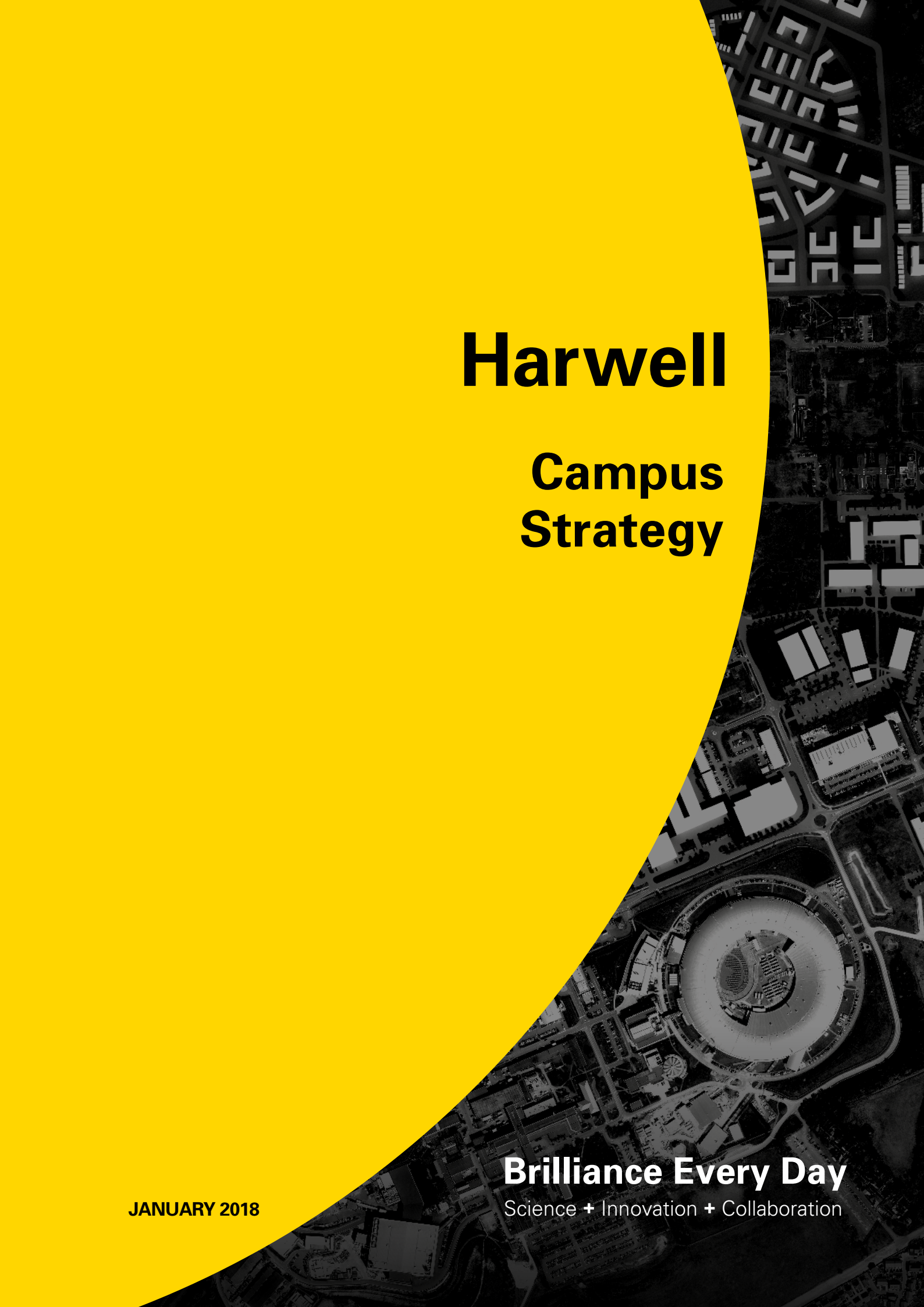
Harwell

Campus Strategy



Brilliance Every Day

Science + Innovation + Collaboration

JANUARY 2018

OUR VISION IS FOR THE HARWELL CAMPUS TO BE A WORLD RENOWNED LOCATION FOR INNOVATION, HIGH TECHNOLOGY INDUSTRY AND RESEARCH

What businesses are saying about the Harwell Campus…

WE CHOSE TO LOCATE OUR GLOBAL INNOVATION CENTRE AT HARWELL CAMPUS BECAUSE WE NEEDED A LOCATION WITH A LEADING REPUTATION THAT WOULD GIVE US ACCESS TO A HIGH-TECH TALENT POOL; PLACE US CLOSE TO OUR ACADEMIC PARTNERS FOR INNOVATION AND ENSURE OUR CENTRE WAS HIGHLY ACCESSIBLE FOR VISITING GLOBAL PARTNERS.

Siobhan Duffy, Executive Director, Element Six (global leaders in the design, development and production of synthetic diamond super-materials)

LOCATING OURSELVES AT HARWELL CAMPUS ALLOWS US TO COLLABORATE WITH LEADING SCIENTISTS AND BUSINESSES TO MAKE OUR SATELLITE STRUCTURES WORLD CLASS.

Mike Lawton, CEO, Oxford Space Systems (an award-winning space technology business)

GSK HAS BENEFITTED FROM ENGAGEMENT WITH THE SPECIALISTS AT THE WORLD LEADING RESEARCH FACILITIES AT THE HARWELL CAMPUS. WE HAVE FOUND THE EXPERTS THERE TO HAVE AN INDUSTRY FRIENDLY APPROACH TO WORKING WITH US.

Dr Malcolm Skingle, Director of Academic Liaison, GSK (a science-led global leader in healthcare)

WE ARE PROUD TO MANUFACTURE OUR PRODUCTS AT HARWELL, ONE OF THE UK'S BEST CENTRES OF SCIENCE.

Gordon Sanghera, CEO, Oxford Nanopore Technologies (world leaders in biological analysis techniques)

ACCENTUS MEDICAL IS PROUD TO BE BUILDING A PRESENCE IN THE GLOBAL MEDICAL DEVICE MARKET FROM ITS OPERATING BASE AT THE HARWELL CAMPUS.

