



HARWELL SPACE CLUSTER

Multidisciplinary Innovation

CONTENTS

- 2 Harwell Campus
- 4 Success of the Harwell Space Cluster
- 6 Multidisciplinary Innovation
- 8 Building the Harwell Space Cluster
- 9 Vision for the Future
- 10 UK Space Industry
- 12 Stakeholder Organisations
- 20 Companies Driving Innovation at Harwell
- 40 Life at Harwell
- 42 Harwell Tomorrow
- 45 Contact

HARWELL CAMPUS

5,500
people

£2+bn
facilities

SPACE CLUSTER

80
organisations

800
employees



harwellcampus.com

FOREWORD

Harwell Campus is an exciting place to be, with cutting edge science facilities, major organisations and a great mix of companies from start-ups to multinationals. The Campus was quick to realise that it needed a mechanism to encourage collaboration, knowledge sharing and drive innovation, which led to the development of thematic Clusters. It started with the Harwell Space Cluster and now includes the HealthTec and EnergyTec Clusters.

I have watched Harwell Campus flourish over the last seven years, including the Harwell Space Cluster, which has grown to 80 organisations employing 800 people. I don't expect there to be any let up in this growth and I look forward to the Campus changing, literally before my very eyes.

I am really excited about the opportunities at the intersections between these Clusters, such as between the Space and HealthTec Clusters. Harwell Campus is able to demonstrate multidisciplinary innovation every day.

There is no better way to really understand what is happening than to visit. I hope that you will do just that and that you will become part of the exciting future of the Harwell Space Cluster and help the UK reach its goal of taking 10% of the global space market by 2030.

The Rt Hon. Lord Willetts



HARWELL CAMPUS

STAKEHOLDER ORGANISATIONS



1 European Space Agency (ECSAT)



2 RAL Space



3 ESA Business Incubation Centre



4 Satellite Applications Catapult



5 UK Space Agency



6 Science and Technology Facilities Council

LARGE SCALE SCIENTIFIC FACILITIES



7 Public Health England



8 Medical Research Council



9 ISIS Neutron Spallation Source



10 Diamond Light Source



11 Scientific Computing Department



12 Central Laser Facility

NEW DEVELOPMENTS



13 The Quad



14 Zephyr Building



15 Rosalind Franklin Institute



16 Residential Complex



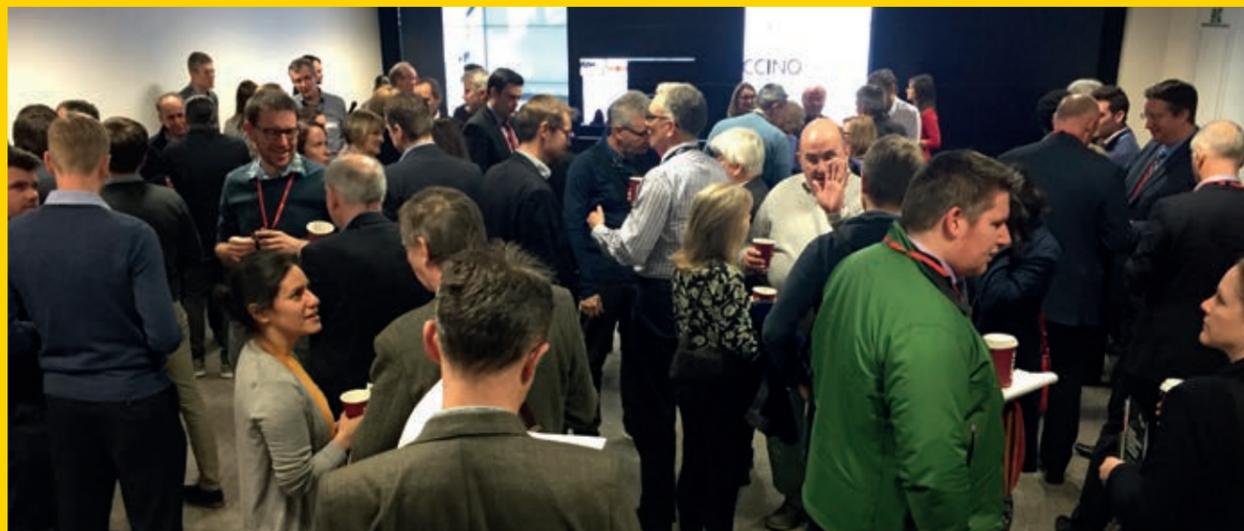
Image supplied by Earth-i Ltd,
Data 2017 ©21AT All Rights Reserved

SUCCESS OF THE HARWELL SPACE CLUSTER

Harwell Campus is home to over £2 billion of scientific facilities and 5,500 skilled people. To drive collaboration and knowledge sharing, 'clusters' have been developed in Space, Healthcare Technology (HealthTec) and Energy (EnergyTec). Each cluster brings together co-located industry, academia and public sector with investors and entrepreneurs, leading to a powerful combination to tackle global challenges. Increasingly, more companies are exploring the opportunities at the intersections between these clusters delivering multidisciplinary innovation.

