

National Physical Laboratory Response to the release of the R&D Roadmap

July 2020

The UK Government have released a Research and Development (R&D) [Roadmap](#) to discuss with the science, research and innovation community how we can cement the UK as a world leading science super-power. The National Physical Laboratory (NPL) welcomes the publication of this roadmap and the continued commitment to invest in R&D to realise the potential of the UK's science and engineering expertise and support the UK's economic recovery post COVID-19.

NPL, as the UK's National Metrology Institute (NMI), provides the underpinning measurement infrastructure and technologies that are essential for enabling science, innovation, research and development, as well as facilitating trade. We were pleased to see that the role of Public Sector Research Establishments (PSREs) like NPL have been recognised within the roadmap and that there will be greater opportunities to utilise our strengths:

- providing measurement infrastructure and technologies to boost productivity
- bringing our world-leading multidisciplinary measurement science to contribute to the success of the ambitious moonshots
- delivering international leadership in the measurement community
- nurturing talent and reducing the skills gap

Raising our research ambitions

The roadmap commits to review and test models of R&D funding, and to increase public investment in "discovery research", placing emphasis on high risk, but high reward projects, and seeing these through to development, modelled on ARPA in the USA.

NPL welcomes the move towards this funding distinction and the support for long-range, fundamental, underpinning science and research, including investment into the applications of research and the development of new technologies. Through investing in development, the UK can become world-class at accelerating discoveries through the technology readiness levels into commercialisation.

The roadmap also highlights the importance of inspirational challenge lead research and development of "moonshot" technologies. For these to be successful they will require a multidisciplinary approach drawing on the wide range of expertise that the UK has to offer. The quality of data and measurements can make or break these projects, NPL hopes to be involved in many of these future collaborations to offer our science and engineering expertise making sure these projects succeed.

Inspiring and enabling talented individuals and teams

NPL further welcomes the commitment to investing in people and ensuring that the UK can attract and retain scientific talent. NPL is proud to be an organisation that is home to researchers from across the world, employing staff from around 40 countries. NPL is an inclusive place to work, which celebrates culture and uses the diversity of its employee's backgrounds to enrich its science expertise. We are pleased to see the acknowledgement of the role public labs such as NPL play in developing and cultivating science talent at all career stages, including from our [apprentice](#) and [PhD](#) programmes, through to our specialised training provision for industry. These opportunities play an

important role in practically developing talent and exposing scientists to the commercial world, enabling an easy transition of talent from academia to industry.

Driving up innovation and productivity

Investment in R&D results in innovation, which boosts economic productivity and employment and delivers benefits across the UK, supporting prosperity and national security. R&D and innovation outcomes contribute to the overcoming of the UK's Grand Challenges, including:

addressing climate change and meeting the net zero carbon emissions ambition, supporting our aging society by enabling earlier diagnosis and personalised treatment of disease, and helping society to embrace digital transformation, as the 4th Industrial Revolution disrupts every part of society.

The UK's [Industrial Strategy](#) commits to investing 2.4% of GDP in R&D by 2027. This roadmap indicates the extent of public investment to reach the target, raising the ambition of doubling public spend on R&D to £22bn per year by 2024/25.

In order to meet the Government's commitment on GDP investment, it is widely acknowledged that there will need to be significant investment made by private industry alongside that of public investment. NPL is pleased to see the emphasis placed on the role of PSREs in supporting businesses to start, scale-up, or invest in innovation. The roadmap details the ability of public labs like NPL to support business in the aim of driving up innovation and productivity, particularly in the wake of the economic damage caused by COVID-19, where investment in innovation is difficult for many businesses. The public sector has a duty to ensure that the infrastructure that is needed to support R&D is in place and to make it as effective as possible, to boost outcomes and attract greater investment.

In particular, investment into measurement infrastructure technologies can support innovation and productivity by reducing the risks for businesses investing in R&D and optimising the process¹. A large variety of R&D activities require precise measurement science. By using cutting-edge metrology, we can improve the outcomes of explorative projects, making R&D a more productive process. We look forward to continuing our close collaboration with government, industry and academia to deliver the measurement infrastructure and infrastructural-technologies needed to support and optimise the productivity of R&D, to cement the UK as an inviting place to undertake R&D activity.

Levelling up innovation across the UK

It is important that the benefits of R&D are realised across the country. Through a variety of projects, NPL works closely with businesses, public sector organisations and universities across the whole of the UK. With hubs London and the South East, North and Scotland we try to ensure that where-ever people are in the UK they will be able to access our expertise.

Being at the forefront of global collaboration

NPL, as the UK's NMI, represents the UK within the global measurement community, undertaking research and development activities with our international partners. The globally agreed use of the International System of Units of Measurement (SI), through countries signing up to the Metre

¹ King, M; Renedo, E (2020) Achieving the 2.4% GDP target: the role of measurement in increasing investment in R&D and innovation. NPL Report. IEA 3.

convention, enables countries to trade and research to be undertaken on different sides of the world and remain comparable.

The UK is world-leading in many science and research areas and we are pleased to see the ongoing commitment to building and leading international collaborations. Many of the challenges that we face are international, that impact all societies across the world. Science is a global undertaking that is most effective when we collaborate to address challenges like climate change, food security and disease. NPL will continue to undertake significant collaborative projects, for example the internationally co-funded space mission, [TRUTHS](#). TRUTHS will be the UK's first national earth observation mission, it allows us to put NPL into space, enabling us to calibrate other earth observation satellites, improving the quality of earth observation data that informs climate models, forecasts and policy.

Developing world-leading infrastructure and institutions

For the UK to be the best place to do R&D we need to make sure that we exploit our already world-leading infrastructures and institutions, continuing to invest in them where needed to maintain and develop capabilities, as well as building new infrastructures where there are gaps. The UK's Quality Infrastructure is already well recognised; the standards and regulations that the UK develops are adopted around the world. There are challenges ahead with the digital transformation of businesses and society and making sure that we have the appropriate digital infrastructure in place will be essential. Measurement is an underpinning infrastructure that supports all sectors of business and research, as new areas of research emerge and new sectors develop, we will need to ensure that measurement requirements in these areas are identified and developed alongside them.

Ensuring a healthy R&D system

NPL welcomes the commitments in the roadmap to review the whole R&D system, from academia, to research institutes, government R&D (including national labs), business and charities, offering greater opportunities for collaborative work with the wider science, research and innovation landscape.

The roadmap states the aims of building on the UK's R&D strengths and resolving long-term problems in the system. It commits to removing red tape and reducing unnecessary bureaucracy, to give researchers more time to think and work on their priorities, improving working productivity and collaboration.

The future of R&D

NPL looks forward to contributing to the discussions on the future of R&D in the UK. The Roadmap along with the Report from the Government Office for Science² and the Nurse Review³ echo that Public Sector Research Establishments are currently underutilised.

We look forward to being able to provide the metrology needed for growing industry sectors and new and emerging areas of technology, being involved in exciting multidisciplinary collaborations delivering the measurement expertise. NPL is home to a fantastic team of scientists and engineers and we are proud of what we have achieved but there is always more we can do for the UK.

² Government Office for Science (2019) Realising our ambition through science: a review of government science capability <https://www.gov.uk/government/publications/government-science-capability-review>

³ Nurse, P. (2015) Ensuring a successful research endeavour: A review of the UK Research Councils https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/478125/BIS-15-625-ensuring-a-successful-UK-research-endeavour.pdf

