European Society for Engineering Education
Europäische Gesellschaft für Ingenieur-Ausbildung
Société Européenne pour la Formation des Ingénieurs

UCL

The London Agenda

16 key questions for deans, directors and department heads in engineering institutions

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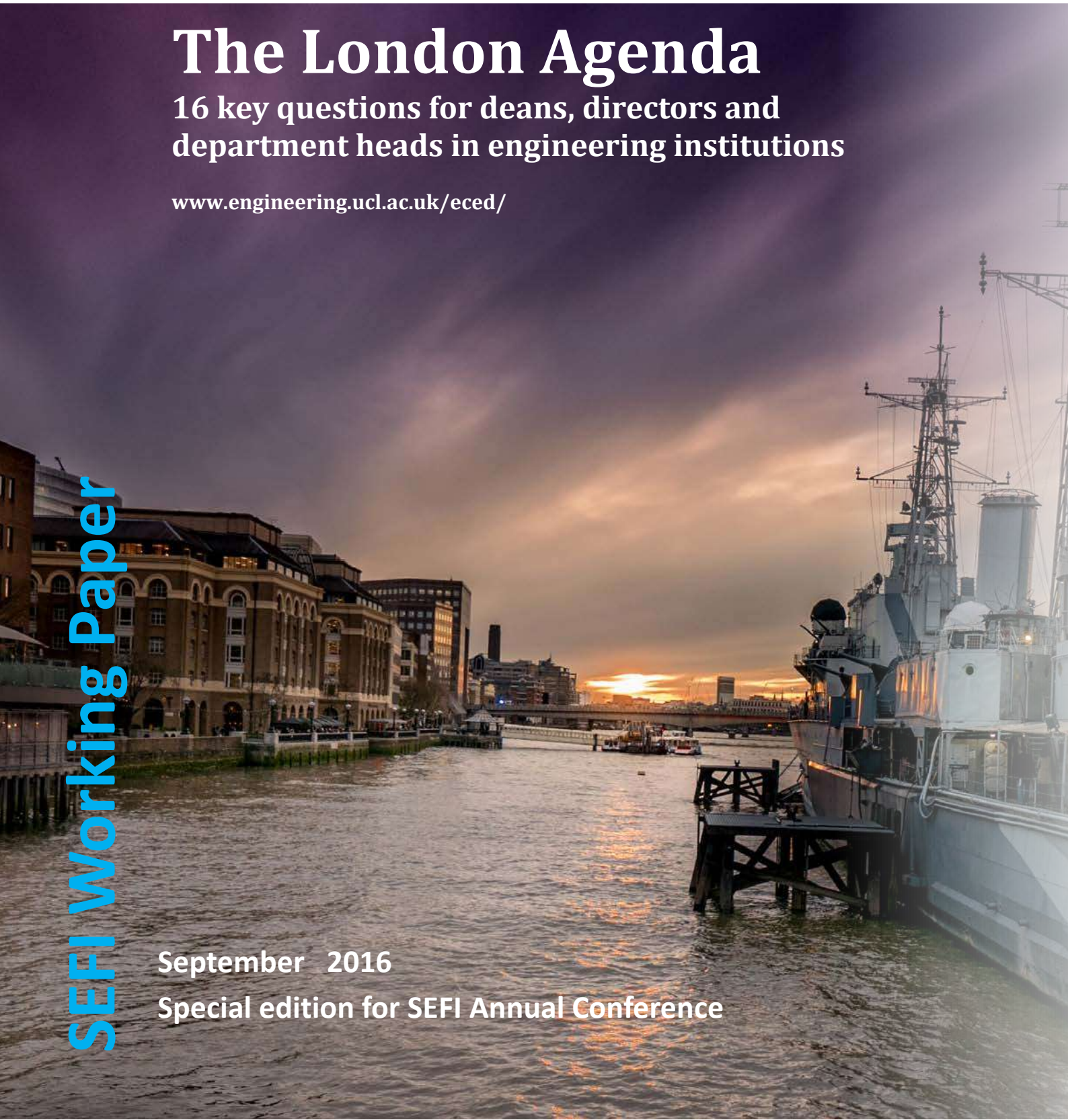

SEFI Working Paper

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European Society for Engineering Education
Europäische Gesellschaft für Ingenieur-Ausbildung
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SEFI is the largest network of higher engineering education institutions (HEIs) and educators in Europe. Created in 1973, SEFI is an international non-profit organisation aiming to support, promote and improve European higher engineering education, enhancing the status of both engineering education and engineering in society.

SEFI is an international forum composed of higher engineering education institutions, academic staff and teachers, students, related associations and companies present in 48 countries. Through its membership and network, SEFI reaches approximately 160000 academics and 1000000 students. SEFI represents 4 decades of passion, dedication and high expertise in engineering education through actions undertaken according to its values: engagement and responsibility, respect of diversity and different cultures, institutional inclusiveness, multidisciplinary and openness, transparency, sustainability, creativity and professionalism. SEFI formulates ideas and positions on engineering education issues, influences engineering education in Europe, acts as a link between its members and European and worldwide bodies, contributes to the recruitment of good students whilst always promoting an international dimension in engineering curricula.

