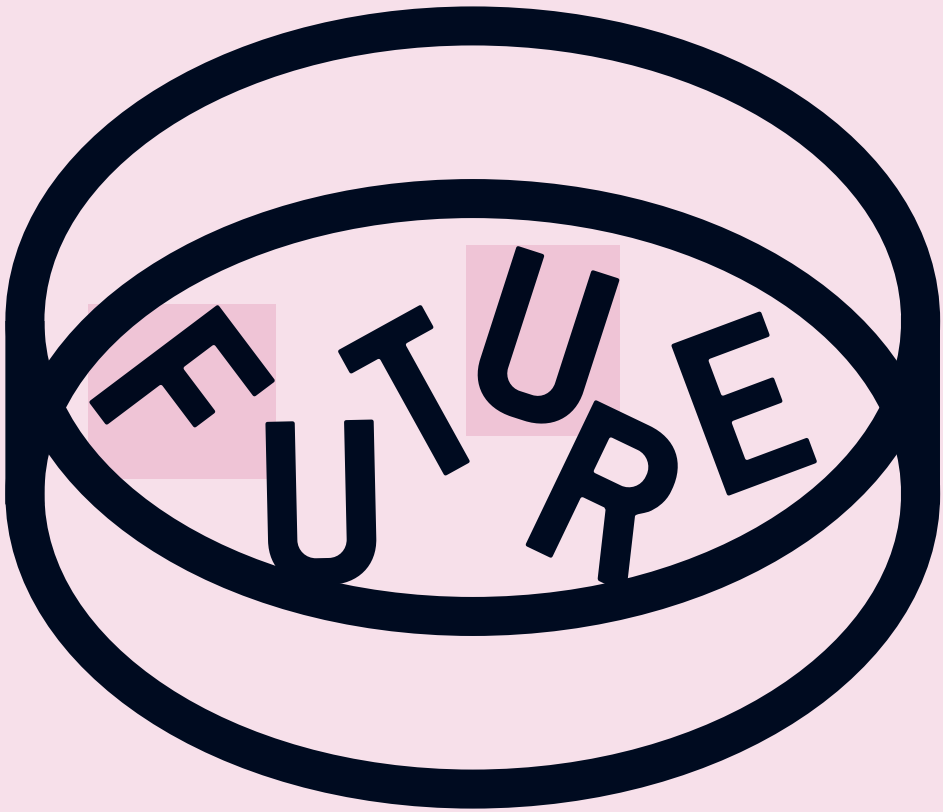


Review of Daresbury Science and Innovation Campus



About the Review

The Manchester Independent Economic Review provides a detailed and rigorous assessment of the current state and future potential of Manchester's economy. It contains a rich seam of evidence to inform the actions of public and private sector decision-makers so that Manchester can achieve long-term sustainable economic growth and boost the performance of the national economy.

Completely independent of local and national government, the Review is led by a panel of five prominent economists and business leaders:

*Sir Tom McKillop:
Chairman, Manchester Independent Economic Review*

*Diane Coyle:
Managing Director, Enlightenment Economics*

*Ed Glaeser:
Professor of Economics, Harvard University*

*Jonathan Kestenbaum:
Chief Executive, NESTA*

*Jim O'Neill:
Chief Economist and Head of Global Economic Research,
Goldman Sachs*

The Review Panel commissioned seven world-class organisations to work on seven strands of analysis which provide a deep and cutting-edge analysis of the economics of the Manchester City Region: the way businesses and people interact in terms of trade and skills, the causes and impact of innovation, how investment comes about and the effect it has, and why, despite all this economic activity and growth, stubborn pockets of deprivation still persist.

An ambitious agenda-setting report pulls together the seven strands of analysis, output from the comprehensive economic baseline study, as well as incorporating the extensive intelligence gathered from a year long consultation across the public, private and voluntary sector, which will be the foundation of an ambitious economic strategy so that the world-class research the Review has produced is used to drive Manchester's aspirations forward.

The Review has been funded by the Manchester Innovation Investment Fund, which is supported by both the Northwest Regional Development Agency and the National Endowment for Science Technology and Arts, separately by the Northwest Regional Development Agency, by the Learning and Skills Council and by the North West Improvement Network. The Review is also funded, supported and underwritten by the Association of Greater Manchester Authorities.

FOREWORD

The Daresbury Campus is one of the UK's major scientific assets, and has a promising future as a leading national and international centre for scientific research.

However, some challenging conditions must be met if its future potential is to be fully realised.

This is our conclusion based on a report we commissioned from PwC as part of the Manchester Independent Economic Review. Here we set out our recommendations if Daresbury's full potential is to be realised.

The benefits of a thriving centre for 'big science' at Daresbury will be immense for the UK as a whole, not simply for the regional economy. The campus is on the right path to achieve this vision. The Manchester City Region (MCR) and the wider Northwest are a source of large numbers of skilled scientists; the infrastructure exists to support the science and innovation campus.

Realising Daresbury's potential as a leading national centre of world-class research into the future would cement in place a virtuous circle of scientific training and scientific discovery, to the huge benefit of the universities of the Northwest. It would continue to support the creation of new businesses and jobs. It would also, of course, start to redress the extraordinary regional imbalance in the national scientific framework which has occurred since the 1960s.

However, while we welcome the positive potential identified by the PwC report, there are some essential challenges which must be met before it can be realised.

The first, and most important, is a challenge to the Department for Innovation, Universities and Skills (DIUS) concerning the funding of major scientific projects.

Daresbury's future as a science campus, as opposed to a successful technology business park, rests on its selection as the destination for major investments in 'big science'. The government has made verbal commitment to a 'di-polar' approach which envisions Daresbury as one of the leading UK scientific research facilities, and recent decisions on a £65M computer sciences centre and a research facility for detector systems are a good start.

However, in big science funding, as in other areas of flagship public spending, government decisions have in the past favoured the south and east. There is always a short-term rationale for selecting already well established centres. This means that the favoured one or two centres pull further and further ahead of any other contenders. The resulting imbalance has created constraints (such as onerous planning restrictions) which are inhibiting the future performance of the well-established centres in the south and east.

Only government intervention can ensure a proper balance. At some point, the government must take a long-term decision to develop alternative research centres (as happens in all other countries). Ultimately, the best scientists in a given area of research will go to the location of the taxpayer-financed equipment they need.

We see it as essential for the future of Daresbury as a leading national scientific centre, working in co-operation with Harwell, that the government makes it the location for the next major facilities investment of symbolic importance.

The second condition is a challenge to Daresbury itself.

The report identifies the need for a clear overarching governance structure reflecting Daresbury's national status; a clarity of scientific vision with a scientific advisory board as its champion; and realistic financial planning.

Delivery on partnerships which will realise the promise of 'open innovation' and ensure Daresbury's future funding needs is identified as a priority. This will require co-ordinated operational and management structures and clear and accountable governance.

The current arrangements lack a consistent, overarching management group, and the existing relationships between relevant parties are too complex and informal for a major national scientific research centre.

It is important to recognise Daresbury's potential national and international importance in its governance structure, and it should therefore not include only regional bodies on its board (just as other national centres in turn ought to have wide shareholder representation on their boards). Equally, its status as a national scientific research centre means it needs scientific leadership of the highest calibre.

An important key task for the short term will be the appointment of a scientific champion, and the development of an operating plan which amongst other things clarifies future funding requirements. Daresbury's current partners, stakeholders and companies will need to work together to deliver an appropriate governance structure, in a process in which the Government as the major ultimate funder could appropriately take a lead; the report describes a possible future structure.

The third condition is a challenge to the leading universities.

The UK's universities are rightly focused on the quality of their research. They want to attract the best people and provide them with access to the best possible research facilities, wherever these are located.

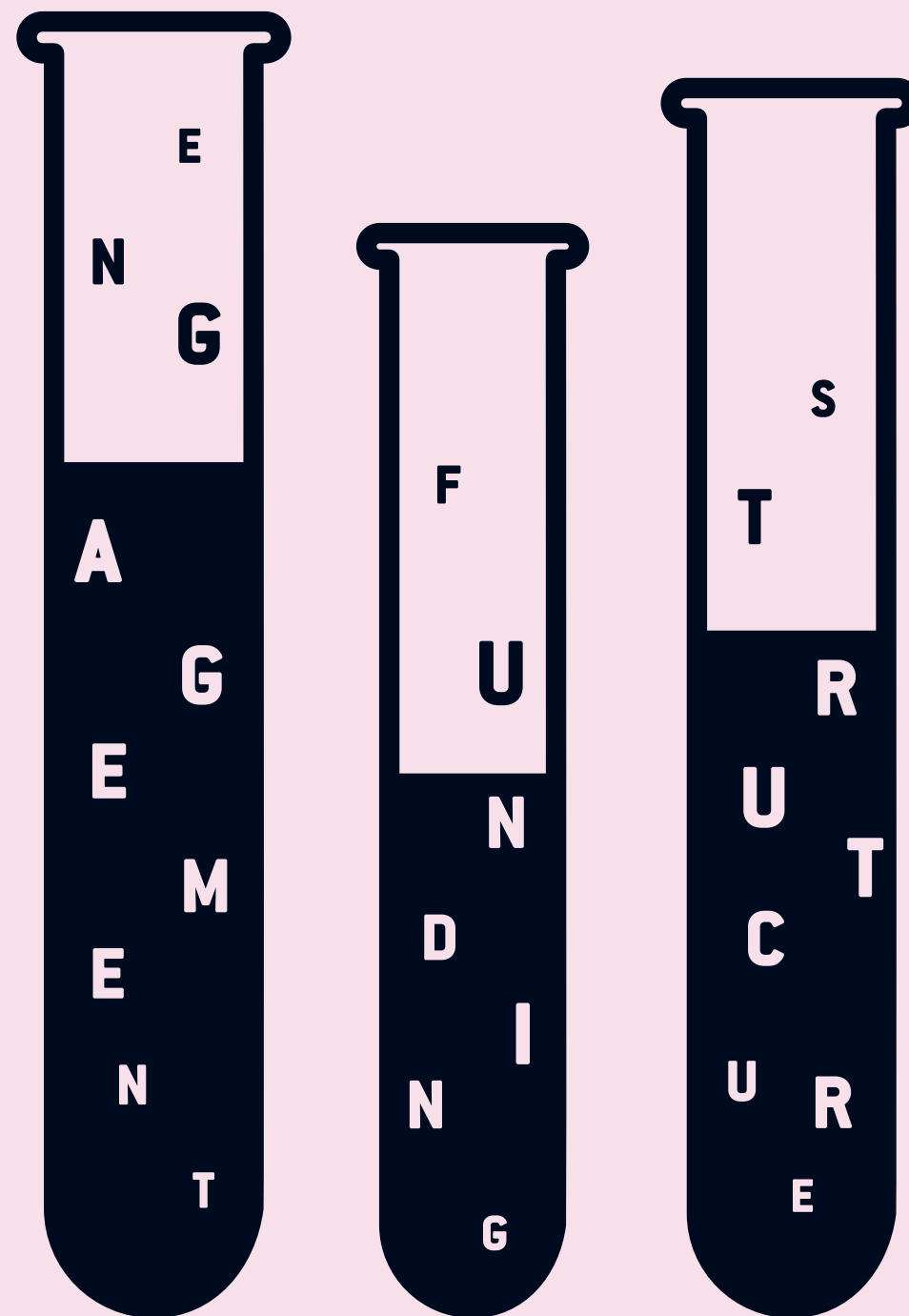
However, Daresbury will not be able to articulate and implement a sufficiently ambitious scientific vision without the active support and engagement of the universities which will use its facilities. If they are sceptical or semi-detached about its future, they will undermine it, thereby losing an opportunity to shape a resource for the benefit of their own scientists.

