

Response to the BEIS Economic Recovery questionnaire (June 2020).

Submitted on behalf of the Photonics Leadership Group (PLG) representing the UK photonics industry. UK photonics, employs ~69,000 people in the UK generating >£13.5bn output at an average productivity of £76,400 gross value added to the economy per employee, 34% higher than the average UK productivity. The industry is sustaining growth of >4% a year, 4X that of UK manufacturing overall. The PLG draws input from over 90 of the UK's ~1000 leading photonics companies at senior management level with a combined turnover of 22% of the industry.

Responses (in blue) are based on the PLG's May survey of the impact of Covid-19 on the industry, discussions at the June 2020 PLG meeting and the PLG's March 2020 Horizon Scanning workshop.

Innovation

1. **What are the systematic barriers to business innovation?** (e.g. regulatory systems, procurement or the network of contacts and exchanges that promote the sharing of ideas)

Agreeing a framework for the discussion of confidential information has long been a hinderance to the sharing of ideas even before parties get to the more involved process of agreeing terms for sharing of intellectual property.

This problem is most acute and addressable between the private and public sector, where the signing of a non-disclosure agreement between a large corporate and a public institution, e.g. University, can take many months, after which the moment to providing responsive support and exchange of information is lost.

Clear guidance is needed to public institutions on acceptable terms for discussion, emphasis on acceptance by default, government approved templates and guidance on acceptable risks all of which will reduce the significant variability between institutions. These need to incorporating an understanding of the asymmetry between a company's need to be confident that their plans or challenges will not be publicly disclosed and the need for the institute/university to be able to openly brainstorm ideas without jeopardising publication, IP protection and funding.

2. **How can we strengthen the support provided by publicly-funded institutions?** (e.g. role of the Catapult Network and other institutions such as the National Physical Laboratory)

Universities and other publicly funded institutions should be strongly encouraged to re-open research facilities as a priority. Quality research is not something that can be accelerated to make up for lost time, meaning the UK risks being left behind if researchers cannot access experimental facilities. Whilst much analysis and background investigation can be done remotely, experimental research requires access to experimental equipment.

Furthermore as companies return to full operation, continued closure of university facilities is putting current, and future, industrial supported research in jeopardy as academic partners can't match the progress being made in industry.

Industry has noted they have been able to follow government guidance and been able to open and operate similar facilities, but there appears to be a reluctance to prioritise opening experimental research facilities, especially at Universities. The current priority appears to be preparing for teaching in October, risking another losing another 5 months of access to world leading assets.

Going forward, agreed processes should be put in place for keeping publicly funded research and test facilities operating safely through any localised lock-downs. This does not require a return to full on site working for all, but scheduled safe access at minimum viable staffing levels.

- 3. How can government better identify and support the key technological trends that will drive innovation-led growth and productivity in the recovery.**

Maximising an innovation led recovery requires matching the best of emerging technology with market demand and leveraging the current market disruption as a driver for change.

Such opportunities would be efficiently identified by requesting ISCF challenge directors, who are already focused on their vertical market roadmaps, to reach out to enabling sectors and identify synergies the innovations on their horizons, such as the 70 future concepts identified in the recent photonics horizon scan.

- 4. What specific actions would enhance the adoption and diffusion of innovation across the full breadth of UK businesses, including those far from the frontier?** (e.g., are there policies that government should stop / start / continue, what role do big firms have in pulling innovation through the supply chain etc)

Raising awareness of what is possible is key. Those far from the innovation frontier are often unaware of the innovations available to them, how to apply them or their impact. Out-of-date perceptions of complexity and costs can persist far beyond the emergence of next generation solutions.

A case in point is the UK adoption of laser based materials processing. Common, especially in German manufacturing, for cutting, welding and marking, adoption in the UK lags other EU countries. Supporting adoption, including support for spreading the capital cost and understanding the return on investment, would improve manufacturing productivity, flexibility and reduce waste and emissions

Use public purchasing to help new technologies to enter market. An example is quantum communication. The UK has great strength in the optical communication and in the satellite sector. Helping UK companies to take quantum communication products to market through public procurement would strengthen international competitiveness of those companies.

- 5. What are other countries doing better than the UK in encouraging and promoting innovation?**

Many other countries (e.g. Germany, USA) balance innovation support for key market driven challenges with support for underpinning technologies that enable advances across multiple

vertical markets. The combined strategy results in more integrated self-reliant supply chains which can source both the applied solution and the key embedded technologies locally.

The UK's approach of focusing innovation support almost solely on vertical markets concentrates two key risks. There is significant market selection and timing risk in picking which verticals to support and when. Additionally lack of support for enabling innovation further risks compelling the UK to be dependent on importing key enabling technology components, increasing economic exposure to disruption / geopolitical interference in global supply chains.

For the UK to deliver solutions to society challenges with UK technology on the inside, as well as on the outside, requires balancing support between enabling technologies and vertical markets.

