

# Coimbra Group High-Level Seminar on Research & Innovation

Venice International University, Isola di San Servolo, Italy

30 October 2014

Colleagues, Ladies and Gentlemen,

It's an honour to have this opportunity to address you here today. I thank the board for the invitation. I'll be talking to you this afternoon about research and innovation, in my dual capacity as Provost, or head, of Trinity College Dublin, and as a member of the governing board of the European Institute of Innovation and Technology, the EIT.

Trinity is Ireland's leading university and is ranked in the top twenty universities in Europe. We're a large, multidisciplinary university, and we've been a member of the Coimbra Group from the outset.

The EIT, as you know, was established in 2008 to increase European growth and competitiveness, reinforce innovation capacity, and create the entrepreneurs of tomorrow.

Today, as I look at this whole crucial area of research and innovation in Europe, I'd like to draw on my experience in Trinity and with the EIT.

## **\*\*\*Trinity\*\*\***

The way in which we've encouraged innovation and commercialisation in Trinity is I think relevant and representative for other Coimbra universities.

Explicit statements about their role in innovation is still new for older universities, relatively speaking. Trinity is over 400 years old and there are other European universities – particularly here in Italy – that are older again.

Innovation and commercialisation started becoming part of many universities' activities about 25 years ago, and only accelerated in the last decade, so we're talking about a very new, exciting, and dynamic phase for universities.

I remember the first campus company established in Trinity – it was in 1986. I was still an engineering undergraduate. The impetus for academic staff to commercialise their research was in response to the exciting developments coming out of campuses in the United States, places like Stanford in California.

From 1986 onwards commercialisation and innovation became part of campus life in Trinity. But that's not to say that everybody immediately got involved in this exciting new academic activity. For over twenty years, between 1986 and 2008 Trinity averaged less than one new campus company a year. Now this figure doesn't tell the full story because some of the campus companies established during this period were astonishingly successful. For instance

the software company, Iona Technologies, founded in 1991, was acquired by Progress Software for \$162 million dollars in 2008; the computer gaming company Havok, founded in 1998, was acquired by Intel in 2007 for \$110 million dollars; and Oplona Therapeutics, founded in 2004, is today a leading drug development company, targeting inflammatory and autoimmune diseases and cancers.

And in this twenty year period from 1986, industry collaboration also increased enormously. I was working in an area, medical devices, which pioneered collaboration with industry – the groundwork we laid in the 1990s has helped make Ireland an international centre for the medical device industry today, including the strong start-up culture.

And also during this twenty year period, Trinity was participating in the different EU Framework programmes and benefitting from their focus on innovation. Up to the late 1990s, State funding was minimal by comparison.

So there was a lot of good work done in commercialisation and innovation in Trinity, as in other European universities, during this period. But such activity didn't form part of the ambitions of many staff – it remained the preserve of a few.

This changed from about 2007. There was change in Europe – the amount of money available for FP7 was huge: €50 billion euro, equal to almost the previous six Framework Programmes combined; this was a big statement about the importance of research and innovation, and of the connectedness of these two activities for economic and social development. And Science Foundation Ireland was funding science in Ireland to a high level for the first time in the country's history.

And there was change in Trinity itself. The change was procedural – our Research and Innovation Service, together with our Technology Transfer Office, revised and simplified the process of approval for campus company formation – for example small and dilutable equity stakes. They removed a lot of the impediments and barriers to setting up companies. The effect was immediate and dramatic: Trinity went from creating less than one campus company a year to creating an average of seven per year since 2009.

A fortnight ago we celebrated our 500th Invention Disclosure Form in Trinity and the licensing of 126 technologies to industry. We now have 42 campus companies employing 250 people. Over the past five years, one in five Irish campus companies has come from Trinity.

And all this happened during a time of severe global recession, which makes the achievement all the more impressive.

There's an important lesson here: innovation doesn't just happen. It's not enough to have excellent research, or even great collaborative projects with industry – these won't in themselves create entrepreneurs and new companies. You need to strategize and plan for innovation. You need to look at what might be preventing entrepreneurship and what you can do to incentivise it.