Dr Philip Agg, CEO, Accentus Medical (experts in surface coatings and materials for use in medical devices)

WE ARE DELIGHTED TO BE EXPANDING OUR FOOTPRINT AT HARWELL… OUR PRESENCE HERE GIVES US CONTINUED ACCESS TO WORLD-CLASS EXPERTS AND WE VALUE THIS AS WE CONTINUE TO GROW.

Ian Macafee, CEO, Oxensis Ltd (high technology manufacturer of optical pressure sensors)

Contents

Introduction to the Harwell Campus

Harwell has an illustrious history. But it is to the future we look in this strategy. The Harwell Campus is a site of 280+ hectares and is currently home to over 200 high-tech organisations. It directly supports over 5,500 jobs and is a location with a growing international reputation as a place where world-leading science, innovation and entrepreneurship converge. It is now generating successful clusters of interlinked organisations, one example being the 70 or so space organisations located at Harwell. Together these make a very significant contribution to a UK industry that in 2014/15 was valued at over £13bn per annum. This success illustrates very clearly the power of co-locating industry, academia and investment in public sector research alongside private sector investors and entrepreneurs.

Harwell is a unique location with a broad range of technical capabilities. It is also an asset of international significance. Located close to Oxford, it is built around a globally unique core of national laboratories and scientific facilities. These very specialist publicly-funded research facilities represent a multi-billion pound investment and are open to academics and industrial scientists from the UK and overseas. Together they form the high technology heart of the Campus and few locations in the world have the same concentration of skills and expertise.

Long term investment in science at Harwell - the bedrock for innovation and growth:

Harwell Campus is the base for many of the UK's large scale scientific research facilities and the underpinning research, technical and engineering expertise needed to operate them. These world-class facilities include:

- The Diamond Synchrotron;
- The ISIS neutron and muon source;
- The Central Laser Facility;
- Specialist Space technology and test facilities based at RAL Space;
- The Mary Lyon centre for genetic research;
- The Research Complex at Harwell (which encourages interdisciplinary research);
- Supercomputing capabilities;
- Detector and imaging capabilities.

But our success to date is just the start. UK PLC demands more from Harwell including the development of further clusters, based on the needs of the UK economy, in other areas of scientific and technical excellence. To this end, work is already underway to boost an emerging 'HealthTec' cluster and to explore other opportunities that draw upon the life and physical science capabilities and technical expertise located on the Campus. The rising profile of Harwell gives us an ideal opportunity to accelerate high-tech business growth, create jobs, build skills and increase the translation of world leading science into commercial success.

This fits perfectly with the stated ambition of the UK's emerging Industrial Strategy which seeks to leverage the maximum economic benefit from publicly funded research laboratories.

Experience shows that high-tech success is rarely the product of effort by either the public or private sector in isolation. Recognising this, the model for Harwell is built on collaboration and the Harwell Joint Venture Partnership brings together public and private sector interests to manage and develop the Campus.

The vision the partners share, and which is woven through this strategy, was originally developed over a decade ago. But at its heart is the firm intent to grow Harwell into one of the world's foremost Research and Innovation Campuses so the UK can enjoy the job creation and economic growth that this will bring. We have had significant success so far and hope you will support us on the next steps in our journey.

The Harwell Campus – Partnership in Action

The Harwell Campus Joint Venture Partnership is a 50:50 public-private partnership. The public sector is represented by the Science and Technology Facilities Council and the UK Atomic Energy Authority. The private sector is represented by a team of highly experienced development professionals, namely Harwell Oxford Partners Ltd and U+I PLC.

Our Vision is for the Harwell Campus to be a world renowned location for innovation, high technology industry and research

Improving the productivity of the UK economy and the skills of its workforce

Ambition 1
To contribute to the delivery of UK and regional growth strategies

Ambition 2
To be a key part of a network of Research and Innovation campuses to lift UK productivity

Ambition 3
To help develop the high-tech workforce the UK needs

Stimulating high-tech business growth

Ambition 4
To create a vibrant high-tech business environment that supports economic growth

Ambition 5
To use the strengths of the Campus community to develop clusters of interconnected organisations

Ambition 6
To promote Harwell as a prime location for research and technology-led organisations

Supporting UK research and innovation

Ambition 7
To develop even stronger connections between research, academia and business

Ambition 8
To promote the need for increased and continued long term investment in research

Ambition 9
To develop Harwell into a community that is attractive, sustainable and accessible

Harwell is one of the largest Research and Innovation campuses in the UK. A recent evaluation by SQW of another science and innovation campus showed that it provided almost 900 high-tech jobs on site and the value of goods and services produced (GVA) was over £160m. By comparison Harwell Campus directly provides 5,500 jobs and by extrapolation its estimated GVA impact may well be £1bn+ annually. Whilst each campus is unique, the overall contribution that such locations provide to the UK economy is immense.

"REAL INNOVATION IN WHATEVER DISCIPLINE OFTEN OCCURS AT THE INTERFACE BETWEEN AREAS OF EXPERTISE.

Professor Sir John Bell, Regius Professor of Medicine, University of Oxford

Improving UK productivity and the skills of its workforce

Ambition 1
To contribute to the delivery of UK and regional growth strategies

This we will deliver by:

- Collaborating with Government and other partners to align activities at the Harwell Campus with UK Industrial Strategy, regional growth strategies and other relevant strategies
- Utilising the facilities, skills and expertise at Harwell to successfully deliver projects funded through the UK Industrial Strategy Challenge Fund and the UK Global Challenges Research Fund
- Assisting the growth of the UK economy by delivering investment and job creation at Harwell

An examination of any successful Research and Innovation campus quickly reveals the importance of collaborations and partnerships, both with central government departments and at a local level. For Harwell to be successful it will need to continue to build fruitful relationships with Government and a wide range of other strategic partners, recognising that in many policy areas there is a shared agenda. For example, from 2018 UK Research and Innovation will bring together the seven Research Councils, Innovate UK and Research England, the research and knowledge exchange functions of the Higher Education Funding Council for England into a single strategic body.

