

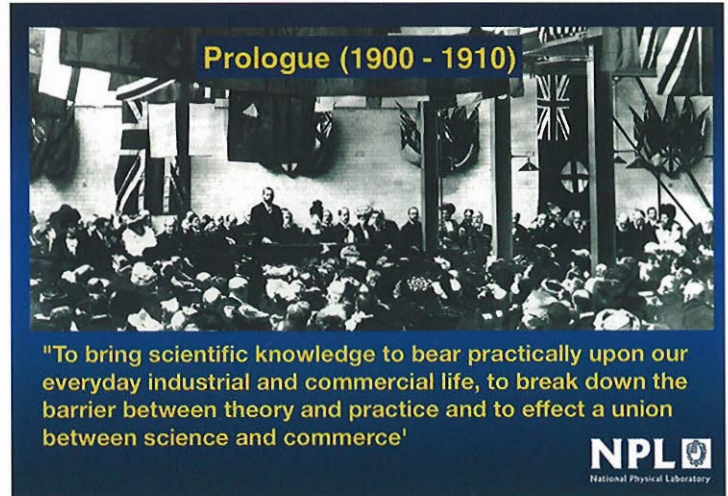
Partnership with industry

David Richardson

Director of Marketing & Knowledge Transfer, NPL

>> *"Knowledge transfer is a two way street. It is as much about NPL listening as it is about NPL transmitting, and that is particularly important with respect to the formulation of NPL's new programmes."*

"Throughout its 100 years NPL has retained a mission, which by its very nature places us at the interface between the worlds of science, industry and government. Knowledge transfer and industry partnering are not activities that we can somehow bolt on as an attractive 'optional extra' to NPL's operations. They sit at the heart of what we are and what we commit ourselves to do."



I would like to talk about partnership with industry - quite a big topic and something that has permeated just about every moment of NPL's hundred years. So I have rather a lot to get through and I am going to go at a fair old lick. I hope you will forgive me for that. I realise that this session of the day is really focused on the future and I am going to try to do just that - talk about where we think we are going in partnering with industry and the basis that we are putting in place now for ensuring the success of that. But I just couldn't resist a little dip back into NPL's first decade. I hope you will forgive me if I just present a little prologue: 1900 to 1910 with three little vignettes. The first one, I think, quite a serious one. The second and third are a little cheeky. But here is the first. This is the extract from the speech given by the Prince of Wales in 1902 that means a great deal to me. The Prince of Wales said on opening NPL *"that the purpose of the enterprise, as I understand it, is to bring scientific knowledge to bear practically upon our everyday industrial and commercial life, to break down the barrier between theory and practice and to effect a union between science and commerce"*. Now, if you take away the slight Edwardian packaging, I think that's a statement that could easily have appeared in David Sainsbury's speech this morning. I don't think very much has changed in terms of the focus of UK science policy.

UK's first PFI? (1909)



The Wernher Building



First industrial appointment to national laboratory management? (1910)



Walter Rosenhain (Chance Brothers)



A couple of other things that I don't think have changed so much. PFI means a lot to us at NPL. That stands for Private Finance Initiative. And that's the way that the new NPL is getting built, with private finance. And it will be tempting to feel that that's an invention of the 80s or the 90s. Not a bit of it. In fact, much of the early building work at NPL was done through partnership between the public and the private sector. So, the Wernher building, which was the base for materials and metallurgy - you have heard quite a bit about the early days of that work - built in 1909 was two-thirds funded with private finance and only a third from the Treasury. In fact, there is no doubt at all that if we had depended upon Treasury funding it simply wouldn't have been built.

Moving on to the last of my little vignettes, we talk a lot about human mobility, moving folks between the science base and the industry base as being a very powerful form of knowledge transfer. And I'll talk about knowledge transfer a lot in the next fifteen minutes or so. Here is a very early example of a bit of human mobility that made a difference. You have heard about Walter Rosenhain already from Tony Kelly. What Tony didn't mention is that Rosenhain came from industry. He came from Chance Brothers, which was the big optical glass and metallurgy company in the UK but not so big and not so smart as the Germans were. And he came into NPL, in part at least, to drive forward the technological base for

the nation and he brought his industrial experience with him. So that I think is probably our first industrial appointment. You will be hearing in about ten minutes from our latest industrial appointment, Bob McGuinness.

