1. What the Jagiellonian means to me

I am deeply honoured to be invited to give this inaugural Jagiellonian Lecture and hope that the theme will be of general interest. I am particularly pleased because of my own links with the JU. I was greatly privileged to meet Alex Koj at meetings in Poland in the 1980s and even more so as we established a collaboration while I was based at Cardiff University. The sheer quality of the work that Alex was able to maintain, in very difficult circumstances, while both head of Molecular Biology and Rector! His team were fantastic and completely committed despite the lack, in those dark days, of any facilities to undertake competitive research. Nevertheless through their commitment they became an internationally recognised unit in inflammatory cytokine research - in my field of research a truly remarkable achievement.

One of the greatest honours that I have been privileged to receive was Fellowship of the Academia Umiejentnosci. This was particularly pleasing because I was made a foreign member in Natural Sciences - a real honour for a clinician! Thus I feel strong ties to JU and this presentation is a singular honour.

2. Characteristics of Great Universities

My university, Cambridge, and the Jagiellonian too, share with other great universities in the world four simple but crucial characteristics:

- academic breadth coupled with excellence,
- a great deal of freedom,
- a unified mission to teach and to research,
- and global ambition.

In this lecture, I will deal with all four – but as you will note from the title of my address, I will pay more attention to the second two, and explain the links between research and the global domain.

a. First: Breadth coupled with Excellence

It is a growing challenge to maintain breadth as well as excellence, when society and government emphasize science and technology for their contribution to economic wealth; funding regimes and prestige tend to mirror that emphasis. But universities were born for the study of the arts (philosophy chief among them, but also music, grammar and rhetoric) and the humanities (principally law and theology). We as
world leading universities, also contribute to the cultural wealth of society in ways less tangible but no less important than technological discoveries. All universities, to justify their name, must cherish breadth, and ancient universities find the arts and humanities at the core of their long history. Moreover, in a world torn by political, cultural and religious conflicts, scholarship and education in the humanities and social sciences are surely more important than ever.

This, in my experience, is universally understood: my Cambridge colleagues in the natural sciences and technology, and even ministers of governments whose focus is economic growth above all, share the high value that I attach to cultural enrichment – and to keeping these subjects not just alive, but confident and crackling with their own excitement. In my discipline, medicine, we can keep people alive if the conditions are right to the age of 100 and beyond: it is often, though, the arts and humanities that make life worth living in the first place.

b. Secondly: A great deal of freedom

There must be freedom in the air that we breathe on university campuses: the freedom to explore new pathways, to think, write and argue beyond that which is conventional or comfortable. This is important as we teach students to think for themselves and not as others would have them think. There can be no real university without these freedoms.

In some societies, though, asserting them is enough to land you in prison. The challenges we confront in the UK and now in Poland are different, much more subtle, and come as much from within as from without. Academic freedom of the kind I have described is inherently inefficient: it is the freedom to take risks and fail, the freedom to go up blind alleys for months or years on end. Pressures -- self-imposed as well as externally imposed -- to be efficient, productive, and “successful” are no bad thing in some measure. But there are risks to relevance and self-imposed efficiency: that we end up constraining the productive inefficiencies of free inquiry – and snuff out the spark that is at the heart of creativity, discovery and innovation.

One defining feature of world-leading universities is their longevity. Universities are for the long term. I am not only speaking of universities like Cambridge and the JU – but of all universities, because the act of establishing a university is a statement of permanence: universities are expected to last – and they have a responsibility to the past, and to the future, which transcends their responsibility to the present.

For that reason if no other, universities need independence. If they are influenced too strongly by governments or by industry, then they will focus too strongly on the short-term, on the immediate problem, because that is what governments and industry want to solve. There is an opposite and balancing problem: universities are responsible to society, and society needs a way to judge their usefulness: universities cannot be allowed to say “leave us alone while we think our high and refined thoughts – our concerns are beyond yours”.

Universities must be independent, and accountable, at the same time. It is a difficult trick.
c. Thirdly: a unified mission to teach and research

As I have said, the focus of my remarks today will be on the last two shared values in my list – the unity of teaching and research, and on global ambition. I hope to show what universities like ours can contribute to our chaotic planet.

