

A vision for NPL - the next decade

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"And so, in summary, if I return to our vision for NPL, we recognise our unique role bridging science, government and industry. We will continue to strive to produce excellent science targeted from our contacts and discussions with government and industrial partners to deliver innovation, which exerts a visible and worthwhile impact on the economy or quality of life. We will attempt to play a full role in international collaboration to support cross-border trade. We will explore strategic alliances and we will continue to develop the GOCO model to benefit government and, of course, its industry customers, NPL and Serco."

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Good afternoon Ladies and Gentlemen. We have been talking a lot about testing this afternoon and I have come to realise that we have been testing your energy level quite severely. I promise we will do this only once every hundred years and we are in the last lap now. It should take only about fifteen minutes.

This has been a very special year in the life of NPL. While the world celebrated the dawning of the new millennium, we at NPL began to celebrate our first hundred years of service to the UK. At a reception in Teddington in June we launched a new history of NPL written by Dr Eileen Magnello and I was pleased to see earlier that she is here. In July, the ground floor of Bushy House turned into a gallery displaying many of the photographs that were taken throughout NPL's history - on that day the guests were members of the Glazebrook Association, NPL's old-boys' club. And as you might imagine, there was a lot of reminiscing and exchanging of stories stimulated, no doubt, by the memories which these photographs evoked.

Now, moving on to today's special event, Sir Aaron this morning rightly reminded us how appropriate it is that we are holding the meeting here at the Royal Society. The Royal Society, together as we have heard with the British Association for the Advancement of Science, were persistent in their lobbying of government for the creation of a National Physical Laboratory. For this, the UK - and NPL - are most grateful! Now, I am particularly pleased that Sir Aaron has been able to give up his time to be with us today in what must be a very demanding month. As we have heard, at the end of November he will have completed his five years as President of the Royal Society. I and all my colleagues at NPL congratulate him on his achievements as President and wish him every success in the future. And also on this occasion I would like to thank Sir Michael Atiyah, his predecessor. It was he who provided helpful advice to the DTI at the time of contractorisation of NPL in 1995.

Rather more belated thanks must also go to an earlier President, Sir George Airy, who has been observing us during this meeting from his post on the wall up there. During his term of office as President of the Royal Society, he led the UK delegation at the International Commission of the Metre and that in turn led to the Convention du Mètre. In a letter to the French Minister, he said that: *"different nations will adopt in different degrees the present system which owes its origin to France so far as regards its application to the transactions of social life. But all will recognise*

the importance of the system in scientific matters and all will join in availing to France the creation of the only system which is available to the science of the world". I think that not even he would have foreseen the full extent of the importance of measurement in today's world and the extraordinarily high level to which metrology is co-ordinated throughout the world. His Sèvres vase serves to remind us of his insight, determination and vision. We are very grateful to the National Maritime Museum for the loan of the vase today and for those of you who haven't caught up with the story, we are pleased to have had the opportunity of supporting its complete restoration after the 1987 hurricane in which it was shattered into more than two hundred pieces. The conservators have been working around the clock and actually this was delivered here this morning about forty-five minutes before we began.

This brings me to the earlier session this afternoon when we heard from all our celebrated international speakers. It was a real pleasure to hear your assessment of NPL's role in the international world of metrology. As we've heard, PTB celebrated its centenary thirteen years ago and we know that NIST is well advanced in its plans for its 100th birthday next year. I think that NIST, PTB and NPL together with the older, but equally venerable, International Bureau of Weights and Measures have together been a truly great influence in world metrology. And it is very, very pleasing that so many of our international colleagues have been able to be with us today. We have heard that we have had people travel from Japan, from Taiwan, from South Africa, from Brazil, from Mexico, from the United States and around Europe. I thank all of you for the warmth of your good wishes and I do trust that you will have a safe journey home. And I think this audience more than most is acutely aware that this safety is underpinned by the skills of the metrologists in National Metrology Institutes all over the world.

I would like to thank Lord Sainsbury for his observations on NPL and his good wishes for our future. He paid tribute to the quality of our science, which he identifies as being of world class. He made the point that the work also needs to be relevant and that is a point to which I will return.

Dr Clapham, I can now tell you, flew in from Malta at one o'clock this morning. He was on holiday. True to form, nothing could prevent him from attending this meeting today. He, like all Directors of NPL, helped to create the history which we enjoyed hearing about this morning. Peter, I have to say that your enthusiasm for NPL's hundred years is infectious. And not only that, we are indebted to you for your skill in condensing that hundred years into just twenty minutes and still finding the time to give a bit of sound advice to Lord Sainsbury!