“The Space Cluster exemplifies the vision of Harwell as a nexus of ideas and an engine for innovation across discipline boundaries.

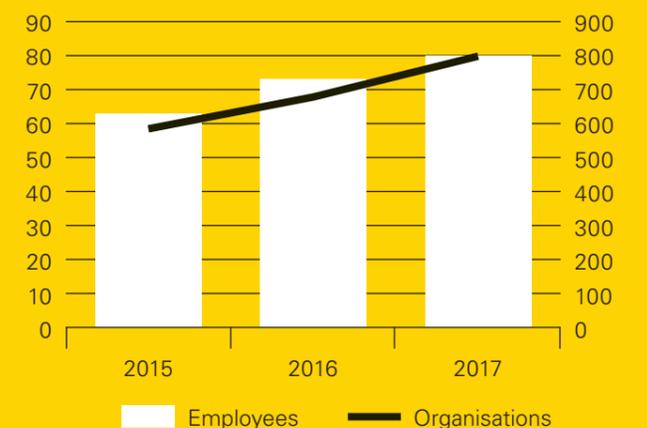
Dr Barbara Ghinelli
Director, Campus Business Development



Harwell Space Cluster is the co-location of industry, academia and public sector organisations at Harwell related to the space sector.

EMPLOYEE GROWTH OVER 10%

The Harwell Space Cluster was the first cluster to be established at Harwell Campus following the arrival of the European Space Agency, Satellite Applications Catapult and UK Space Agency, alongside the longstanding activities of STFC RAL Space. The presence of these stakeholder organisations has attracted many companies to set up operations at Harwell Campus. Since 2010 the Harwell Space Cluster has grown from a handful to more than 80 space organisations today, employing over 800 people. The number of employees in the Harwell Space Cluster has been growing at 13% per annum for the last two years.



STRONG COLLABORATION

Collaboration at Harwell is strong, for example, AgSpace worked with the Satellite Applications Catapult to develop a new crop measurement tool for farmers; Deimos and eOsphere are working together as part of the UK Space Agency's International Partnership Programme; RAL Space is collaborating with Thales Alenia Space to deliver the Microcarb satellite mission, a joint UK-French satellite mission to help combat climate change; Orbital Micro Systems came to Harwell through the Satellite Application led In Orbit Demonstration Programme and have subsequently partnered with Satavia to enhance flight safety and reduce aircraft maintenance costs.

GATEWAY TO THE UK SPACE SECTOR

Harwell Space Cluster is able to act as the gateway to the UK space sector due to the wide range of national facilities, infrastructure and space organisations with established links across the UK. Harwell is the first port of call for many international visitors to the UK space industry.

“Great facilities, amazing companies – this is an exciting place to be.

Dr Joanna Hart
Harwell Space Cluster Development Manager

MULTIDISCIPLINARY INNOVATION

To encourage collaboration and knowledge sharing between the wide range of organisations at Harwell Campus, thematic Clusters have been identified. Following the success of the Harwell Space Cluster, HealthTec and EnergyTec Clusters were established to improve the connectivity of the Harwell organisations operating in these areas. The Harwell Cluster Steering Board takes a strategic lead in identifying new opportunities, supporting emerging clusters and encouraging activities at the intersections between these clusters to drive multidisciplinary innovation.

“ At Harwell we focus on stimulating innovation and industrial competitiveness, especially by the application of space assets in a wide range of other sectors.

Magali Vaissiere
 Director of Telecommunications & Integrated Applications, ESA, Head of ECSAT Centre



HealthTec at Harwell

The Harwell HealthTec Cluster includes the Diamond synchrotron, Public Health England and the Medical Research Council, and will include the new £103 million Rosalind Franklin Institute, which will house 240 scientists linked to 10 universities. Companies at Harwell include Adaptix Imaging, The Electrospinning Company, Oxford Nanopore and OxSyBio and the Cluster is linked to over 250 companies in the Oxfordshire Biopharma Cluster.