In Trinity, we've learned the lesson well. We haven't been sitting on our laurels. One of the areas that we've really developed in Trinity since 2009 is educating for innovation and entrepreneurship.

\* \* \**Educating for Innovation*\* \* \*

Trinity, like all your universities, has a dual mission in education and research. We do not compartmentalise the two – we know that what we research informs how we educate, and that our choices in what we teach affects our research.

If education and research are our mission, where does innovation fit in? Innovation permeates, if you like, both aspects of the mission. And it follows that innovation cannot just be the preserve of staff and researchers. Innovation and entrepreneurship must permeate education.

To this end we've established in Trinity an Innovation Academy jointly with UCD in Dublin and Queen's University of Belfast in Northern Ireland. It is aimed at incentivising PhD students to become entrepreneurs. This Academy encourages link ups between students in different disciplines – so engineers collaborate with doctors, and computer scientists with historians. In this “doubling up” students have an experiential learning experience which promotes interdisciplinarity.

And for undergraduates we've established a programme, LaunchBox, which provides students with seed funding, office space, and mentoring for three months while they incubate their business ideas. This is funded by a group of Trinity Angels – successful entrepreneurs who are giving back to the upcoming generation.

One of the projects incubated under LaunchBox is 'FoodCloud' which aims to bridge the gap between food waste and food poverty by creating a 'virtual food bank' app, linking restaurants, retailers and caterers to charities. FoodCloud has won social entrepreneurship awards, and just a few months ago it partnered with the supermarket, Tesco, to deliver surplus food to Dublin charities. Talks are ongoing to extend this to Tesco in the UK. FoodCloud is a really exciting model of social entrepreneurship, and it was founded by undergraduates.

The Innovation Academy and LaunchBox are two of the ways which entrepreneurship permeates the education we offer in Trinity. They are what I call 'innovation pathways'. The development of such pathways is integral to the Trinity Education, across all our schools. Not everyone is going to have a career in business or in commercialising research, but all students can benefit from entrepreneurial mind-sets, whether they are studying medicine, engineering, music, or history.

Entrepreneurial ability is something employers seek from graduates, because the ability to turn challenges and 'gaps' into ideas and solutions, to spot opportunities, to make research impactful, to work with clients to improve products, to think about funding and sales – all of this has obvious use and benefit, and not only for those starting their own companies.

\* \* \**Strategic Plan*\* \* \*

We are now looking ahead to the next phase. Just last week I launched Trinity's new Strategic Plan, which lays out our university's mission, values, goals, and activities for the next five years, to take us up to 2019.

This Plan is comprehensive, covering all goals from talent acquisition to public engagement. On Innovation and Entrepreneurship, the Plan builds on our existing strengths. It prepares for a new Trinity Business School, and a new Office of Corporate Partnership and Knowledge

Exchange which will bring under one roof all the functions necessary to support research collaboration and commercialisation.

This Office will provide a single interface for industry, which will reduce any barriers for companies seeking to interact with Trinity researchers and infrastructure. This will allow us to support the creation of more than 160 companies over the next three years, including campus companies, student companies, spin-ins, and collaborative companies.

Our Plan envisages multiple goals and actions, but during the launch I put particular focus on innovation and entrepreneurship for the following reason:

Trinity is a “venerable institution”. It is over 400 years old. Our most famous graduates are writers like Samuel Beckett, Jonathan Swift and Oscar Wilde, and political thinkers like Edmund Burke and Mary Robinson, and philosophers like George Berkeley. Of course we also have famous mathematicians and scientists, including Ernest Walton who split the atom, but Walton is famous in his field rather than a household name like Beckett and Wilde. Writers have that advantage over scientists.

So, in the public mind Trinity is associated with heritage and tradition, with arts and humanities, with politics and law, with philosophy and history. I am immensely proud of that association – and our lecture theatres are called after our famous writers and thinkers. But I’m also aware that it doesn’t tell the full story, and that our other achievements risk getting lost.

