Consultation for the National Strategy

The success of the Strategy for Science, Technology & Innovation (SSTI) 2006 to 2013 provides a strong platform from which to hone the development of core objectives for the sector that can serve to make Ireland a leader rather than follower.

This submission argues for STEAM led Research Prioritisation that increases impact and job creation by fully leveraging the breadth of Irish research and the multi-faceted skills of our diverse graduate population.


STEAM is a growing international movement in innovation which seeks to move from a focus on the STEM fields (Science, Technology, Engineering and Maths) to include the Arts in its widest spectrum of creativity (Creative Arts, Design and the Humanities). Ireland's 21st century economy will be transformed by the intersection of STEM fields and the Arts, leveraging our strengths across disciplines to provide a foundation for future prosperity.

STEAM offers a platform from which to develop the agile workforce needed to adjust to the ever changing 21st century market needs and to cultivate interdisciplinary and transdisciplinary research which has the capacity to address a range of societal issues from a variety of perspectives. STEAM led Research Prioritisation will build Ireland's talent pool "to maximise the

flow of skilled individuals going into companies, creating companies and working in the public research system". STEAM thinking will be instrumental in addressing the Millennial Project and European societal challenges tackled by Horizon 2020, building capacities and developing innovative ways of connecting science to society. A STEAM approach can enhance scientists and laypeople's understanding of diverse concepts and phenomena and generate creative, innovative solutions to build a sustainable and resilient society.

A STEAM approach cultivates multidisciplinary models in industry, business, and education with an emphasis on team led creative problem solving that maximizes our expertise across disciplines.
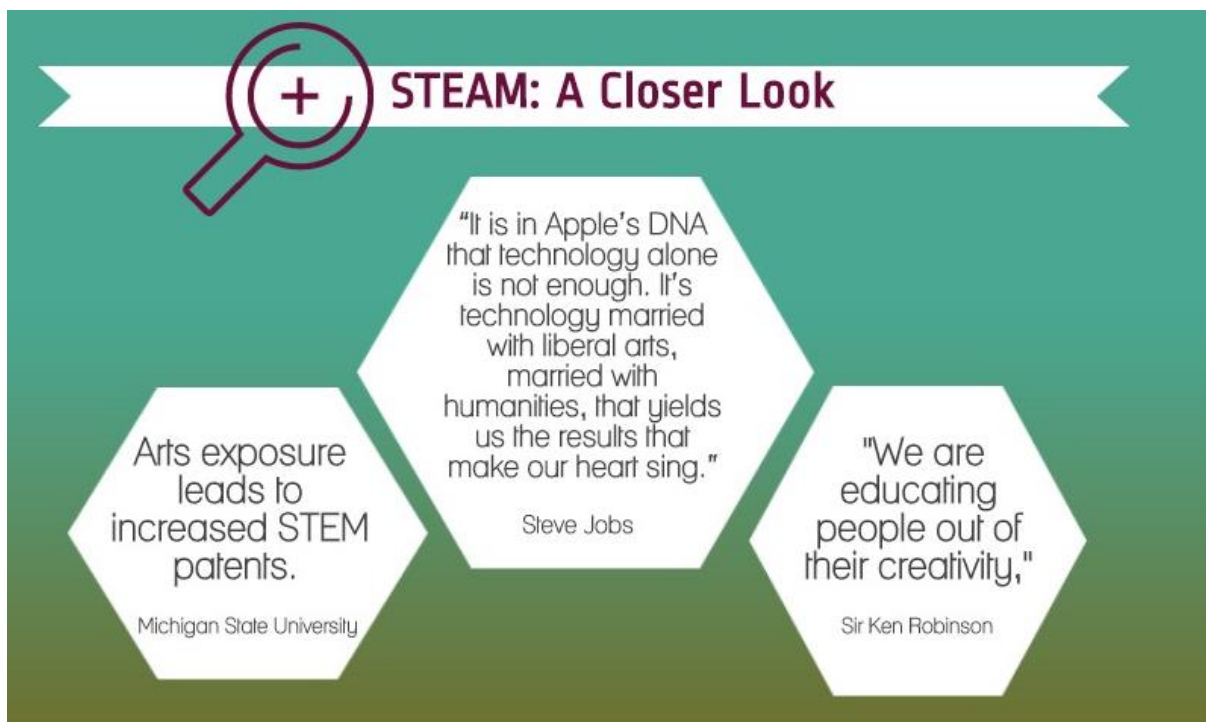
CONTEXT

Past STEM led Research Prioritisation informed by international models does not adequately recognise our distinct national strengths and overlooks an opportunity to lead internationally by cultivating a truly integrative Research Strategy that not only seeks to support innovation but which is itself innovative in its approach.

The Strategy for Science Technology and Innovation 2006 – 2013 was very successful in increasing student numbers for the STEM fields and growing our research capability. Nonetheless, 14,453 students put Arts & Humanities as their first choice in their CAO 2013 applications, 23.8% of total applicants, down only 1.6% on the previous year (HEA 2013). 4,570 applications had Science as first choice accounting for 7.5% of the total number, a .5% increase on the previous year. It is clear that we need to create a national strategy that will maximise the expertise and creativity of graduates emerging from Higher Level Institutions across disciplines. The Arts and Humanities disciplines have much to contribute; it was the most popular field of

study for non-Irish new entrants in 2011/12 and in terms of university international rankings, Irish Schools of Arts & Humanities consistently appear in the top 100.