Now into the main content that I would like to put before you. What I would like to cover is what I have rather, perhaps grandly called national leadership. But what I am focusing on here are the national programmes, the major national initiatives in which NPL has played a key or leading part. Then I would like to move on just to talk about the future strategic direction for closer industry partnering and then look at partnership today - what we are looking at right now to address the requirements of the future; look at knowledge transfer and partnering as we are doing it, practising it today; and give you a few case studies to illustrate the point. And that is where my mystery object will come into its own.

National leadership – Accreditation

- ◆ NAMAS - one of the world's first metrology and testing accreditation services to industry
- ◆ Direct Laboratory-to-Factory partnering with a focus on business systems
- ◆ Currently more than 2000 accredited services (including NPL's!)
- ◆ UKAS-accredited Laboratories now generating global sales >£100M pa

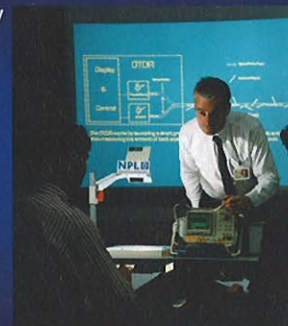


So let's focus first on this question of national leadership in partnering programmes. I felt it would be sad to get through the day without a fairly full mention of NAMAS, or as it now is, UKAS. It was one of the world's first metrology and testing accreditation services. It was inspired and led by Dr Paul Dean, Director of NPL from 1977-1990. It would be a little unfair to see UKAS as merely the metrology police. Sometimes they can be perceived that way but if we think about it, it is a very direct form of knowledge transfer and partnering between folks in a laboratory and people in industry. There is a very direct bridge between places like NPL and the factory floor. There are currently more than two thousand accredited services in the UK. It is one of the great and coherent national measurement systems, in that sense, in the world and it is the envy of many nations. And it is a successful business segment within the UK economy in its own right, generating something like a hundred million pounds worth of sales every year. I should say, of course, that UKAS is no longer part of NPL. It became a stand alone organisation in 1995.

Like UKAS, the question of club programmes is something that was developed many years ago. It doesn't grab the headlines in terms of knowledge transfer and partnering but we have been doing this for a very long time, establishing interest groups, bringing together industry and academe to address issues of common interest, usually very closely related to our core programmes and indeed informing and directing those programmes. And unlike many of the other early

National leadership – the Club programmes

- ◆ An early player in establishing industry clubs (1970s)
- ◆ Currently 26 Clubs
- ◆ 1600 members (many SMEs)
- ◆ Pre-competitive environment for:
 - information exchange
 - meetings between industry and the science base
 - programme orientation
 - spawning co-funded projects
- ◆ Good Practice Guide programme (now web based)



pioneers in this kind of club or network management, we have stuck with it as a mechanism. There are currently twenty-six clubs or networks operating out of NPL, sixteen hundred members including many SMEs - that's jargon for small to medium size enterprises - and they create a pre-competitive environment, where companies and academics can exchange information - they can talk to our experts and we can learn from them. Clubs also help to orient our programmes and they can spawn co-funded projects. I will be speaking a bit more about co-funding in a while.

And I also wanted to mention good practice guides. Every week on average, NPL publishes three reports or good practice guides for industry and sometimes that goes unnoticed. Very often those good practice guides come directly out of the club relationships.

LINK Nanotechnology. This was one of the first LINK programmes, I won't go into the background to LINK, save to say that it has been one of the national flagship, knowledge transfer and industry to science based partnering programmes in the UK. And in this case and in several others, we have been in the vanguard of making these programmes happen. In our case, in the case of the Nanotechnology Programme, there were as many as twenty-eight research projects, twenty-three million pounds, quite a considerable sum, some very exciting commercial applications for the work, including inkjet printing and very novel methods of drug delivery - things that are

National leadership - LINK Nanotechnology

- ◆ Part of the first wave of LINK programmes in 1988
- ◆ 28 collaborative research projects with a value of £23M
- ◆ Commercial applications included
 - ink jet printing
 - drug delivery
 - optical coatings
 - improved automotive brakes
- ◆ "The LINK Steering Group congratulate you on the good quality and range of projects and potential for wealth creation"
- ◆ LINK Surface Engineering followed



actually beginning to find their way into daily life. We received some pretty good reviews from the critics. We later went on to manage the secretariat for the LINK Surface Engineering Programme also, because of the success with the Nanotechnology Programme.