I particularly enjoyed hearing of NPL's earlier work on quantum metrology and materials characterisation from two of NPL's most distinguished alumni, Sir Alan Cook and Professor Tony Kelly. Your work at NPL, I think, set the standard which serves as a constant inspiration to those who work at NPL today. Without the significant foundations which you created, NPL would not now be in a position to be able to report work of the kind and quality which we heard earlier this afternoon from the new generation of scientists. I hope that you are persuaded your legacy continues in their good hands. The reputation of NPL today, and I think it is the same with any other organisation, is established to a large extent over many years by the work of the key people, whom you attracted to work at NPL in the 1950s and 1960s. And I recognise that one of my key responsibilities as Managing Director is to ensure that NPL sustains its well earned reputation by continuing to attract a cadre of young people who, in the best traditions of the past, exploit exciting science and technology to solve problems in measurement and materials. I would also like to thank Sir Alan for his suggestion of our recording some of the proceedings of today's meeting in the prestigious journal *'Notes and Records of the Royal Society'*. Since he is the editor of the journal I have a high expectation that the meeting will indeed appear there! I understand it will be in the Millennium issue to be published in January 2001.

And finally I would like to thank Professor Dave Gardner and Dr Kamal Hossain for the presentations on the importance of NPL's work to industry and quality of life issues. As Kamal said, it's only in recent years that the expression 'quality of life' has been coined to describe that work at NPL which supports issues such as health, safety, law and order. He gave examples taken throughout NPL's history which demonstrated our contribution to the quality of life. I think the message is clear - measurement does actually pervade every aspect of our modern lives. It ensures our safety and sustains our sense of well being.

And from the point of view of the value of our work, I think a particularly significant contribution today was that from Professor Gardner. He so clearly recognised the significance of NPL's work to his company. Amongst ourselves we often talk about measurement being an important driver of efficiency and of innovation. But how much better it is to hear it being said by one of our major customers.

I would like now to turn my attention to the future of NPL. We believe we are, and intend to remain, a laboratory which aspires to and delivers excellence in science and its application, particularly of course in measurement science. The key to our future success is a continuing commitment to the quality of our science. Put simply, we have to be the best in our chosen fields and we must choose our fields of activity with great care. So what is visionary about that, you might ask? I think the challenge is to deliver this well and sustain the delivery in a world which is changing faster around us than ever before. We hear that said very often. If I could just give one example to illustrate the pace of change and you probably heard it but in the world of e-commerce, business to consumer Internet traffic is currently doubling every six months and business to business Internet traffic is predicted to grow even faster than that.

I believe that the first duty of any organisation is to ensure its own survival. For NPL to flourish in order to be able to continue to fulfil its mission, it's essential to take a broad view of the sectors and technologies we exist to support and ensure that we tailor our fields of activity to be relevant to our environment. Take another example. Whereas over the last three years in the UK, machinery manufacture declined around 3.5% per annum, industrial instruments about 1.4% and scientific instruments about 3.1%, computer equipment has been growing at 14% per annum and telecommunications at about 10%. This means that we have to develop close links with our customers - and that is the industrial base, I think, in its broadest sense - in order to understand not only their current, but also their future requirements. Excellence in science is essential. But this in itself is not enough. We have to be excellent in areas which are relevant to future industry needs and the outcome of our work must have practical application.

Now we already know that there are a number of new and exciting areas in which we need to be increasingly active, to be able to realise and support future standards in addition to our traditional areas. And I think one prime example of this is the new Photonics

Programme where we took parts of other scientific programmes and combined them together to focus on the needs of the communications sector. This, incidentally, is also a very good example of how a closely market focused programme is able to attract a significant level of industry co-funding. We have heard from Martin Milton on biotechnology, where we would aim to bring our expertise in measurement science to bear on advances in biochemistry. We will turn our attention in the area of materials measurement to the provision of design and product life-prediction tools and models enabling firms to make less scrap, make better use of new materials and processes or reduce design cycles. There is the area, as David Richardson mentioned, of soft metrology encompassing, for example, measurements in scent, taste, colour and appearance. We have heard a great deal this afternoon about new developments in quantum metrology. At NPL we are actually very fortunate to have such strength in mathematics, statistics and software to support many of our emerging fields. And of course there is the area of Internet calibration. A recent award winning paper by Richard Dudley, Nick Ridler and Jonathan Williams, entitled *Internet based calibration of electrical quantities at the UK's National Physical Laboratory* outlines the use of remote instrument control as part of a calibration procedure by a National Measurement Institute. This project, which is currently in proving trials, we expect and hope will go live in January, 2001.

And at the same time as all of this, the level of activity on the international scene is at its highest ever, driven by the need to support international trade through the Mutual Recognition Arrangement - and it would be appropriate at this point to recognise the contribution made to bringing this arrangement to fruition by Dr Terry Quinn - and also by global economic trends and by government policies. NPL remains keen to play a central role in driving forward international collaboration, culminating in the establishment of joint international projects in appropriate areas of activity.