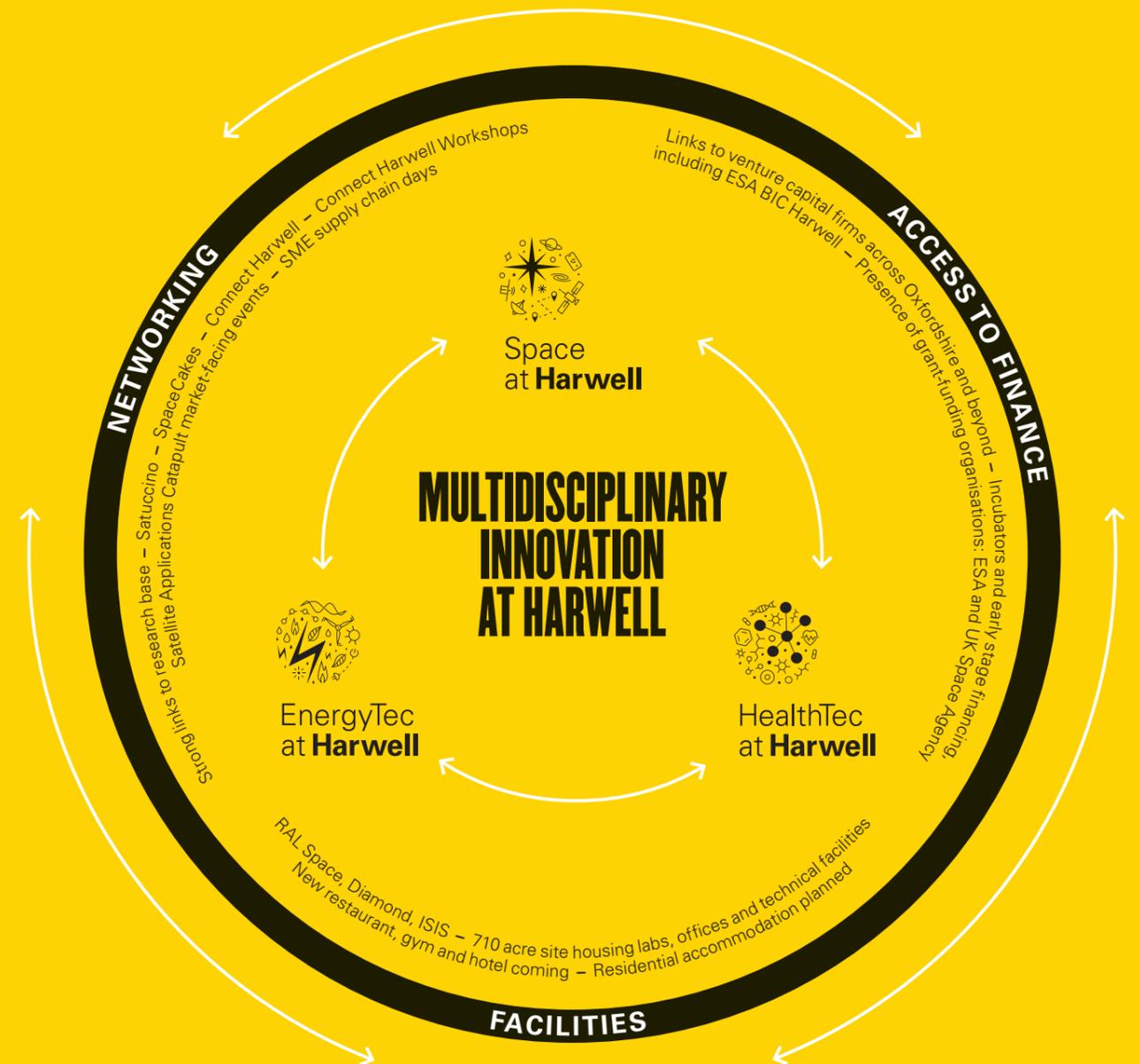
EnergyTec at Harwell

The emergent EnergyTec Cluster is building on the unique insights into battery behaviour at the ISIS neutron source and Diamond, as well as the catalysis hub at the Research Complex where many collaborations with universities already exist. The HQ for the Faraday Institution will join companies such as Oxford nanoSystems, SerraLux and ZapGo.