This is obviously a critical relationship for the future, but other important stakeholders include Local Authorities, the Local Enterprise Partnership and agencies such as the Department for International Trade. By working together it is possible to make sure that the strategic contribution of Harwell to economic development at both regional and national level is recognised and its contribution to the success of the UK economy is maximised.

The Harwell Campus joint venture is itself an example of the power of strategic partnerships. By bringing together research expertise, land ownership and private sector development skills the joint venture can achieve growth which would elude any one agency. It does this not solely through public investment in research but by harnessing private sector expertise and funding. This 'twin track' approach is a strength of the UK approach and makes sustainable growth possible. Coupling private sector finance and entrepreneurship with publicly funded assets means that the maximum benefit can be derived from the UK's investment in scientific infrastructure. It also permits the sharing of both costs and risks.

A successful Harwell campus allows the UK to cement its place at the forefront of world-class research, innovative technology and specialist engineering. The Industrial Strategy recognises this and identifies that government funding can be an important mechanism to accelerate economic growth if suitably targeted, echoing the ethos of the partners.

At a national level, the Industrial Strategy Challenge Fund will focus on those areas where the market opportunities are largest and where the UK has unique capabilities. These opportunities include many areas where the Harwell Campus is already a major resource for UK researchers such as satellites and space technologies, healthcare, materials research, biotechnology, and digital technologies such as supercomputing. This means that Harwell is well placed to help those researchers and companies that may benefit from the Challenge Fund, providing access to unique skills and expertise. It can also provide space to accommodate new research centres or facilities.

In addition to the need to safeguard the UK's economic position, it is clear that the global challenges that face the world today require a rapid technological and industrial response. The UK Government's funding of the Global Challenge Research Fund is recognition of the need for investment closely targeted at tackling these challenges.

The research facilities and expertise located at Harwell mean that it is well placed to make a significant contribution, particularly as a potential location for high technology demonstrator projects or activities. Many of the global challenges require innovative solutions at the forefront of multiple technologies and Harwell, as a truly multi-disciplinary site, is well equipped to assist.

The partners recognise that Harwell also has an important part to play in supporting local and regional economies, and is a key component of Science Vale, the local planning framework. It is also an important contributor to aspects of the four areas of focus identified within the Oxfordshire Science and Innovation Audit (autonomous vehicles, space-led data applications, digital health, and technologies underpinning quantum computing). Harwell's areas of expertise can accelerate the development of these transformative technologies and provide the potential for the region to build and develop new world-leading ideas and products. In this way, working with key partners such as the Oxfordshire Local Enterprise Partnership (OxLEP), the University of Oxford and the County and District Councils, the Harwell Campus can help deliver the shared ambition that Oxfordshire should be a vibrant, sustainable, inclusive, world leading economy, driven by innovation, enterprise and research excellence.

"HARWELL IS A PLACE THAT MATTERS GLOBALLY. IT'S A PLACE WHERE THE IMPACT OF WHAT HAS BEEN DISCOVERED COULD MATTER FOR THE REST OF THE WORLD.

Magali Vaissiere, Head of the European Space Agency's European Centre for Space Applications and Telecommunications

Harwell research and innovation – a great return on investment

The ISIS neutron and muon source is one of the major research facilities located on the Harwell Campus and has long-established industrial links with more than 100 companies. A study in 2016 by Technopolis highlighted that even a conservative analysis shows a return on investment of over 200%. In the words of their report, this "clearly demonstrates how publicly funded research and innovation drives economic growth".

Ambition 2
To be a key part of a network of Research and Innovation campuses to lift UK productivity

This we will deliver by:

- Developing long term informal partnerships with other Research and Innovation campuses across the UK to share best practice
- Being an enthusiastic partner in collaborations of mutual advantage
- Assisting in the development of a coherent strategy that recognises the importance of Campus locations to the UK economy and the contribution they can make to the delivery of the UK Industrial Strategy

Across the UK there are a number of Research and Innovation Campuses that are addressing similar issues to those experienced at Harwell. Each location has unique research strengths together with its own challenges and opportunities. Addressing these challenges requires unique local management but by working together a national informal network of expertise and experience could be developed which will ultimately encourage faster economic growth and be to the UK's strategic benefit. Harwell has considerable practical expertise of what works. It is willing to share this and see how it can be translated to other areas, perhaps through piloting new ideas, joint events, exchange of staff or simply sharing best practice. It can also take the opportunity to draw upon the learning of others to mutual benefit. In addition, there are a number of Campus-like sites in Oxfordshire itself and there is a complementary relationship which could be built upon for the purposes of marketing and attracting inward investment.

This collaborative approach would dovetail with the thinking behind the Industrial Strategy and allow the development of a coherent approach to UK Campus development which is built upon working together rather than in competition. A good example is that the Harwell Campus partners have established the Oxford Advanced Skills Apprenticeship Training Centre at the nearby Culham Campus. Very close linkages also exist with the Daresbury Research and Innovation Campus and the Royal Observatory Edinburgh which are directly managed by the Science and Technology Facilities Council.

"IF WE WANT TO BE A PROSPEROUS COUNTRY WE HAVE AN ADVANTAGE IN SCIENCE AND WE CAN'T LET IT GO.

HRH Duke of York,
Patron of Harwell Campus

Oxford Advanced Skills Apprentice Training Centre

The Oxford Advanced Skills Apprentice Training Centre (OAS) provides an example of how working across campuses can bring benefit to the UK. Recognising the need for advanced technical skills training in the region, partners at the Harwell Campus (specifically the UK Atomic Energy Authority and the Science and Technology Facilities Council) have jointly developed a training centre to meet this need. Located at the Culham Science Centre, the OAS enables Oxfordshire businesses to offer young people hi-tech and engineering apprenticeships of the highest quality in new purpose built facilities. OAS took its first intake of apprentices in September 2016 and will train 125 young people each year, helping provide employers with the skills base they need to develop their business.