I think this combination of uncompromising excellence with an ever-increasing range of scientific fields to cover, leads one unavoidably to the conclusion that it is just not possible to be active in any single laboratory in all required areas of science. The obvious solution for all of this is to seek alliances both with other scientific institutes at home and with sister national standards institutes abroad. Some examples of this might be collaboration with the National Institute of Biological Standards and Control (NIBSC) in the

UK and NIST in the United States on bioscience. And again, for example, this coming Friday we will be meeting with colleagues from PTB (Germany), DPLA (Denmark) and NMi (the Netherlands), to discuss research collaboration and co-ordinated provision of services within Europe in the field of acoustics.

Now, one of the challenges of achieving this vision of scientific excellence impacting the economy is that we must continue to attract and retain scientists of the required calibre. I think in order to do this, we have to ensure that our scientists are able to work in challenging and interesting fields, in a stimulating environment with a culture of the highest standards and excellent facilities and with a reasonable likelihood that their work will be put into practice in industry or commerce, thereby delivering visible benefit.

I believe that the GOCO model, operated now successfully at NPL for five years, helps this process. Now, GOCO as we heard already today, stands for Government Owned, Contractor Operated. And since 1995, NPL while continuing to be owned by government, has been operated by the Serco group. Serco is a highly successful fast growing task management company. I think the model has proved to be a real success for the DTI, for NPL and for Serco. And indeed, we actually receive a steady stream of visitors from the UK and overseas keen to learn more about how the model operates. I think this combination of government ownership and operation by Serco offers the best of both worlds in terms of stability, combined with opportunities for career advancement.

And in terms of excellence and facilities, I am pleased to be able to report that we have been making significant investments in Teddington. This year, we have commissioned our new Cobalt 60 facility for ionising radiation. This is identical to facilities employed in UK hospitals for the treatment of cancer, and is used to calibrate hospital equipment to ensure its safe use. I think that this is just another excellent example of science in support of the quality of life.

Only last week we had the official opening of our unique acoustic pressure vessel. This 100 tonne facility is the largest in Europe and allows us to simulate sea conditions of depths of up to 700 m and temperatures ranging from 2 °C to 35 °C. It's designed for the testing of underwater acoustic devices over a frequency range from 1 kHz to 2 MHz which are typically those used in the oil and gas, oceanographic and defence industries.

But, of course, the major investment is the new 16-module laboratory building now being constructed which I think it is fair to say will be

envy of the world. This is a £300M Private Finance Initiative to build and service over its lifetime a 36,000 m² facility designed to improve the quality and efficiency and effectiveness of the delivery of scientific programmes and measurement services.

We continue to work in close partnership with government, represented by the DTI and we strive to be alert to and respond to government priorities. As we have heard today, the impact of scientific output on the economy is a theme which is very current and it was highlighted in the recent government white paper on science and innovation entitled *Excellence and Opportunity*. There are numerous references to the need to exploit research and I have taken just a couple of quotes. '*Scientific excellence is only the start. It is not enough to generate research - we also have to make the most of it.*' and '*We must have a first class process for pursuing scientific advance and using it successfully. We must have the ability to generate, harness and exploit the creative power of modern science.*' Now, again as we have heard, at NPL we have established the Centre for Knowledge Transfer and that is specifically to build links between NPL and industry, specifically with small and medium size companies, through programmes such as the National Measurement Partnership Programme which is soon to become the Dissemination Programme. We operate a network of 26 clubs with 1,600 corporate members which we are currently looking to re-vamp and rationalise in our drive to develop ever more intimate links with industrial companies.

And so, in summary, if I return to our vision for NPL, we recognise our unique role bridging science, government and industry. We will continue to strive to produce excellent science targeted from our contacts and discussions with government and industrial partners to deliver innovation, which exerts a visible and worthwhile impact on the economy or quality of life. We will attempt to play a full role in international collaboration to support cross-border trade. We will explore strategic alliances and we will continue to develop the GOCO model to benefit government and, of course, its industry customers, NPL and Serco.

Earlier this year I led a process involving all of the staff across NPL and it was to debate and discuss what is it that we would like NPL to be over the next 10 years. I would like to leave you now with our vision for NPL and it is this: *A world-leading measurement science laboratory, globally recognised for excellence; uniquely positioned to forge links between scientific, commercial and government communities.* «



Sir John Rowlinson (chairman)

Thank you Dr McGuiness.

That, of course brings the meeting to an end and I would like on behalf of the audience to thank all the speakers we have heard today for a variety of always intriguing and certainly always very informative and often inspiring papers.

∇ Thank you very much indeed.