The universities of the Northwest certainly need to rise to this challenge, and their proximity makes it easier for them to be engaged; but so do leading universities elsewhere in the UK. National resources ought to have representation and engagement from all of the country's leading universities as well as a special relationship with neighbouring universities.

In the future we envision for Daresbury, leading scientists from all over the UK and the rest of the world will seek it out, and the entire national scientific establishment must be involved in delivering this world-class status.

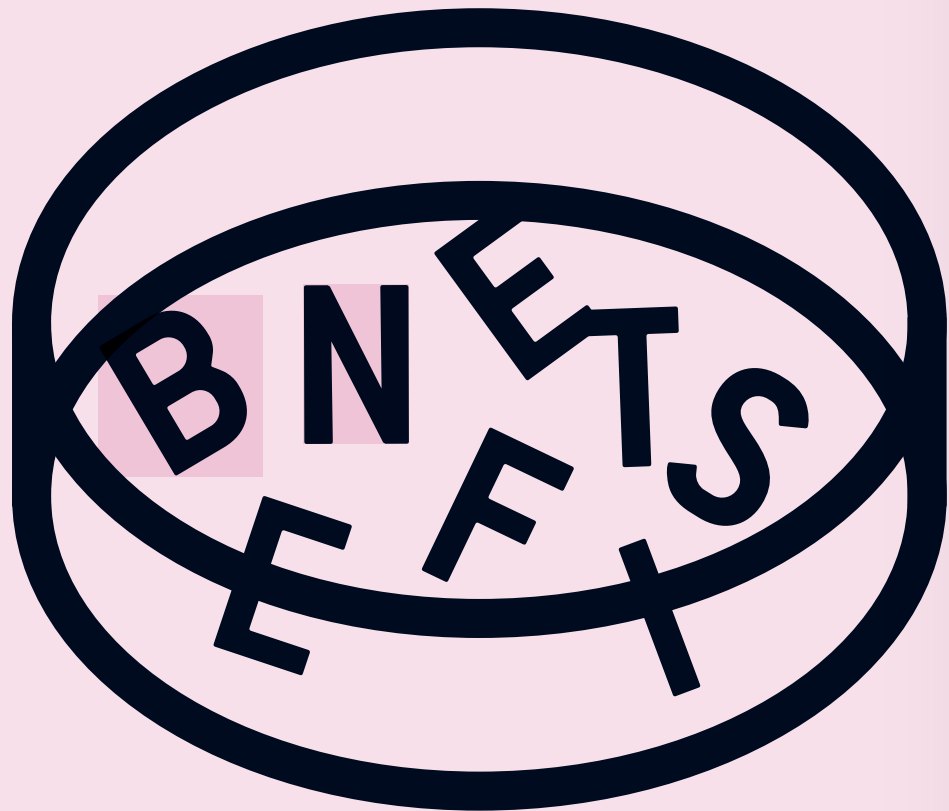
All of these challenges must be addressed together, if the potentially bright future for Daresbury as an internationally important centre of scientific research is to be realised. This will not be easy as any set of stakeholders has somebody else to blame if things go wrong, undermining their incentive to co-operate.

Overcoming co-ordination problems of this kind is a proper task for government, and we would look to DIUS to take a lead in ensuring the Science and Technology Funding Council (STFC) and other funders, the Daresbury shareholders and management, and the university leaderships, work together.



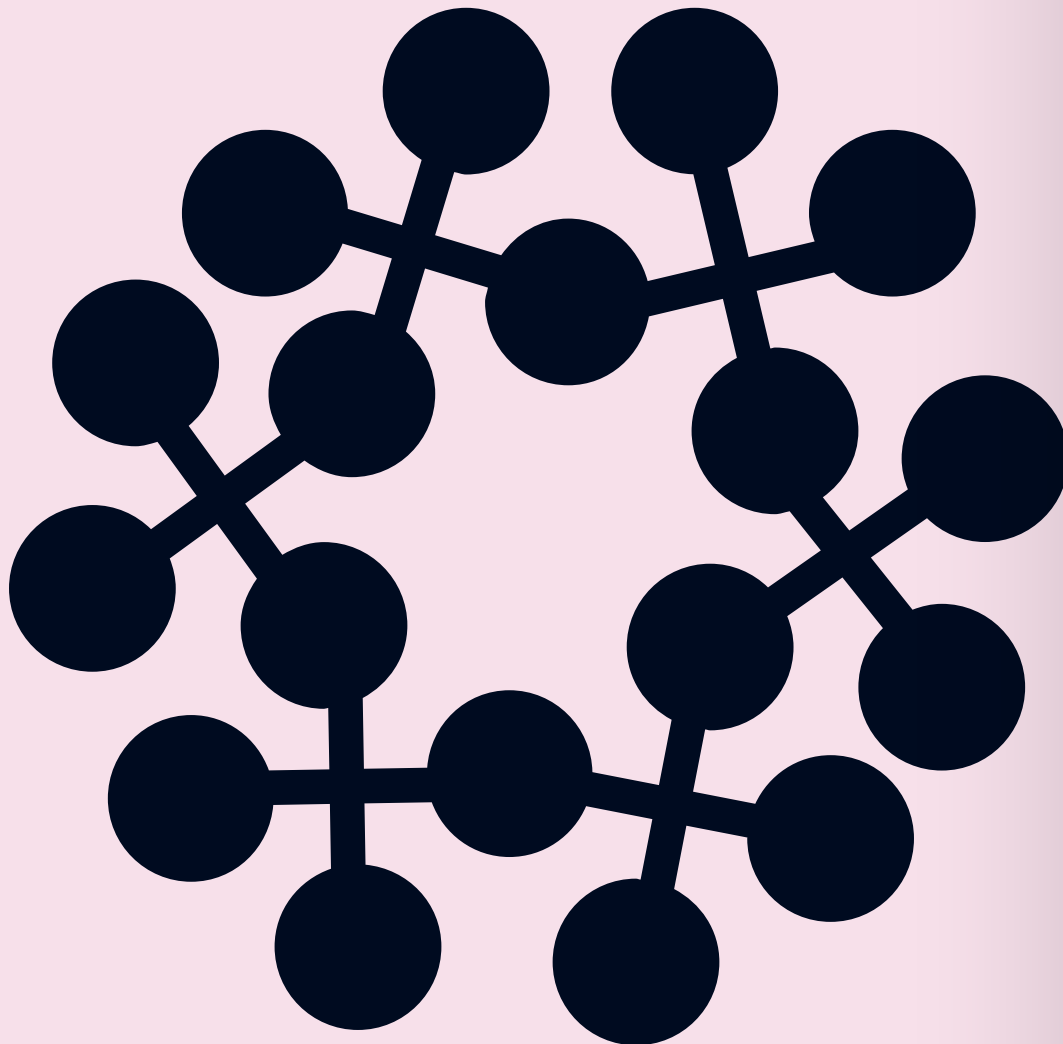
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EXECUTIVE SUMMARY

Daresbury Science and Innovation Campus offers significant potential benefits to the Northwest Region and the UK as a whole.



These benefits will be realised through the adoption of open innovation involving the collaboration, on site, of industry, research facilities and academia in world class science and technology – research and development.

A pre-requisite to generating these benefits will be the continued commitment and investment by government in the campus facilities. Current estimates suggest the need for more than £600 million investment over the next thirty years. This could lead to over 12,000 new jobs on site producing up to an additional £217 million gross value added (GVA) annually to the Region.

Government commitments will only be forthcoming if the campus structure and operation can now demonstrate the capability to deliver such returns and, in the future, ensure that employment and income rise in the manner suggested by the open innovation approach.

There are several factors that are likely to affect this capability (and by implication sustainability and attractiveness to government and users), namely:

- **Co-ordinated operational and management structures:** the success of the campus will depend upon formal and informal networking and co-operation and open innovation between campus organisations and external partners. In this context the current operating structures appear unco-ordinated and will benefit from reform;

- **Funding:** the current emphasis of the campus is on securing capital funding support for facilities on site, particularly in seeking the Government's commitment. There is also a need for a detailed funding strategy, covering non-capital funding – co-ordinated on a campus-wide basis – and this should be one of the priorities of a co-ordinated management structure;

- **Partnership commitments:** the continued commitment to using the Daresbury facilities (particularly by the regional universities) cannot currently be assured over the longer term. Universities are bound to opt for whichever facilities best suit the needs of their researchers. These essential partnerships need to be strengthened by a range of approaches and new university partners identified; and

- **Research and commercialisation activities:** the aim of the open innovation model is to extend the benefits of research activities beyond the campus. While it may be premature in the context of the primary research currently carried out at the laboratory, it will be important in future to consider the structure, resources and mechanisms that will support the links between initial research and development, spin-outs at the Daresbury Innovation Centre, on-going support and ultimately commercial exploitation of research.

Against the above, there are a series of actions and recommended approaches that could strengthen the future potential of the campus in realising the vision of open innovation, securing the support of Government and attracting future users to the site, namely:

- Introducing a new overall operating structure, a Science and Technology Plan, a Project Champion and a Scientific Advisory Board, in order to manage the complex relationships that will be needed to ensure open innovation opportunities are maximised;
- Enhancing revenue generation opportunities with detailed short and medium-term planning to realise greater funding and create a long-term sustainable flow of revenue;
- Building deeper relationships with existing partners and attracting new partners to enhance further the quality of on-site science and innovation and to maximise the involvement of the wider research community; and
- Increasing engagement with industry through provision of space and other facilities for business through enhanced knowledge transfer activity to maximise on-site industry involvement.

1.0 INTRODUCTION

The overall aim of the Daresbury Science and Innovation Campus is to reinforce the strengths of the national and regional science base, by promoting primary research – academic linkages to exploit research & development (R&D) opportunities.

1.1 Study context

The Daresbury Science and Innovation Campus (DSIC) is recognised, together with the Harwell facilities, as part of a commitment by the UK Government to developing two poles (the di-polar model) of world class science and technology, research and development.

This commitment has been reinforced by the recent announcement of over £65 million in investment at Daresbury to finance a computer sciences centre and a research facility to develop detector systems.¹

In this context DSIC offers the first major opportunity in the UK to test and develop the model known as “Open Innovation”, or the:

“enhancement and sustenance of a research and development activity of internationally recognised excellence involving industry, research laboratory and academia in a seamless, three-way collaboration with uninhibited technology transfer.”²

The strategic importance of the campus to the nation and to the region, and the benefits that could be realised by the successful implementation of a process of open innovation, should not be underestimated. The potential benefits include:

- **international competitive advantages to the UK that might be gained in terms of combining scientific, innovation and entrepreneurial excellence;**
- **development of commercially exploitable research, through collaborations with on-site academic and industry partners;**

¹ As announced in July 2008 the funding will be drawn down from the Large Facilities Capital Fund (“LFCF”) which is used for providing additional capital to priority projects identified by UK Research Councils. The Hartree Centre, to be based solely at Daresbury, will receive £50 million in funding.

The Detector Systems Centre will operate over two research sites: one at Daresbury in Cheshire the other at the Harwell Science and Innovation Campus in Oxfordshire. The £30 million funding allocated to the Centre will be split 50:50 between these two sites.