Our activities: Annual Conferences, Ad hoc seminars/workshops organised by our working groups and task forces, specific events and actions for the deans in engineering, scientific publications (incl. the European Journal of Engineering Education), European projects, Position papers, cooperation with other major European and international bodies such as the European Commission, the UNESCO, the Council of Europe or the OECD. The cooperation with partner and sister organizations in Europe and in the world is also one of our priorities.

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University College London (UCL) was founded in 1826 to open up higher education in England to those who had been excluded from it – becoming the first university in England to admit women students on equal terms with men in 1878. UCL's Centre for Engineering Education brings together UCL's Institute of Education with its Faculty of Engineering Sciences. We're passionate about Engineering and Education, believing there's a need for a new conversation about how we attract and nurture engineering talent.

The London Agenda

The 8th European Convention of Engineering Deans (ECED 2016) was hosted by University College London, Centre for Engineering Education (CEE) from the 13-15 April 2016. It brought together 80 deans from 15 European countries. ECED is the European networking event of the year for deans, directors and department heads in engineering institutions, organized by SEFI (European Society for Engineering Education) and CESAER (Conference of European Schools for Advanced Engineering Education and Research).It brings deans, directors and department heads together to discuss current issues in engineering education and research.

At its conclusion ECED 2016 produced the first draft of an agenda – the ***London Agenda*** – which is intended to highlight the most important issues, challenges and opportunities for schools of engineering today. It is presented here - *as a SEFI Working Paper* – listing important questions on current issues of today that are in line with the outputs of the Convention. The London Agenda is built around three themes:

I. **Engineering Education: Meeting the Engineering Profession's needs**

II. **Engineering Research and Innovation: Meeting the needs for Sustainable Development**

III. **Engineering Schools Adapting to Change: How much, how fast, and in what way?**

For each theme, there is a list of questions which conference delegates agreed on as important. However, these lists may not be complete, and there also may be more than one correct answer to each question because the context of each engineering school is different.

We hope the London Agenda will help and inspire deans, directors and department heads to focus better on their roles in engineering education and research. We further hope that more colleagues across Europe will see the benefit of working together and meeting annually at ECED for the exchange of support and ideas whilst contributing to the advancement of engineering institutions in general.

Theme I: Engineering Education: Meeting the Engineering Profession's needs

This theme divides into a list of principles and a list of procedures. The discussions gravitated towards education quality and how to ensure the development of good engineers equipped with the right skills and attitudes for working life. Interpreting this as the most important need of the profession, the following seven questions emerged. Obviously, education quality systems are closely linked with the various accreditation systems across Europe.

Principles

The principles deal with the understanding that engineering education is a service to society, and it is for the benefit of society. Naturally, education is always student centered. Students are people who undergo personal change and development at the university, they are engineers in training. Students are the key stakeholders in education.

1. **How do we accentuate the relationship between engineering education and society?**
   How and by which channels does a School of Engineering meet with society? How do we receive feedback from stakeholders in society, including industry, and how do we process it?

2. **How can we make sure we involve students?**
   Students always want to improve things, and if invited they will participate in fruitful

discussions on the curriculum, teaching methods, quality system and improvement of their programme.

3. **How can we be role models?**
   A university is full of professors, not necessarily engineering practitioners or industrial champions. This can be a challenge, especially to research-based universities. A successful academic is a role model for what she does, technically and ethically. Engineering is more than academia and there are many forms of role models. How do we attract engineers with the personal experience of working in the private sector and select those worthy of being role models? "Show – don't tell" is a strong pedagogy.

4. **How do we engender the right "attitude" in our students?**
   To be an engineer means so many things more than just the acquisition of scientific knowledge and technical skills. It concerns the way one thinks and reasons: critically, creatively, systematically and ethically. It concerns the way one feels: humble, responsible, brave and optimistic. How do students adopt these ways of thinking and feeling?

Procedures

The procedures concern the way we operate engineering education. How do we design, monitor and check the quality of our programmes? Do we foster the mindset of continually improving programmes?

5. **How is the management of the programme structured?**
   Is there one "Mastermind" with all the technical and pedagogical insight? Are responsibilities divided, shared? How does the programme adapt to changes? Who is open to new input and able to lead colleagues and staff engaged in the programme? Who carries the responsibility and owns the resources to run the programme? Is there a single point of responsibility?

6. **How do we know if the programme works, that it produces effective engineers?**
   Can we put up a set of key performance indicators for student learning? What should they be? How do we measure the learning, competences and knowledge gained by the students, and how should we handle the evaluation and grading of students in order to also make this a learning experience for our students?

7. **What is a well-controlled quality system based on outside feedback?**
   How do we process feedback and use it afterwards? How should we obtain feedback from graduates and industry, not to mention the accreditation and professional agencies?

Theme II: Engineering Research: Meeting the needs for Sustainable Development

This session produced a set of questions, amongst which five were identified as the most important. They fall into categories of internal matters and of public affairs.

Internal Matters

One focal point is how we operate and run our own research organisation. This has to do with internal university affairs and the management of research.