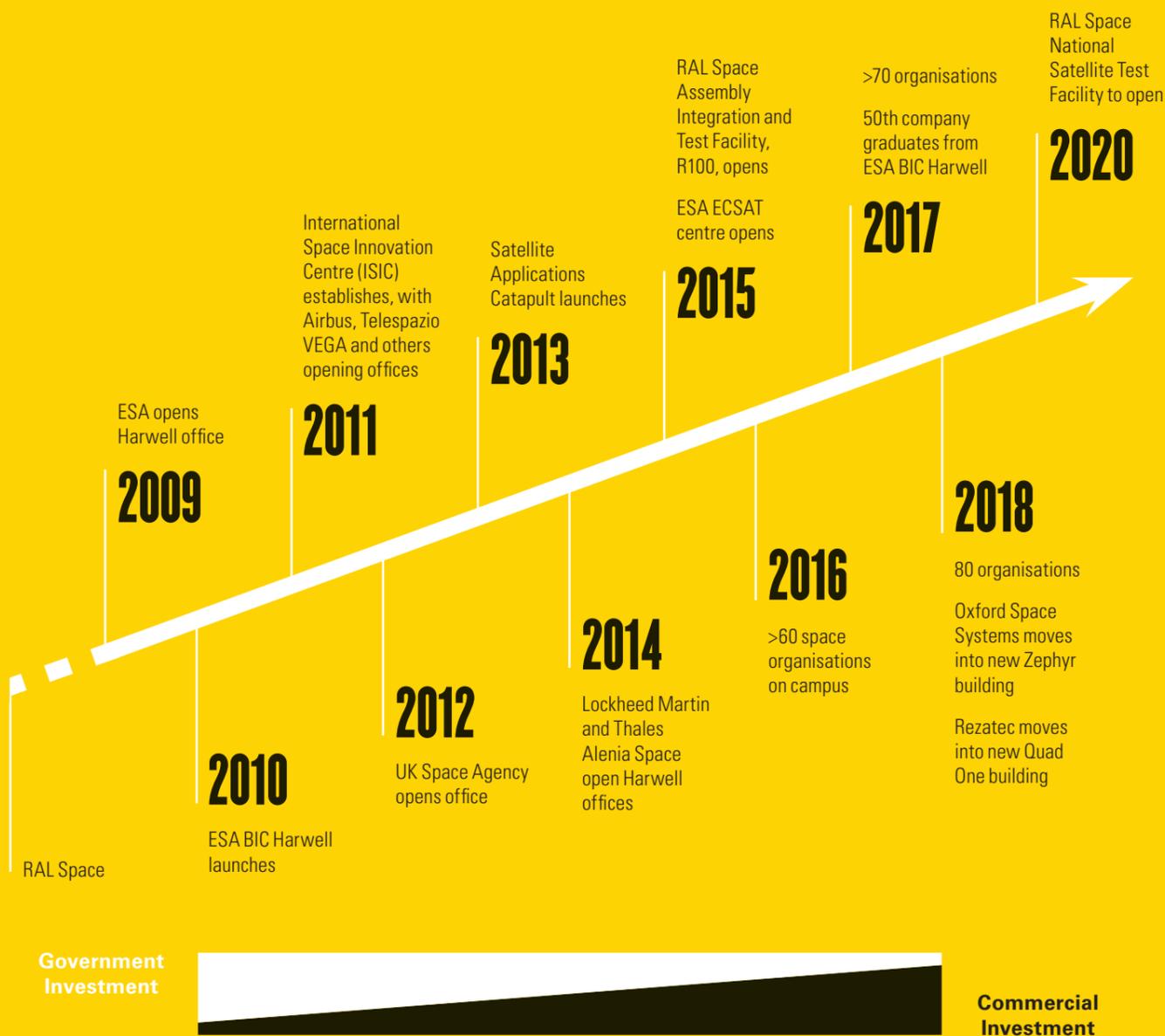
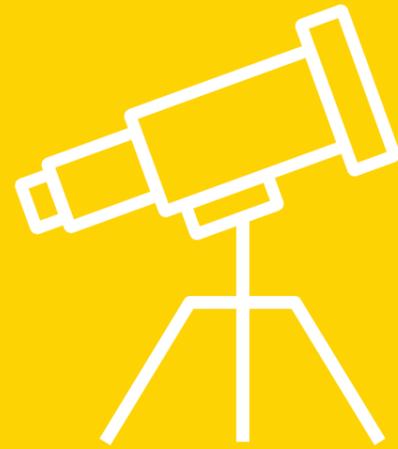
ATTRIBUTES OF A SUCCESSFUL CLUSTER

“ Real innovation in whatever discipline often occurs at the interface between areas of expertise. Multidisciplinary clusters become a huge cauldron for innovation.

