



President's Annual Address

Sir John Cadogan CBE DSc MAE FRSE FRSC PLSW FRS

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THE LEARNED SOCIETY OF WALES
CYMDEITHAS DDYSGEDIG CYMRU

CELEBRATING SCHOLARSHIP AND SERVING THE NATION
DATHLU YSGOLHEICTOD A GWASANAETHU'R GENEDL



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To celebrate, recognise, preserve, protect and encourage excellence in all of the scholarly disciplines, and in the professions, industry and commerce, the arts and public service;

Mission

To promote the advancement of learning and scholarship and the dissemination and application of the results of academic enquiry and research;

To act as a source of independent and expert scholarly advice and comment on matters affecting the wellbeing of Wales and its people and to advance public

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This is our fourth birthday. It is a good day to take stock. What have we achieved? Have we made a difference?

We began with some 60 Founding Fellows, a President, two Vice Presidents, the General Secretary, the Treasurer and a Chief Executive, and most importantly, financial and office support from the University of Wales.

This support came with the crucial, arms-length guarantee of independence.

We also began with many ambitions. We said that our main aim is to be the champion for excellence so that Wales could come to be seen, justifiably – I repeat justifiably – as a small but clever country. Our only axe to grind would be excellence.

At the outset it was put to us by some in Government and the Civil Service that we should avoid being elitist. We heard this but didn't listen – and I am glad to say we have heard no more of this. Indeed there is now acceptance of our aims in this respect. After several years of being told by Government that the sole purpose of the universities is to create employment and promote social justice we now hear the word excellence coming from Cardiff Bay.

We saw our Society as a radical initiator of beneficial outcomes, and a force for inhibiting damaging decisions based only on belief rather than evidence.

Our advice and opinions might well be ignored but at least these sound opinions would be there for all to see.

It is my personal view that the Society has achieved much more than I thought possible four years ago. That His Royal Highness the Prince of Wales has consented to be Royal Patron of the Society so early in the life of the institution is a tremendous signal. This gives momentum to our next ambition which is to obtain our Royal Charter and who knows, maybe we will one day become the Royal Society of Wales.

Our progress owes an enormous amount to some very hard working and key people. In our General Secretary, John Tucker, we have been lucky to have benefitted from his helicopter vision of our activities And also of his vision of what the Society can become. He is a very busy man but we get a great deal of his priority time. He had the responsibility of leading the search team appointed to find my successor. He has done a great job. In Sir Emyr Jones Parry we have a President who will surely take the Society on to greater things and whose voice will command attention.

Our two Vice Presidents, Dianne Edwards and Wynn Thomas, have had the hugely important task of overseeing the elections to the Fellowship. This work behind the scenes has been very time consuming as well as vital. The Fellowship *is* the Society.

Our Treasurer, John Wyn Owen built on the foundation laid by Sir Roger Jones and has produced excellent plans for the future based on sound finances. We benefit continuously from his extraordinarily wide and influential network both inside and outside Wales.

Here I recognise with pleasure and gratitude the continuing support from University of Wales and now from the universities of Bangor, Cardiff and Swansea.

I thank, too, those Fellows who have contributed to our appeal – which is not closed, by the way!

Underpinning – and pushing – the Officers and the Society, is our Chief Executive Dr Lynn Williams. We have been extraordinarily fortunate in his appointment. He fits the Society perfectly. He has also managed to find excellent support in our two executive officers Dr Sarah Morse and Georgia Burdett.

Our strength lies in our people.



The source of our influence and standing lies in the calibre of the Fellowship. This is where our lustre lies. 43 Fellows have been elected this year bringing up a total of 355.

We expected at the beginning that it would take at least three years to work through the 'back-log' of people deemed worthy by peer review to have been elected earlier, had the Society been in being. This has proved to be so and starting this year there has been a cap on the numbers to be elected annually. The next election will be restricted to an entry of 40.

First, I congratulate the new Fellows just elected. Some are here today. You have joined a body of scholars and researchers spanning all disciplines from Welsh Language to Theoretical Physics, from Organic Chemistry to Sociology, from Civil Engineering to Molecular Biology. Your work and reputation is not limited to a box marked Wales. You operate on the world stage. You actually do bring Wales to the world and the world to Wales, whether you live here or not.

The Learned Society is a new resource for Wales. It is a unique network which goes far beyond the boundaries of this small country of ours: one of our new Fellows has travelled from the United States to be here today. The resource which our Society now provides is not restricted by institutional or political boundaries or

barriers. For the first time UK, European Union and international policy forming and grant giving bodies now have an independent institution of stature in Wales to turn to when formulating their decisions. Now this is happening. The importance of this cannot be overemphasised. Previously, Wales was not on the mailing list, so to speak.