Ambition 3
To help develop the high-tech workforce the UK needs

This we will deliver by:

- Supporting training providers to deliver high quality apprenticeship, graduate and PhD programmes tailored to the needs of UK business and research
- Working with partners to pilot activities such as secondments between Campus partners and in the development of skills standards that can be rolled out across the country
- Enthusing young people to enter careers based in science, technology and engineering

As recognised in the Industrial Strategy, and in published UK Skills Strategies, any shortage of skilled people will ultimately erode the UK's competitive edge and constrain its economic growth. Investment in research and research facilities is, in itself, of limited value if the skilled scientists, technicians and engineers are not available to use, develop and operate them. Likewise it is difficult to grow a high-tech enterprise if it is starved of the highly skilled people it needs.

An environment such as the Harwell Campus requires a broad range of highly technical skills and expertise if it is to be successful. But the partners recognise the Campus also has a supporting role in providing a pipeline of skilled individuals for the broader benefit of the UK's economy. For this reason it is committed to playing its part in helping to address the technical skills shortages currently facing the UK, especially middle tier technician skills which are in very short supply.

At a local level, Campus partners are working closely with strategic bodies such as the Oxfordshire Local Enterprise Partnership and the Oxfordshire Skills Board and already support a number of initiatives that link to the high technology activities on the Campus:

- Technical apprenticeships (through the Oxford Advanced Skills Training Centre);
- Post graduate specialist training;
- PhD sponsorship and placement opportunities;
- Industrial Continuing Professional Development; and
- A broad programme of public engagement activities to encourage young people to study STEM related subjects and enthuse them about careers in science.

The 2017 announcement by Government to further expand the number of STEM subject PhD placements and fellowships is timely and will help maintain the advanced research skills base essential to Harwell's success. In order to make the best of this investment it may be helpful for there to be opportunities for PhD secondments between industry and the research facilities, fostering greater understanding and collaboration. With suitable support from Government, the partners would be willing to establish a pilot project along these lines.

The partners also welcome the development of the University Technical College Oxfordshire which provides scientifically-focused and high technology education. The science and engineering specialisms offered are particularly relevant and having a regional centre of excellence which involves the public sector and industry partners is a local strength.

This relationship may provide the platform for further initiatives linked to the Campus such as piloting new training schemes or the development of skills standards.

Of course attracting young people to enter science and engineering careers is of vital importance to the long term success of the Campus. The framework for delivering this activity is set out within the Public Engagement Strategy being delivered by the Science and Technology Facilities Council and its partners. At its heart is showcasing science and technology, including that at the Harwell Campus, and allowing people to experience the scale and achievement of UK science.

The Public Engagement activities at Harwell include school visits, workshops, exhibitions, teacher training, work placements etc. In the academic year 2016-17 there were some 122 different public engagement activities and these engaged with over 13,000 members of the public, teachers and school students in face-to-face activities. This was over and above those that attended the Harwell Open Week.

Throughout its evolution the success of Harwell has been built upon the skills of its people, many of whom are drawn to the Campus from overseas. The ability to attract and retain the best, wherever they may be from, is vital and the recruitment of foreign scientists and technologists is important to Harwell's continued success. Staff and researchers from over 60 countries work at Harwell and for this reason the Government announcement of funding to attract researchers to the UK from emerging research nations such as India, China, Brazil and Mexico is welcomed.

"

IT'S BETTER THAN LEGOLAND!

Anonymous message written on visitor's whiteboard at the Harwell Campus 2016 open day

Inspiring the next generation

Encouraging young people to get involved with science and understand the attraction of a career based upon STEM subjects is an important part of the partners work. Without a pipeline of talented and skilled people Harwell cannot grow and thrive. In 2015 a Harwell open week attracted over 16,000 people on the public day, 1,500 students and teachers on the school day and involved around 400 stakeholders. This was a great opportunity to enthuse young people about the career opportunities which science and technology offers – even if not everyone can be an astronaut!

Stimulating high tech business growth

Ambition 4
To create a vibrant high-tech business environment that supports economic growth

This we will deliver by:

- Providing a broadly based business support and incubation programme
- Providing support and guidance for those companies wishing to take advantage of locating at Harwell
- Delivering a wide range of business and laboratory spaces suitable for high-tech businesses of all sizes and types

Although the economic growth generated at Harwell in recent years has been impressive, it can deliver more for the UK. Specifically, even greater emphasis needs to be given to providing an environment at Harwell that encourages and stimulates every aspect of high-tech business growth. Experience has shown that it is the blend of world-class research facilities, close collaboration between academia and industry, direct support for business development and the provision of a top quality physical environment that delivers growth and jobs.

The partner's approach is to work together on a range of inter-dependent activities that combine to generate a dynamic business support ecosystem. Specifically, helping to grow small and medium-sized high technology companies requires:

- The provision of flexible, reasonably priced accommodation specifically geared to their needs (with the ability to grow and yet remain on the Campus);
- The provision of advice on how to access research facilities and the skills of those that operate them;
- Tailored business advice, training and specialist networking events;
- Access to shared support services and specialist equipment;
- Access to funding (including grants or investment drawn from a network of Business Angels, Venture Capitalists or corporate investors);
- Encouraging the rapid translation of research into profit through schemes such as proof-of-concept funding and collaborative research and development; and
- Working collaboratively across organisational boundaries on projects of mutual benefit.

This programme of activity delivered by the partners is closely linked to existing business support initiatives based at Harwell such as the European Space Agency's Business Incubation Centre, the Innovation Technology Access Centre and those overseen by the Satellite Applications Catapult. These provide unique environments geared exclusively to accelerating innovation and unlocking the commercial potential within small companies and SMEs.