I want people to realise that as well as educating the author of *Gulliver’s Travels*, Trinity is today a global leader in the production of the new material, Graphene, which has tremendously exciting potential applications including lighter cars, engines that use less fuel - and maybe even computer screens that fold into your pocket.

There is a tendency to associate innovation with new universities and new disciplines. But innovation can and does happen in all disciplines. As long as you are creating knowledge at a faster rate and to a higher level than your competitors, then you are opening up opportunities for innovation. Such knowledge can be technological, artistic, creative, or societal. To limit innovation to certain disciplines and certain universities is reductive.

Secondly, my university, like I, think many universities of the Coimbra Group, emphasizes critical thinking and independence of mind. This is now so long established with us that it has become second nature to the way we teach and research. We expect students to be inquiring, demanding, discerning, questioning. We expect them to speak up in seminars and tutorials. If we were faced with students who agreed with everything we said and who researched only what we told them to, without ever disrupting the brief – well we would be dismayed. Our whole model depends on our students confronting us with their very different ideas and research.

Of course this disruptive model, this educating for critical, independent thinkers is exactly what produces innovation. You do not get ground-breaking ideas through educating for conformity. My contention is that universities like ours are particularly well-positioned for innovation. We are not afraid of radical thought or where it might lead.

I emphasised our innovation and entrepreneurship strengths in our Strategic Plan to establish in the public mind the connection between our traditional strengths in education and innovation. This is relevant for Trinity and for Europe.

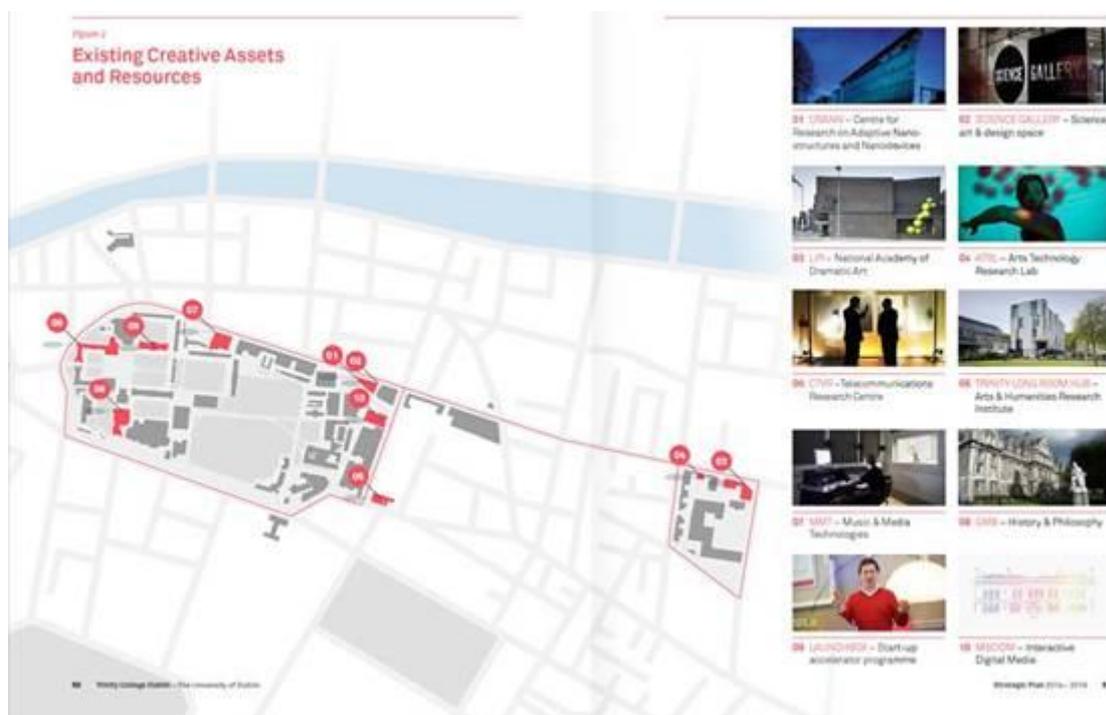
I was gratified by the amount of media coverage our Plan received, and the interest from government. The Plan was something of a national event: the Prime Minister launched it and it was analysed in the broadsheets.