Apart from international issues, the Society has found itself engaged with the Welsh government on the vital issue of funding of the universities. The size of the funding gaps between investment in the universities and schools in Wales compared with England and Scotland is simply dangerous and damaging. And we will keep on saying so.

This gap amazes those of us who know how valued and supported education at all levels used to be in Wales. Sadly there has been no sign of a halt in the decline of funding let alone an improvement. And in saying this I acknowledge the Sêr Cymru contribution, small though it is. It is significant, however that this has come from the department of Business, Science and Transport rather than the department of Education and Skills. The fear is that the latter department thinks that support of scientific research in the universities is not its responsibility.



Which brings me to a demarcation problem which has detrimental effects on the support of research, be it in science or the humanities. The issue is that although education is devolved, research is not. Support of research through the research councils across the UK is the responsibility of the UK minister for the universities and science. I have personally put it to the Minister, Mr Willetts, to the Secretary of State for Wales, Mr David Jones, and his Under Secretary, Baroness Randerson, that because the Welsh government has underfunded the Welsh universities ever since devolution, our capacity to compete successfully for research councils funds is reduced – and they should not just stand by and watch it happen.

This Welsh government-induced capability gap in infrastructure support, both in terms of staff and capital, means that Welsh contribution to the UK research effort, which is Mr Willetts's responsibility, is diminished to the detriment of the UK as a whole. To hide behind an incorrect interpretation of the devolution settlement by abandoning the research issue to the attention of the Welsh government is unacceptable. Sadly, I have to report that I have the strong impression that this problem has been put into the Minister's tray labelled 'too difficult'.

It all comes down to underfunding, of course.

The Society has stated the obvious in saying that the current policy on student fees has taken money from the universities' directly funded budget and put it in the hands of the students who may then spend it where they see fit, either in Wales or elsewhere.

The Welsh government is therefore gambling that more students will enter Wales than will leave. But it is matter of quality as well as quantity. England has removed the cap on accepting numbers of the best students. Before this, the tariff scores show that many, if not most, of our best students have left the principality, many never return. More are now likely to depart because very good English universities, freed from the cap, are actively recruiting the best in Wales. We cannot complain about this because our own universities are busy recruiting from outside Wales too. But Welsh success in this will depend entirely on where they stand in the world league table.

We do not believe it is possible for our hard pressed universities to plan on the basis of a gamble and therefore the Society does not agree that the universities are in a stronger position as a result of the current fee structure.

The Society has also argued that the relatively low world standing of our universities has its roots in at least 15 years of underfunding. This leads to a spiral of relative decline in staffing and infrastructure and hence lower attraction for the best students, whether they be from Wales or elsewhere, particularly from the lucrative overseas cadre.

Excellent academic staff produce excellent results from the Research Councils. Note that the University of Bristol has 46 professors of chemistry and 23 professors of physics for example. These people in these areas of science are the source of big sums of research money, bringing an additional 80% overhead for the further benefit of the university, its staff and its students, not to mention its increasing reputation for research and teaching. Hence the University of Bristol is on an upward spiral. The Sêr Cymru initiative coming from the Welsh Minister for Science is of course very welcome, but £10million a year, funding perhaps 3 full time professors, is not enough to produce the step jump needed to meet its ambition to improve the success rate with the research councils from the present 3.5% of the totals funding to the target 5%. Just work out the numbers for yourselves.

As I said, we in Wales have to go to the UK research councils for competitive research grants. Successive UK governments over the last 20 years have provided increasing support for these via the science budget, particularly recently – and they are to be congratulated for this. However this has been accompanied by an increasing emphasis on directed research programmes at the expense of curiosity driven, blue sky research.

The word impact has become a favourite, indeed the, dominant driver of our paymasters and their servants in relation to research. Of course impact has its place but to decide in advance the importance of yet to be performed research is dangerous. It tempts scientists to go for the obvious in the light of fashionable targets of the moment.



It will also stretch the imaginations of our scientists, but in the wrong way, as our Vice President Dianne Edwards points out. Imagination: not in dreaming up new scientific ideas but in dreaming up rationales to fit the demands of the bureaucrats. Who knows, will we soon see a designated cadre of expert writers of science fiction emerging to support or even concoct proposals from the universities in future?

All of this would be much less worrying if the total university education money available (that is, direct grant plus student largesse) were to be much nearer to funding available in Scotland, say. But it is not. Government has the absolute democratic right to decide pursue its damaging education policies but the Society does not accept this is right for the future of Wales.

