

POSSIBILITIES FOR THE NEXT WAVE OF CATAPULT CENTRES

A speech delivered on the Challenges and Opportunities for Extending the Catapult Network, Westminster Business Forum, at the Worshipful Company of Glaziers, London.

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Introduction

Good morning and thank you for the kind invitation to speak at this conference and I'm particularly pleased to be commenting on possibilities for the next wave of Catapult centres.

By way of introduction, I lead the Materials Processing Institute, which is an independent, not-for-profit research institute, working in the materials sector. Like Catapults, we sit in the technology space between universities and industry and our remit is the commercialisation of technology for process and product improvement. There are many standard industry technologies that are used globally and were developed in our laboratories in the 70 years since our inception.

My background has been primarily in industrial research, but I have also worked in industry, in manufacturing, technology and commercial roles, so I have been both a provider and a customer of industrial research. My experience includes leading an international research organisation in a large company and working extensively in international collaborations in Europe and Asia, which has given me an insight into how innovation is organised and executed in other territories.

This morning I will outline the need for another wave of centres, the challenges this poses and how we might overcome this and I will illustrate this by means of a case study around the proposal for a new Materials Catapult that is currently under discussion with Government.

I realise many of you may be unfamiliar with the materials industries. However, I am referring quite specifically to the point in the supply chain that is generally before a component is formed. It also fully encompasses the circular economy, industrial decarbonisation and alternative energy. Currently this part of industry does not have the support of a Catapult.

By using Materials as an example we can consider how a new wave of Catapult centres can be established, but it is first useful to take something of a historical perspective by considering the outcomes from previous waves of Catapult centres in the UK.

Historical Perspective

We are currently in the third wave of establishing catapult and catapult like research centres. The first wave was in the 1920s and the second in the 1940s. My own organisation, the Materials Processing Institute, is a product of the second wave, when, only ten days after D-Day, the government set about the process of establishing a national research institute for the Iron and steel industries. Even the funding model at that time was similar to the modern Catapult network. It ultimately resulted in each pound of public money being matched by one pound of private money. A model that is broadly the same as the current Catapult network.

Our first research director, Sir Charlese Govdeve, was of the firm view that a research institute was to be complementary to the R&D laboratories in industry, not in competition with them and that the role of the Institute must be understood in relation to the wider research landscape of universities, industry, science and technology. We talk about the 'valley of death' and mid-range technology readiness levels as a relatively new concept, but in 1962 Sir Charles identified the 'bridge' that is required between research for the 'advancement of knowledge', to be carried out at a university, and research for the 'benefit of mankind of mankind' focussed on industry. The research institute has its peak activity at the intersection of the two and straddles the domains of both science and technology.



So there is a clear understanding that there is a need for specialist innovation organisations, as distinct from universities, to commercialise research, develop technologies and help make leaps forward in industrial productivity. It is also a well established principle that they need to exist as partnerships between government and industry.

Need for and Selection of New Catapults

In considering whether more Catapults are required, it is important to consider the economic impact and future growth potential of different industrial sectors. New Catapults need to also to be formed where there is scope world leading improvement in competitiveness through innovation. The starting point therefore needs to be firm economic data on the scale of the opportunity.

A set of five criteria have been previously defined for determining whether there is a need for a Catapult in a particular area. They are that:

- 1. There should be access to markets worth billions of pounds per year
- 2. The UK should have world leading research capability
- 3. We should have the ability to exploit the technology and increase investment
- 4. We should be able to attract and anchor more knowledge-intensive, globally mobile companies and secure sustainable wealth creation
- 5. And finally that this should be aligned to strategic priorities.

I think I can sum this up in that there should be a market opportunity, a knowledge opportunity, a technology opportunity and an investment opportunity, to realise a national competitive advantage. For industrialists such as myself, this is quite readily recognisable as a criteria for investment appraisal in the technology space and of course a Catapult is a joint industry and Government investment, so the investment appraisal approach makes sense and should be adequate for assessing the majority of cases.

Returning to my example, the proposed Materials Catapult has identified a sector with a turnover of £69bn, representing 30% of UK trade goods and half a million employees, with a GVA contribution 36% higher than the economy as a whole, excluding financial services. In the metals sub-sector, GVA is higher still.

UK universities are generating world leading research and continued investment in new centres, such as Royce at Manchester, demands that facilities be made available for commercialisation. Finally in the technology and investment space, the materials industries are at the cusp of a major global technology shift in processing technologies, with new entrants are looking for investment opportunities. The UK has a window of opportunity to become the leading European nation in this race for materials supremacy. History tells us that where materials start advanced manufacturing follows and so the economic benefits are clear.

Challenges for Catapults

There are many challenges facing Catapult centres to ensure the long term success and viability of the industries they serve. Some of these challenges have become apparent as the current wave of Catapults have been established, others exist only because of the need to establish more centres. It would be foolish to embark on an expansion of the network without addressing and today I would like to address two of these challenges:

- 1. Viability of future funding.
- 2. Working with SMEs.



Viability of Future Funding

One of the key reasons for the success of the Franhoffer institutes and for the drift of our own previous waves of research institutes is the certainty of long term commitment to public funding. This is not just a question about providing for funding across a Parliament, or of the rhetoric of politicians, but whether, given historical precedent and the political culture in the UK, it is reasonable to anticipate that Government funding will be sustained for the long term.