Universities are unique places. They are not the only institutions that perform research: companies do that too, as do public and private research institutes. They are not, either, the only institutions that teach beyond secondary school level: technical colleges and institutes of technology do that. But universities are the only institutions which combine higher teaching and research across a full range of disciplines, from philosophy to nanotechnology, and to use their strength in research to educate students up to – and beyond- the boundaries of current knowledge.

Some will think it odd that I need the word ‘research; in my title at all: ‘the role of research universities in a global world’. It is necessary for two reasons: first, a matter of philosophy which is largely historical but has contemporary resonances; and secondly, because of contemporary diversity among today’s universities.

Let me deal with the history first.

When His Holiness Pope Benedict XVI visited the United Kingdom a couple of years ago, he beatified an English intellectual, Cardinal John Henry Newman. In academic circles, Newman’s most celebrated writing was The Idea of a University, a series of published lectures given in 1852 to mark the foundation of the Catholic University of Ireland, of which he would be the head. His University leadership was not great - the Catholic University of Ireland failed over 10 years although it laid foundations for University College Dublin - but those lectures are still the subject of scholarly attention and debate, because they help us to frame some questions about the purpose of modern universities, and the creation of intellectual capital.

The assembled audience in 1852 for the series of lectures which would become Newman’s book The Idea of a University were 400 or so of the leading Catholic lay and clergy of Ireland: he would later say that “all the intellect, almost, of Dublin was there”. Newman himself was there as the first Head of a new University, the Catholic University, appointed in November of the preceding year.

This set of lectures is renowned – people like me, and in my experience many academics who work in universities, enjoy asking ourselves the question ‘what are universities for’, and sooner or later someone will quote Newman. The lectures are particularly famous these days for emphasising ‘knowledge for its own sake’, and defining the nature and benefits of a ‘liberal education’ – as opposed to education with some specific goal in mind, such as (from an individual student’s perspective) getting a job or (from a government’s perspective) training people for industry so that they can be economically productive for the country. The arguments Newman marshals are powerful enough to ensure that he remains a reference point – the reference point – today.

It is important to view these discourses in their historical context. The impetus for the foundation of the new institution lay squarely with teaching: moral and religious instruction as well as dissemination of academic disciplines.
I found reading the Idea of a University quite a chore. It’s a difficult text in two ways: the language, to my eyes and brain, is dense and dated – it is almost easier to read Shakespeare, and certainly easier to read Jane Austen, than to parse Newman’s early-Victorian sentences.

Newman is remembered today for two principles:

1. Education for its own sake
2. Universities are places for teaching, not research

The first is championed by today’s academics as an ideal: in the UK at least, the second principle has been thought for the last 25 years or so to miss an astonishing opportunity. Personally, I find the separation of teaching and research in large modern universities deeply problematic.

The first principle of a university for Newman is not apparent until well into the discourses: the concept of pursuing knowledge for its own sake - knowledge ‘capable of being its own end…liberal knowledge’.

It promotes a liberal philosophy aiming for the perfection of the intellect as a goal in itself without a prior agenda – a good in itself. This approach in fact lends itself to a classical British tradition of producing generalists rather than specialists – educate the mind and the educated can turn their hand to almost anything – though that would not have been Newman’s choice of justification (he would not have concentrated on the uses to which education can be put, but only the effect of education on the mind and spirit). Still, it did shape British attitudes to education for at least the following century. I consider that this argument has much to commend it, for the following reason:

More specific focussed or primarily professional education runs the risk of prejudging what will be needed in the future, when in all disciplines (especially the sciences) progress is so rapid that predictions of utility are futile. When technology is changing so rapidly - and our planet is changing so rapidly - it is better to educate people in how to solve problems, than simply to teach them a problem that has been solved.

However, as a theorist on universities, Newman had predecessors – and indeed, even the title of his discourses the ‘idea of the university’ was not invented by Newman. Theories on the purposes and development of the modern university begin with Wilhelm von Humboldt, starting at the University of Berlin in 1810 and influencing the whole of Europe, especially the ‘Free University Movement’. These reforms enabled the dominance of German Universities by 1914 and most importantly influenced the development of Universities in the United States. Its central theme was the union of ‘teaching and research’ and the pursuit of advancement of knowledge by a disinterested search for truth with the shared engagement of scholars and students to this purpose. The consequence was that research became a key part of every University’s activities.

