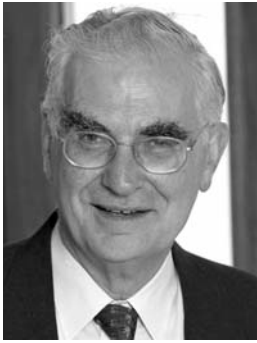


SCIENCE, ENGINEERING AND POLITICS



Lord Oxburgh

INTRODUCTION

This is not a topic on which I claim to be an expert. I have never written about or studied this subject. I don't think I have ever spoken about it before. I have however engaged with this topic to some extent. The first half of my career was as an Academic Researcher, then as a Scientific Civil Servant and more recently in Business, so I have been a little bit involved. The first thing to say is that policymakers, politicians and businessmen need professional advice in a number of areas. You can think of Law, Accountancy and Economics, and then Science comes into this spectrum. I suppose what is different about Scientists is that those receiving their advice generally have much less familiarity with the general area than they might have with the others. And for that reason we are a little bit more unconfident about dealing with it.

DIFFERENCES BETWEEN SCIENTISTS AND BUSINESS PEOPLE

Let me start with an observation which sounds pretty banal but I think is quite important and I will illustrate it with a story. And that is because there is a fundamental difference in the outlook between the Scientific Community and most of those with whom they interact. Fundamentally, Scientists, and Research Scientists in particular, are interested in what isn't known, – what has still to be discovered, and what still has to be found out. The rest of us, – and I put myself on the other side for the moment – Business, Civil Servants, Government, – are much more concerned with what is known. And this may sound a silly distinction – but let me give you an example. About

five years ago Columbia University Business School in conjunction with their Earth Science Department decided that something dramatic had got to be done about Climate Change by engaging with US Business. They organised a big meeting and managed to pull in senior representatives from CEO level and to the next level down from eighty of the biggest one hundred companies in the US, and a stellar cast of seven expert speakers on Climate Change – and I was the eighth speaker – invited, but not as an expert on Climate Change, but speaking on behalf of “the acceptable face of business” on this occasion. Speeches were given by the experts, which were outstanding research talks. While the current knowledge base was taken as read, or delivered in a rather summary fashion, the main emphasis of all of the talks was

almost entirely focused on the additional research which still remained to be done to resolve aspects of the fine detail of Climate Change and not the fundamentals. By lunchtime, the leaders of business were saying that they were all very surprised because they had thought that all this was cut and dried – and that all the relevant information concerning Climate Change was already known! And, by early afternoon, a number of them had left the meeting. I came on at the very end and tried to recover the situation. But by that time the Business Community, as represented there, was satisfied that the science was totally uncertain and that a great more needed to be done. That was simply the result of both a cultural and a difference of approach between two very different communities, and it is one which is very frequently

never really appreciated by we scientists.

PUBLIC POLICY AND RESEARCH

From the Business point of view Research is a Cost. From a Business or Government viewpoint research costs should be limited to those which are absolutely necessary, and not a penny more, in order to be able to deal with a specific issue of governance, or to stay just ahead of the competition. From the researcher's point of view, some research is "good", more research is "better". And those are very, very different approaches.

RESEARCH LEADS TO GOVERNMENT POLICY

Now let us just think about public policy and research, and I think there is probably only time to deal with one of the many aspects of this intriguing topic. Let's deal with the situation in which free and open academic research has led to some quite important implications for Government policy. Fifteen or twenty years ago one might have thought of the Tobacco Industry and the work done by Sir Richard Doll and others that really demonstrated a very clear link between smoking tobacco and lung diseases. At that time the Tobacco Industry mounted a really major attack involving questioning the research, smearing the researchers, employing professional lobbyists, with the primary goal of protecting their industry. Now, you might well expect that any industry threatened by a piece of research which implies a major change in Government policy, would question that research very thoroughly. And I think one

of the interesting questions is where that questioning should end, or what the limits of that questioning are in relation to the public interest?

Another example, which is current in the US, has to do with proposed Government legislation about the sugar content of canned drinks of various sorts. But, you will also have seen in the US, that the publicity budget of the trade body concerned has increased by something like a factor of 10 over 18 months, effectively lobbying against any change whatsoever.