Linking together peers from different organisations to share their knowledge and expertise has proved to be an important aspect of what makes Harwell special. Inter-organisational and inter-disciplinary collaboration is fostered through tailored and imaginative networking events, so that entrepreneurs get rapid access to information to identify funding and marketing opportunities, develop their products and overcome technological barriers to growth. It has been found that one of the best ways of facilitating and stimulating innovation and collaboration can be through utilising shared spaces and providing opportunities for different disciplines to interact. Harwell has embraced this concept and the new office, laboratory and social facilities now being provided generate exactly this kind of interaction.

In addition to providing support for businesses already located at Harwell, new organisations considering joining the existing business community need to be convinced of the benefits of a Campus location and how it would benefit them. Articulating this, and providing a single point of contact for advice and guidance is important if Harwell is to be able to offer an 'end-to-end' solution. This is an ambition of the partners, although a seamless solution will require additional resources to implement.

"HARWELL CAMPUS IS AN EXCITING NEW CHAPTER FOR RESMED UK. IT PROVIDES OUR BUSINESS WITH THE IDEAL ENVIRONMENT TO CONTINUE OUR RAPID GROWTH AND MARKET LEADING POSITION IN THE UK AND IRELAND.

Ewan Cuthbertson, Managing Director, ResMed (a global leader in connected healthcare)

Cobalt Light Systems

Cobalt Light Systems was the UK's fastest growing SME exporter in 2015. Its products, developed from Harwell technology, allow non-invasive, sub-surface chemical analysis across a range of applications. These range from pharmaceutical applications to airport security screening. In 2014 Cobalt Light Systems were awarded the prestigious MacRobert Award from the Royal Academy of Engineering and in 2015 Cobalt Light Systems won the Queen's Award for Enterprise in the category of international trade. The Queen's Award is the UK's highest accolade for business success.

Ambition 5
To use the strengths of the Campus community to develop clusters of interconnected organisations

This we will deliver by:

- Continuing the growth of the Harwell space cluster
- Developing the HealthTec cluster and attracting the anchor organisations that will accelerate its growth
- Identifying and developing new clusters that align with the strengths of the Harwell Campus

Clusters can be considered to be concentrations of interconnected organisations, institutions and businesses of all sizes, rooted in a specific sector, technology or scientific field. Each cluster does not exist in isolation and experience has shown that it is the overlap and connections between organisations working in different spheres that can help accelerate growth, providing 'disruptive' innovation and adding value.

The long term public investment in research facilities, technology and scientific infrastructure at Harwell is the bedrock on which success is grown. But in the short/ medium term investment in the development and promotion of specific clusters provides a great mechanism for bringing together academia, research and industrial organisations with a shared interest in emergent technologies. In this way it is possible to raise awareness of the capabilities which exist on site, stimulate innovation both within and across clusters, provide new opportunities for collaboration and accelerate economic growth. Each Research and Innovation campus will have its own relative strengths, but uniquely Harwell has significant underpinning technical and engineering expertise in a range of areas that include space-related activities and aspects of health technology. Encouraging the further development of these areas is central to our strategy.

The Space Cluster at Harwell is a good example showing how the cluster approach works in practice. The Campus is now the pre-eminent centre for the space sector in the UK and the 70 space organisations currently at Harwell are testament to the power of co-locating industry, academia, research expertise and technology alongside investors and entrepreneurs. In 2016 over 700 people were employed in space related enterprises at Harwell, with two thirds being in down-stream activity such as satellite broadcasting and telecommunications – the fastest growing and most profitable activities.

Recent investment at RAL Space has provided two new large test chambers that allow satellites, space systems and components to be tested in environments that replicate those found in space. This is a catalyst for growth and public investment in RAL Space has itself helped to accelerate the growth of the UK space sector - ultimately attracting international organisations such as ESA to the Campus. Building on this, further Government investment of around £100m will, by 2020, create a world class National Satellite Test Facility for the testing of satellites and satellite instrumentation. This is a great example of significant public investment in science plugging a gap in high technology infrastructure, thereby supporting the growth of private sector innovation.

Promoting and building clusters is also one way of aligning multi-disciplinary research and cross-cutting technologies to the economic and societal challenges facing the UK today. One of these challenges is that relating to the increasing demand placed on healthcare systems due to sedentary lifestyles, obesity and an ageing population. Harwell already has a range of facilities that relate to different aspects of healthcare and life sciences. In 2016 these accounted for around 1,000 jobs in some 40 organisations such as the Medical Research Council Harwell, Public Health England and a wide range of smaller enterprises.

HealthTec at Harwell

Advancements in healthcare are increasingly dependent on the juxtaposition of knowledge from different fields. The Harwell HealthTec Cluster will be a world-leading healthcare innovation hub founded on inter-disciplinary collaboration between physical and life sciences. With over 40 health related organisations already at Harwell, it focuses on areas such as ageing, drug discovery and the environmental impact on human health. Companies within the HealthTec Cluster benefit from access to specialist skills and technologies including those based within the UK large facilities and access to a specialist investor network.

This provides a sound basis for developing the Harwell HealthTec Cluster and is in line with the UK Industrial Strategy which identifies leading edge healthcare and medicine as one of the UK's areas of strength and opportunity. Looking ahead, the Engineering and Physical Sciences Research Council, working closely with a number of leading universities, is implementing plans to establish the new £100m Rosalind Franklin multi-disciplinary research institute at Harwell. This will allow academic and industry researchers from across the UK to develop new technologies to tackle key challenges in health and life sciences, drawing upon the facilities and expertise at Harwell. In this way it is possible to accelerate the discovery of new treatments for chronic diseases affecting millions of people around the world and deliver new jobs and long-term growth to the local and UK economies. Attracting additional 'anchor' organisations to Harwell that are aligned to the HealthTec sector would help further accelerate growth and act as an attractor to others.

The partners will continue to review new potential cluster opportunities and it is possible that in the medium term aspects of energy technologies, or other emergent technologies, may prove to be equally fruitful. These will need to be aligned not only with the strengths of the Campus but also the areas of potential identified in the UK Industrial Strategy. They will also need to dovetail with the work of partner organisations.