Meanwhile, in the same period at the newly-renamed Jagiellonian University, research was front and centre. In my own field, medicine, I recognise the functioning of adrenaline and the identification of the typhoid microbe as achievements of the 19th-century Jagiellonian. Karol Olszewski and Zygmunt Wroblewski first liquefied oxygen and nitrogen from the air in Krakow in 1993, while their counterparts in history and law were making prominent contributions to the thinking of an old (and simultaneously young)
nation. Research, for the sake of curiosity and for the sake of usefulness, was to be found in abundance in the alma mater of Mikolaj Kopernik.

But here – and this is distressing to me and many contemporary academics – is Newman’s view, taken from the Preface of his book, on the place of research (which he calls ‘advancement’) in a university:

“The view taken of a University in the Discourses which form this Volume, is of the following kind:—that it is a place of teaching universal knowledge. This implies that its object is, on the one hand, intellectual, not moral; and, on the other, that it is the diffusion and extension of knowledge, rather than the advancement. If its object were scientific and philosophical discovery, I do not see why a University should have students.”

Newman wants to separate the two functions of teaching and ‘advancement’, which Humboldt tried to unify. I find this rejection of research as a proper purpose of a University particularly difficult to understand. In these lectures he is trying to sell particular concept to a particular audience, but we cannot exonerate Newman on those grounds: he re-states this position time and again even later in the Preface. He believes that research is best carried out in research institutes, since:

‘To discover and to teach are distinct functions; they are also distinct gifts, and are not commonly found united in the same person.’

All that I can say in response, looking around at my academic colleagues at Cambridge and in the Jagiellonian, is that I beg to differ.

On one level, Newman’s emphasis on education cannot be faulted: every bit as important as our research discoveries is our role as educators – and the students we send forth as the citizens and leaders of the future.

In recent decades, led by the sciences, the research budgets of most research-intensive universities have been growing fast. The fraction of the operating budget that supports educational activities is fast diminishing as a result. In research-intensive universities everywhere they receive less academic acclaim and reward than discoveries in research. This combination of circumstances is a real cause for concern, because it risks a subtle but real drift away from the educational mission of universities that is an ever more vital contribution to the world. In his vision for universities, Newman privileged education over research; now we perhaps need to acknowledge the dangers of the opposite mistake.

For me, the dual mission of a modern university - to teach, and to research – combine to place postgraduate-level education at the heart of the unique contribution universities like the Jagiellonian, and like Cambridge, can make.

Research, of course, is an exciting vocation for any student. There is a description of soldiers at war, and indeed of pilots flying passenger planes, as comprising ‘long periods of boredom interspersed with moments of sheer terror’ – the life of the researcher, if he or she is lucky, includes astonishing moments of rapture (even if it also includes the boredom!). It is instructive, though, to distinguish between different kinds of research.
What sort of research?

Much research today is informed by considerations of the eventual use to which discoveries could one day be put. This is what Donald Stokes has called “Pasteur’s Quadrant” in his 1997 book by that name. The title is a reference to Louis Pasteur, of course, whose breakthroughs in the understanding of infectious disease were motivated by his keen desire to alleviate the human suffering he saw: Pasteur did fundamental research, but his motivation lay clearly in the world around him: Pasteur’s Quadrant occupies that space, between purely fundamental and applied research.

Fermat’s Last Theorem was solved after 357 years by a Cambridge-educated theoretician, Andrew Wiles, working largely on his own. Mathematical theory has underpinned all of science since the work of another great Cambridge mathematician, Isaac Newton. Theory, and blue-skies research will of course remain utterly necessary: such endeavours are the ultimate source of all the disruptive, unanticipated discoveries that can be truly world-changing. Crick and Watson, for example, working in the Cavendish Laboratory in Cambridge, established the structure of DNA out of curiosity and a determination to solve a problem. In doing so, they created several lucrative and productive new industries, but this was not their primary goal.