National leadership – BRITE-EURAM Helpdesk

- ◆ Information and proposal support to UK bidders for EC grants in industrial technology and materials
- ◆ Under the EC's Fourth Framework Programme (1995 – 99) UK business :
 - Had more successful proposals than any other member state
 - Secured 20% of FP 4 funds compared with a "juste retour" of 14%
 - Was involved in 64% of successful proposals
- ◆ NPL now the UK National Contact Point for the EC's Competitive and Sustainable Growth Programme



BRITE-EURAM help desk. BRITE-EURAM was, under the last European Framework programme, the industrial research and materials research programme through which a very significant amount of European Community money was put into collaborative research projects across Europe. We had, and in fact we still have, a contract with the DTI to provide information and proposal support to UK bidders for those grants. This is a very direct form of work with industry to support them in focusing their requirements and their proposals. And the track record is pretty good, not entirely, I am sure down to our own work. But we played a part in this. The Brits in the 4th Framework Programme had considerably more successful proposals than any other member state - twenty per cent of the funding as opposed to fourteen per cent *juste retour*. British partners were involved in sixty-four per cent of the successful proposals. So quite an impressive track record and we are very proud to have played a part in achieving that. This continues today. Only the name has changed. We are now the national contact point for the 'Competitiveness and Sustainable Growth Programme'.

National leadership – Faraday

- ◆ 1998 NPL and SIRA awarded contract by EPSRC to run one of first four UK Faraday Partnerships
- ◆ "Intelligent Sensors for Control Technologies" or...



- ◆ Initiates new research and KT initiatives for intelligent sensing and measurement systems
- ◆ Focus on industrial requirements to analyse, control and monitor production processes



Faraday Programmes, Faraday Centres, another flagship initiative of EPSRC and now the DTI. We were again one of the first wave partnerships to secure a contract to operate under this framework. Working with SIRA, we won this contract with EPSRC in 1998 and

we were one of only four Faraday Programmes that were established. There were seventy original proposals. The theme within our particular Faraday with SIRA, is on intelligent sensors for control technology, and the acronym is INTERSECT, focusing on knowledge transfer initiatives for sensing and measurement systems applied to production processes - *in situ*, on-line, monitoring and measurement. And that sort of dynamic measurement is something that I think is going to be a big part of the future of metrology. It's not really been mentioned today but I suspect that it might be quite an important part of the future of metrology. We have quite an impressive list of industrial partners which includes ICI, British Steel, Unilever, SmithKline Beecham, Rolls-Royce, Kidde, BNFL, Health & Safety Executive, Glaxo-Wellcome, BAE Systems, DERA and London Underground Ltd. We have an equally impressive list of university partners including University College - London, Imperial College, Cavendish Laboratory - Cambridge, Brunel University, City University and the universities of Southampton, Bath, Warwick, Surrey, Loughborough and Kingston. Together we are working, forming joint projects and receiving partial funding to address the objectives of the programme.

Towards closer industry partnering

- ◆ Consensus on need for further improvement in awareness, dissemination and partnering
- ◆ Better awareness of the business environment - probably via increased sectoral focus
- ◆ New industry partnerships for emerging National Metrology programmes – eg Biotech, Measurement of Appearance
- ◆ Increased Industry Co-funding and SME involvement
- ◆ Greater emphasis on regional delivery



Now I'd like to move on to a view of the future - the strategic direction. Where is partnering going? I just have a couple of slides on that before I start to talk about what we are doing here and now to try to address the agenda.

Towards closer industry partnering

- ◆ DTI / Serco relationship for the management of NPL is itself a Government-to-Business partnership
- ◆ Working together to achieve
 - co-funding and small business policy objectives
 - improved dissemination processes and
 - better Impact measurement to give feedback and develop the *Mapping Measurement Impact* predictive model



You heard in the Minister's speech this morning that there's consensus that there is a need to improve, to do better in getting the message out, to do better in raising awareness of the importance of metrology, to disseminate and to partner. I think all sides have agreed that that is a priority for us in partnership, this partnership being NPL and the DTI. Partly that's about better awareness in places like NPL of the business environment. We really work very hard on this, but we have some way to go, and we probably haven't done enough to really think about sectoral impact, particular sectors of the UK economy. Places like NPL are structured in terms of technological excellence and expertise and that is a very good way of getting good science and good metrology done and I don't think we would look to change that, but in terms of our outreach, I think that our outreach needs perhaps to be managed down sectoral lines rather more than we have achieved to date.