Having said this, the Society maintains that our universities have done surprisingly well despite underfunding but they have a long way to go. Just think what they could do with just half of the funding received in Scotland on a like for like basis. We should reinforce success, bearing in mind that world class universities attract high value industry which needs to be near to such places.

The only thing that causes governments of any colour to change their convictions is the fear of losing power.

Because this is unlikely in Wales, there is a great need for our independent Society to fearlessly fly the flag for proper support of the universities and schools and thus hopefully influence public opinion.

But in saying this, flying a flag never won battles.

The Society fears that strident cries about our students leaving Wales taking their money with them could lead to a populist solution mimicking Scotland's decision not to fund Scottish students if they leave Scotland (94.8% stayed in Scotland at the last count). Our government having decided on its fee policy, it is the Society's view that to follow Scotland would be a monstrous error and unfair to our best students then to deny them the opportunity to study in the best universities. It is relevant to note that Scotland has four universities in the world top 200. Their students, although penned behind Scotland's borders, have great universities to turn to.

We raised this issue with the Minister for Education at our last meeting and I report with pleasure that this 'Scottish Solution' was unacceptable to him. It was also clear to us that the question of the fee structure was in his mind and firm evidence of this has now been provided in the form of the Diamond Review of Higher Education Funding.

The review is now collecting evidence and opinions before publishing its report in 2016 – safely after the next election. It will be interesting to see whether the present elephant in the room will be addressed: that is whether to reduce the generosity to our students. We welcome this review. It is the first time we have evidence that the Welsh Government is prepared to hear opinions on funding voiced outside Cardiff Bay; whether it will then listen remains to be seen.

The Society has been asked to contribute which it will do. Our position based on the evidence of persistent and chronic underfunding is of course well known.

Another dangerous facet of the fee strategy is that the quantum per student is £9000 regardless of subject studied. This is plenty for those studying arts, humanities and social studies but inadequate for science and engineering. It follows that Vice Chancellors are faced with subsidising the latter on the backs of the former and/ or the temptation to cut back on expensive STEM subjects.

Financial pressure on the universities hits all disciplines but I hope you will forgive me, in this, my last Presidential Address, to say something about funding of science and engineering.

These are expensive subjects where inflation is not comparable with the price of a packet of cigarettes. For example when nuclear magnetic resonance first hit chemistry and biology, not to have the 40Mhz instrument meant you were just not in business. Then came 60Mhz at twice the price and the earlier machine was obsolete. Then the 100Mhz instrument, then the 220Mhz and so on, to superconducting magnets and whole body MRI. Another example is the study of viruses now made possible by cryogenic electron microscopes costing £2million. If you want to lead in this field, you have to have one. Remember – scientific research is one race in which there is no prize for being second. The analogy is entering a Grand Prix with a 1960 Morris Minor when the others have the latest Ferrari.

There are several truisms here for our paymasters to ponder. Whether they be in Whitehall or Cardiff Bay. It is easier for our paymasters to feel comfortable about proclaiming socioeconomic programmes related to Health, Energy, Materials, climate change, the hydrogen

Economy and so on rather than announce, let alone trumpet, that money is available for scientists and engineers to follow their curiosity in their own disciplines.

Short term populism is cemented into the way Governments work in order to retain or gain power on a four or five year cycle. The result is that curiosity-driven research that may bear fruit after a long time being squeezed.

Frontier scientific discovery is all about getting starts in races that were hitherto unknown. Of course directed programmes have their place but the issue is one of balance. Industry and society depends on the university science base to make discoveries that no one knows need to be discovered. However some of the abundant directed programmes today smack of quasi industrialism. The genesis of the problem is that socioeconomic targets, beloved of policymakers, are not disciplines unlike chemical and biological synthesis and mechanisms, molecular biology, genomics, electrochemistry, software engineering, nuclear engineering immunology and so and on.

Without discoveries in and across these disciplines, the populist targets become part of a meaning less wish list. Understand that multidisciplinary research, which sounds so attractive to bureaucrats, cannot take place without expertise in the disciplines first. As Sir Andre Geim of graphene fame has commented, “Social media can make some people very rich but cannot save the planet. The latter requires new fundamental discoveries”.

The fact that planned discovery is impossible is very difficult to get across. But the lessons of history are there for all to see. None of the great breakthroughs which have changed the world have come from directed programmes:

- Lasers
- Magnetic resonance imaging
- X-rays
- Nuclear fission
- Penicillin and hence antibiotics
- Liquid crystals
- DNA
- Stem Cells
- The transistor
- Photovoltaics
- Radio
- Ozone hole

You can write your own lists.