CLIMATE CHANGE

More recently, we have seen an example concerning Climate Change. Now, for something like twenty-five years scientific groups around the world have been working together in an informal and voluntary way as part of the Intergovernmental Panel on Climate Change (IPCC). This voluntary organisation has produced a series of reports at four to five year intervals, documenting the anthropogenic consequences of human interventions on the environment. These have become progressively more pessimistic. Or looking at it another way, more confirmatory that there is a significant effect. This led on initially to the Kyoto Agreement, and more recently to the meeting in Copenhagen at which it was hoped that a new International Agreement would be reached.

As you are already aware, about six weeks before Copenhagen, the computer system servers at the University of East Anglia (UEA) Climate Group were hacked into, and a number of very damaging emails

were stolen and then put on the Web. It appears that about the same time as the UEA server was hacked into, attempts were also made to hack into the servers of three or four other Climatic Research Institutes worldwide, which however were unsuccessful. Certainly, the publication of the material from some of the UEA emails was extremely damaging. It was damaging for two reasons, first of all because email conversations are extremely difficult to interpret, and secondly because these email conversations contained a great deal of material which really were the sort of thing that people might talk casually over a coffee machine, but not the sort of thing which they would ever dream of going into the public domain. And these revelations were "manna from heaven" to those who wished to discredit the arguments for Climate Change. The fact is, of course, that three different enquiries in this country and one in Holland have now disproved the most serious allegations concerning the UEA researchers, namely that they had been dishonest, and had contrived the presentation of their observations in order to appear to justify a particular conclusion. I don't think anyone who has looked at the evidence carefully thinks that is the case. They were unwise in all sorts of ways; they were perhaps not using the best methods available for their work, but in terms of deliberate deceit, all of us were convinced of their innocence. And indeed *Le Monde* had a very interesting editorial recently in which they said that we have now had all these enquiries and they have all demonstrated that the fundamentals of Climate

Change have not altered. I am still waiting to see a confidently firm editorial in one of the UK newspapers.

PUBLICITY

The importance of publicity is that certain industries are clearly going to be seriously damaged if Governments take action on Climate Change. Probably the Coal Industry worldwide will be seriously damaged, but others may be as well. The question is are Governments going to be able to withstand the kind of organised pressure to which, I think, they are now being exposed? And the pressure is clever and it is subtle. Fundamentally, people in this country and other parts of the world are going to be receiving fuel bills within the next twelve months which are totally transparent, distinguishing the cost of producing the electricity and the gas which they get, from the various imposts which are there as VAT and a whole range of additional measures that are designed to address Climate Change effectively. And many people are going to see fuel bills which will be up to thirty per cent more than they would otherwise have been without the extra charges related to Climate Change. And clearly those commercial interests directly involved can take this opportunity to undermine Government initiatives by persuading people that, actually, it is all a bit uncertain. And this thirty per cent added to your bills does not really have to be there. It is just some sort of dubious scientific fallacy. That is a very serious problem for politicians!



THE COMMONS IS CRYING OUT FOR MORE SCIENTISTS – AND FOR THE EVIDENCE-BASED EXPERTISE THEY CAN BRING



Julian Huppert MP

One of the things I've most missed since becoming a Member of Parliament has been the opportunity to talk about my other life, as a science academic working in the Cavendish Laboratory in Cambridge. Remarkably, there are only two science PhDs in the Commons, myself and Dr Thérèse Coffey, the Member for Suffolk Coastal; if we widen the field to include those with any STEM degree, employment history or committee interest, then we get around 70 names, or a little over 10% of the House's composition. It is important to emphasise that there are many from non-scientific backgrounds who have worked hard to further the cause of science and technology; what is needed principally is interest, not expertise. But overall it is little wonder that evidence, the keystone of scientific and technological research, has yet to become the decisive factor in policy-making it ought to be.

As an RCUK Academic Fellow in Computational Biology, I worked on DNA structure and function, particularly on unusual, lesser-known structures that nucleic acids are capable of forming. We all know about the double helix thanks to Watson and Crick, themselves Cavendish men, but my interest was especially on four-stranded structures called G-quadruplexes and when they might form. Although much of this was fundamental, blue-sky work, it turned out to have important

real applications: helping us to understand better the way that cancer cells work, leading to the development of better anti-cancer drugs. We are also hopeful that we will ultimately be able to use our other strand of research, in nano-technology, to use DNA templates to make large objects, such as improved solar panels.