Also you heard about new NMS Programmes. David Sainsbury mentioned this this morning. You have heard Martin Milton talk about biotech and this is going to call for new partnerships. This is something we are very committed to. Measurement of appearance or soft metrology, another area of growing importance in measurement which hasn't had much of a mention today but is going to be a definite feature of the future. And we need the right partnerships with industry to make that happen.

It almost goes without saying but increased industry co-funding will, I think, be a theme and greater small company involvement in NMS programmes, will be a theme, as will greater emphasis on regional delivery. Much of the DTI's infrastructure now is regionally based and we are working closely with the Small Business Service, (I'll mention that in a moment) which is really driving its efforts out to the regional level, in part through regional development organisations.

I think it is important just to note that the DTI - Serco relationship (if you don't know who Serco is, that's the company of which NPL Management Limited is a part) is itself a piece of successful government to business partnership. We've just come to the end of a five-year contract which we are now looking to extend out for a further two years. But it is of itself a partnership and potentially a role model for other partnerships of a similar kind. We see ourselves working absolutely hand in glove with the DTI to achieve the various policy objectives that I have been describing for you. That last bullet point there, I think is a crucial one - more effort on understanding measuring the impact of the work we do so that we can focus it better in the future.

Partnership today the National Measurement Partnership

◆ NMP unites

- NMD, NPL, UKAS, NEL, NWML, LGC with
- Inst. MC, GAMBICA, WCSIM and
- more than 120 commercial labs

◆ Partnership approach to serving industry

◆ First National Measurement Conference in 1999 had 600 attendees (book your diary for NMC 2001 6 - 8 November, Harrogate)

◆ Calibration NVQ (pioneered with Rolls-Royce and Mitutoyo)

◆ The *Competing Precisely* campaign....



way we do knowledge transfer and partnering today, the National Measurement Partnership - that brings together what we might call the supply side of UK measurement. Many of the organisations within the Partnership are represented in this room. We get together to try to address the needs of the UK economy with respect to measurement. We held our first National Measurement Conference, I think probably the first of its kind, last year, with six hundred attendees. I would be delighted to see as many of you as possible at the next one, which is about a year today. Also I think it was quite significant that the NMP programme created and launched the first calibration based NVQ, National Vocational Qualification. That is a technician qualification. Nothing like that existed for metrology technicians until two years ago. That was pioneered with Rolls-Royce and Mitutoyo. It has been rolled out in partnership with those companies and others, by our friends and colleagues at Brunel University.

Competing Precisely – 20 regional campaigns

Some partners/hosts:

- ◆ British Aerospace
- ◆ Rolls-Royce
- ◆ ICI
- ◆ Vickers
- ◆ Nissan
- ◆ Mitutoyo
- ◆ Samsung
- ◆ Courage Breweries



Then, there's the *Competing Precisely* campaign which is our sort of attempt to get out and about around the UK, spreading the word about the importance of good measurement practice and its potential impact on business. There have been twenty regional campaigns to date all over the UK and here are some of the companies we have worked with as partners or hosts for these awareness raising events. Strangely, it was the meeting at the last of those places, which I enjoyed the most!

I am going to move on now to what is going on here and now at NPL. I hope you will see that we are really seeking to address some of the objectives that I have just been talking about. I am going to start with some features of the landscape, prominent features of the

Partnership today - programme formulation

- ◆ KT is as much about listening, learning and responding as about dissemination
- ◆ Sixteen major industry consultation exercises since 1995
- ◆ Involving
 - Meetings with more than 1000 UK companies
 - More than 30 user requirements studies
- ◆ Economic impact prediction model (*Mapping Measurement Impact*) developed in partnership with private sector and academic partners (Scientific Generics, PA Consulting, London Business School)