Other countries, notable US, France and Germany (often with EU support), are also investing in pilot lines to develop and build scale in the manufacture of new innovations. Many modern consumer facing markets, driven by global on-line demand, require near instant ramps in production with demand switching from near zero to millions in weeks. Fostering capacity to respond to such demand, requires investment in pilot lines that build critical volume process knowledge and capability. Locations for investment in the full volume capacity facilities are inevitable going to be influenced by the location of pilot line facilities.

Investment

1. **What aspects of the UK “offer” should we focus on enhancing?** (e.g., specific regulatory burdens, skills gaps that disproportionately hurt investment)

The availability of skills and the business environment for R&D (tax credits, patent box etc) are significant drivers of inward investment in the UK and should not be lost. For many multinationals these measures are greater drivers of investment than project support (e.g. via Innovate)

In skills, industry highlights the maintenance of the skills pipeline should be given the greatest priority. The focus should be on where we have great skills now and where and how we are investing to keep availability of those skills growing in the future. Emphasis of skills shortages is counter productive to inward investment.

2. **Are there any particular types of investor, project or investment that business and HMG should prioritise for investment in the UK?** (e.g., specific sectors or projects critical to the UK's future e.g. net zero, particular skills or technologies, or to locate in particular UK regions.)

Greater balance of support is required between enabling technologies, exemplified by photonics, on which wide ranges of products and markets depend and vertical market sectors. Without such balance the UK will be dependent on buying-in and importing embedded enabling technologies from elsewhere, reducing resilience and exposure to supply chain shocks.

3. **What specific approaches would help “land” more investment deals for the UK?** (e.g., different types of senior engagement, flexibilities in local planning and transport, faster/different approaches to investor queries, better marketing of the UK “offer” – including strengths in innovation)

Many photonics companies who have invested in the UK note two critical axis drive investment

- 1) The favourable business and financial environment especially corporate tax rates, R&D tax credits, patent box and relative labour force flexibility (vs e.g. other EU locations).
- 2) Access to enabling UK knowledge and skills and a pipeline for growing skills availability in key areas that enhance/ add to the capability of their organisation.

Investment approaches need to a) emphasis the durability and long term commitment to sustain the UK’s favourable business environment despite the impact of Covid-19 on public finances and b) emphasis the access to the additional/next generation knowledge they need to support growth and innovation in their business. The latter is therefore not necessarily about focus on traditional UK sectors, but where the UK has enabling skills that will support future businesses.

Providing more and larger sums of first-time investment through the UK Innovation & Science Seed Fund helps to raise the profile of the investments and will unlock further private investments.

4. **How can access to finance support inward investment, and what role can government play in facilitating this?**
5. **How could we more effectively retain and expand existing UK investors’ (including FDI already here) presence?** (e.g., strengthening UK supply chains, building HMG relationships with them, working better with regional partners in the UK)
 - Clarification on Brexit terms as soon as possible.
 - Commitment to maintaining the favourable UK business environment

Levelling up

1. **What are the key barriers to private sector investment in the regions?** Considering how business and government can work to address these.
2. **How can government and businesses work together to identify meaningful opportunities to invest across the Midlands, the North and the Devolved Nations?**
3. **How can government work with business to strengthen local business networks and ecosystems?**

Financially support local industry clusters. For clusters particularly in regions with lower economic activity, require public support. The ability to network, hear about regional innovation initiatives, promote sector strength beyond region requires dedicated effort and needs to be paid for. The clusters will also provide a means for government to engage.

4. **What could be the single most meaningful priority for business and government to work towards in order to level up?** (e.g. skills, transport, science & innovation, net zero etc)

Growth and maintenance of a skills pipeline around modern clean hi-tech manufacturing. These skills are materially different to traditional shop floor manufacturing a different that is not always reflected in vocational training.

Investment in the core communications network, reducing disparities in access speeds for businesses and homes.

5. **How can government strengthen the support provided by publicly-funded economic development institutions?** (e.g. the role of Mayor led Combined Authorities)

Green Recovery and Net Zero

1. **Which areas of infrastructure investment should we prioritise for early action to drive economic recovery and support delivery of net zero?** (e.g. building energy efficiency and heat, low carbon power, energy systems, electric vehicle infrastructure)

The resilience of the UK's communications network to the huge changes in working practices, home and remote working during lock-down has been one of the great success stories of our response to Covid-19. Without our comms network, which beyond the WiFi/mobile mast is built entirely on optical fibre technology, the economic impact of Covid-19 would have been far worse.

High speed dependable broadband access with a robust network can now clearly be seen as an essential service vital to sustaining the country in times of crisis. Our and other industry surveys indicate there will be a permanent shift to increased remote working that depends on the communication network. Covid-19 has also shown it is not always about mobile access and 4/5G -the majority of our Covid resilience has been built on wired networks.