Such were the esoteric surroundings from which I came to the famous green benches of the Commons. I might have been forgiven for thinking that having understood the intricacies of quantum chemistry, and coped with the Byzantine ways of the University, Colleges and Research Councils, Parliamentary life would seem rather simpler! No such luck, unfortunately: the Palace of Westminster is an even more bizarre place, a labyrinth imbued with a sense of simultaneous urgency and lethargy, where things can change either at the snap of a Minister's fingers or after years of committees, debates and divisions.

There are far more differences than similarities. Despite the influence of the plucky few who strive to further the cause of science in the Commons, there is a fundamental clash of cultures between scientific and political method. In science it is acceptable – essential, in fact – to change ideas given new evidence; in politics, any change of mind is taken as a sign of

weakness, inconsistency or plain dishonesty. This isn't to say, of course, that sometimes it is not one or all of those! But the intransigence and stubbornness of some politicians can be traced to a more deep-seated problem: the deliberate dismissal of evidence in favour of head-in-the-sand ideology.

This clash of cultures can lead to some awkward situations. Consultations become less about orderly debate, based on careful consideration of available evidence, and more about scoring party political points. One recent example was the wrangling over the Coalition's proposals for fixed term parliaments, where the suggestion of a 55% figure for dissolution of Parliament was greeted by animosity and misunderstanding by some MPs, despite the widespread use of fixed terms and high dissolution thresholds in many countries around the world. A more considered response, raising legitimate questions over the purpose of fixed terms, the length of those terms and the practical arrangements for dissolution would have been more in keeping with the job Parliamentarians are supposed to be doing in holding the Executive to account. As it was, the proposals were updated in the light of criticism – only for those who had called for changes to crow about 'U-turns'!

Of course, I recognise that in politics people have an agenda

to push. That happens in science too, but thankfully less so. The challenge for people like me is to walk the line between the two worlds. Recently I had the opportunity to do just that, when the British Medical Association and the House of Commons Science and Technology Committee both called for the National Health Service to stop funding homeopathy on the basis that according to current evidence, it is no more efficacious than a placebo. The Government's response to the Committee's findings was equivocal, failing to recognise that to provide unscientific placebo "remedies" is fundamentally to mislead people, removing their right to an informed choice and undermining the trust between doctor and patient. This inability to look objectively at the evidence leads to a kind of doublethink, where the Chief Scientist at the Department for Health can conclude that "there is no plausible scientific mechanism for homeopathy", but at the same time, the DoH can claim that it "wholly supports the concept of the informed patient". By any sensible definition, these stances are contradictory, as the benefit of placebos is destroyed by informing the patient of the ineffective nature of the placebo they are being prescribed!

The report by the Science & Technology Committee, incidentally, shows what can be done if non-scientific MPs put their minds to this essential task of changing our policy-making culture. Lord Willis, the former MP for Harrogate and Knaresborough and the then Chair of the Committee, chaired it with great distinction and an admirable zeal for evidence.

Another example of ideology trumping evidence is in the area

of civil liberties. The previous government's push for 'security' at all costs led to an authoritarian apparatus of jury-less secret trials, secret evidence, detention without charge, control orders, the DNA database, ID cards and more. Most egregiously, it led to the catastrophic war in Iraq, an example not of evidence-based policy but policy-based evidence; denounced by the former chief of MI5 as the cause of a huge increase in home-grown terrorist activity. In other words, it had precisely the opposite effect to the policy's aim – a clear failure, even discounting the illegality of the invasion.

We have already seen the effect of scientific illiteracy on health policy. But perhaps the most worrying thing about the lack of scientific knowledge in the Commons is that evidence-based policy is crucial in every department. On Home Affairs, for instance, there has been a lack of attention to what experts are saying about crime, or drugs policy, and successive Home Secretaries have favoured the populist, knee-jerk response. Climate change will not be taken seriously until there is a far greater emphasis on the need for sustainable transport; instead, road-building has dominated the Transport agenda for years, despite ample evidence that congestion can often worsen as a result. One ray of hope is in the Ministry of Justice, where Ken Clarke appears to have seen the light (or perhaps simply revealed his own light) on penal reform, accepting that correlation between higher prison numbers and decreasing crime levels does not necessarily imply causation.