² See: Economic Appraisal of Daresbury Science Park, 2005, p.12-14.

³ See: DSIC – Business Plan, 2008, p.4-5.

⁴ Based on the current average income per employee of £85,000 at the Daresbury Innovation Centre and SIC Division 73: ‘Research and Development’ GVA per employee, Scottish Executive, Scottish Economic Statistics, 2004 (<http://www.scotland.gov.uk/Topics/Statistics/16170/ScotSec04>).

⁵ It is important to note that, in May 2008, PwC were also commissioned by the Northwest Development Agency to undertake an evaluation of the current operations of the Campus. PwC agreed, therefore, with the Agency and MIER that there would be significant benefits and economies of scale to undertaking both studies in parallel.

- **economic benefits accruing to the region and the UK as a whole, through the development of science-based businesses and highly skilled jobs; and,**
- **maintaining and enhancing the UK’s international position in leading edge research and development, through the provision of large scale and ‘big science’ R&D facilities.**

The current master plan for the campus envisages, over the next thirty years, new capital investment in the site of over £600 million and up to 12,000 new jobs which would:

“provide for higher growth than that proposed for Harwell SIC and that seen in other key UK science park developments (e.g. Cambridge Science Park).”³

Based on existing metrics,⁴ such an uplift in employment could be worth annually around £1 billion income, or £217 million gross value added to the regional economy.

If this investment is delivered, the campus offers the opportunity for a step change in UK science and innovation policy, with a range of attendant benefits that will significantly enhance the UK’s global economic strength and the Northwest’s position in the UK economy.

1.2 Study rationale

In April 2008, PricewaterhouseCoopers LLP (PwC) were commissioned by the Manchester Independent Economic Review (MIER) to undertake – in the context of the current position – a strategic review of the future prospects for the Campus.⁵

Although a very different model is now being developed, the original outline for the Campus originated in 2000 when the Government Office for the Northwest, on behalf of the Northwest Science and Daresbury Development Group, commissioned the Northwest Science and Daresbury Development Study.

This study noted that, despite the world class quality of the Northwest’s science base, the region’s science sector was dominated by just a few key facilities, poor research-industry relationships, low private sector research and development (R&D) spending and limited inter-university collaboration.

The 2000 study concluded that such a weak background could stifle future R&D in the region with industry likely to rely increasingly on scientific excellence located outside the region.

Given this weakness, the study suggested that (with the appropriate regional support infrastructure) the Daresbury site could and should be developed as a world class campus for multidisciplinary scientific research in physics, biosciences, computing and engineering.

In response, the Northwest Regional Development Agency (NWDA) purchased land adjacent to the Daresbury Laboratory – in March 2001 – with a view to developing a science and innovation campus at Daresbury. This led to the development of the Daresbury Science Park project which sought to act as an incubator, provide office space on the site, and to develop a co-operation agreement with the Laboratory.

The project proposals initially envisaged the development of two new buildings: Building 1 to house laboratory space and a business campus and incubator and Building 2, as a grow-on (for companies from Building 1) office building.

In November 2003 a decision was taken in principle by the NWDA (subject to formal approval which was received from the then-DTI in April 2005) to support the establishment of a research and development institute by providing facilities and space at Building 2 at a cost of up to £10 million.

This Institute (entitled the Cockcroft Institute for Accelerator Science and Technology) was to provide an “intellectual and practical focus” for R&D in Accelerator Science and Technology, by facilitating the development of new technologies in UK industry, thereby enabling local businesses and researchers to take advantage of the potential commercial opportunities.

After a 2004 reappraisal by the NWDA and the Science and Technology Funding Council (STFC), joint venture proposals were developed (with the Laboratory in partnership with the Universities of Lancaster, Liverpool and Manchester) for Building 2 to be used to house the Institute.

The DSIC was completed in January 2005 and the Institute in May 2006. The government in March 2006 had recognised the campus as one of only two UK “Science and Innovation Campuses”⁶ in recognition of the opportunities offered by open innovation regionally and nationally.

This decision was included in the Science and Innovation Investment Framework “Next Steps” document, which set out the government’s intention to create a more effective science and innovation system, and to maximise the impact of public investment in science on business innovation.

A key aspect of the plan was the establishment of two national science and innovation campuses to help attain this business-science collaboration, one at Daresbury the other at Harwell. The Daresbury Campus was formally inaugurated by Lord Sainsbury, the former Science and Innovation Minister, in September 2006.

1.3 Review issues

The success of Daresbury depends on the realisation of the commitment of the UK Government – and the Department for Innovation, Universities and Skills (DIUS) in particular – to supporting the di-polar model and investing significant funds to develop “big science” facilities on the Campus.

These major investments in world class facilities occur only rarely, and it will be important for the UK Government to demonstrate to all the other stakeholders, at the first opportunity, its commitment to locating such a facility at Daresbury.

The subsequent aspiration of securing of up to 12,000 jobs at Daresbury will depend on ensuring that the collaborative research, envisaged through open innovation, attracts research teams from leading global technology companies to locate on site alongside the innovative SMEs that are likely to be nurtured by the Innovation Centre.

Our study, therefore, has focused upon the constraints and opportunities to realising this long-term vision. In particular, while stakeholders recognise the importance of the Government’s ongoing infrastructural investment on site as a necessary and essential condition for securing future growth, this is not viewed as sufficient. There are likely to be several other factors, within the control or influence of stakeholders, that will affect the future of Daresbury.

⁶ The other Campus facility is at Harwell, Oxfordshire.

The overall objective of our review has been, therefore, to assess the current operation of the campus, identify those factors that could either support or constrain the mission of the campus, and assess what changes should be considered and translated into agreed actions by relevant stakeholders.

As a result the key study issues we addressed were the:

- analysis of the current performance of the campus and its plans to generate growth, engender open innovation and meet the long-term mission of ensuring Daresbury is an internationally recognised, sustainable and world class facility;
- examination of the factors likely to influence the achievement of this aim in terms of the processes, activities and operational relationships between stakeholders in managing the campus; and
- assessment of options for the future development and operation of the campus in order to enhance its future growth potential.

1.4 Our approach

Our approach has consisted of:

- a detailed analysis of the financial information, strategic studies and other relevant documentation, provided by various stakeholders, relevant to the management and the current and future outputs of the campus;
- a comprehensive interview programme across a cross-section of campus staff, the management team, campus advisors, current tenants/users, NWDA staff, university representatives and other stakeholders, to examine their views as to the critical issues to delivering future growth; and
- an analysis of the implications of our findings to inform the MIER research and key stakeholders of the options for the development, management and operating structure of the campus, in order to deliver the shared aim of securing its world class status and to maximise its potential economic benefits.

1.5 Research outputs

The findings from these stages of work are summarised in the rest of this report:

- Context in Section 2 that covers the background to the development and vision of the campus, as well as the profile of campus activities;
- Key issues and recommendations in Section 3 which outlines the issues that we have identified relating to achieving the long-term vision for the campus, and our recommendations on how to address these issues; and
- Conclusions in Section 4 that set out the actions that stakeholders might wish to consider in supporting the campus.

By the nature of our work programme we have captured a significant amount of data, information and related study material and thus a substantial 'evidence base' to support our recommendations and conclusions.

We have provided this evidence in the form of appendices to this report (which are available to download at www.manchester-review.org.uk) and cited these appendices at relevant sections:

- Capital investment profiles (Appendix A): indicating, where known, the current projections in relation to public and private investments on the site;
- Background material summaries (Appendix B): in the form of matrices highlighting the key findings of our review of the various campus materials and documents provided to us by stakeholders;
- Consultees (Appendix C): listing the names and organisations of the representatives we interviewed during our work programme;
- Interview frameworks (Appendix D): detailing the questions we asked consultees in relation to their understanding, involvement with and views of the campus; and
- Summary of the key characteristics of the potential development options (Appendix E): outlining the options considered within the Master Plan for the future development of Daresbury.

We wish to recognise and thank all those who have taken time to speak to us and in other ways support this review. While all our consultations were undertaken on a non-attributable basis the views expressed by stakeholders form one of the core foundations of our analysis.

Finally we wish to stress that while the conclusions and recommendations we have drawn from this analysis are independent and objective, they aim to support these stakeholders in realising the long-term vision for the campus.

2.0 CONTEXT

In this section we outline the initial rationale and objectives for the campus, provide an overview of current activities and outcomes and consider the implications for our approach to analysing the possible future directions for the campus.

2.1 Introduction

Our analysis is, in part, based on our review of around 45 documents relating to the campus that were provided to us, at the start of this study, by the STFC, the NWDA and other stakeholders. Our main findings relating to this documentation are detailed at Appendix B.

2.2 Rationale

In a national context (as set out in the DTI's Competitiveness White Paper⁷ of 1998) the rationale for public sector support of facilities such as Daresbury is to ensure that the UK can compete effectively in a global economy whose main drivers will include: "innovation, commercialisation of ideas, creativity, skills and knowledge." All of these can be concentrated in a campus environment in order to gain the benefit of their mutual reinforcement.

⁷ "In order to compete in modern market places business has recognised that the drivers of the global economy are innovation, commercialisation of ideas, creativity, skills and knowledge. Higher education and campuses of research are at the heart of these drivers. They provide research and innovation, scholarship and teaching that equip individuals and businesses to respond to changes in the global economy. Higher education and campus of research are therefore at the core of the productive capacity of the new economy".

⁸ The CCLRC was formed in 1995 and owned and operated the Daresbury Laboratory as well as the Rutherford Appleton facility in Oxfordshire and Chilbolton in Hampshire. It has now been superseded by the STFC.

⁹ For example, the contribution of the Campus to business development objectives included:

- helping to foster and accelerate business cluster network development;
- pursuing the targeted attraction of inward investment to support business cluster development;
- encouraging business start-ups and spin-outs from universities;
- increasing the capacity of Northwest universities to develop targeted national and international science; and,
- encouraging the strategic development of science and innovation parks to support the increased growth of knowledge intensive businesses.

¹⁰ Science and Technology Facilities Council, Annual Report and Accounts 2007-2008, STFC, 2008.

In the Northwest, the initial rationale for support for DSIC was focused upon:

- creating the right environment in which larger companies could establish close linkages to research in order to foster technology acquisition, staff recruitment and innovation;
- establishing clusters of technology-based companies that would be more easily accessible to, and trusted by, these larger companies; and consequently
- developing business incubation support that helps entrepreneurs start new businesses.

The selection of a campus development at Daresbury was based on several factors. It was an attractive and well-located site, adjacent to the Daresbury Laboratory and could benefit from a committed partnership between the (then) Council for the Central Laboratory of the Research Councils⁸ (CCLRC) and the NWDA.

In addition, the development and build-out of the DSIC was seen as central to support the Regional Economic Strategy (RES) (2003) and, in particular, to meet the various business development, skills and employment, and infrastructure strategic objectives.⁹

The project was also identified as a major contribution to the NWDA's Science Strategy (2002) and Regional Innovation Strategy, and was supported by the Lambert Review (2003) and the HM Treasury July Spending Review (2004), both of which stressed the increased need for Regional Development Agency (RDA) investment in R&D and in the UK regional science base.

2.3 DSIC – objectives

At the national level, the Science and Technology Facilities Council (STFC)¹⁰ states that the National Science and Innovation Campuses will:

"become world-leading, internationally-regarded centres of excellence in science, technology and innovation, providing opportunities for businesses, universities and other public sector bodies to:

- work in an amenity rich, collaborative environment, that promotes exciting new open innovation techniques;
- access the STFC's advanced facilities and scientific and technical expertise;
- access a unique training ground with a highly qualified mix of professionals, ranging from experienced technicians, through to dynamic researchers and academics; and
- collaborate with the STFC and other campus partners in an exciting and innovative environment with new partnership models."