"HARWELL IS THE EPICENTRE OF UK COMMERCIAL SPACE ACTIVITY.

The Telegraph

The Harwell Space Cluster – part of a £13.7 billion per annum success story

The decision to locate the European Space Agency (ESA) European Centre for Space Applications and Technology at Harwell was based upon recognition of the profile that Harwell has within the international space community and the strength of the existing Harwell Space Cluster. The campus has been described by ESA as a 'crucible' for new ideas and the ESA Business Incubation Centre located on the Campus encourages small businesses to take ideas generated from space technology and apply them in non-space applications. Since 2010 it has hosted over 60 start-ups. Many have grown and expanded into other accommodation. A third remain on the Campus and all are successfully generating wealth and jobs for the UK. This illustrates exactly the type of economic growth that the Harwell Campus environment can deliver, and clearly supports the UK Industrial Strategy ambition to capitalise on the UK's strengths in this sector.

Ambition 6
To promote Harwell as a prime location for research and technology led organisations

This we will deliver by:

- Implementing an expanded programme of communications and marketing to proactively promote the Campus both within the UK and overseas
- Engaging actively with key stakeholders to foster strong long term partnerships through collaborations and targeted engagement
- Working with universities and others to promote the advantages of co-locating university research activities alongside the UK national research facilities and businesses at Harwell

Internationally the UK has a great reputation as a place to do business. Our vision is for the campus to become a world renowned location for innovation and to achieve this we need to build on the advantages the UK offers and the strengths of the Harwell Campus. The Harwell Campus already enjoys an internationally-renowned reputation amongst scientists. There are many examples of multi-national scientific collaborations such as the Central Laser Facility's role in designing and developing new lasers for use by scientists at the Extreme Light Infrastructure project in the Czech Republic and the European XFEL project in Hamburg.

It is also becoming increasingly well known amongst high-tech businesses generally – including those from outside the UK. Harwell has had success in attracting major research driven companies such as Element Six to the Campus and building its profile further is likely to generate additional growth of this nature. The Campus is well placed to take advantage of this type of international company migration and encouraging companies to locate their research and development activities at Harwell is strategically important. In this regard, the Campus can be considered to be a prime location for pharmaceutical research, being close to the University of Oxford, one of the world's foremost biomedical research centres. This is an advantage to be exploited. To date the promotion of Harwell has been relatively low key and it must raise its profile further if it is to achieve its full potential and not be in the shadow of international rivals. For this reason, the partners will develop their strategy for communications and promotion in order that an effective range of promotional activities can be delivered in a cost effective manner. This will be achieved by more closely integrating the promotional activities of the partners and attempting to identify additional resources. In this way we can promote the skills, technology, research facilities, business support and real estate opportunities at Harwell and highlight the benefits of a Campus location. It will also allow us to build on the international collaborations that already exist at Harwell and ensure that it is a favoured location for further R&D investment, particularly from outside the UK.

The benefits of partnership and collaboration

The University of Manchester has joined forces with Diamond Light Source to develop a world-leading imaging facility that will allow researchers to create high-quality 3D images of samples ranging from engineering materials to bio-materials. The X-ray imaging beam line (the 'Diamond-Manchester Beambranch') was co-funded by Manchester. The university and DLS have now entered a long term collaboration to explore and exploit new science using synchrotron light.

Closer to home, it is possible that closer links could be forged with those research led universities that access research facilities. Academic excellence is crucial to long term success in research and at any one time there are over 30 universities represented at Harwell. The partners are mindful of building upon these close links, particularly those with the world renowned University of Oxford which is located close to the campus. Both the University of Oxford and University of Manchester are already represented on site and close links exist with many other universities, including Cambridge, Cardiff, Edinburgh, Imperial, Queens University Belfast, Strathclyde, UCL and York. The partners seek to utilise these links and ensure that Harwell is seen as a trusted partner in initiatives such as investment in new shared research facilities or as a potential base for specialist research groups.

To this end a new university quarter forms part of the masterplan for Harwell and this will enable UK universities to take full advantage of the research facilities on site and strengthen links to the many businesses and other organisations already located at the Campus. This will also be an additional attractor to research driven companies that value access to university researchers but that are not yet represented on the Campus.

> **IT'S ALWAYS EXCITING TO VISIT HARWELL CAMPUS - I CAN'T WAIT TO BE BACK.**
>
> **Major Tim Peake (UK Astronaut)**

The special relationship with the University of Oxford

The University of Oxford is internationally renowned as being one of the finest universities in the world and was rated as the 'world's best university' 2016-17 by Times Higher Education. The close relationship between the university and Harwell Campus is a particular strength and has been formalised in a 'Partnership for discovery and innovation'. The proximity of these two globally renowned sites of expertise, know-how and equipment provides a unique opportunity for supportive networks of interdisciplinary research and innovation to develop.

Supporting UK research and innovation

Ambition 7
To develop even stronger connections between research, academia and business

This we will deliver by:

- Promoting collaboration between UK academia, research facilities and industry
- Encouraging industrial use of research facilities and research together with a flexible approach to the use of intellectual property held by the public sector
- Hosting an annual conference celebrating the achievements of Campus organisations and providing a forum for discussing challenges and opportunities

Harwell is one of the few locations in the world that can combine access to world class research facilities with the specialist expertise needed to help industrial users conduct their experiments and analyse the data coming from them. This is a unique strength.

Collaboration between research facilities, industry and academia is already well embedded in the culture at Harwell and subject specific networking events are embedded in business support initiatives. Access to research facilities, and the expertise of those employed within them, is encouraged through various pathways according to the needs of the company involved, with some UK based companies obtaining free access to facilities through collaborative R&D programmes. Fostering a spirit. Fostering a spirit of co-operation and partnership between industrialists, academics and researchers enables organisations to address the complex challenges lying behind the commercialisation of innovative technologies.

A WORLD-LEADING TECHNOLOGY HUB.

Estates Gazette

Many of the most important advances in science take place at the interfaces between traditional disciplines. The Research Complex at Harwell provides the environment and facilities for researchers in the life and physical sciences to undertake research across such traditional boundaries. It is especially targeted at researchers whose work may require utilisation of multiple research facilities.