While the SSTI sought to include the Humanities and Social Sciences (HSS) as part of its development plan for a broad based strategy to build research and innovation, a clearer model to support greater engagement between and across disciplines should be outlined in the next strategy. A STEAM led approach offers an innovative model through which to leverage our international reknown for our cultural and creative excellence as well as stregthen the STEM fields and increase participation in the Sciences.

The US study, *Ready to Innovate* demonstrated that more and more companies are looking for workers who can brainstorm, problem-solve, collaborate creatively and contribute/communicate new ideas. STEAM will ensure that Ireland becomes a leader by recognising and supporting cross-disciplinary approaches that sustain creative innovation. The inclusion of a STEAM approach to the National Strategy will help to build a successful infrastructure to leverage our national strengths and support collaboration across sectors in order to boost Ireland's global competitiveness in a world economy.

The 8 Pillars

STEAM is applicable and relevant across all 8 pillars to be considered in the formulation of the new Strategy.

Pillar 1 Investment in STI and key goals/targets
Ireland's ambition should be to be a leader not a follower. A STEAM research prioritisation that fosters creativity and cross-disciplinary problem identification and problem solving skills will ensure that we have an agile workforce that can evolve with an ever-changing economy and society. A STEAM-led national strategy will be truly innovative and will likely elicit great interest internationally, especially given STEAM's growing popularity in the US and Europe.
Funding can be conservatively applied to develop STEAM prioritization by facilitating the inclusion of STEAM-led cross-disciplinary engagement from within existing HEA centers and by supporting research grants for projects that encompass a STEAM approach.
Given Horizon 2020s emphasis on inter and transdisciplinarity this should serve to raise the opportunities for EU funding. A further justification is the promotion of Ireland as leader in innovation with an agile workforce accustomed to team led creative problem solving. The STEAM approach ensures that we maximize our resources by drawing on expertise that is already being funded beyond the STEM fields. Further still, research has shown that the Arts contribute to a better understanding of the Sciences from a Neuroeducational stand point as well as serving to potentially attract more women to STEM and to better explain the sciences to the wider public.

Pillar 2 Prioritised Approach to Public Research Funding
The STEAM approach will help Ireland lead in the identification of opportunities and challenges and developing innovative solutions through design thinking and team-led problem solving. STEAM ensures that we can better serve our national objectives of a strong sustainable economy

and a better society by maximising our resources and nurturing a workforce that is agile and creative.

Last century, Clinton's former Secretary of Education, Richard Riley, presciently summed up this need for creative innovation to drive our future when he predicted that: "The jobs in the greatest demand in the future don't yet exist and will require workers to use technologies that have not yet been invented to solve problems that we don't yet even know are problems." In order to Horizon Scan we need creative graduates.

Pillar 3 Enterprise-level R&D and Innovation Performance

STEAM provides the framework to strengthen the number of innovation performers in the multinational sector by inculcating a sense of collaborative action and by funding cross-disciplinary research.

Enterprise programmes similar to the UK's Creativeworks London wuld be a useful addition to the strategy and highlights an underdeveloped area that could prosper with a small level of support. This type of programme fits in with existing voucher schemes already in operation.

Pillar 4 International Collaboration and Engagement

Localised support for STEAM led colaborative research will broaden the capacity for Irish researchers to gain EU funding. International collaboration within the Environmental Humanities offers a strong example of what this looks like in practice. Framing the Research Prioritisation in STEAM terms as part of the National Strategy will be testement to the belief and investment in cross and transdiplinary approaches that support creativity and innovation. This will help promote collaborative engagement and offer an attractive model for international partners and increase our opportunities to address shared societal problems. STEAM opens up new research dissemination pathways that are benificial to all Horizon 2020 applications. Industry has largey adopted models that support creative innovation, as such STEAM should prove attractive and help attract new industry partners.

Pillar 5 Organisational/Institutional arrangements to enhance research excellence and deliver jobs

• What could we do to further enhance our landscape and institutional arrangements to maximise the impact of research excellence and deliver jobs?

Funding STEAM research that specifically asks for cross institutional collaboration would be a viable starting point. All funding applications should be asked to include diverse dissemination outputs that draw on more than one discipline and ideally engage with other institutions.

• How can Ireland optimise its strategic advantages of location, scale and environmental quality as a fundamental component of its research infrastructure?

STEAM offers an innovative model given our reknown for cultural and creative excellence. STEAM can help further increase/strengthen the effectiveness of our national collaboration and engagement across all areas of STI investment in pursuit of economic and societal goals.

Pillar 6 World class IP regime and dynamic systems to transfer knowledge and technology into jobs

• The establishment of Knowledge Transfer Ireland has seen an important evolution in our knowledge transfer system but what more can we do to enhance further the transfer of knowledge into jobs?

By recognising the high numbers of students entering into Arts and Humanities programmes and thus developing a stratgegy that maximises our resources by placing Arts within the STEM focus.

Pillar 7 Government-wide goals on innovation in key sectors for job creation and societal benefit

STEAM ensures that we draw on the breadth or our research to innovatively adddress national challenges. There is a central synergy incumbent in STEAM is the capacity to address societal challenges whilst attracting outside investment thus aiding job growth.

Pillar 8 Research for knowledge and developing human capital

Central to STEAM is the development of our human capital as it recognises the value of the Arts in its widest capacity to addressing societal challenges and making plain the value of creativity to the private sector.