The vision for the Science and Innovation Campuses is that they will become national focal points for interaction between world class 'embedded science' facilities, ultra-high technology capabilities, world leading researchers in universities, and a strong and rapidly growing business base.

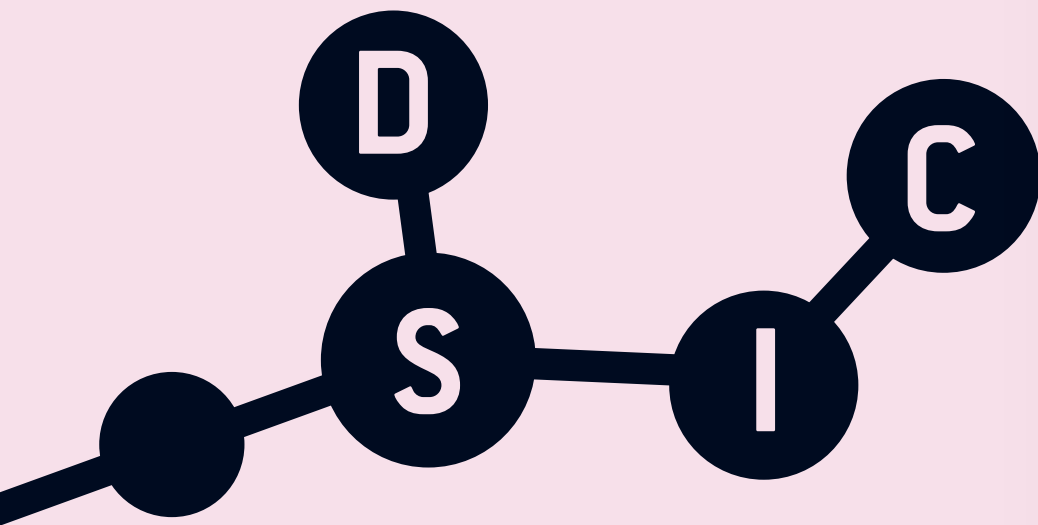
The campuses will be developed around a positive planning policy framework, offering a high quality environment for new industrial research activities and knowledge intensive businesses. They will act as powerful attractors of inward investment from the international research and development sector and multi-national companies.

The initial aims of the campus were focused on three key objectives:

- preventing any erosion of the regional science base, by accelerating the formation of new businesses linked to local research institutes and Higher Education Institutions;
- contributing to economic growth, by providing infrastructure and facilities for local science based businesses; and
- creating a world class cluster of businesses, by building on the core competencies of the Daresbury Laboratory.

These initial objectives were subsequently refined and expanded in the 2007 Business Plan for the campus, as follows:

- assisting in bringing “big science” investment in scientific research facilities and national research / technology centres to DSIC;
- developing and implementing a long-term plan to grow the “Science and Innovation Park” element of activities, through private funding;
- evaluating the options to secure the “grow-on building” to the Innovation Centre and progress the preferred option;
- providing facilities, support and networks to help tenant companies grow;
- providing facilities and support to catalyse tenant / tenant and tenant / stakeholder interactions and synergies;
- developing the DSIC brand, identity and reputation, in order to ensure national / international recognition;
- developing organisational structure and capabilities to facilitate growth and self-sufficiency;
- developing organisational capabilities and effective promotional and informational processes, to maximise inward investment opportunities on the campus;
- helping support spin-out activities from the Laboratory; and
- identifying and implementing campus operational efficiencies, working with tenants, STFC, and the NWDA.



2.4 DSIC – background

Daresbury Science and Innovation Campus Ltd. was established in September 2006 as a company limited by guarantee, with a Board comprising eight representatives from the NWDA, STFC, the Universities of Lancaster, Liverpool and Manchester, and Halton Borough Council.

The Board is responsible for the management of the campus including:

- development of the long-term vision for the campus;
- review and approval of business plans;
- securing / provision of required funding;
- review and approval of accounts, specifically the annual audited accounts;
- entering into agreements / contracts with third parties;
- ensuring compliance with all legal requirements and general good practice company management; and
- development of policies for the remuneration and recruitment of employees.

The DSIC consists currently of various existing and planned components, with the former comprising the:

- Daresbury Laboratory: (part of the STFC) is one of Europe’s largest multidisciplinary research organisations supporting scientists and engineers world-wide. It has a staff of 550 supporting the work of over 5,000 scientists and engineers, mainly from the university research community, but increasingly with industrial and commercial partners. The laboratory is responsible for several large-scale facilities and has expertise in: synchrotron light exploitation; accelerator science; advanced instrumentation; advanced engineering; high performance computing; nuclear physics and modelling and simulation;

These objectives were updated further in 2008 to incorporate a number of specific targeted goals, in the form of a ten point plan relating to the growth, funding and delivery of the preferred Master Plan for the campus (and the ‘grow-on’ building) to include:

- assisting in bringing large science facilities and national research / technology to the DSIC;
- delivering the grow-on building by 2009 and bring forward sufficient tenants to fill it within 3 years of opening;
- delivering the first single-occupier building by 2010;
- promoting the preferred Master Plan and developing an appropriate delivery mechanism to realise it;
- developing the DSIC profile and reputation to ensure national / international recognition;
- developing plans for long-term self-funding and to be on track to deliver substantial income streams by 2009;
- providing required facilities, support and networks to help tenant companies maximise their growth, in particular through collaboration with campus stakeholders / partners;
- building on the existing first-class events programme through collaboration with campus stakeholders / partners;
- continuing the momentum for business development growth within the Innovation Campus without overstressing available capacity; and
- delivering the Business Support Fund and ensuring that all NWDA / European Regional Development Fund audit requirements are met.

- Daresbury Innovation Centre (DIC): on NWDA-owned land. Currently populated with over 70 companies employing around 200 staff, the facilities at the DIC include laboratory and office space, specialist support for growing businesses, high-speed internet access, full access to a range of meeting rooms and other business services; and
- Cockcroft Institute: the UK Centre for Accelerator Science in an NWDA-owned building. The Institute employs around 60 STFC scientists involved in accelerator science and technology research and development.
- The Institute is a joint venture between the Universities of Lancaster, Liverpool and Manchester and the STFC, and it provides a critical mass of intellectual focus, educational infrastructure and the essential scientific and technological facilities for accelerator research and development.

The campus has scope for planned developments, including:

- potential build space on STFC-owned land;
 - 2.5 hectares of fully serviced building plots on NWDA-owned land, with planning permission for 11,148 sqm of science based commercial build; and
 - the upgrading of the DSIC;¹¹ through housing and recreational use, potentially extending the site across the Bridgewater canal in the south.
- biomedical, including diagnostics, pharmaceuticals and medical devices;
 - chemicals and specialities, including petrochemicals and materials chemistry;
 - energy and the environment, including nuclear energy and marine ecosystem modelling;
 - digital/ICT, including supercomputing and modelling expertise;
 - automotive and aerospace engineering, including turbine development and airflow simulation monitoring;
 - micro and nanotechnology, including the Central Microstructure Facility with its micro-cantilever technology;
 - accelerator science, including synchrotron instrumentation design, manufacture and testing;
 - modelling / simulation, including high performance parallel computing, turbulence and combustion modelling, micro-fluidics and non-equilibrium gas dynamics; and
 - advanced engineering and instrumentation, including advanced engineering for numerous technology sectors.

2.5 DSIC – activities

The laboratory is being used by a number of companies and research organisations operating in a diverse range of scientific sectors.¹² These include:

¹¹ This would involve development of a multi-use, multi-purpose Science and Innovation Park which stretches from the NWDA-owned land in the west of the site, adjacent to the Runcorn Expressway, through the STFC laboratories and continues eastwards to the existing Daresbury Business Park beside the M56. Halton Borough Council has also zoned some of this land for housing and recreation.

¹² For example, the total expenditure for beamline utilisation at Daresbury by around 80 companies came to nearly £2.1 million over the last eleven years (1997-2007).

This industrial usage is estimated to account for some 5-10% of the total usage of the SRS facility beam times. Source: Review of economic impacts relating to the location of large-scale science facilities in the UK, July 2008, SQW Consulting.

In addition, the laboratory also has access to the Central Laboratory Innovation and Knowledge Transfer Limited (CLIK or CLIK Knowledge Transfer). CLIK is an independent technology exploitation company of the STFC, which operates a dedicated marketing team with a group of technical sales managers.

CLIK has the exclusive rights to the commercial exploitation of the intellectual property of the STFC and operates not only at Daresbury but also at the Council's other two institutes (at Rutherford Appleton Laboratory in Oxfordshire and the Astronomy Technology Campus in Edinburgh). The CLIK team works closely with the technical inventors, to progress individual projects to implementation as commercial licenses or spin-out companies.

Since its inception the DSIC has attracted around 70 science and technology-focused tenants. The 2008 Business Plan states that these companies have achieved:

- sales of £10 million per annum, with average annual sales growth of over 30%;
 - employment for over 200 people, with 60% at NVQ level 4 or above and recruitment of approximately 60 people (since tenants moved onto the campus);
 - 6 joint-developments and 23 collaborative engagements between STFC / Stakeholder universities and campus companies;
 - over 100 significant engagements between campus companies & partner organisations;
 - 36 technology / commercial collaborations between 30 campus companies;
 - 10 campus companies securing £930,000 through NWDA's Grant for Research and Development (GRAND) Awards; and
 - approximately 50% of the companies have used services from both UKTI and Business Link.
- expand total campus to 94ha from current 28ha of developed land;
 - develop substantial heart (approximately 14ha) between DSIC and the Daresbury Business Park (DBP) with business, commercial services and residential development in order to produce a village centre for use by the campus and local community;
 - provide main and local line rail station with bus interchange & substantial car parking;
 - develop limited residential properties adjacent to the heart;
 - provide a link road through the total campus, from the M56 junction to Daresbury expressway; provide strong road linkage to adjacent Sandymoor community; and provide link to potential site for Halton's Science Academy.

The Cockcroft Institute between its opening in September 2006 and March 2008 has supported:

- 109 Full Time Equivalent jobs (of which 36.5 are new jobs); and
- 114 individuals in receiving skills training.

2.6 Future options

In 2007 the DSIC Board commissioned Taylor Young, in conjunction with Gifford, DTZ and WT Partnership, to prepare a strategic vision and master plan for the development of Daresbury over the next 20 to 25 years.

Four initial options were proposed. These are set out in detail in Appendix E. The preferred option approved by the DSIC Board, referred to as the 'Maximum Intervention', was to:

Three delivery options for securing the significant additional funding required were identified, namely:

- development of existing STFC / NWDA land through long-term lease with private developer;
- establishment of a private / public partnership Joint Venture (JV) as in the case of Harwell SIC; or
- establishment of a consortium including a public / private JV.

Of these three delivery options, the third has been selected to deliver the preferred Master Plan maximum intervention proposal. The intention is to provide additional funding (of approximately £40 to £60m) in the campus through the establishment of a JV for the development of buildings / infrastructure and acquisition of land.

The JV will include assets from NWDA, STFC and Halton Borough Council. It is expected to take approximately 18 months to set up and will require central government funding of up to £4m.