I'm well aware of the rather gloomy picture I've painted so far. What can be done, then, to

make things better? One key issue at the moment, particularly in a time of economic austerity, is funding. While we all recognise the need to tackle the deficit, we also recognise the need to do it carefully, without jeopardising the long-term prospects for our economy. STEM subjects hold particular strategic importance in this regard, and I have been working hard to ensure that leading overseas academics are still able to come and work in our country to endow our students with the skills they need, and to provide innovations that will make our economy more competitive and more sustainable.

In the short term, we need to encourage more people from STEM-based backgrounds to become part of our political discourse. It was deeply disappointing to see Dr Evan Harris lose his seat in May, and not merely because he is of my party, but because of his excellent credentials as an advocate for evidence. If scientists, mathematicians and engineers feel like fish out of water in a Commons suffused with lawyers, politicians and PR types, we are unlikely to see the sort of fundamental change in policy-making that I have advocated.

One scheme which I particularly welcomed was the Conservatives' manifesto commitment to require all new Conservative MPs to go on a science awareness course. This was an excellent idea, and one I wished had appeared in my own party's manifesto. Unfortunately the course turned out to be a one-hour seminar, interrupted by a division, and attended by only about ten MPs. Far better attended was the Royal Society for Chemistry's annual Parliamentary Links day,

a good showcase for what can be done in educating MPs – several of whom attended. However, even then they were largely the usual suspects!

A lot of the onus rests on the scientific community's ability to make their arguments palatably clear to people who either have no interest in science, or are positively scared of it. The fact that this latter response exists is arguably due in part to our tendency as scientists to reveal somewhat in the esoteric nature of our work. The advent of social networking websites such as Facebook and Twitter has given those of us trying to make evidence-based arguments a very powerful tool; through Twitter, for example, I can access many experts who will pull together and analyse information for me.

Another important area is that of scientific journalism. We are lucky to have in this country some excellent writers, such as Ben Goldacre and Mark Henderson, but all too often our newspapers resort to the same old binary-style reporting that leaves no room for nuance, describing everything as a wonder-drug or a terrifying killer.

Unless we in the scientific community take decisive steps to make our voices heard, whether in Parliament, in the media or elsewhere, the likelihood is that vital evidence will be ignored, and policy will continue to be based on ideological and political considerations, sometimes with disastrous consequences. For that reason, I intend to carry on beating the drum for evidence-based policy whenever possible.





Pallab Ghosh

Thank you for inviting me to speak here at your meeting. For me Science and Politics have always been intertwined. They're intertwined – because an understanding of science is empowering. It enables ordinary people to make rational choices. To see through hype and overstated claims. Key to this is the use of science and scientific advice by government. It's a system of scientific advice that's been developed in recent years by successive Chief Scientific Advisors, Lord May, Sir David King and Sir John Beddington.

ROLLS ROYCE

Their efforts have put scientific advice – not so much at the heart of government – but the veins, arteries and capillaries of the policy circulation system. Nearly each department has a chief scientist. The advisors themselves work well in a coordinated and effective manner. It's a Rolls Royce system. But I wonder how effectively it's being used. And at a time when departments are looking for savings – that Rolls that's kept too long in the garage must look very vulnerable.

HOME ALONE

Last year a survey by the Campaign for Science and Engineering showed that several secretaries of state had only sporadic contact with their department's scientific advisor, some meeting with them just once a year. Eight Secretaries of State did not meet at all with the government's Chief Scientific Advisor John Beddington. And some of the departmental advisors and former advisors I've spoken to have often expressed frustration at having to be kept in their box. They have little access to Ministers and are asked to make contributions that often don't see the light of day. Languishing and rarely retrieved

files on a Whitehall server – never to see the light of day.

INCONVENIENT TRUTH

Sir John Beddington loves to quote President Obama that we should listen to advice not only when it is inconvenient – but especially when it is inconvenient. It's all very well to say that Advisors should advise and Ministers should decide. But that's only if that advice is transparent – and if that advice is rejected – the reasons should also be publicly available.

Now let's remember why the system of scientific advice was developed.

In March 1996 the Health Secretary, Stephen Dorrell announced that humans could become infected and die of eating BSE infected beef. Up until then Ministers had said beef was safe to eat.

PHILLIPS REPORT

A report by Lord Phillips into the affair recommended that scientific advice in government should be independent and available to the public directly from scientists – and not be interpreted by Ministers.