Our communications network from the optical fibre backbone, to fibre-to-the-home, should be prioritised for significant investment to increase its capacity, resilience and capability and ensure it will be there to support any future crisis response and enable the new normal remote work. This investment should be used to proactively support the development of UK suppliers and UK technology wherever possible.

By investing in the network we can capture these benefits in reduced emissions that have been highly evident in the recent crisis for long term benefit. Such investment also provides reassurance that people and companies can stay connected no matter the crisis.

2. **What action should we take to align investment in the UK and globally with net zero?** (e.g. incentives for investment in net zero aligned infrastructure to reduce exposure to unsustainable investments and sectors)

Have a clear strategy for investment with KPIs, which allows companies to plan. A big problem for example was the ad-hoc changes to feed-in tariffs for renewable energies, not the reduction of the tariffs in general. It did not allow companies to plan. If subsidies were tied to cost of technology and percentage of renewable energy and those rules are public, companies would have been able to plan. The random changes almost killed off the solar market.

3. **What are the key regulatory barriers weakening incentives to invest in net zero, and how do we address them?**

Local planning for renewable energy sources such as wind and solar farms.

4. **How can we more effectively support businesses across the economy in acting to access growing low carbon markets and support delivery of net zero?** (e.g. innovation support, advice, regulatory barriers)

Educate about the opportunities and innovation in the areas and through innovation support. The photonics sector is an enabler also of the green economy, this ranges from using lasers in manufacturing which can support more efficient use of material to sensor technologies from process engineering to running windfarms more efficiently. Running innovation projects that could help translate those technologies widely would be welcome. Equally, the sector could also benefit from innovation since some of the processes used are energy intensive and polluting. Getting support on de-risking development and implementation of solitons are helpful

5. **How do we most effectively enable the UK's carbon intensive sectors to transition to low/zero emissions while maintaining competitiveness?** (e.g. CCUS/hydrogen)
6. **What actions should we take to embed net zero in local and regional economies?**

Starting and Growing a business in the UK

1. **What are the most significant barriers to starting and growing a business in the UK, and what can business and Government do to address them?** (e.g. regulations, costs to business, access to markets)

Access to growth finance has traditionally been a barrier.

Post Covid-19, however photonics companies have indicated access to customers is key to getting there business back on track. This includes E, and transcontinental travel and

resolution to delays and increased costs in global airfreight (a particular problem for high value supply chains). Whilst emphasised by existing photonics manufacturing business, these barriers will be equally relevant to new businesses. Given engagement with customers is a key requirement for investment, these new, post Covid-19, challenges may come to be most significant barriers for starting and growing a hi-tech globally facing UK business.

2. What specific actions should we take to ensure the UK creates a strong pipeline of investable start-ups that have the potential to grow into future UK Unicorns?

The UK already has several start-up programs funded either through public bodies such as STFC, EPSRC and InnovateUK or through learned societies. These are critical to prepare aspiring entrepreneurs for taking ideas to market and obtain investment. Continuation of such programs is important to create investable start-ups.

InnovateUK funded feasibility studies have helped photonic start-up companies to develop demonstrators and, indirectly provided due diligence for seed fund investment. This type of funding, including InnovateUK accelerator funding should be maintained.

3. Beyond making sure businesses have the access to finance to support growth, what are the most critical factors for successfully growing a business in the UK? (e.g. access to talent, level of ambition, access to markets)

Access to global markets and customers. Access to networks that facilitate collaboration, knowledge exchange, identifying new supply-chain partners and customer segments.

4. What more can be done to encourage businesses to invest in their own success? (e.g. capital investment, tech adoption, investing in skills, improving leadership and management capability)

Simplifying the R&D tax credit regime. In particular removing incentives / motivation apparent at HMRC to negotiate down R&D tax credit payments. HMRC should be encouraged to facilitate R&D tax credit payments to support company investment, rather than apparently looking for routes to reduce payments.

The current R&D tax credit processes further also favours larger companies who have the internal expertise to negotiate with HMRC, penalising SMEs who cannot support such expertise, but where credits make a proportionally larger impact on their internal investment.

The current apprenticeship levy is not supporting investment in skills by many SMEs or even modest sized large companies. Only very large companies can afford the dedicated staff teams required to define a full apprenticeship programme. Even companies of several hundred employees, find the burden of engaging with the current scheme excessive and cannot utilise the apprenticeship levy they are already paying for their benefit. The scheme requires rethinking to support investment in internal skills across a greater range of companies.

5. How can we boost progress (e.g. develop equity finance ecosystems) in some of the hubs for fast-growing businesses outside of London? How can we support

businesses through venture capital, an area where our performance outstrips that of European neighbours?

- 6. How can government target skills and employment support to best aid economic recovery and drive progression and productivity, and which interventions should we prioritise?**

An urgent review of the types of training a company can use the apprenticeship levy for. Reduced demand can free up staff time for training, but there are many types of CPD training that the apprenticeship levy can not currently be used for. Removing restrictions would not require new money, but enable better use of existing funds.