This kind of interest was not greeting universities' strategizing in decades past. What happened within universities was regarded as an in-house, private matter, not something the country or government needed to know about. So, what has changed?

Well, because of this new emphasis on innovation, entrepreneurship and commercialising research, universities now contribute to driving growth and competitiveness. Universities provide the research that fuels the innovation ecosystem; and universities educate the leaders, entrepreneurs, and the many different professionals who contribute to a thriving economy.

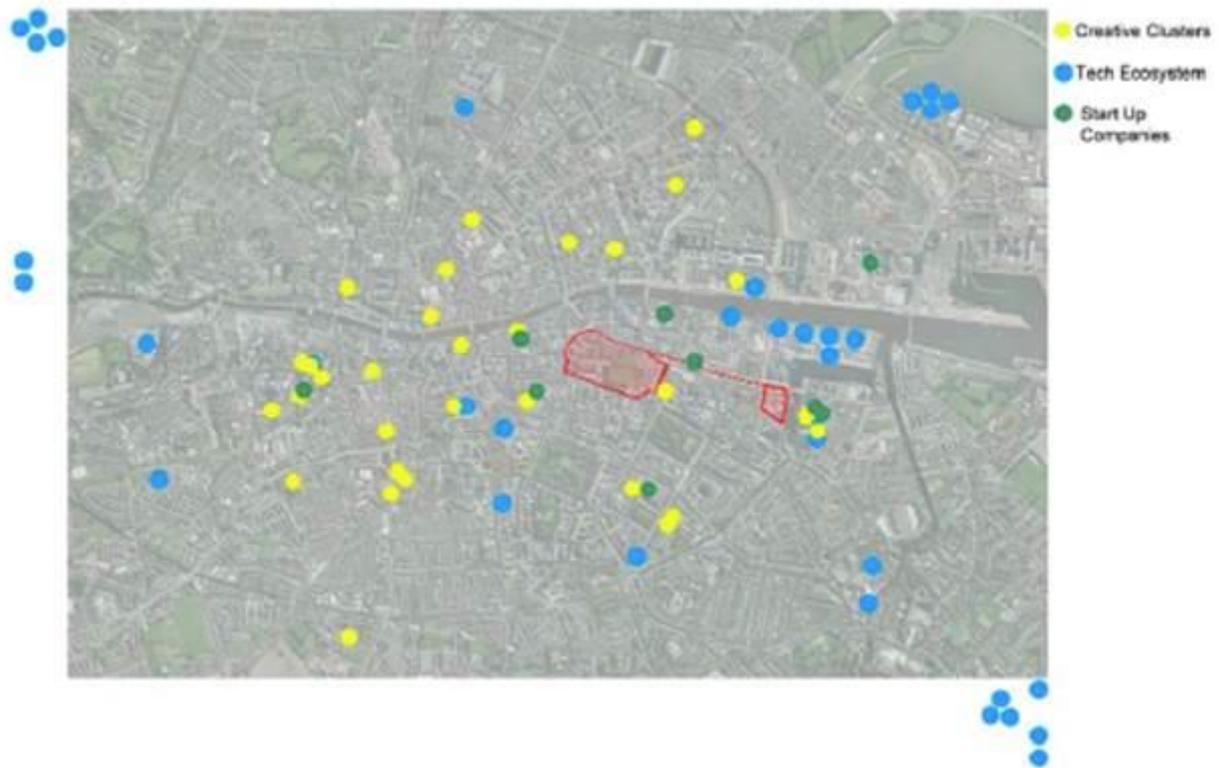
For our Strategic Plan we consulted widely with numerous stakeholders – with staff, students, government, State agencies, alumni, employers, industry. And when launching the Plan, we emphasized that it was a partnership with these stakeholders - a partnership aimed at strengthening not just Trinity, but the whole country.

Here are some slides to put Dublin and Trinity in context:



This shows Trinity (left) and the TTEC – the Trinity Technology and Enterprise Campus (right) with some of our research institutes and other facilities labelled.