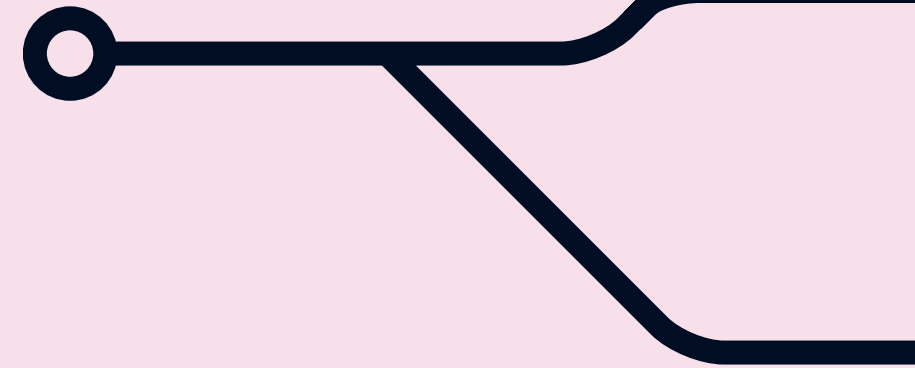
The DSIC Board proposed in the 2008 business plan that the consortium should be established by 2009 to ensure momentum is maintained with the development of the campus and in particular the necessary infrastructure. Discussions (at the time of writing) are currently underway with partners and DIUS to agree the way forward, including the timetable for implementation.

The plan anticipates that the current Daresbury SIC Ltd Board will evolve into an advisory board to the JV (in line with the Harwell SIC JV structure) with participation from the private sector, as well as the existing stakeholders. In time it is possible that this could evolve into a broader structure to cover both Daresbury and Harwell Campuses.

In addition, as indicated in the introductory section, DIUS announced funding of £65m in July 2008 to finance a world class computer sciences centre and a research facility to develop detector systems at the campus.

The two new centres will be known as the Hartree Centre and Detector Systems Centre. They will provide cutting edge research in computer modeling, used to understand issues such as climate change, how cells interact in the body, and biomedical imaging. The Centres also plan to raise commercial funding from their findings.

JOINT VENTURE





DEVELOPMENT



¹³ Based on the findings from our consultation programme, e-survey of DIC tenants and analysis of impacts.

2.7 Impacts

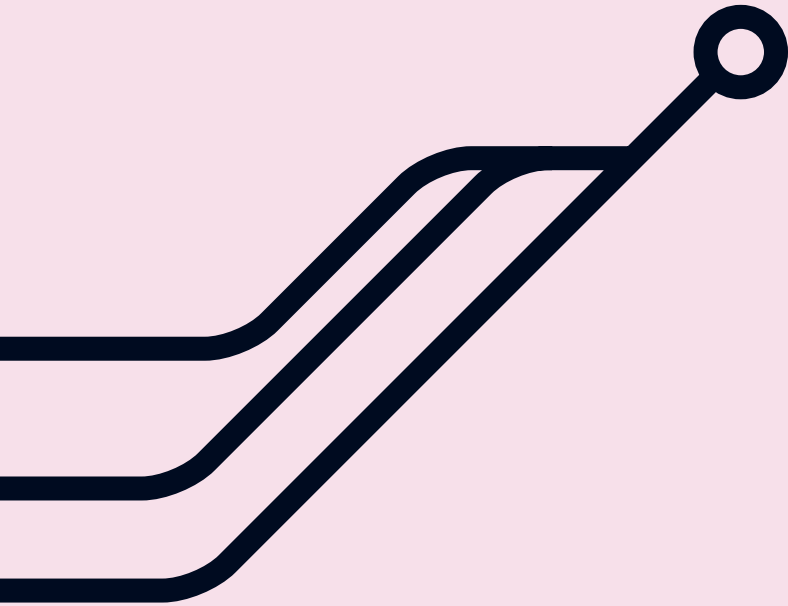
From our parallel review of the current impacts of the campus for the NWDA, we concluded that the longer term sustainable future of the campus requires significant and substantial investment in major facilities by DIUS, if Daresbury is to retain a world leading reputation in areas of big science, that can act as both a catalyst and magnet for participation by, and investment from, the Universities and the private sector. Government must play this role if Daresbury is to develop critical mass and reinforce the process of open innovation.

In the context of this overarching requirement, our other conclusions¹³ are that the current direct net impacts, generated by NWDA support for the DIC and the Institute, are at present relatively limited.

However, this outcome is certainly not unexpected given both the short time over which these bodies have been fully operational and the rationale (in terms of market failure) in relation to the NWDA's wider support of the campus. This rationale:

- anticipates the requirement for further and potentially significant capital funding during the next few years to complete the planned elements of the campus and thereby ensure that all the relevant physical components for a successful and sustainable facility are in place;
- assumes that investment on this scale will provide some of the conditions for open innovation to succeed and thereby attract (and retain) R&D in big science and also other projects from local, national and international universities, SMEs, indigenous firms and global companies;
- recognises that none of this can guarantee the generation and exploitation of commercially viable research and innovation, either in its own right, or through significant levels of research on site or in the region; and consequently
- accepts the high relative risks as well as potential rewards attached to developing Daresbury, as well as the long-term timescales involved.

CONSORTIUM



3.0 KEY ISSUES AND RECOMMEND- ATIONS

In this section we consider the issues that, based on interviews with stakeholders,¹⁴ it will be critical to address in realising the future vision for the Campus. It also provides recommendations in relation to the potential options available.

3.1 Key issues

The announcements by DIUS, of its investment in the two Gateway Centres, are an important step to realising the vision for Daresbury. It will, however, be crucial to the longer term viability and sustainability of the campus that DIUS also allocate further substantial, capital and large scale facilities investment if Daresbury is to retain credibility, critical mass, and appropriate scientific leadership. This is necessary to give credence and substance to the di-polar model accepted in the Government's Science and Innovation Investment Framework - next steps document.

Our analysis is based on the assumption that such government funding will be forthcoming, as stakeholders see this commitment as a necessary condition for the realisation of the vision for Daresbury set out above. Without such support the future for Daresbury will be significantly different from the vision considered in this report.

We have, therefore, focused on assessing how the campus may best generate the benefits that any future government investment, on such a large scale, will aim to deliver.

On the basis of our consultations we consider that there are four key issues that may assist or constrain the growth of the campus and its potential to realise world class status. These are¹⁵:

- **Co-ordinated operational and management structures: Daresbury's success as a national science campus will depend upon formal and informal networking, and on co-operation and open innovation between campus organisations and external partners. The majority of stakeholders we consulted consider that in the context of this future need, the current operating structures are unco-ordinated and will benefit from reform;**

¹⁴ Appendices C & D outline the stakeholders interviewed and the topics covered.

¹⁵ It is also interesting, in our view, that the SOW study identified four key success factors for 'big science' facilities, which in part reinforce (albeit independently) our findings, namely: "The culture and approach adopted can play a major role in leading to success. In particular, these organisations need to accommodate four main roles:

Operating and managing the facility to optimise its performance and ensure its future relevance;

Ensuring the scientific excellence of their own work through undertaking experiments, optimising equipment, writing analytical software, undertaking experiments in areas of their own specialist knowledge, often with an objective of achieving publications and conference proceedings;

Facilitating success among visiting researchers and enabling them to achieve the maximum possible in the limited experimental time available, providing tacit knowledge and experience that enables external researchers to achieve the best possible outcomes; and

Promoting the facility as a centre of excellence (marketing is an important aspect of this) and perhaps more importantly, is the development of networks and conferences for example".

¹⁶ This is primarily on the basis that they would change their existing activities if, in the future, better (alternative) R&D facilities were available/accessible elsewhere than those they currently use at Daresbury.

- **Funding:** there has been an emphasis on securing capital funding support for facilities on site, particularly in seeking the Government's commitment in principle to a di-polar approach. Stakeholders suggest there is a need for a detailed funding strategy, covering non-capital funding, co-ordinated on a campus-wide basis and that this should be one of the priorities of a co-ordinated management structure;
- **Partnership commitments:** the continued commitment to using the Daresbury facilities (particularly by the regional universities) cannot currently be assured over the longer term, as the universities are bound to opt for whichever facilities best suit the needs of their researchers.¹⁶ These essential partnerships need to be strengthened by a range of approaches, and new university partners identified; and
- **Research and commercialisation activities:** the aim of the open innovation model is to extend the benefits of research activities beyond the campus. While it may be premature, in the context of the primary research currently carried out at the Laboratory, it will be important in future to consider the structure, resources and mechanisms that will support the links between initial R&D, spin-outs at the DIC, ongoing support and ultimately commercial exploitation of research.

In the rest of this section we set out these issues in more detail, along with our suggestions as to how to address them.

3.2 Co-ordinated operational and management structure

Recommendation: to introduce a new overall operating structure, a Science and Technology Plan, a Project Champion and a Scientific Advisory Board, in order to manage the complex relationships that will be needed to realise the vision for Daresbury as a second UK pole of scientific leadership.

Many of the stakeholders we consulted regarded the absence of a clear and consistent overarching management structure, accountable for activities of the campus as a whole, as a major shortcoming of current governance arrangements.

While the composition of the DSIC and Institute boards overlap to a significant degree, their ultimate responsibilities and priorities differ. This confusion is magnified when the Laboratory is considered as well. This facility is designated as a national resource operated for the benefit of the UK science community as a whole and is managed centrally by the STFC.

Our consultations with partners, stakeholders and companies located at the DSIC highlighted a range of relationships that exist between the different parties, relationships which are at differing stages and levels of participation. The structure of these different types of relationships are illustrated in Figure 3.1.

As the diagram demonstrates, the most noticeable 'gaps' identified, with little evidence to date of relationships developing, were between the DIC and the Institute. This is perhaps not unexpected considering the nature of the work undertaken to date at the Institute, but there would appear to be potential opportunities to develop and exploit such linkages and relationships.

Another potential gap identified was in the setting of the strategic direction and the operation of the campus as a unified entity, with no clarity about how the various parties interact in the development of policy and agreement of resourcing and funding.

Current indications from our consultations indicate that the various constituent parts act independently with a focus on individuals representing their organisations, rather than an integrated and joined up approach.

The consultations also suggested that the creation of the new joint venture company presented an opportunity to formalise, at an operational and planning level, some of these relationships – particularly between the laboratory, the DIC, the NWDA, and private sector partners.

Consequently while the current management structures for the various strands of activity across the campus may be operating effectively (when viewed from the perspective of each entity in isolation), a widespread view among stakeholders is that such structures are not optimal for delivery of the overarching campus mission.¹⁷

In parallel to the business plan covering commercialisation activities, there is a need for a science and technology development plan, setting out a strategy for the growth and development of research infrastructure and capabilities, linkages between individual programmes of research, and links to university research both within the Northwest, the rest of the UK and overseas.

Adopting this approach (implemented through a co-ordinated operational and management structure as recommended above) will have the potential to strengthen the linkages between government-funded scientific research and other research activity in the university sector.

It will also provide an initial basis to address the perception of the corporate sector that “big science” is too remote from the corporate objective of applying scientific and technological developments to generate value.

Attracting complementary and supporting university research may also assist in bridging a gap between pure and applied science, using the universities established links with business to focus the research agenda. There are signs that efforts to attract partners beyond the core campus organisations are beginning to yield some success, with Durham University seeking to engage with the Institute.