8. **In order to succeed in research and innovation, do we need to be disruptive, or can we work in an evolutionary manner?**
   Should we try to encourage disruptive changes? How do we take advantage of a combination of disruptive and non-disruptive methods?

9. **Can we speed up the innovation processes concerning sustainability – and how?** Should we try to speed up such innovation processes? Are innovation processes concerning sustainability different from other innovation processes?

Public Affairs

Universities live in the real world, and must always consider their position in society for acceptance, appreciation and, of course, for funding.

11. **Are the interests of universities and industry always aligned – and how do we know?** How do we use this alignment if this is the case? How do we act if this is not the case?

12. **Do university deans have the tools to influence the policy decision makers?** Is it the university deans, directors and department heads that should influence the policy decision makers? How should these tools be used?

13. **How should we deal with intellectual property rights generated by universities alone or in collaboration with industrial partners?** Does open-research or open-innovation offer a liberating solution - or is it a show-stopper? In many countries it is demanded that the universities deal with this kind of questions so that successful intellectual property from the universities also results in revenue to universities. Does this pose a threat or an opportunity to universities?

Universities are a service to society. Some delegates discussed this and argued, that it is not only by meeting the needs for a sustainable development, that engineering research and innovation is a service to society. Many times university research and innovation rather shapes or creates the needs for development than meeting them. Likewise, you could argue the same for meeting the needs of the engineering profession.

Theme III: Engineering Schools Adapting to Change: How much, how fast, and in what way?

The questions raised by the Convention when it comes to adapting to change, concern curriculum development and change management issues.

Curriculum Development

Over time engineering education has generally changed slowly. Globally the pace of change, in society, in technology, in most areas of life has quickened. Against this backdrop of rapid change engineering education must consider how best to react and develop.

13. **How do we create an "innovation spine" within our curriculum?** How do we encourage and develop creativity across the entire programme? How can deans, directors and department heads lead such a process and break new ground in engineering education?

Change Management

Change does not always happen automatically. But when is does, the risk is that it happens too fast and one loses control.

14. **How do we act on the constant change we experience?** How do we recognise that there is only a limited capacity for change? How do we use our leadership to create space for others to innovate within areas of sustainability?

15. **How do we move on from just discussing "soft-skills"?** How do we value and teach these skills as an inherent and necessary part of the formation

of an effective engineer? How should deans, directors and department heads introduce this change, which sometimes exceeds the competencies of some educators, because it is a new element in engineering curriculum?

16. **How do we embrace the common direction we see in design, sustainability and innovation?**
    How do we find ways to consistently share best practice? How do we make best practice even better?

Many conference delegates found change inevitable. The digitalisation of everything that we do will revolutionise how we do things, and how we use things. Our surroundings change much faster than we do, and it is a special challenge to make sure that our staff can handle this. The willing and the able are in the front, and the tail comes at the end. What can we do about the future, where everybody has to change constantly, and nothing ever stops? Adaption is required, yet there is only a limited resource for how much you can adapt at a time. How do you eat an elephant? In small bites!

The Future: What next?

We intend to support an ongoing leadership dialogue to explore the questions raised through the London Agenda. Together we can find and discuss answers. We believe that much value is generated in the interaction between deans, directors and department heads, who seek the best answers with respect to the context and situation of their individual institutions. We will use our next Convention, ECED 2017, at TU Munich to continue to advance this dialogue. We welcome your participation and contribution.

Leadership dialogue taking place amongst delegates in London at the ECED 2016 hosted by UCL.

ECED^3 2017

European Convention for Engineering Deans, Directors and Department Heads –

A university leadership dialogue

3-4 April 2017 at TU München (D)

The time and venue for the next ECED^3-ULD is fixed. The organisers would like to consolidate this meeting as ***the event of the year*** for leaders of engineering institutes, schools, departments and universities. We are looking forward to seeing many people and to continue our leadership dialogue in Munich. Preparations are ongoing. Please do not hesitate to contact us to learn more about the next convention. Information will be displayed on our homepage.

The Technical University of Munich (TUM) goes back to the founding year of 1868. TUM is one of Europe's leading research universities, with more than 500 professors, around 10,000 academic and non-academic staff, and 39,000 students. Its focus areas are the engineering sciences, natural sciences, life sciences and medicine, reinforced by schools of management, education, social and political sciences. TUM takes advantage of this breadth to create interdisciplinary structures in both research and teaching being aware that it is only through collaboration between disciplines that the great challenges of the 21st century can be overcome. TUM acts as an entrepreneurial university that promotes talents and creates value for society. In that, it profits from having strong partners in science and industry. It is represented worldwide with a campus in Singapore as well as offices in Beijing, Brussels, Cairo, Mumbai, San Francisco, and São Paulo. Nobel Prize winners and inventors such as Rudolf Diesel, Carl von Linde, and Rudolf Mößbauer have done research at TUM. In 2006 and 2012 it won recognition as a German "Excellence University." In international rankings that address various dimensions, TUM regularly places among the best universities in Germany. www.tum.de

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The 2016 Convention website is still open on which podcasts of the plenary sessions and the YouTube flipped-classroom invited talks are available.

www.engineering.ucl.ac.uk/eced/

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