The partners propose to help encourage further cross-sector dialogue by hosting an annual Harwell Campus conference to bring together those with an interest in creating high technology jobs and growth through collaborative action. The conference would also be a forum for discussing the difficult skills and training issues facing high technology businesses.

Collaboration between research facilities, academia and industry

In 2015 around 15% of research time of the large research facilities was used by industry. Many household names such as Unilever, Rolls Royce, Johnson Matthey, Procter & Gamble and Nestle have used Harwell's facilities, usually working in concert with Research Council funded academic researchers. A good example of the benefits of working across sectoral boundaries is the collaboration agreement between Johnson Matthey, the University of Oxford and the Diamond Light Source synchrotron to create a state-of-the-art materials characterisation facility at the Harwell Campus. As part of Diamond's pioneering hard X-ray nanoprobe beamline and electron microscopy centre, Johnson Matthey and the University of Oxford will each contribute cutting-edge microscopes to offer unrivalled facilities for research across the biological and physical sciences. The centre also has support from the Wellcome Trust.

Ambition 8
To promote the need for increased and continued long term investment in research

This we will deliver by:

- Highlighting the importance of long term investment in research and technology to UK business growth
- Developing Harwell as a 'living laboratory' where research is embedded in the infrastructure of the site and it is possible to pilot new technologies in a real environment
- Working with Government partners to ensure Harwell is the natural choice and prime location for new large scale research facilities and that existing UK national research facilities are operated at 100% of their design capability

Harwell is the base for many of the UK's large scale scientific research facilities and the underpinning technical and engineering expertise needed to operate them. Collectively these facilities provide the specialist tools needed by some 20,000 researchers per annum from universities, industry, public sector research establishments and charities. This enables the study of a vast range of subject matter, from new medicines to innovative engineering, material science or aspects of our cultural heritage. These facilities permit not only world class 'blue skies' research, but also the development of innovative technology and specialist engineering. This ultimately helps connect science to economic growth and provides a perfect environment for high technology pilot or demonstrator projects.

For this reason long term investment in the underpinning science and technology at Harwell, and ensuring that existing research assets are utilised to their full, is essential to the UK's economy. It is increasingly clear that in the future there will need to be imaginative ways of funding both the future construction and operation of scientific facilities. Harwell has grasped this, and there are already a wide range of different relationships in place. These extend from formal agreements to share costs (such as that in place with the Wellcome Trust whereby it is a 14% stakeholder in the Diamond synchrotron), through to international agreements in place at the ISIS neutron source,

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IT'S A PLACE WHERE PEOPLE PUSH YOU. WE ALL NEED THAT. YOU DON'T MAKE PROGRESS BY THINKING IT ALL OUT YOURSELF, YOU MAKE PROGRESS BY BEING CHALLENGED BY OTHER PEOPLE. AND YOU GET IT HERE.

Professor Steve Cowley FRS

Tackling business problems and global challenges

Boeing and researchers from the University of Sheffield have been using the ISIS neutron source to reduce manufacturing costs. Residual stresses in aerospace structures are an inevitable result of metal processing. They can mean components are not fit for purpose, have reduced lifetime or require costly operator skill to identify and intervene in machine processing when distortions occur. Studying blocks of AA7050 (the aluminium alloy commonly used in aerospace) at ISIS has allowed researchers to understand how residual stresses occur, see hidden residual stresses and, by coupling these data to computer models, improve manufacturing techniques. Another example is that researchers from the University of Manchester, supported by agrochemical company Syngenta, have used the ISIS neutron source to show the crystalline structure of leaf coatings. This opens the door to important discoveries about how pesticides work and how to fine tune them to increase crop yields. Given the rapid population growth predicted in the future such discoveries may well have global impact.

or sponsorship of specific new initiatives by universities or industry. The joint venture partners are committed to developing further this flexible 'mixed economy' approach, and see this as a particular strength of the UK's way of working.

It is however important that research facilities are operated to their full potential if the UK is to benefit fully from the return on capital investment at Harwell - conservatively estimated at in excess of £2bn. In recent years investment in science by UK Government has been maintained despite pressure on the public purse. But over time cash constraints have meant that some research facilities now operate at well below their design capability. The joint venture partners remain committed to ensuring that the case for continuing, and indeed increasing, public investment in science and technology is made clearly and strongly.

Looking further ahead, keeping the UK at the forefront of science and technology demands that there is periodic investment in new large scale facilities, such as the possibility of a UK- based Free Electron Laser or other activity. The Harwell Campus is an obvious location for such facilities and the site masterplan has earmarked space for the expansion of the portfolio of large scale scientific instruments on site. The synergy to be gained through co-locating large scale research facilities is obvious and the joint venture partners believe that Harwell is a prime location for such initiatives, and will promote it as such.

World class excellence

The Diamond Synchrotron is the UK's national synchrotron facility. It was opened in 2007 and is now used by over 3,500 academic and industrial researchers across a wide range of disciplines including structural biology, energy, engineering, nanoscience and environmental sciences. It represents an investment of around £500m and has a world class reputation for scientific excellence, best practice in industrial liaison and research productivity. Just two examples of real world impact include the use of Diamond's protein crystallography beamlines to develop a new methodology to produce a vaccine for the foot-and-mouth virus and work with BMW MINI to investigate new ways of stretching steel by looking at the unique atomic arrangement within the metal. Examples like this show that Diamond, and the other large research facilities at Harwell, are vital not only to UK academic research but also to product development by UK industry.