Achieving further success (and in particular forming alliances with leading international universities) will, however, require substantial effort in developing and communicating a robust scientific strategy and building the profile of the campus in a national and international context. These efforts, in our view, should be focused on determining the key scientific themes or areas in which the campus will specialise¹⁸ and approaching leading international universities and research institutes within such fields.

In addition to attracting additional university partners, the campus’s activities would be significantly strengthened by the attraction of leading global technology companies. Such organisations have the scale and resources available to attract and retain the expertise necessary to understand big science activities and appreciate the potential commercial applications for such technologies.

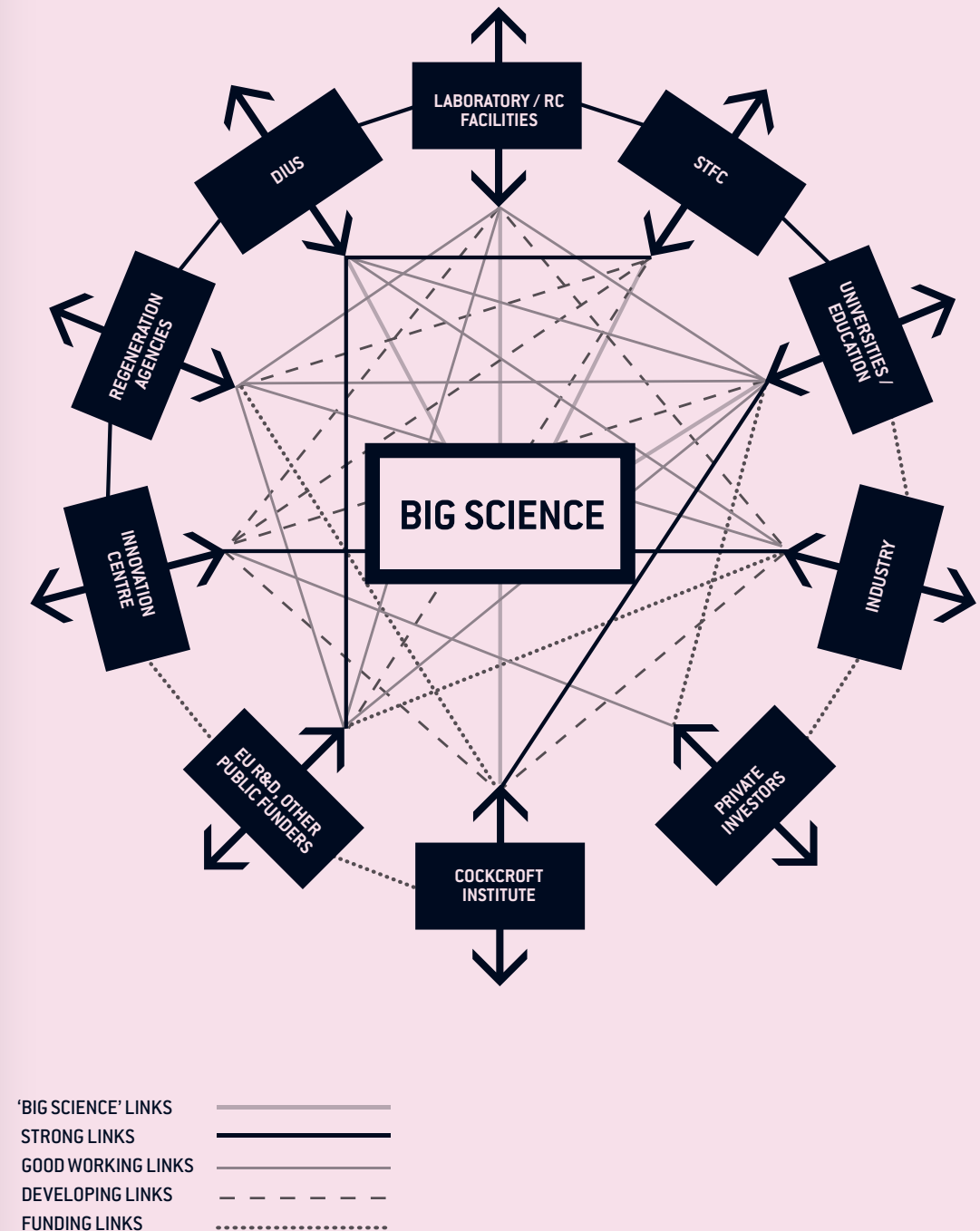
A common theme amongst stakeholders with regard to the need for changes to the management structure and science and technology development was the need for high calibre scientific leadership and a scientific champion to lead the development of the Daresbury Campus.

¹⁷ This is also reflected in the findings from our evaluation survey (as part of our evaluation work for the NWDA) of resident companies from the Innovation Centre. While the centre’s management team have been highly successful in attracting companies to the site (the centre is now operating close to capacity), with effective networking activities established supporting the interaction between resident companies, there is little evidence of engagement between companies and scientists from the Cockcroft Institute, Daresbury Laboratory or partner universities.

Our survey suggests that companies tend to be attracted to the site by factors including the quality and accessibility of facilities and the reputation of the Campus. Substantially fewer companies surveyed (38% of respondents) quoted the potential to collaborate with STFC/Daresbury facilities and personnel as a key driver of their decision to establish a business on the Campus, while 45% of respondents suggest that the potential to collaborate with stakeholder university facilities and personnel is an influencing factor in decisions to remain on-site.

¹⁸ In relation to our NWDA study we also identified this issue namely that: “in the context of Daresbury, we suggest it will be important to benchmark the quality of R&D (in terms of both facilities and staff) at a national and international level, in order to determine whether the basis for generating R&D that might be exploited is competitive, is likely to remain so going forward and, therefore, is of a quality to attract interest from industry. If it is, then by implication the Campus may promote and market itself from a position of strength.”

Figure 3.1
Nature and type of relationships between organisations and entities linked to the Daresbury Science and Innovation Campus



Such an individual would lead the process of harnessing the potential of the constituent parts of the campus to develop a robust strategy and communicate it to existing and potential future partners. This leader would need to attract research partners on the one hand and offer commercial partners a channel for influencing the direction of research and thus maximising its commercial “pull-through”.

A specific issue under the heading of scientific management and leadership is the relationship between Daresbury and Harwell. Historically these sites have competed for investment. In the di-polar approach both sites are expected to complement each other’s research activities.

Therefore a key role of the Daresbury management team will be to articulate clearly the strategic priorities of the site and to foster effective links between Daresbury, the Rutherford Appleton Laboratory and the rest of the Harwell site.

As such, what management structure would be required to co-ordinate relationships effectively and provide scientific leadership?

There are current proposals to establish a three tier management structure to oversee development and operations:

- a main board of the joint venture vehicle formed to own and develop the site (being a public private partnership between the existing landowners and a private sector developer);
- a public sector partnership board – with agreed representation from the existing public sector partners; and
- an advisory board (comprising representatives of industry, universities and the public sector to advise the main board). It has been suggested that this body could be an evolution of the current DSIC board.

In addition to the above governance structure, a consortium would be established with the landowners / stakeholders responsible for delivery of the wider development master plan (including Daresbury Park Business Park, housing developments and the creation of a new urban core). This relationship would be informal with co-operation guided by an agreed master plan and supporting memorandum of understanding.

The STFC has also indicated that consideration is currently being given to the establishment of a joint advisory board to provide scientific and strategic advice to the main boards of both Daresbury and Harwell Campuses. Such a board would be chaired by a leading national science figure.

While a main board to oversee the operations of a new joint venture vehicle and represent the interests of public and private sector partners will undoubtedly be required, we consider the role of the public sector partnership board in the proposal to be unclear and could have a substantial overlap with the advisory board proposed by DSIC.

We would therefore suggest that the governance structure should represent three key functions, namely:

- strategic direction, asset ownership, development and management;
- operations; and
- scientific advisory board.

19 Two other issues were identified affecting future funding requirements:

The requirement to adopt Full Economic Costing (FEC) by research organisations (in the case of Daresbury this includes the Universities and the Research Council funded facilities on the Campus) can lead to a shortfall in revenue support (due to the lack of management costs and related overheads within grant allocations) thereby creating a need for additional revenue funding to ‘fill these gaps’; and

Future requirements related to implementation of the new Daresbury Master Plan will also require the securing of private sector investment in addition to public sector investment from the STFC, NWDA and Halton Borough Council. Such investment will be linked to involvement in the new Joint Venture vehicle to be established for the Campus. Formation of this new vehicle is expected within two years.

We would suggest that the main board could comprise representatives of the key (public sector) contributors of land and property (i.e. the NWDA, STFC and Halton Borough Council) balanced with representation from the private sector development partner.

While it may be appropriate for a variation of the current DSIC board to form the operations board (also including CEOs of the Institute, Hartree Centre and any further research institutes) the effective operation of the campus would also require additional roles including a funding director, an individual responsible for promoting and facilitating formal and informal networking between big science, universities and commercial residents.

The joint advisory board covering the Daresbury and Harwell sites proposed by the STFC would have advantages and disadvantages. It may dilute the degree of attention given to Daresbury and the ability to promote the campus to national / international partners. On the other hand there would be potential benefits associated with the co-ordination of activities at the Harwell / Daresbury sites.

A ‘Scientific Advisory Board’ at Daresbury could comprise representatives of the STFC, universities, research institutes and industry. In addition to co-ordinating the focus of big science and university research activities and seeking to attract such activities, a representative of the Scientific Advisory Board could also play a leading role in the targeting and attraction of industry partners.

Finally, Figure 3.2 provides an overview (and simple outline) of the structure that we suggest might be considered. The key point is that Daresbury’s future governance structure should map clearly into the three key functions of strategy, operations and scientific leadership.

3.3 Funding

Recommendation: to enhance revenue generation opportunities with detailed short and medium term planning.

Two key messages¹⁹ emerged from our consultations with stakeholders and key players at a regional and national level, as to requirements for future funding of activities and new developments at the campus:

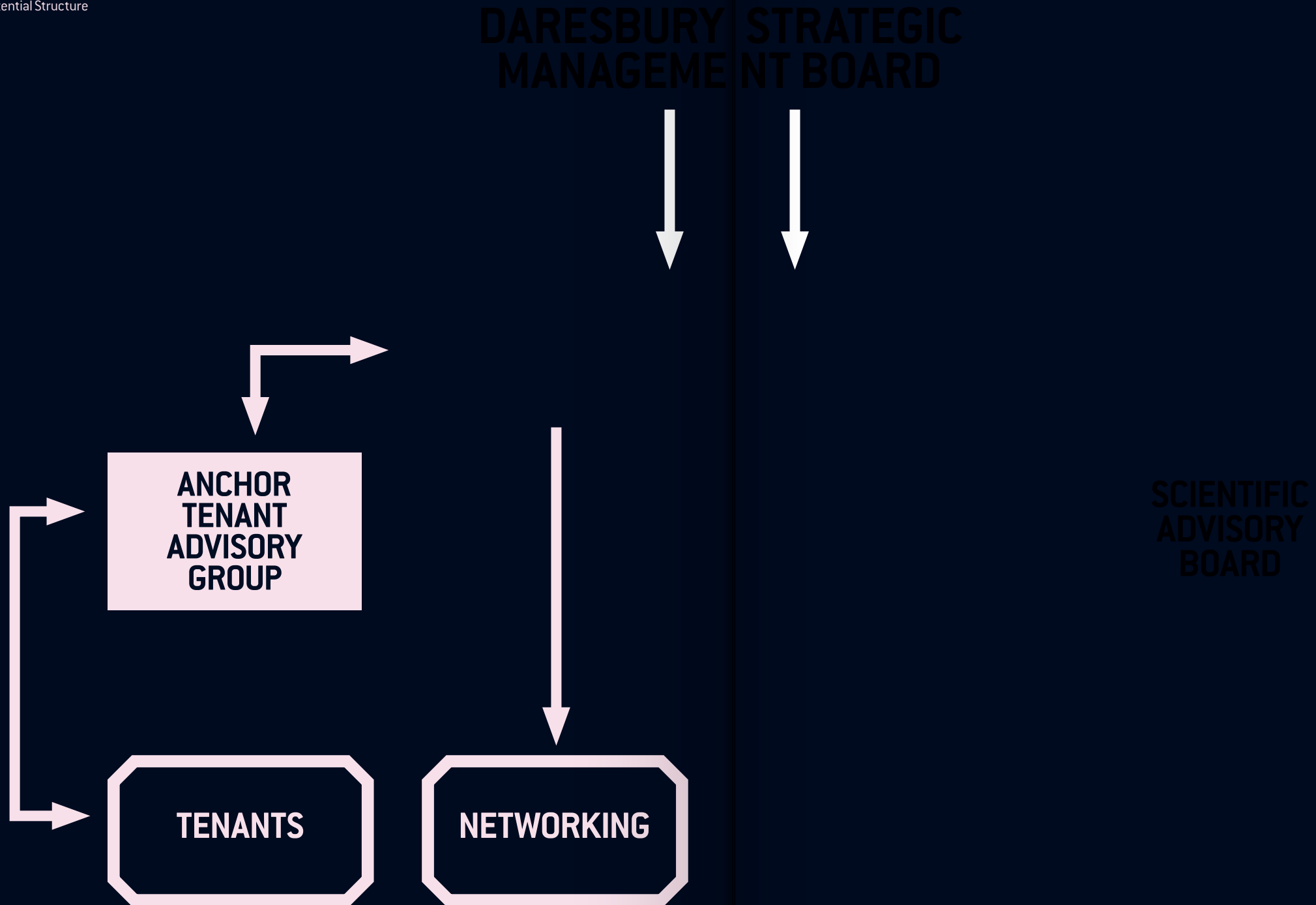
- the requirement to secure future significant and substantial capital investment by Government in major facilities, in particular the New Light Source (NLS) facility, due in 2011 /12; and
- the need to deliver ongoing revenue support for both facilities and research / project activities.

We have already discussed the importance for Daresbury of the Government’s next decision on investment in a major facility. Here we turn to the question of other funding. DIUS and other government departments have indicated that future funding of major facilities (including the recent announcement of two new investments for Daresbury) will provide capital support only.

Ongoing revenue and operating requirements will need to be funded by the operators and users of these facilities. This approach is also being adopted by public sector bodies, such as the NWDA, under guidance from HM Treasury. This is the model adopted for the funding and operation of the Institute, where the universities and other users are responsible for operating costs.

Although many of the 12,000 additional jobs envisaged will be funded through commercial activity, it is clear that the sheer amount of income needed will also require Daresbury to develop new approaches to securing funding.

Figure 3.2
Potential Structure



3. KEY ISSUES AND RECOMMENDATIONS

Any potential approach adopted would need to take account of public sector funding requirements (for example, compliance with State Aid Rules) whilst also enabling the freedom to undertake scientific research in an appropriate manner and providing a return on investment to private investors and commercial funders, as well as generating revenue for the campus itself.

Potential opportunities to secure new sources of funding for Daresbury could include some or all of the following (it should be noted that these are not mutually exclusive, and could be combined or developed independently or in phases as the campus develops).

Creation of an endowment fund which could be built with some or all of the following:

- capital injections from key stakeholders and sponsors generating an investment income;
- ongoing revenue generation from land values (for example, link to transfer value of land assets included for the Daresbury Master Plan, balanced by generation of a rental income / charge);
- IP revenues and the generation of income from licensing fees, etc. and ring-fenced to the campus;
- research contracts with commercial / industrial partners – the revenue generated from these activities could be used to cross-subsidise core campus activities; and
- membership / sponsorship – consideration of the scope to charge a fee for joining the campus as an elite or founder member – this could include benefits related to discounted access to services, first refusal on commercialisation of research or new applications, access to networking opportunities and knowledge transfer activity.²⁰

The endowment fund could then be used to support research and development and other core activities across the campus including, for example:

- **Proof of concept programme (PoCP):** to provide funding for early market testing and validation of concepts and applications emerging from research activity;
- **Late seed funding:** to provide venture capital funding to support more mature start-ups and spin-outs to address commercialisation of products/services;²¹
- **Access funds:** primarily to support company-based activity through the Innovation Centre and related facilities; and
- **Bursaries or training credits:** to support ongoing professional development and creation of a pool of skilled and qualified scientists, researchers and technicians.

The establishment of an endowment fund as suggested would require contributors to acknowledge transfer of the funds, and the authority to use them, to an appropriate management vehicle.

The approach to the use of funding should be driven by scientific and research needs (and could be based on the Haldane Principle²² and the process of peer review) to ensure the maintenance of the neutrality and independence of the campus. An endowment fund would clearly need appropriate governance, reporting structures and audit arrangements.

²⁰ For example a 'super network' at Daresbury could look to offer associate membership to companies and organisations that would pay for early sight of leading-edge research.

²¹ For example, following the model of the recently established UMIP Premier Fund at Manchester University, which secured first round funding of £32 million from: the European Investment Bank (EIB) through the European Investment Fund (EIF); NESTA (National Endowment for Science, Technology and the Arts); the Greater Manchester Pension Fund; the Co-op bank; Partnership UK; and the University of Manchester (through a three year transfer of its PoCP funds).

²² The Haldane Principle states that decisions about what to spend public research funds on should be made by researchers rather than politicians. Under this principle general research funding is decided by the autonomous Research Councils on the basis of peer review.

A more traditional approach – all funds raised externally and ring-fenced – would primarily relate to identifying new or expanded sources of research funding, including:

- options to raise income from licensing / sale of 'back-catalogue' IP. Consideration should be given to assessing what current and future applications and commercial opportunities might exist from previous research activity that at the time it was undertaken was too far from market to have been considered previously;
- up-front payment for requirements – i.e. improve management of cash-flow by requiring up-front rather than retrospective payment;
- securing prioritisation of Daresbury for future Research Council and other research grant funding.

Commercial sponsorship/funding, either from private foundations such as the Gates and Wellcome Foundations, or from sovereign wealth funds.

European funding offers another option, for example funding from the European Research Council (ERC) / 7th Framework Programme funding, and the Competitiveness and Innovation Framework Programme (CIP) through the European Investment Bank / European Investment Fund.

A condition of these forms of funding is 'open access' to the IP created. Consideration would need to be given to how this condition might restrict the potential commercialisation opportunities going forward.

CAPITAL INVESTMENT

ONGOING REVENUE

A structural approach would principally involve the development of a Private Public Partnership (PPP) vehicle; it could be considered as an alternative model for the establishment of the new Joint Venture (JV) vehicle in place of the British Private Equity and Venture Capital Association (BCVA) structure which is currently being adopted at Harwell and is seen as the model for Daresbury. Careful consideration would need to be given to the financial (e.g. tax planning, State Aid impacts, asset valuations, etc), legal (e.g. contracts, IP, etc), and governance and performance monitoring issues.

The various approaches identified each offer potential advantages. They would also require a differing degree of management preparedness and governance arrangements to be in place to be operated effectively.

We consider an endowment fund to be the most comprehensive approach, offering a sustainable long-term source of funding and a greater degree of flexibility and independence.

An endowment fund would be a comprehensive vehicle that could incorporate all other suggested approaches in a single management and operation structure, with transparent reporting arrangements, which could be directly tied to the new JV structure and its governance arrangements.

However, it would be complicated to set up and there would be a need to develop appropriate and robust investment criteria. Other sources of funding would have to be found meanwhile, given the likely timeframe.

The advantage of EU funding is that it is perhaps the most substantial in terms of the potential scale of funds that could be secured, through the 7th Research Framework Programme (FP7). Consideration would have to be given to the application and approval processes, the timescales involved and the requirements for partners / collaborators from elsewhere within the EU and ensuring free access to the outcomes.

The structural approach could provide significant levels of capital funding and also has the potential to use land values, as well as up-front capital input from public sector partners, to generate ongoing revenue streams.

Finally, the standard approach could raise potentially significant sums of funding, but would require considerable staffing to deliver sufficient revenue.

Perhaps the potentially most lucrative source of funds under this approach could relate to greater utilisation and exploitation of the back catalogue of IP. Consideration could also be given to approaches to appropriate private and public foundations. This could include, for example, the sovereign investment funds who are beginning to invest significant sums in foreign assets.

Funding the type of activity undertaken at the campus would be new for these funds and consideration would need to be given to what rights over the technologies and applications developed they would require. In particular, what this would mean from a UK and regional perspective. Conversely their investment might also open up potential new opportunities for collaboration and exploitation in their home countries.

3.4 Partnership commitments

Recommendation: to build deeper relationships with existing partners and attract new partners to enhance further the quality of on site science and innovation.

One of the key issues raised by stakeholders concerned the level of commitment by Daresbury's partners to its ambitions. Specifically, some questioned the level of ongoing support and engagement that was likely from Higher Education Institutions.

It is important to stress that the universities' priority is intellectual rigour and quality, and so they have to choose the best possible options for their researchers in terms of where to conduct research. This means that their commitment to Daresbury cannot and should not be assured, until they can be sure the campus will provide the world class facilities and innovation they need.

While this issue is outside the direct control of the campus, there are various options for encouraging further involvement from existing partners.

These include:

- pooling bids for funding support (for example through the 7th Framework) for research to be conducted on site (and therefore providing additional funds to each institution which they might not win individually);
- lobbying for greater Research Assessment Exercise ("RAE")²³ recognition of research and commercialisation activities undertaken on site;
- clarification of the relationships between DIUS and STFC and consequent funding streams, to ensure that Universities face transparent choices in supporting R&D at the National Centres of Excellence relative to their own facilities and other alternatives; and
- ensuring that revenue support is directed to Higher Education Institution partners (as detailed previously).

We would also suggest further consideration be given to developing relationships with other HEIs. While we understand this might go against the spirit of existing partnership arrangements, it would be consistent with the future vision of the campus, as a national resource open to all. It would also safeguard Daresbury against future changes in different universities' research priorities.

23 The RAE is conducted jointly by the Higher Education Funding Council for England (HEFCE), the Scottish Funding Council (SFC), the Higher Education Funding Council for Wales (HEFCW) and the Department for Employment and Learning, Northern Ireland (DEL). Its primary purpose is to produce quality profiles for each submission of research activity made by higher education and research institutions.

