, smart mobility, high-tech systems, data science and materials.

Approximately **9,000 doctoral researchers** are currently registered across the four graduate schools of the EuroTech Universities. The Alliance has provided a European framework not only to promote **international and interdisciplinary research collaboration**, but also to promote **synergies and complementarity between our doctoral training programmes**. We have also developed **joint interdisciplinary postgraduate summer schools** and a **common database of doctoral courses**.

## 2. Reflections on EU cooperation instruments for doctoral education

### a. Marie Skłodowska-Curie Actions

The Marie Skłodowska-Curie Actions (MSCA) are important instruments to support the further development of innovative doctoral training, as well as international and intersectoral mobility and career development of young researchers. The EuroTech Universities **support the close link between the MSCA and the Principles of Innovative Doctoral Training (IDT)**. We share the view that the acquisition of transferable skills is important and must be regarded as an integral part of the doctorate.

The Innovative Training Networks (ITNs) play a vital role in bringing universities and industry together to jointly develop a training programme for a new generation of researchers around important societal challenges. In order to continue to attract applications from the best consortia, consideration should be given to how to **overcome the particularly low – and hence demotivating - success rates** of ITNs under H2020.

<sup>2</sup> <https://www.gs.tum.de/en/applicants/paths-to-a-doctorate/external-doctorate/>

<sup>3</sup> <http://www.dtu.dk/english/Education/phd#industrialphd>

<sup>4</sup> <https://www.tue.nl/en/university/working-at-tue/tue-impuls/>



The EuroTech Universities **support the introduction of the MSCA European Industrial Doctorates as a means to define long-term cooperation between universities and industrial players** on the basis of jointly defined R&D roadmaps addressing industrial, innovation or societal challenges. We call on the European Commission to continue to **ensure the balance between the interests of the company and the role of the university in offering doctoral degrees at the highest standard.**

The EuroTech Universities **welcome the extension of the COFUND instrument** to doctoral programmes under H2020. This provides an excellent opportunity to boost the attractiveness of our universities' fellowship programmes and to explore new venues for the improvement of doctoral education.

#### **b. European Institute of Innovation and Technology (EIT)**

The EuroTech Universities have each been involved in several of the EIT's Knowledge and Innovation Communities (KICs) and a number of our doctoral researchers have benefited from the KIC Doctoral Schools. We **support the flexibility of the KIC instruments**, which have promoted **innovative models of European cooperation in education**, rather than imposing a one-size-fits-all model based on joint degrees.

The KIC postgraduate educational programmes provide a **unique opportunity to jointly develop innovation and entrepreneurship skills within a large partnership of top European universities and industry**. They address the European innovation skills gap on a scale that cannot be addressed by a single institution. We urge the European Commission to **continue to support the ongoing KICs, as well as ensuring commitment to the creation of the three new KICs** (Food4Future, Added-value manufacturing and Urban mobility) as foreseen under the current financial framework. The EuroTech Universities are eager to contribute to consultations and evaluations of the current EIT model and its interlinkages with a potential European Innovation Council.

#### **c. Erasmus+ instruments**

The EuroTech Universities **support the introduction of Strategic Partnerships** under the Erasmus+ Programme as a means to promoting in-depth collaboration around issues of strategic importance.<sup>5</sup> Further, as strategic instruments to jointly develop curricula with European partnerships of universities and companies, **Knowledge Alliances should be given further priority** in the future. The EuroTech Universities fully **support the continuation of the Erasmus Mundus Joint Master Degrees**, as a means to promote the international exposure and skills of graduates.

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<sup>5</sup> Through funding from the Erasmus+ Strategic Partnership instrument, the **EuroTech Universities Alliance has developed a European Venture Programme**, offering students the opportunity to 'Become an Entrepreneur in 12 days!' through privileged access to the entrepreneurship expertise and networking resources available across the four universities.



### 3. Calls for new types of action in the future

The EuroTech Universities call on the European Commission to develop the following types of action in future instruments for cooperation in doctoral and postgraduate education.