In 1997 the then Government Chief Scientist, Lord May, drafted guidelines on scientific advice and

polymaking in order to set out standards for the integrity of the process. And so was born our Rolls Royce system of scientific advisors, advisory committees and arms length bodies – such as the Food Standards Agency. But gradually – almost inevitably – Whitehall slipped back into its old controlling, secretive, mistake-covering ways.

FOOT AND MOUTH

In September 2007 there was a second outbreak of Foot and Mouth just days after the Government's chief Vet, Debbie Reynolds, had announced that the virus had been eradicated. The Department for the Environment Food and Rural Affairs briefed journalists that this was possibly because there had been a second leak of the virus from a nearby laboratory. A publicly funded genetic study showed that this was not true. The first outbreak hadn't gone away – Defra had simply missed cases on a nearby farm. The scientists who produced the research said that they had difficulty publishing the research because of opposition by Defra.

ORGAN DONATION

In 2008 an expert group was asked to investigate whether the system of presumed consent for organ donation would save

more lives. Gordon Brown was in favour of the plan - but the expert group concluded that it wouldn't work. They handed their report to the then Chief Medical Officer for England, Sir Liam Donaldson. He wrote an article for the Observer just days before the publication of the report – contradicting the conclusions of the report that he himself commissioned:

NDAS

Last year DEFRA published its climate impact projections – an ambitious attempt to predict the impact of climate change at a local level. Some scientists had grave doubts about the scientific basis of the projections. Defra commissioned a scientific review – but all the scientists on the review board were asked to sign legally binding non-disclosure agreements. Their review was critical and published on the same day as Defra launched its climate projections to much fanfare. The criticism is effectively buried. Some scientists are worried that government is on occasion, interfering, burying and briefing against its own independent scientific advice. Of course that happened to the former drugs advisor Professor David Nutt and the work of his committee – the Advisory Committee on the Misuse of Drugs.

NUTT STORY

As you may recall the then Home Secretary Alan Johnson sacked Professor Nutt because of what he said at a public lecture. They said that it was because he was campaigning. But the fear was that the chair of a scientific advisory committee was sacked because he was giving advice that no one wanted to hear. The episode led to 90 of the UK's

leading scientists asking government to reaffirm the basic principles that arose after learning the lessons of BSE. That scientific advice should be free from political interference. I'm delighted to see that it was one of the first acts of the coalition government to make those basic principles part of the Ministerial code.

NOT ONE OFF

But as I've explained the Nutt Affair was not a one off. It was an extreme and latest case of a growing culture of complacency within government. Officials have forgotten the lessons of the report by Lord Phillips. He knew that trust in government scientific advice was crucial. The reason that so many people – so many parts of the media wouldn't take the department of Health's advice over MMR was that there was widespread scepticism of the competence and integrity of the scientific advice from government. It had taken a decade to rebuild that trust – and it's in danger of being undermined. Not just by big falling outs between Ministers and advisors – but by more subtle and arguably more corrosive undermining of the process.

THICK OF IT

More corrosive – because it's become part of the Whitehall culture – to turn a deaf ear to inconvenient truths. No-one likes to think of themselves as being blasé about evidence or that they can't handle hearing awkward advice. But the pressures on ministers and their communications staff are very real. The Television Comedy *The Thick of It* isn't that wide of the mark – and it's when it really hits the fan their instincts are to

'control the message'. But even on calm days – small apparently harmless decisions are made not to publish the minutes of advisory committee meetings, to hold back a section of a report at DEFRA or the Home Office because of perceived media hostility.

THOUSAND CUTS

It's these thousand cuts that lead to the erosion of independent advice and breed cynicism. Chief Scientific Advisors also need to answer to the scientific community as well as their Whitehall masters. What we don't want are 'safe pairs of hands'. That's a Government's euphemism for people who tell them what they want to hear. That's great for maintaining calm in Whitehall departments but it's another threat to independent scientific advice. Another favourite Government euphemism to watch out for is being told that something you have raised is 'unhelpful' or 'taking us in the wrong direction'.