3.5

Research and commercialisation activities

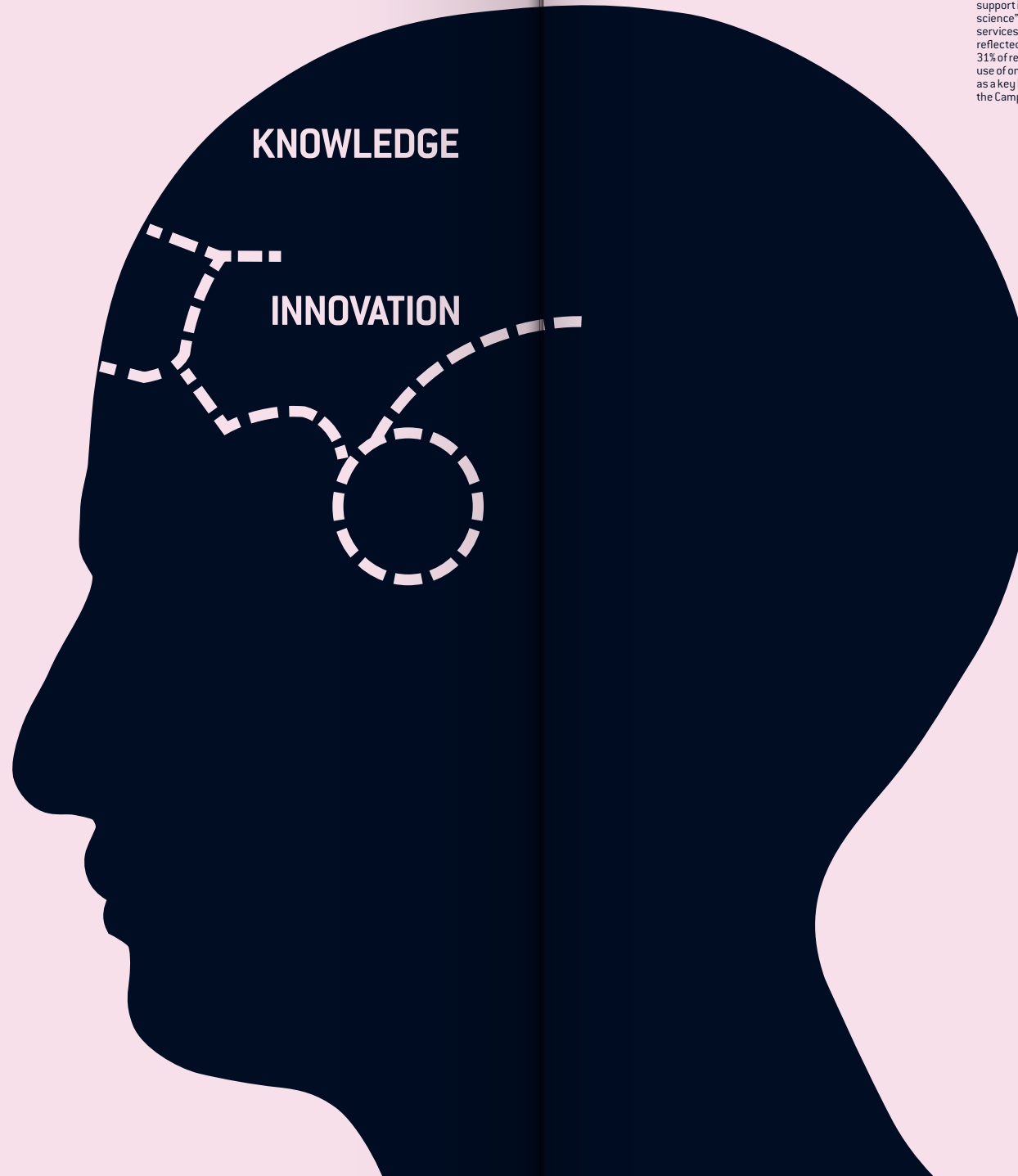
Recommendation: to build deeper relationships with existing partners and attract new partners to enhance further the quality of on site science and innovation.

Daresbury's full potential will only be realised by researchers and management from industry choosing to locate at DSIC, inspired by the opportunity to work in an environment which encourages them to see their activities as an active component part of international research efforts inspired by interaction not only with international academics but also with industry.

Continuing investment in the highest possible quality facilities must continue if Daresbury is to command such international respect. Suitable accommodation should be identified alongside existing laboratories where visiting researchers could work together for periods of time, sharing the practice of open innovation and pursuing the benefits to be gained from its exploitation.

Such accommodation would also be a useful incentive to inward investment in the region. The SIC is an integral part of the campus and is now almost full. And the proposed Vanguard Building offers essential follow-on business accommodation at commercial rates.

Not all researchers based at DSIC will want an academic career. Increasingly graduates see the benefits and satisfaction to be gained from setting up their own company, a choice which government policy actively encourages. With the SIC on site, the campus offers the accommodation required to create a supportive environment for a new generation of science and technology companies.



²⁴ In assessing the effectiveness of linkages between individual strands of activity it is instructive to note that while a significant proportion of respondents quoted that DSIC staff had provided valuable assistance in signposting other NWDA and public sector support services (72% and 86% of respondents respectively), only 34% and 48% of respondents respectively suggested they had received support in engaging with "big science" and other academic services expertise. This is reflected by the fact that only 31% of respondents quote the use of on-site R&D facilities as a key benefit of locating on the Campus.

Given government's strategy of industrial research collaboration, the campus should lend itself not only to spin-outs from Daresbury's own research activities, but also 'spin-ins' from co-location opportunities with industry, exploiting the route increasingly favoured by business to contract out specialist services.

A substantial amount of intellectual property is owned by the Laboratory. A technology transfer operation (Central Laboratory Innovation and Knowledge Transfer Limited – "CLIK") has been established by the STFC to exploit this IP. This has achieved some success in securing spin-out companies.

The lack of engagement indicated in our survey of resident companies²⁴ may, however, suggest there is more scope to further enhance the profile and effectiveness of commercialisation operations.

Similarly Daresbury maintains a global reputation as the original home of accelerator science and with its university partners is in a unique position to build on this enviable reputation. Knowledge exchange and training is now a major income source for universities and Daresbury's opportunity for open innovation lends itself to offer specialist training courses to industry, as well as post graduate degree work in partnership with the universities. This could be taken to a level where a post doctoral centre could be established and managed on site.

3. KEY ISSUES AND RECOMMENDATIONS

In the context of all the above, our suggestions are:

- a 'Daresbury Directors' knowledge transfer structure should be put in place, reporting to the operational board. This group should include SIC and Vanguard Directors. It should have a high-profile business Chair;
- technology translators (i.e. researchers whose work is market-focused) should be available to demonstrate potential applications of research output to business. They could also assist business in clearly specifying the requirements of contract research, an area which frequently leads to frustration;
- businesses should be encouraged to offer 'placements' from their research groups to work alongside Daresbury researchers. Communication between researchers and business should be pursued through both formal networking opportunities, and also at an informal level, offering the opportunity for increased staff awareness and motivation;
- consideration should be given to developing advisors who are building a reputation for active leadership in open innovation systems;
- within its overall support for knowledge transfer, the campus should look to establish an 'entrepreneurs in residence' programme, offering advice on existing financial support for research entrepreneurs who want to start up a company but lack the commercial experience. An enterprise fellowship programme could offer formal business training and mentoring support from experienced technology entrepreneurs, while proof of concept funding would allow the technology development work of the fellow to continue. In addition the opportunity to attract experienced technology entrepreneurs to mentor the new businesses should be explored; and
- the STFC is keen to see the establishment of an international 'super network'. Not only would this be exclusive to the world's leading researchers, but would attract the attention of global companies eager to sit alongside such exceptional scientists. Building on participation in a 'super network', Daresbury could look to offer associate membership to companies and organisations that would pay for early sight of such leading-edge research. A high profile annual event could be initiated and participating companies could also be entitled to a number of days access time for discussions with 'technology translators'.

4.0 CONCLUSIONS

In this last section we sum up our conclusions and suggest how our recommendations could be prioritised.

4.1 Overview

As illustrated in Table 4.1, for DIUS (and the Government as a whole), the key step will be delivery of public sector capital funding to support the di-polar model. The Government must recognise and reflect the national importance of the campus in securing the benefits of open innovation.

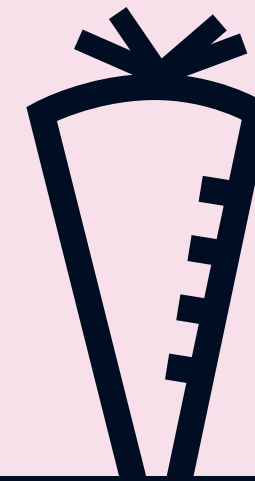
In relation to the campus we suggest that consideration should now be given to amending the governance structure and to setting up a process that can fully engage university and industry partners in a sustainable and ultimately self-financing manner.

Finally, it will be critical that the universities are provided with sufficient incentive to engage with the other organisations and facilities on site, in order to ensure that the scientific leadership required by the future vision for Daresbury is fully developed.



Table 4.1
Daresbury – Issues, Proposals and Rationale

ISSUE RAISED BY STAKEHOLDERS	PROPOSALS	RATIONALE
Government delivery on commitment to 'di-polar' mode	Decision in practice to invest at Daresbury required to demonstrate reality of policy commitment	A necessary condition for other proposals to succeed in delivering on vision for Daresbury
Need for co-ordinated operational and management structures	New overarching structure	To ensure open innovation opportunities are maximised and ensure good fit between governance structure and ambition for Daresbury as 2nd national scientific 'pole'
	Science and technology plan	
	High calibre leadership	
Need to put funding in place	Scientific Advisory Board	To improve short to medium term revenue opportunities and create a long-term sustainable flow of revenue
	Establishment of Endowment Fund	
Partnership commitments	Supplemented with other short and medium term funding options, in detailed funding plan	To maximise the involvement of the wider research community and the quality of scientific research and development
	Deeper involvement of existing partners	
Research and Commercialisation Activities	Engagement of new partners	To maximise on-site engagement with industry
	Knowledge transfer structure	
	Facilities for entrepreneurs	



4.2 Priorities

Partnership commitments will underpin the success of the entire campus concept and the future success of open innovation, given the demands placed on all the organisations involved in order to ensure research onsite can be exploited fully. This is therefore, in our view, the first priority that should be addressed.

As discussed above, realising the full potential of partnerships, especially with the universities, will rest on turning into reality the decision – in principle – that Daresbury will be one of two major national science facilities.

The second priority is the creation of co-ordinated operational and management structures that are underpinned by an operating strategy. A well-designed strategy will require the commitment of the main partners, but can also act as the vehicle for engaging partners successfully.

There is a significant amount of initial co-ordination required in achieving the necessary changes in structure and strategic planning, which will require committed leadership.

A strategic operating plan would lead to a fuller understanding of the campus's funding requirements, not only of how best partners can utilise existing funding sources, but also an understanding of which new approaches could be collectively considered and implemented.

The campus's research and commercialisation activities would need to be identified in the strategic plan, and prioritised in the funding requirements.

Finally, it must be stated again that these priorities are predicated on substantial and significant investment by government in major world class facilities at Daresbury in the future. This is essential if Daresbury is to:

- retain its credibility and develop a reputation as a world leader at the forefront of 'big science';
- fulfil its potential as a progenitor and catalyst of research and development activity across the UK;
- ensure the successful commercialisation of this R&D and the adoption of new technologies and applications; and
- enable Daresbury to fulfil its potential wider role as an engine of economic growth for the UK and the Northwest region.

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Dr Mark Graham (Project Director) leads PricewaterhouseCoopers LLP (PwC) regional advisory team working on economic impact issues.

Mark has recently directed PwC's work for Scottish Enterprise in relation to an evaluation of their Proof of Concept Programme and all of the recent studies for S.E. in relation to commercialisation including the Creative Bio-Pharma Initiative, Institute of Medical Science and Technology, Scottish Photonics Institute, e-Institute and the Scottish Food and Drink Centre.

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Dr Graham and Milligan have been supported by a senior project team of economic analysts from PwC.