We should note, though, that more and more research like Crick and Watson’s, which can still be properly characterized as fundamental, is pursued with a clear and explicit bearing upon the problems of the modern world.

This is important because it goes back to the concept that universities do not exist in a vacuum; they are part of society indeed a creation of society and therefore have to be relevant to society. This is enshrined in Cambridge University’s mission statement:

"to serve society through teaching, research and learning to the highest international standards"

Therefore, rightly in the service of society, more and more attention is given to the prompt transfer of discoveries and innovation to the benefit of society. More and more academics work closely with private sector partners, and identifiable “innovation ecosystems” are emerging around the world.

Let me describe Cambridge’s well-established innovation ecosystem as an example of boundary-crossing, and partnership across the academic-private sector divide.

Cambridge University has been the nucleus of Europe’s most significant biotechnology and IT clusters, developing over a 50-year period. The University’s relative prominence has properly diminished as the clusters have attained critical mass, but it remains the innovation hub or centre of the cluster to attract, like a magnet a myriad of ventures. There are 1,525 companies in the Cambridge high-tech cluster, 12 of which are valued at over 1 billion US dollars, and 2 of those at over 10 billion. The cluster companies employ 53,000 people.

The University of Cambridge itself, through our technology transfer office, holds equity in 66 spinout companies; and supports over 1,000 university researchers in the various stages of securing and commercialising their Intellectual Property. These researchers have won £17.5 million of external translational funding, and most importantly of all, 80% of spinout companies are still in business after 3 years. But the weight of numbers is not the point, or not the primary point:
Permeable boundaries between academia and industry, and strong partnerships with the private sector, make it easier for people as well as ideas to move, they increase the scale and breadth of activities far beyond anything the university could support alone, and they make the university a much more exciting place. That’s the real point.

To those who would suggest that this is a distraction from the primary purpose of a University I would point out that far from inhibiting blue skies research Cambridge thrives in that arena too, with 89 Nobel Prizes - hardly a measure that would suggest inhibition!

Academics are motivated to build these translational partnerships for a variety of reasons. What is interesting, surveying the Cambridge scene, is to realise that the critical mass of research activity provides many different reasons and motivations to companies for locating activity there – some are spinouts from Cambridge university laboratories, others are multinationals, yet others locate there because they want access to a particular research group, or – as is now happening - to other companies with complementary activities.

What I conclude from the Cambridge experience is that ecosystem is indeed the right metaphor for these clusters. They are diverse in composition, and interact in complex nonlinear ways. Nurturing them requires a culture of openness, an entrepreneurial spirit, and a lot of flexibility. That adds up to a certain level of creative chaos, best managed by effective infra-structure (not super-structure) and a sound policy environment. The next big challenge is taking these very place-specific activities global – and we have exciting collaborations in Bangalore, and with Silicon Valley.

d. Fourthly: Global ambition

This thought takes me to the final “value” of the four I outlined: the global sphere of activity of a modern research university.

Universities are crossing international boundaries with increasing frequency. There are many good reasons for this. Let me propose just three. The first is education. We are educating citizens and leaders for an increasingly interconnected world, in which many of today’s students will go on to live and work in a variety of national and cultural settings in the course of their lives. The second is the search for solutions to the challenges of our modern world. The third is quite simply to be of service, helping build capacity where little presently exists.

My university, Cambridge, is moving along a line of transition – it is moving from one distinct mode of internationalism to having two. The first centres on the individual. Cambridge has been welcoming visiting scholars for centuries, Cambridge academics have undertaken their own travels, and we have educated students from abroad for almost as long. Our researchers also publish jointly with their counterparts in universities around the world. I hope this will not stop. But the power of intelligent partnership is becoming ever more evident.

At Cambridge we have chosen partnerships as our preferred model for international activity. Partnerships can be top-down or bottom-up; research-led or education-led; bilateral or multilateral. They can involve
physical exchange of students and staff, or virtual exchange of ideas; they can reflect symbiosis between two institutions of equal strength, or a conscious attempt by one institution to help build capacity in another.