The next slide shows Trinity in terms of the whole ecosystem in Dublin:



*\*\*\*A European Innovation Ecosystem?\*\*\**

I have focused on Trinity because it is the university I know, and because we have taken a proactive approach to encouraging innovation. Our experience of how changing procedures helped unleash campus companies is, I hope, an instructive one.

But when I talk about stakeholders in higher education, I am of course aware that these stakeholders are not only national. In the world today graduates travel for work, and researchers collaborate with universities and industry partners in other countries. This happens on an international, global scale, but because of the European Union, graduates are particularly incentivised to work in Europe, and researchers to collaborate within Europe.

That's the idea. But in practice, when it comes to innovation, Europe is not one united free-flowing terrain, it is still divided into fragmented territories.

Europe has a number of high-functioning innovation ecosystems – places like London, Munich, Helsinki, Milan, Frankfurt, Copenhagen, where exciting products and services are innovated, and where the right link-up between industries, universities, and research is happening.

But too often successful regional ecosystems remain just that – regional. Currently companies in Germany are looking to recruit more engineers and technology people. Ideally such recruits should be flowing in from other European countries, but they're not – or not to anything like the extent that's needed.

Europe as a continent underperforms compared to the US, South Korea and increasingly China, on crucial growth indicators, like people owning their own businesses, and labour mobility, and the percentage that companies spend on R&D.

Individually, some European countries and regions score well on these indicators. But we need to think in terms of general European competitiveness, not in terms of individual countries. As the old saying goes, a chain is only as strong as its weakest link. On that basis, Europe is not competitive enough. The markers of the contemporary age - laptops, tablets, smartphones, social networking – are not, for the most part, European creations.

\* \* \**EIT*\* \* \*

This is where the EIT comes in. The EIT seeks to achieve a step change in innovation in Europe – to build networks across the continent and so create a pan-European innovation ecosystem.

The idea is to get businesses, entrepreneurs, investors, universities, and regulatory bodies interacting across our borders to create jobs and open up opportunities.

A company in north Europe should be able to recruit easily from universities in southern Europe; and entrepreneurs in Eastern Europe should be able to interest investors in west Europe.

Students from one European region should be ready to study in another region – and not just for a term.

Legally ‘the free movement’ of people, products, and ideas has been in place in Europe for decades, but in practise, we are not achieving the synergy we need. Despite initiatives like the Bologna Process and Horizon 2020, which seek to, respectively, harmonise academic structures and encourage research link-ups around the continent, Europeans remain disinclined to uproot themselves, or to do business or find commercial partners in other EU countries. This is hindering innovation in Europe. Where there should be flow and dynamism, there is stasis and inertia.

We need to wed the research capacity of our universities to the entrepreneurial culture, and so provide impetus to European innovation.

The EIT proposes to do this by increasing and facilitating common working between the three sectors of:

- higher education,
- the business community,
- and research and technology.

This is the ‘Knowledge Triangle’, which of course you are all aware of. Through integrating the sides of the triangle, the EIT creates pan-European groups, called Knowledge and Innovation Communities, or KICs for short.

The three KICs already underway are in Climate Change; ICT; and Sustainable Energy. And following the launch of the call in February, two new KICs will be designated in December: in Raw Materials, and Healthy Living and Active Ageing.

Our vision is that in a generation from now economists will point to the EIT KICs as the start of something that led to globally recognised products and services, in vital areas for quality of life on this planet.

This is achievable: the EIT has been designed as an adaptable, flexible instrument, and the level of funding is impressive.

\* \* \* *Debunking the Public vs Private Sector Myths* \* \* \*

The EIT is in a great and honourable global tradition of public investment in innovation.

We tend to think of innovation as a private sector activity. People talk in terms of an entrepreneurial risk-taking private sector and a cautious conservative, public sector.

But recently two distinguished economists have challenged this orthodoxy. They have pointed out that successful states frequently take risks with public money by investing in pioneering research.

Mariana Mazzucato, a professor in the University of Sussex, published this year her book, *The Entrepreneurial State*. The subtitle is *Debunking the Public vs Private Sector Myths*, and that is what the book does.