OUR RESPONSIBILITY

In other words it doesn't fit with the message. So are we left to be ground down – by Whitehall reverting to type? Or do we take responsibility and keep our policy makers under scrutiny. Among the science journalism media we are taking responsibility. The Association of British Science Journalists organised a conference just down the road at Westminster Central Hall last year – to raise standards of science journalism. Not just to explain complicated things better – but to change our culture – to what I've called a more kick-ass approach to science Journalism – to scrutinise claims made even by the most revered scientific bodies.

WICKED WAYS

And we are spreading our wicked ways. The Association of British Science Writers is affiliated to 40 science journalism associations across the world through the World Federation of Science Journalists. We're training African science journalists through a five million pound mentoring scheme – funded with the kind support of DFID and Canada's IDRC. Already we're producing African journalists writing and broadcasting about science issues relevant to them in African media. We're creating more kick-ass journalists. We're creating more associations of science journalism. While we are grateful for the resources we are offered by scientific bodies to "better cover" scientific issues.

NOT CHEERLEAD

But it's important that science journalists have our own conversation. Because we are here to scrutinise – not to cheerlead. Our motto at the World Federation is "Empowerment through (Science) Journalism". Science and science advice for me is what keeps our policies honest. It's too precious, too important to be undermined and hacked about with by apparatchiks. It's time to dust down and wheel out the Rolls Royce system we have in the Whitehall Garage.



THE ROYAL SOCIETY'S 350TH ANNIVERSARY



Martin Rees
President of the Royal Society

The Royal Society's 350th anniversary has offered us a pretext to learn more about its origins, and to appreciate more fully how science and technology have transformed everyone's lives.

At the Society's earliest meetings Christopher Wren, Robert Hooke, Samuel Pepys, and other 'ingenious and curious gentlemen' (as they described themselves) viewed all kinds of experiments, sometimes rather gruesome ones – blood transfusions and the like. They peered through newly-invented telescopes and microscopes; they heard travellers' tales, and dissected weird animals. They were, in Francis Bacon's phrase, 'merchants of light' – seeking knowledge for its own sake. Their curiosity seemed boundless. But for Bacon, discovery had a second motive: 'the relief of man's estate'. And our founders were indeed immersed in the practical agenda of their era – improving navigation and the navy, exploring the New World, and rebuilding London after the Great Fire.

350 years later, human horizons have hugely expanded; no new continents remain to be discovered. Our Earth no longer offers an open frontier, but seems constricted and crowded – a 'pale blue dot' in the immense cosmos.

The Royal Society is also a vastly different institution, but its

essence actually hasn't changed. Today's Fellows – and all the young scientists we support – have the same motivations as their forebears. They probe nature and nature's laws for their intrinsic value. And their engagement with society and with public affairs is still strong – though today's focus is of course not just on London, but on issues that are often global.

Science itself is a global culture that should transcend all national differences – and all faiths too. But it's more than that. A former President, George Porter averred that 'There are two kinds of science: applied and not yet applied'. He was echoing Francis Bacon's sentiment in different words. And of course the insights of Newton, Faraday, Maxwell, Rutherford and others on the distinguished roll-call of our Fellowship – have spawned technologies that have transformed lives worldwide.

Indeed innovations happen with staggering speed. Many things we take for granted would have seemed magic even 50 years ago. The World Wide Web is only 20 years old – and we're proud to have its inventor, Tim Berners Lee, as a Fellow. Computers double their power

every two years. Spin-offs from genetics could soon be as pervasive as those from the microchip have already been.

Although the Royal Society's priority has been the backing of individuals, it also advances research by its publications – printed and electronic – and by its high-quality discussion meetings on topical scientific themes. But its reach extends beyond the professional community – into science education, and public engagement.

In the past the Society wasn't much engaged with school-level education.

However, there's now a crisis that we surely cannot ignore. We risk falling behind other nations at all skill levels – top-rate postgraduates, but also highly competent technicians and apprentices. There's an ageing population of experts in areas such as the nuclear industry, and it's not clear that there will be enough replacements of the same quality. Young children are generally fascinated by at least some aspects of science – whether it be space, dinosaurs, or tadpoles. But too many bright pupils turn elsewhere in their teenage years, because the curriculum and teaching don't inspire them. The Society intends to provide expert advice on the science curriculum to policymakers and to support efforts to enhance the flow of good scientists into teaching. I

... The World Wide Web is only 20 years old – and we're proud to have its inventor, Tim Berners Lee, as a Fellow. . .