Partnership today the Knowledge Transfer Centre

- ◆ NPL benefits from an extensive KT "tool kit"- a legacy including almost all of the above
- ◆ Creation of the NPL Knowledge Transfer Centre (a £4M pa business unit)
- ◆ NPL proud to have won contracts for TCS, Envirowise, Queen's Awards
- ◆ Programme formulation for a National Measurement System Dissemination programme under way now



Programme formulation. What I really just wanted to say here, very quickly, is that knowledge transfer is a two-way street. It is as much about NPL listening as it is about NPL transmitting, and that is particularly important with respect to the formulation of NPL's new programmes. And there have been sixteen major industry consultation exercises since 1995. That has involved meetings with more than a thousand UK companies and more than thirty user requirement studies to focus the work we do, the kind of work you have been hearing about from the guys this afternoon on the needs of industry so that we aren't going off at some strange 'ivory tower' kind of tangent.

We also have developed, again in partnership with private sector and academic partners, a model to look at the economic impact or predict the economic impact of programmes during formulation. What I was alluding to earlier was the need really to look retrospectively at programmes and be able to understand and quantify their impact post-event.

The Knowledge Transfer Centre. So important to us is this whole field of knowledge transfer management, innovation support and partnering, that we brought together the folks who really concentrate on this in a professional way as a sort of mini centre of excellence within NPL. It comprises a frighteningly young and lively group, constantly challenging me and led by Jerry Benson. We benefit from

this sort of legacy, this vast array of knowledge transfer programmes and tools. Almost everything I have spoken to you about still exists in some form or other and offers us another weapon in the arsenal. It is something like a four million pound business - so really quite a useful little unit in its own right.

And we are very proud to have won the contract for the management of TCS, which you might know as the Teaching Company Scheme. Certainly I see that as probably the premier knowledge transfer scheme in the UK. We have also won the contracts to manage a programme called Envirowise which used to be called the Environmental Technology Best Practice Programme and the provision of contractual support to the Queen's Awards.

What you see in the picture is a TCS Associate, working at Trico in a joint collaborative project with Swansea University and he is in fact looking at the measurement of the aerodynamics of windscreen wipers.

We are also doing the programme formulation for a new programme, a national measurement system dissemination programme where we are really going to focus more effort, more energy on the way we communicate with end users and industry.

Partnership Today Case Study 1. "Added Fibre"

- ◆ Demand for high capacity telecommunications driving fibre optic technology at an astounding rate over the last two decades
- ◆ Early 1980s NMS recognised the need for an impartial measurement infrastructure to support this rapid growth - invested at NPL to establish national excellence
- ◆ Recognising the value of UK expertise, Anritsu partnered with NPL in developing a new fibre optic power meter, designed from concept in partnership with NPL.



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creation of that centre of excellence, a number of companies are now partnering with us very intimately. One of them is Anritsu - I just pulled them out as an example. They have worked with us from the design phase in developing a fibre optic power meter and that work has been extremely successful. The National Measurement System has ended up with capabilities which, without the private sector involvement, we simply would not have had. There has been inward investment into the UK by Anritsu. They are now developing instruments in this country in a way that they may not have done without the infrastructure and the investment at NPL some time ago. There has been commercial income to NPL, which allows us to spread our overhead costs across a range of projects and not just focus them on the DTI work. And I think, importantly, we have new skills within our photonics team. Not just skills developed, if you like, in an academic sense but in direct response to market requirements. And we have been involved with Anritsu in spreading good measurement practice out to their supply base.

Partnership today Case Study 1. "Added Fibre"

Benefits of Anritsu co-funding:

- ◆ NMS has developed capabilities (available to all) which could not be funded by DTI alone
- ◆ Inward investment secured for the UK
- ◆ Commercial income to NPL spreads overhead cost
- ◆ Important new skills for NPL in direct response to the market
- ◆ Good measurement practice disseminated to Anritsu's customer base



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Partnership today Case Study 2. "Working Environment"

In 1999 NPL and BP-Amoco agreed the transfer of environmental analysts from Sunbury to NPL, creating a centre of excellence in diffusion tube sampling for air quality assessment.