As a rule, Cambridge has found that bottom-up collaboration achieves more concrete results than “top-down” initiatives. Most of our relationships are bilateral, though we are members of several large multilateral consortia – and we also band together with other research-led universities in networks and alliances when it helps to make our voice heard politically.

3. Role(s) of research universities

So far I have defined what I think the values are of modern universities. What of the roles we play? Universities today are regarded as crucial national assets. Governments worldwide see us as vital sources of new knowledge and innovative thinking, as providers of skilled personnel and credible credentials, as contributors to innovation, as attractors of international talent and business investment into a region, as agents of social justice and mobility, and as contributors to social and cultural vitality. And of course we are also warehouses of knowledge, which we pass on from one generation to another, we are cultural institutions, and we are national and regional symbols. But these are not our primary purpose – they are wonderful by-products of a relentless focus on excellence in teaching and research. That focus is in itself the best contribution we can make to society.

One wonderful way in which a focus on research excellence can help global society is by encouraging the development of similar expertise in the developing world. Three Cambridge Professors – the Director of our Centre for African Studies, and two senior researchers in infectious diseases, one in the School of Clinical Medicine and another in our Vet School – and their counterparts in Makerere University in Uganda, and the University of Ghana, have come together to create a project to build research excellence in the African partner universities. The project involves Cambridge academics in many Departments and Faculties, and will train postdoctoral researchers, research managers and administrators, and research supervisors in the delivery of high-quality research in the African partner universities. By building up centres of excellence in developing countries, my strong hope is that a continent which is truly developing in the full sense of the word will have the resources to sustain its development.

4. The European context

Poland and the UK are bound to each other in the framework of the European Union, which supports student mobility within Europe and outside it through the Erasmus programme (Cambridge has an Erasmus agreement in Materials Science with the University of Zielona Gora, for example), and also of course supports research excellence through its Framework Programmes. The creation of the European Research Council has hugely increased the EU’s capability in the provision of high-quality research and innovation.

The bilateral research relationships that I mentioned earlier are motivated either by an equal partnership in which each partner brings skills and capabilities needed by the other; or by a desire to build capacity, and raise the level of achievement of the partner. Partnerships of equals are easy to find at the level of the
individual researcher – pockets of excellence appear all around the world, and they take us to interesting places! All of the 1,596 Cambridge academics, for example, will have bilateral research collaborations, many of them in their dozens or scores, amounting to many thousands overall. Academics from Cambridge and the Jagiellonian University have published 107 publications together in the last 10 years – but that number conceals the very close collaboration created by the Large Hadron Collider at CERN, which accounted for 48 joint publications in 2012 alone.

5. **Conclusion: bringing it together - the role of the research university in the global world**

There are pre-requisites for international collaboration between research universities:

- First, a shared belief in excellence,

- Second, a commitment to research and discovery (please ignore the sound of Cardinal Newman’s complaints!)

- And third, institutional autonomy.

It is clear to me that the periods in the history of JU when it was at its most productive and successful were precisely the periods when it had control of its own fate, and sufficient resources to exercise that control: the 15th and 16th centuries, the 19th, and modern times. When restrictions were placed on the nationality of students attending, or the content of the curriculum or the language of tuition, the quality of research and education started to fall, and the institution needed to be rescued – most often by the courage of its own faculty members – from a slide into irrelevance.

I look forward greatly to visiting the University when I am in Krakow in April. Last time I was in Poland was the summer of 2011, when I had the pleasure and honour of addressing the Ministerial Conference on the European Research Area, in Sopot. In that speech, I said:

“In an economic environment of austerity and cutbacks, autonomy appears to be a luxury, and governments are tempted to create incentives for universities that are fine-grained in terms of desirable outcomes, and heavy-handed in terms of rewards and penalties. Governments know what they want: economic growth. But autonomy is not a luxury. It is an absolute and indispensible condition for excellence, and every step which tends to remove the power of universities to decide who they educate and how; and what they research and why; is a step towards mediocrity and paralysis.”

I stand by that view. Cardinal Newman, vigilant against rule by Church or State, knew this in 1852; and its relevance today cannot be overstated.

Thank you.