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Opening remarks to the Joint Committee on Education, Further and Higher Education, Research, Innovation and Science on the Future of Science, Technology, Engineering and Maths (STEM) in Irish Education.

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Chairperson and members of the Joint Committee, thank you for the opportunity to input into today's discussion and to make some opening remarks. I represent the Irish Universities Association (IUA), whose eight members play a key role in STEM education: we design and deliver the STEM programmes which provide specialist STEM capabilities and capacity; we educate educators at all levels from early years on, including specialist teachers of STEM; we engage in research about STEM education, and we are leaders and partners in activities to strengthen and diversify participation in STEM.

At the outset, we acknowledge the value of STEM literacy broadly, and the fundamental role of early childhood, primary, and post-primary education in shaping motivations, interests, and skills for STEM. Integrated STEM education from early years is key. Success in this is predicated on teachers having content knowledge and confidence across STEM disciplines. Diversity in STEM goes hand-in hand with access to a wide range of subjects and appropriately qualified teachers. You will have heard from other stakeholders about the challenges associated with each element of that 'recipe for success', and we support those being addressed.

Interest in, and preparedness of students for STEM at third level

While STEM literacy on completion of post primary school is empowering for citizens generally, there is a clear need to capitalise on it in specific ways. We must ensure we meet skills needs across key sectors of the economy, and open a door to and sustain rich careers in STEM for individuals. This is where the role of IUA institutions primarily sits. As such, the level of interest among school leavers in STEM programmes, and their preparedness to be successful in those programmes are of importance to us. In terms of initiatives to generate interest in STEM, a multitude of which are led by, or supported by IUA members, we urge that policy move to provide consistency and substance in funding, so that momentum can be maintained for individual activities, our ability to evaluate impact is improved and we can seed new innovations to drive interest in STEM. Preparedness for university study is linked to competence in core underpinning subjects, such as mathematics and the natural sciences and we welcome positive trends in uptake of higher-level Leaving Cert STEM subjects, including Mathematics. We do however echo concerns expressed by others to this committee that PISA data shows the higher performing cohort in Ireland is behind its peers internationally in mathematics. The growing number of students taking Computer Science as a Leaving Cert subject is a positive and IUA encourages

government to ensure Computer Science is offered broadly and that education is funded for sufficient numbers of secondary school teachers to upskill in Computer Science.

Provision of STEM in Higher Education

To capitalise on STEM education to address skills needs (including skills focused on the challenges of climate change and the digital transition), we need a policy focus on scaling the provision of STEM progammes at third level. We also need a broader strategy for lifelong learning, including re-skilling and up-skilling to unlock the potential for STEM participation and inclusion.

IUA institutions have been proactive-we have absorbed a significant number of additional STEM enrolments over the last 6 years. Despite this, and the support of HCI (funded from the National Training fund), shortages of STEM graduates exist very broadly. If anything, emphasis on areas such as ICT and Engineering seems to have reduced and focus shifted to shortages in health-related disciplines where government is the main employer. We cannot afford to reduce emphasis on STEM; we are far from meeting the skills challenge currently and that has impact on competitiveness.

The single barrier to increased provision of places on STEM programmes is underfunding (both recurrent and capital). That funding which is available under targeted schemes is often allocated in a piecemeal way which does not actually add capacity and is hugely inefficient. "Funding the Future" explicitly accepts that we must bring staff-student ratios more in line with European peers. There is no argument about where we are. Agile development of new STEM programmes, providing more laboratories, implementing digitally enhanced teaching and active pedagogies in STEM, running more research projects, providing academic supports and designing and producing quality online education resources all absorb significant time- insufficient numbers of staff limit ambitions for all of these.

IUA members are now effectively stalled in our ability to do what we want to do, which is to strategically plan enhancements for STEM capacity and provide greater agility to respond to STEM skills need. This can only change by addressing the gap in core funding. The first step of €40m toward that, while very welcome, was considerably less than that required to have meaningful impact. We call for the urgently needed investment of €307m/annum to be fully addressed over the next two budgets with at least €150m provided in Budget 2024.

The second dimension to underfunding is capital investment**:** STEM-related programmes, by their nature tend to have higher capital investment requirements, a faster rate of obsolescence and are more constrained by facilities (in terms of possible student numbers) than other disciplines. There has been insufficient capital investment in established universities since the onset of the financial crisis. IUA Universities have borrowed heavily to meet capital infrastructure needs as we accommodated demographic growth. Many have reached their borrowing limits and will not be able to meet the required growth in STEM provision over the next decade without capital investment.

It is important to note that my remarks here are not specific to taught programmes in STEM. Similar constraints exist for STEM education through research. The development of a new research funding agency and the current review of PhD supports are important opportunities to address not only capital investment and financial supports deficits for STEM, but to enhance links between higher education research, enterprise and other stakeholders, including schools, and the community which can in turn enhance STEM education from early years to doctoral level.

Diversity in STEM graduates

In its submission to this committee, the Union of Students in Ireland emphasised diversity and a culture of inclusion in STEM and these are priorities we echo. As a female engineer and former Executive Dean of a Faculty of Engineering and Computing this is an area of particular interest to me. There are key points I want to make that we may get an opportunity to discuss further:

- There has been a sustained focus on women in STEM for well over 30 years. It has delivered progress, but at a frustratingly slow pace. We do need to keep doing what we've been doing, but new thinking is also needed around gendered perceptions of confidence/difficulty, how we use role models and how career risk is perceived.
- We have a much larger pool of young women with strong competence in higher mathematics than there was a decade ago, but that competence is not translating into higher numbers of young women choosing STEM at third level. We should examine how this could be changed.
- The stakes have risen. We are heading into an exciting time for science and technology with the adoption of Artificial Intelligence (AI) tools. The people who will shape our society, our businesses, our healthcare and our policy-making will be those who can navigate STEM concepts, are not intimidated by the terminology and can understand the value of STEM artefacts. Unless we effectively address lack of diversity in STEM, the technology divide will create fault lines in society, with women and people from poorer families firmly on the wrong side. A new level of urgency is merited.

To conclude, I want to note that the IUA has submitted additional briefing material in advance of today's discussion which I hope has also been helpful.

Thank you