This is the latest step in a 15 year relationship and further collaboration is in progress

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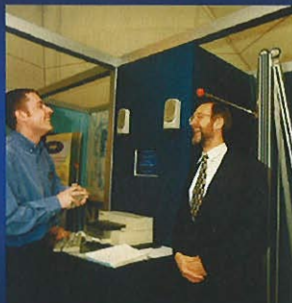
Now, to finish off, just three quick case studies which illustrate the way we are working with British companies or companies who are in the UK. About twenty years ago, the National Measurement System spotted in quite an impressive way the likely growth of fibre optic technology to support modern communications and IT, and invested heavily at NPL to build up excellence in measurement making for this important feature of the economy. As a result of the

And now the second case study of three. I talked about human mobility earlier. And if you like, the Anritsu case is a fairly classic case - an intimate relationship between working with a company and investment in the National Measurement System. This second case study is about people. About a year and a half ago, BP-Amoco agreed to transfer one of their key teams, the environmental analytical team, to us. They felt we were probably a better host environment for

Partnership today Case Study 3. "Hitting the Tape"

NPL approached by SMEs in the clothing manufacture and retail industries looking for measurement technology that

- ◆ Allows direct data transfer to PC
- ◆ Gives rapid data capture
- ◆ Is cheaper than whole body scanners
- ◆ Improves on the accuracy of conventional tape measures
- ◆ Is easy and "traditional" to use



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them to flourish as a group although they still retain quite a bit of project work back in BP. And that has worked extremely well and created a new little centre of excellence within our environmental group. We are delighted with that. And it is really just the latest step in a fifteen-year relationship that's going strong and we are finding new ways of collaborating. But moving people around between the Laboratory and industry, industry and the Laboratory, I think is quite an exciting way of partnering.

And my final case study I have called '*bitting the tape*'. What you see in the picture is David Sainsbury's predecessor, John Battle, being measured in what is effectively a sort of joke device but it is a laser interferometer which we use for measuring heights. We take it to exhibitions and so on and it is quite a good way of communicating measurement to the general public. The point of the story is that we took it to an exhibition called '*Tomorrow's World*' which is aimed at young people. We actually measured twelve thousand school kids in three days. (I am still recovering from that.) While we were doing that we were approached by a couple of very small UK companies asking us about measurement and its application to the clothing industry, both clothing manufacture and retail. What they were looking for was a technology which would allow the transfer of measurement data to a PC, give very rapid response and quality control, be cheaper than what is being used at the moment for the big body measurement surveys being done by the likes of Marks and

Partnership today Case Study 3. "Hitting the Tape"

Invented and Patented by NPL

Marketed by Davies Design and the London Consultancy
Prototype Manufactured by Frazer Nash (Midhurst) Ltd



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Spencer, which is whole body scanning, but still would be very easy to use. They gave us that challenge. We were just out there flying the NPL flag and they came along with a very specific market-based challenge. And the upshot was our mystery object. This is the prototype for something we call FEMT, Flexible Electronic Measuring Tape. It is a tape with no numbers. You probably cannot see that but it is a rather extraordinary thing in a rather chunky, clunky prototype stage at the moment but the important point is that this device will make simple dimensional measurements and download them to your PC. It's not ion trapping but it is extremely industrially and market focused, and it's happening now and we are working in partnership with the smallest of small SME's, Davies Designer and London Consultancy. Companies don't come any smaller than those two, I can assure you. And the prototype has also been manufactured by a small local firm. Even as we speak in fact, the guys responsible for this project are out and about within the clothing industry. And I have to tell you, if you know anything about the sartorial standards of NPL staff, you will know that when NPL staff start turning up at London Fashion Week it is not because of their commitment to dressing better; it is because they are very interested in working with industry.

This concludes a quick, but I hope, helpful survey, illustrating NPL's commitment to working in close partnership with industry and others to develop, then exploit, the benefits of NPL's scientific programmes.

Throughout its 100 years NPL has retained a mission, which by its very nature places us at the interface between the worlds of science, industry and government. Knowledge transfer and industry partnering are not activities that we can somehow bolt on as an attractive 'optional extra' to NPL's operations. They sit at the heart of what we are and what we commit ourselves to do. «

Sir John Rowlinson (chairman)

Thank you Mr Richardson.

The final talk in this afternoon session is very appropriately from the Managing Director of the National Physical Laboratory. I don't think he's going to look forward to the whole of the next century but I hope he will tell us something about what his plans are for the NPL for the next decade.