A really worrying downside of the emphasis on directed programmes is that the next generation of researchers will themselves become programmed to have only ideas which are user oriented as seen today. Who can blame our youngsters?

They will be scared that, if their proposed research is not in response to directions by bureaucrats and politicians, not to mention the power wielders in the universities, they won't be able to get any support.

This may be the worst and most insidious outcome of the present system.

No minister, no civil servant, no board of directors, no committee, no advisory board, not even a network has ever made a discovery. Discoveries are made in the laboratory and the library. Ideas may arise when walking alone in the fields.

There are many examples of this and the Learned Society is preparing a paper on just this issue. This will be published in a few weeks and will include evidence provided by some of our best scientists – Fellows of the Royal Society and Nobel Laureates. They actually know the nature of discovery: they have done it and led it. If we are sick we need a specialist who actually knows from experience – not a politician or bureaucrat.

The current emphasis on Doctoral Training Centres and Partnerships is another dangerous example of the balance tipping the wrong way. The rationale here is that PhD programmes are all about training and not education and discovery. Worse, the centres operate in the directed research mode wherein all PhD topics must conform to areas designated by authority. Of course training is a vital part but it is a backward step to emphasise technical training rather than an education in how to think, work independently, identify worthwhile questions and conduct research to try to answer them.

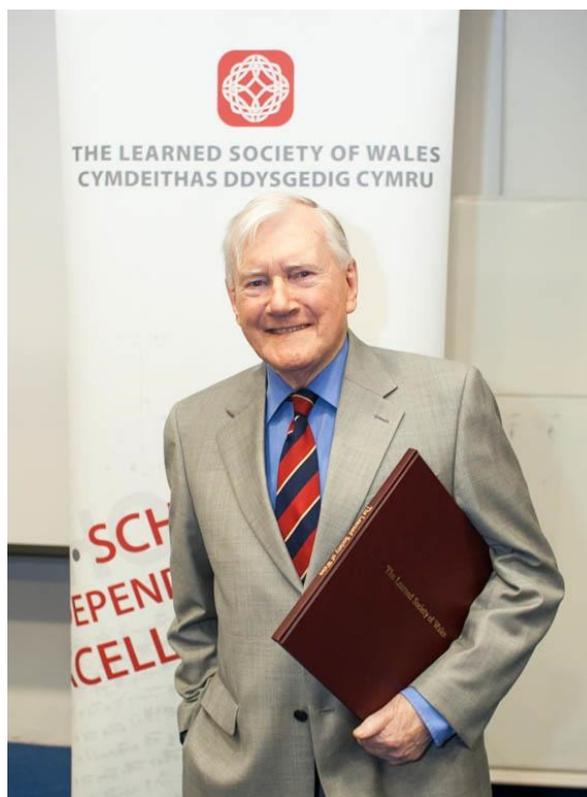
Many real steps forward in the past came from PhD students without any interference from research councils on the topics studied. Nobel Laureate Brian Josephson's discovery, at the age of just 22, of the revolutionary Josephson Junction is the prime example. The system also gave opportunities for supervision by young staff to show their worth.

My plea is **not** that we should do away with directed programmes, but that the balance has swung too far in their favour.

This reduces the possibility of discovering new knowledge with the further downside that the next generation of scientists will become short term practitioners driven solely by what are perceived to be user-needs of the day. All of these downsides combine to reduce the founts of new "starts" and reservoirs of creative scientists that we need to nourish the general socio-medico-economic scene and creative industries, other than *Strictly Come Dancing* and its ilk.

It has been put to me that no one in power or with influence will listen – so why risk offending them? But if we, the practitioners – the *doers* – say nothing, Government will assume that everything is just fine. Governments don't want to hear things they don't like. Their advisers and civil servants have to conform and their many beneficiaries will be taking a risk if they do not. This independent Society doesn't have to conform. The two Governments which control us should act on evidence and not belief or – worse – convictions. Remember what Nietzsche said: "*Convictions are worse than lies*".

John Cadogan



The Learned Society of Wales is Wales's first national scholarly academy. It was established and launched in May 2010. It now has more than three hundred Fellows, who are prominent figures within their respective academic disciplines. The Society's guiding ethos is *Celebrating Scholarship and Serving the Nation*: as well as to celebrate, recognise, safeguard and encourage excellence in every one of the scholarly disciplines, its purpose is also to harness and channel the nation's talent, as embodied in its Fellows, for the benefit, primarily, of Wales and its people. Its *Strategic Aim* is to be a sustainable organisation that is fit for purpose and that is acknowledged both as the recognised representative of the world of Welsh learning internationally and as a source of authoritative, scholarly and critical comment and advice to the National Assembly and other bodies on policy issues affecting Wales.

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