#### a. Dedicated funding for more ambitious interdisciplinary projects at doctoral level

Addressing societal challenges requires new ambitious models of research and innovation that are increasingly collaborative and interdisciplinary. A new generation of researchers needs to be trained according to a “T-profile”, encompassing broad knowledge of a number of fields as well as an in-depth knowledge in one discipline. Yet, when evaluating proposals for interdisciplinary projects, it is challenging to find reviewers who are proficient in multiple fields. As a result, on average **interdisciplinary proposals tend to be ranked lower than mono-disciplinary ones.**

With the exception of European Industrial Doctorates and European Joint Doctorates, ITN proposals are normally evaluated according to one of eight ‘main evaluation panels’ organized according to broad scientific disciplines. To ensure the development of more truly interdisciplinary doctoral training networks, the EuroTech Universities advocate the following:

- **The introduction of a new funding scheme under MSCA devised to ensure high-quality doctoral training programmes at European level that are truly dedicated to promoting interdisciplinary research alone.** We believe that developing a specific instrument for interdisciplinary research will advance new cross-disciplinary innovations necessary to address the grand societal challenges.
- In addition, MSCA evaluators should be selected on the basis of their interdisciplinary background and each panel should include a number of interdisciplinary experts. **The fraction of interdisciplinary panels should match the intended amount of funding for interdisciplinary research.**

#### **Promoting interdisciplinarity at the TUM International Graduate School of Science and Engineering (IGSSE)<sup>6</sup>**

To promote more ambitious interdisciplinary projects at doctoral and postdoctoral level, the IGSSE was created at TUM in 2006 as part of the German Excellence Initiative.<sup>7</sup> A programme open to all disciplines present at TUM, the IGSSE requires that at least two different scientific fields (ideally one from science and one from engineering) collaborate on a proposal. Each proposal brings together 4-5 doctoral researchers from the respective disciplines to work on a common project, with a postdoctoral researcher as team leader.

This model has been implemented with international partners, whereby part of the team may be located at other universities abroad. For instance, the EuroTech Universities Alliance has implemented the GreenTech initiative,<sup>8</sup> which invested €1 million since 2012 in a joint programme for doctoral and postdoctoral researchers to collaborate on joint projects in the fields of Energy efficient buildings and communities, Photovoltaics and Wind.

<sup>6</sup> <http://www.igsse.tum.de/>

<sup>7</sup> [http://www.dfg.de/en/research\\_funding/programmes/excellence\\_initiative/](http://www.dfg.de/en/research_funding/programmes/excellence_initiative/)

<sup>8</sup> <http://eurotech-universities.eu/research/>



### b. More flexible models to promote international and intersectoral networking

Given our focus on science and technology, the EuroTech Universities Alliance offers important opportunities for international and intersectoral networking to doctoral researchers. In addition to the more classical mobility based on travel and physical presence, we **support more virtual ICT-based cooperation**. Our experience with organizing international summer schools – notably through the GreenTech Initiative (see above) – also demonstrates the added value for doctoral candidates of **international networking and organised knowledge acquisition in a short but intense period**. We believe that these more flexible models of international and intersectoral mobility **optimize the interaction of doctoral candidates across universities and companies, as well as their access to unique or expensive experimental facilities**. Shorter intense mobility periods (e.g. 14 days) also work **in favour of more optimal gender equality of researchers**. We therefore call on the European Commission to be **open to short but intense mobility periods** several times during the doctoral training.

#### Promoting international summer schools at EPFL<sup>9</sup>

EPFL has pioneered a new model of international summer schools, organized by the doctoral researchers themselves with the content of the scientific programme validated by the relevant doctoral programme. A total of 22 summer schools will be organized in 2015 and 2016. In order to encourage maximum international networking, the participation of doctoral candidates from other universities is further incentivized through funding.

### c. Alternative models to the joint doctorate

The EuroTech Universities attach great importance to the IDT principles behind the MSCA European Joint Doctorates. However, **linking these principles with the obligations associated in delivering joint, double or multiple degrees can cause unnecessary administrative burden and has no clear added value for our universities**, since we already have in our rules all the flexibility required for truly collaborative doctoral training. Rather, we would ask to be given the **flexibility to propose and explore novel formats and vehicles for joint doctoral supervision beyond the joint or double degree**. Through the EuroTech Universities Alliance, we wish to explore alternative models to the joint doctorate, with a goal to propose highly attractive doctoral training programmes, which foster international and interdisciplinary collaboration, as well as access to a larger critical mass of research and transferable skills training and of unique research infrastructures. We **encourage the European Commission to accept more flexible models of joint supervision** as an alternative to the joint doctorate.

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<sup>9</sup> <http://phd.epfl.ch/summer-schools>