Mazzucato unpicks the Apple iPhone to show that all the technologies behind it were originally State-sponsored: the US armed forces pioneered the internet, GPS positioning, and voice-activated “virtual assistants”. They also provided much of the early funding for Silicon Valley. Academic scientists in publicly funded universities and labs developed the touch-screen and the HTML language.

Likewise, the research that produced Google’s search algorithm, the fount of its wealth, was financed by a grant from the National Science Foundation.

Steve Jobs, Larry Page and Sergey Brin had the entrepreneurial genius to harness those technologies into products and services, but US State investments into radical research enabled the consumer-electronics revolution.

As for pharmaceutical companies, they are even bigger beneficiaries of State research than internet and electronics firms: America’s National Institutes of Health, with an annual budget of more than 30 billion dollars, finances the studies that lead to revolutionary new drugs. The UK’s Medical Research Council discovered monoclonal antibodies, which are the foundation of biotechnology.

Mazzucato emphasizes that the State’s role is too often written out of the picture, with the result that a paradigm has been allowed to develop of risk-loving venture capitalists and risk-averse bureaucrats – does the current paradigm accord with the facts?

The true paradigm is of the State incubating a discovery-rich environment, which entrepreneurial businesses then capitalize on to bring new products and services to the market.

But myths are dangerous, or at least unhelpful things. As I said earlier it's unhelpful for people to equate innovation only with new disciplines and new universities. And it's even more unhelpful to set up a false divide between the private and public sectors. In any successful economy, these two work together. As they do in some of our most successful universities, and as they do in the EIT.

On this subject, I also think it's unhelpful to set up a divide between so-called 'blue skies' or 'fundamental' research and 'applied' research. I really do not like this. Surely all research is both, perhaps starting out as one and ending up as the other? Everyone who researches intends for their research to have impact, to move out of the library and laboratory, to influence people. When we talk about 'clinical trials', we are talking about a stage in the common trajectory of research moving from the fundamental to the applied phase.

This trajectory can take a long time. The example I always like to give is that of quaternions which were discovered by a Trinity mathematician, William Rowan Hamilton in 1843. He wrote the equation for them on a bridge in Dublin, where there's now a plaque. Today, quaternions are used in computer graphics, control theory, signal processing, and orbital mechanics. Hamilton's discovery was certainly 'blue skies' and it took 150 years for it to be 'applied'. He could not have envisaged such applications, but he wanted his discovery to influence and impact.

The division between fundamental and applied is false. I prefer to talk about translational research, or 'research to impact' is how we put it in our Strategic Plan.

Let us do away with unhelpful divisions – between education and research, between 'government' and the private sector, between fundamental and applied. Let us accept our common enterprise: we are all working together to make discoveries that will improve life on our planet. And we all need and depend upon, each other.

On this point, I would just add that while we are doing away with these divisions, we might also do away with the division between public and privately funded universities. Trinity is equal parts publicly and privately funded – with non-exchequer funding coming from commercial revenue, research contracts, student fees and philanthropy.

This is increasingly the model which universities round Europe are adopting. It makes sense in terms of everything I have been talking about. Since higher education is a public and private good, just as innovation is a public and private good, since we are all engaged on this common enterprise of discovery and growth, it makes sense that the State and students and philanthropists and industry all contribute to the considerable costs involved in running excellent universities.

### *\*\*\*Conclusion\*\*\**

I'll conclude by emphasising my main points, which I hope I've got across.

- Innovation can, and must, be planned for. It doesn't just happen;

- Key to planning for innovation is allowing each stakeholder play their part. Innovation happens when universities, government, industry, State agencies, employers, venture capitalists, and regulators work together. We should not prioritise one of these over the others. What's key is co-ordination and cohesion;
- Thirdly, the EIT is attempting something which, although new in super-State EU terms, has honourable precedent in successful State economies. We should get behind the EIT. For the good of our students, our universities, our countries and the continent, we should help ensure that EIT's achievement matches its high ambition.

Thank you.