This aspect of the reliability of Government as a long term partner is a topic that I raised recently in discussions with Government and research agencies in Slovakia, where I was asked to advise on options for establishing national research institutes. My advice at that time was that unless you can create the sense of certainty around a long term commitment to the funding, then you must acknowledge that you need to create a system that works locally, within the bounds of your own political framework, rather than trying to replicate the Franhoffer system. In contemplating the expansion of the Catapult network we need to make similar considerations in the UK.

It is seems to me unfeasible to imagine that as the network expands, Government will continue to make open ended commitments to the provision of core funding, particularly as the funding requirement continues to grow in existing Catapults.

In the Materials Catapult proposal we have tried to address this issue by explicitly identifying and leveraging existing assets nationally, where they exist. For instance, ourselves, TWI and the Institute of Materials, as partners in the proposal, bring our existing asset base and capability.

We have then assembled a coalition of other parties that can be engaged with the Catapult to provide the necessary expertise and facilities as required by the programme. We believe that this points to a successful model for future Catapults, where, by leveraging existing facilities in which investment has already been made, phenomenal value for money can be achieved.

So for the Catapult centres I advocate that innovation does not end with the technology, it must include an innovative approach to funding and to the business model as well.

Working with SMEs

The second major challenge is around working with SMEs in the supply chain. The scale of the opportunity here is staggering. For instance the automotive sector runs an £18bn trade deficit. Only £6bn of this is in finished goods, the rest is in the supply chain. As the automotive sector expands the supply chain companies must expand as well, or risk losing their entire contract overseas. An increase of productivity in the supply chain of up to 30% in the next four years is required to keep the supply chain in the UK.

The existing Catapults have been phenomenally successful in working with larger companies, but as we move further up the supply chain there are a plethora of SMEs, in desperate need of innovation support, but who might not have even heard of Catapults, or InnovateUK. This is the area of untapped potential for significant improvements in innovation and we recognise this in the Materials space, which is the most SME dense industrial sector in the country.

Our market research has shown that SMEs will look locally for innovation support and so, to be successful, a Catapult must have a pervading national presence. What this means is that 'place' becomes an important part of the overall Catapult package.



We have addressed this in the Materials space, by proposing to utilise the establishments of the participating partners, giving the Catapult an immediate national reach and a specific understanding of the priorities in different regional manufacturing centres.

Conclusion

It can be clearly seen that there is a need for a continued, measured expansion of the Catapult network. That the approach taken in the materials sector which was to:

First identify the opportunity using clear economic indicators and extensive market research;

Then bring together the right innovation partners to leverage the asset base and expertise;

Lastly to use the partner establishments to provide the national reach that SMEs require;

could be a demonstration of the model by which we can continue to create a financially sustainable expansion to the network and provide exactly the type of innovation support that is being requested by industry and is ultimately essential to the competitiveness of UK manufacturing.

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Chris McDonald is the Chief Executive Officer of the Materials Processing Institute. The Institute carries out industrial research and innovation in advanced materials, low carbon energy and the circular economy. Chris's background is in industrial research and manufacturing, where he has worked internationally. He led the divestment and return to independent, not-for-profit ownership of the Institute in 2014, the year the organisation celebrated its 70th anniversary.

In addition to leading the Institute, Chris provides expert consultancy support to companies, Governments and public bodies, in technology strategy and the technical due diligence aspects of mergers and acquisitions. He is prominent in the development of public policy, around innovation, steel and SMEs, where he works to support growth and inward investment. He is the policy chair for Innovation and Enterprise for the Federation of Small Businesses, a member of the CBI Regional Council for the North East and is the Innovation Lead for the UK Metals Council. Chris is also a member of the Steel Advisory Board for UK Steel (EEF).

A graduate of Cambridge University, Chris is a Fellow the Institute of Chemical Engineers and of the Institute of Materials, Minerals and Mining. He sits on industrial advisory boards at a number of universities, including Oxford and Sheffield.

He is often called to commentate in the media on innovation leadership and the steel industry.

Chris McDonald Chief Executive Officer Materials Processing Institute Chris provides expert consultancy support to companies, Governments and public bodies in materials, technology and innovation strategy 9 9



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Materials Processing Institute

The Materials Processing Institute is an independent, open access and not-for-profit technology and innovation centre working with industry, government and academia worldwide. Support ranges from small scale, site based investigations, through to long term collaborative research programmes.

The Materials Processing Institute is expert in advanced materials, low carbon energy and the circular economy, specialising in challenging processes, particularly those involving high specification materials, high temperatures and difficult operating conditions.

The Institute has over 70 years' experience as a leading UK technology provider. Extensive materials processing knowledge is supported by state-of-the-art facilities with a broad range of equipment, from laboratories through to demonstration, scale-up and production plant.

Scientists and engineers work with industry and apply their expertise to develop and implement robust solutions to research and development and improvements for products and processes.

Expertise is spread across a wide range of disciplines, including:

- Materials Characterisation, Research and Development
- > Simulation and Design
- > Monitoring, Measurement and Control in Hostile Environments
- > Process Development and Upscaling
- > Specialist Melting and Steel / Alloy Production
- > Engineering / Asset Management
- > Materials Handling
- > Minerals and Ores

Research and project management teams deliver support across a wide range of industrial and manufacturing sectors including:

- > Metals and Metals Manufacture
- > Chemicals and Process
- > Nuclear
- > Oil & Gas
- > Energy
- > Aerospace and Defence
- > Mining and Quarrying



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