

Late-stage development and demonstrators

Summary

Late-stage development and demonstration is difficult and risky, but is a crucial step in bringing new products and services through to market.

Attracting later stage innovation activities can bring significant benefits to the broader economy. Sites often become the primary location for companies' market development and further R&D, as it convenes technologists, investors and customers, and is often capital intensive.

Compared to competitor countries, the UK is poor at supporting this crucial stage of development.

The UK should prioritise the provision of multiple support mechanisms for companies to develop, test and demonstrate their technological innovations. This should include maximising the use of existing infrastructure as national innovation assets.

After early-stage R&D and prototyping, most new products need to be extensively tested and demonstrated at scale in real-world environments before they can succeed on the market. They also need to be integrated and tested in a whole system. For example, autonomous vehicle technology needs to be trialled in full-scale, city-like testing facilities before it is market ready.

“There is more national support for ‘risk capital’, associated with later stage technology demonstration and scale-up, in countries like the US and China, than there is in the UK.”

Head of Technology, large company

Why is late-stage development work important?

For companies:

Late-stage development work is usually technically challenging and capital-intensive, and is therefore high-risk compared to early-stage R&D.

However, it also:

- allows companies to demonstrate their technology to potential customers, increasing confidence and the probability of successful transition to market
- acts as a focal point for technologists, investors and potential partners, establishing a skills base.

For broader economies:

Attracting late-stage development work can also have broader economic benefits:

- Companies may establish a broader base of work in demonstrator locations, including further R&D, due to the capital-intensive nature of this work.
- Demonstrators can support the development of a local market for new technologies, helping regions become leaders in emerging technologies and sectors.

What do late-stage development and demonstrators look like?

Late-stage development and demonstration projects can be very different across technologies and sectors, from purpose-built test facilities or equipment that can be used by multiple companies, to a real-world environment such as a city.

CCm Technologies has developed a technology that has the potential to reduce UK carbon emissions by converting CO₂ from industrial processes into useful products such as fertilisers. The company has received several innovation grants from public funders, including a recent grant from Innovate UK to develop a full-size sustainable fertiliser production unit that integrates with an anaerobic digestion unit¹. As well as helping them develop and assess their technology at scale, this has driven a step change in how they engage with potential customers as the technology can be seen working at full scale.

Vodafone 5G networks will provide ultrafast connection speeds and more reliable network performance. Vodafone is leading 5G trials in Milan and its metropolitan area after the Italian Ministry for Economic Development made frequencies available to the company so that it can trial pre-standard 5G at scale in the city using local infrastructure². This demonstration will bring a €90 million investment to the city over four years with 38 partnerships, as well as benefits to early test applications in healthcare and transport³.

“It has been more challenging to secure funding for our late-stage development work than early stage R&D. Yet it was this late-stage R&D that has been crucial in moving our technology from an idea to a commercial reality.”

CEO, small company

The challenge

Innovation funding in the UK is excellent for early-stage R&D but there is very little public support for late-stage development and demonstration work relative to comparator countries. Of active Innovate UK projects in 2017, only 10% are larger than £1 million⁴, suggesting large scale, late-stage projects are relatively rare.

➔ See also *Innovation funding*

Existing support is scarce but very valuable. Large scale facilities are provided by Catapult Centres, such as the High Value Manufacturing Catapult. The Aerospace Technology Institute and Advanced Propulsion Centre have also invested in demonstrators, supported by significant industry co-investment. The Industrial Strategy Challenge Fund is playing an important role in supporting demonstration activities that address specific challenges, such as the smart energy systems. However, companies interviewed emphasised that existing support is not meeting their needs.

For small companies who may have received significant government support for early R&D, it can be incredibly frustrating to lack support for crossing the final hurdle (the ‘Valley of Death’) and delivering new and beneficial technologies to market.

For large companies this gap often results in late-stage investments being made outside the UK. Since demonstrators are key to pulling products through to market, this has knock-on effects: market development, technology uptake, and further R&D end up being driven out of the UK.

While not all late-stage development and demonstrator activities may qualify under the Frascati definition of R&D, it is nevertheless a crucial part of realising the social and economic benefits from investment in R&D.



Almost a **third of the companies** interviewed find support for late-stage development a considerable barrier to their R&D investment in the UK.

Support for late-stage development and demonstrators can take many different forms:

- > The US Department of Energy Title XVII scheme⁵ provides loan guarantees to companies developing innovative clean energy technologies. These reduce the risk associated with late-stage projects and help companies to attract private investment to bridge the gap between laboratory and commercial delivery.
- > German Fraunhofer centres provide support across the technology development pipeline, including late-stage development. For example, the Test and Application Centre LINK⁶ at the Fraunhofer Institute for Integrated Circuits provides testing infrastructure for companies to trial Industry 4.0 technologies at scale without having to interrupt their own manufacturing.
- > Meridian, funded by UK government and industry, is developing a coordinated national platform of infrastructure to support the testing of connected and autonomous vehicles in the UK⁷. Continued investment in such projects is essential. Existing automotive testing facilities in the UK are oversubscribed, forcing companies to move R&D to other countries, delay work, or self-fund large projects that put them at a disadvantage compared to global competitors.

To increase business R&D investment:

- > Boost support for late-stage development and demonstrator projects that meet business needs.
- > Prioritise the provision of high-quality opportunities and diverse support mechanisms for companies to develop, test and demonstrate their technological innovations. Partnerships and co-investment are key, whether between industry and government or collaboration between businesses.
- > Use existing UK infrastructure as 'national innovation assets' to provide high-quality testing facilities. For example, use existing airfields for testing drones, hospitals to trial data-driven innovations, or existing factories to trial automation, as well as purpose-built infrastructure such as the Catapult Centres.



This explainer is part of a series based on interviews with individuals responsible for making decisions on R&D across a wide range of engineering companies.

See **Introduction** explainer to find out more.

- 1 *Gateway to research*, UK Research and Innovation, <https://gtr.ukri.org/projects?ref=103491>. Accessed September 2018.
- 2 *Vodafone trial extends range of pre-standard 5G*, Vodafone. <https://www.vodafone.com/content/index/what/technology-blog/testing-5g-in-milan.html>. Accessed October 2018.
- 3 *Vodafone 5G Milan*. https://www.vodafone5g.it/5g-milano.php#use__cases__wrapper. Accessed September 2018.
- 4 *Gateway to research*, UK Research and Innovation, <https://gtr.ukri.org/projects?ref=103491>. Accessed September 2018.
- 5 *Title XVII*, US Department of Energy. <https://www.energy.gov/lpo/title-xvii>. Accessed September 2018.
- 6 *Test and Application Centre L.I.N.K.*, Fraunhofer IIS. <https://www.iis.fraunhofer.de/en/profil/standorte/linkhalle.html>. Accessed September 2018.
- 7 *About us*, Meridian. <https://meridianmobility.tech/about-us/> Accessed October 2018.