Ambition 9
To develop Harwell into a community that is attractive, sustainable and accessible

This we will deliver by:

- Sensitive master-planning and community development: creating an environment that is both exciting and inspirational
- Working with partners to deliver the infrastructure necessary for the future growth and expansion of the Campus
- Enabling more online networking to help build collaborations both across the Campus and with universities, research centres and individuals around the world

The joint venture has developed an exciting and ambitious masterplan for the physical development of Harwell's 280+ hectares. To give an idea of scale, this is approximately the same footprint as the City of London. The masterplan balances the need to provide capacity for future large scale scientific facilities with the demand for high quality space for technology focused businesses and capacity to provide bespoke accommodation for major research led companies looking for a new location. It also provides for new affordable housing and a wide range of supporting amenities such as new hotel and conference facilities, restaurant, gym etc. in a sensitive and sustainable mix that will bring even greater vibrancy to the Campus. This combination will give people the opportunity to be part of a sustainable and attractive community, blending social and economic benefits.

Building a community is of course about more than just physical infrastructure, but turning the masterplan into reality is well underway. Recent additions include the new headquarters for the European Space Agency's European Centre for Space Applications & Telecommunications and the construction of a new building (Genesis Phase 2) that will provide more top quality flexible innovation spaces incorporating laboratories, clean rooms and offices. During 2015/16 in excess of 100,000 square feet of office and laboratory space was refurbished and some 200,000 square feet of new space provided.

The framework provided by the masterplan shows it will be possible to create the kind of balanced community which we would all wish to live in. The proximity of Harwell to Oxford and its cultural heritage is a unique advantage and can be used to help entice people to live and work close to the Campus. More broadly, Oxfordshire is an attractive county and it is the view of the joint venture partners that Harwell must be enticing for high technology enterprises and the highly skilled people that work for them not just as a research base, but as a vibrant community in its own right. With the help of local planning authorities, and other agencies, there is an opportunity to create something special at Harwell which will serve as an example of what can be delivered through public and private collaboration. Sustainability is at the heart of the masterplan and there may be opportunities for high technology or green technology demonstrator projects to be incorporated into future plans. These will link well with Harwell's technological credentials.

Looking outside the boundary of the Harwell Campus masterplan, physical infrastructure improvements are needed to effectively connect Harwell to the rest of the UK outside the Campus boundary. This is crucial to its long term growth. An example is the recent upgrading of the A34 junction at Chilton, which has improved road access to the Campus. This is welcome, but even greater pace will be important in the future if growth is not to be stifled. An example is the decision to connect Oxford to Cambridge by rail, which is a positive development and welcomed by the partners.

> **"HARWELL IS SUCH A TREMENDOUSLY EXCITING PROJECT – AN OPPORTUNITY TO RESHAPE AN EXTRAORDINARY NATIONAL LABS CAMPUS WITH OVER 75 YEARS OF HISTORY INTO A 21ST CENTURY INNOVATION TOWN.**
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> **Oliver Milton, Partner, Hawkins Brown (Architects)**

It should be noted that while a certain level of infrastructure costs can be built into the commercial development plans of the Campus, there are some infrastructure schemes for which that approach is inappropriate and which do not meet the narrower financial appraisal criteria of private sector joint venture partners. Examples are link/loop roads connecting up the campus, improved transport links, accommodation for central amenities, water, power and telecommunications/ broadband connectivity.

To date Regional Growth Funds (RGF) and modest contributions from campus development budgets have assisted with addressing some of these infrastructure requirements, including the construction of a north-south link road and a shuttle bus link to Oxford. However, further investment in these areas needs to be prioritised by central and local government in future years to fully exploit the potential of the campus as an engine of economic growth.

Some existing scientific infrastructure is also in need of further investment. Notably, at present the scientific data network is inadequate to permit the easy transfer of large quantities of research data to researchers based off site. The ability of organisations to manage, move and analyse large amounts of data is becoming of ever greater importance for the future.

The proposed Ada Lovelace Centre has the potential to introduce a multidisciplinary approach to data processing, computer simulation and data analytics which would benefit many of the science disciplines represented at Harwell, as well as industry and academia.

The partners' intention is that Harwell will become an attractive community where people work, live, carry out world-class research and develop ground breaking innovations. Part of this will be building Harwell's presence online to create a new website and enabling more online networking to help build collaborations both across the Campus and with universities, research centres and individuals around the world.

Living at Harwell

Harwell is an exciting and dynamic place to live as well as work. The Halifax Quality of Life survey 2016 placed three of the Oxfordshire Districts (one of which includes the Harwell Campus) in the top 50 places to live in the UK. Surrounded by beautiful countryside, it is within easy reach of picturesque towns and villages, including the historic university town of Oxford. The Campus itself benefits from a mini-supermarket, cafes and restaurants and the next stage of development proposes to increase this social offering. As well as housing and hotels on site, the Campus offers those who live and work here a range of social activities including sports facilities and social clubs; health therapists and hairdressers; and professional childcare. Harwell aims to provide all the amenities of a small town in a way that is specifically targeted to the entrepreneurs and innovators who live here.

Looking to the future with confidence

At the beginning of this strategy the partners set out their vision that the Harwell Campus should become a world renowned location for innovation, high technology industry and research. That it is already successful is obvious. But we are striving for much greater things and accelerating progress.

The partners are passionate about helping deliver what is needed. The actions outlined here need to be seen as a package of activity. Taken together they will make Harwell a beacon for the UK's world leadership in science, with an international reputation built on the translation of technological advantage into the creation of jobs and wealth. We are confident we can deliver this, bringing benefit not only to Harwell, but to the UK as a whole.

Want to know more?

The Harwell Campus is located in an area of outstanding natural beauty.
It enjoys easy access to Oxford and London as well as links to Heathrow Airport.

LONDON AND HEATHROW ARE APPROXIMATELY AN HOUR AWAY

The Harwell Science & Innovation Campus Limited Partnership is a 50:50 private/public partnership. The public sector is represented by the Science and Technology Facilities Council and the UK Atomic Energy Authority. The private sector is represented by a team of highly experienced development professionals, namely Harwell Oxford Partners Ltd. with U+I PLC. The Harwell Campus is one of Science Vale Oxford's Enterprise Zones and as such there may be financial incentives on offer to those considering relocation or starting a business. For further information about the opportunities on offer please get in touch with the Harwell Management Office:

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Property Week

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