Sir John Bell
 Regius Professor, University of Oxford and Chair of the Bill and Melinda Gates Foundation Scientific Advisory Committee



BUILDING THE HARWELL SPACE CLUSTER



VISION FOR THE FUTURE

All of the stakeholder organisations are working to accelerate the growth of the Harwell Space Cluster and to continue to build Harwell's global reputation. This will involve:

- 1** Growing the Harwell Space Cluster to 200 organisations employing 5,000 people by 2030 (in line with the Space Growth Partnership targets) from the current 80 space organisations with a combined 800 employees. This will require growth of the existing organisations at Harwell and attracting new companies to set up operations at Harwell, including inward investors that can work alongside universities, Harwell facilities and large companies to rapidly exploit and commercialise advances in research and technology.
- 2** Working with UK public organisations, companies, academia and clusters to leverage the national and international assets at Harwell to enable economic growth across the UK. Using the strong links with academia, particularly the local universities of Oxford, Oxford Brookes and Reading, will drive productivity improvements across the UK.
- 3** Building links with international space clusters and organisations to build partnership opportunities, encourage exports and inward investment to help the UK reach its target of 10% of the global space market by 2030.

The common vision for the Harwell Space Cluster is:

TO BE A GLOBALLY RENOWNED SPACE CLUSTER AND GATEWAY TO THE UK SPACE SECTOR

“Oxfordshire’s Science and Innovation Audit identifies data-led space applications as a transformative technology that will bring innovation and growth for the local and national economy. The Harwell Space Cluster is pioneering this innovative technology and we are committed to supporting its continued success.

Nigel Tipple
Chief Executive, OxLEP

UK SPACE INDUSTRY TARGETS 10% OF GLOBAL SPACE MARKET

The UK space sector is currently growing at 6.5% each year and has a labour productivity 2.7 times the national average.

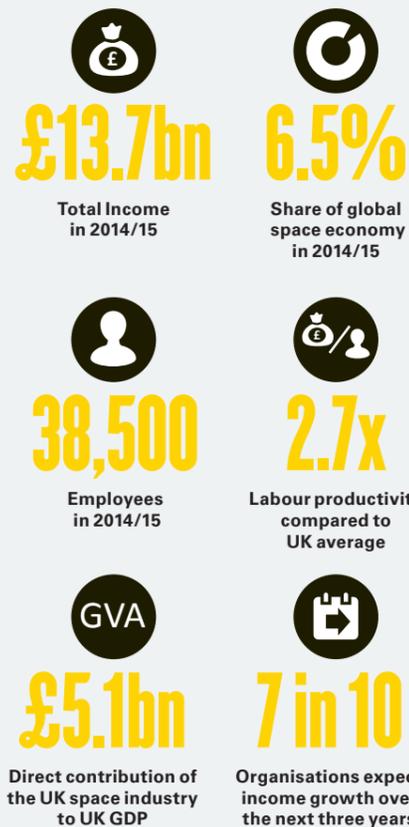
The Government's Industrial Strategy sets out how the UK Space Agency is working with industry to grow the UK's share of the global space market from 6.5% to 10% by 2030. This will build on the strong returns delivered through the Space Innovation and Growth Strategy, which since 2010 has involved a powerful combination of industry, academia and the public sector.

Harwell Space Cluster has a significant role, as many of the key players in the UK have a presence at Harwell, making it a gateway to the UK space sector. The UK space sector already provides £5.1 billion of GDP to the UK economy and when the wider benefits of satellite-enabled services are included the impact is greater than £250 billion. If all the satellites were turned off tomorrow, that would be the impact to the UK economy. The space sector is a strategic and enabling sector.

¹ UK Space Agency Size & Health of the UK Space Industry 2016, London Economics: www.gov.uk

*UK non-financial business economy only

SIZE & HEALTH OF THE UK SPACE INDUSTRY 2016¹



Wider UK GDP* supported by satellite services



CONNECTED ACROSS THE UK AND BEYOND



The Harwell Space Cluster is part of the wider UK space sector and is connected to other clusters of space activity across the UK. The Satellite Applications Catapult, with support from the UK Space Agency, has five Centres of Excellence¹ across the UK; the Science and Technology Facilities Council has additional sites at Daresbury and Edinburgh; UK Space Agency has also invested in a number of business incubators across the UK to create a comprehensive Space Incubator Network². Through the international operations of companies based at Harwell, ESA and international collaborative projects supported by the UK Space Agency, Harwell has global reach.

DEVELOPING SKILLS

Harwell Space Cluster is actively working to ensure that the space sector has the skills it needs to deliver on its targets. For example the Satellite Applications Catapult and UK Space Agency run a Space Placements in Industry³ scheme which introduces undergraduates to the space sector and helps space companies recruit new talent. As a world-leading multidisciplinary science organisation, STFC supports university research and inspires the next generation from public engagement to apprenticeships.



¹ sacatapultcoe.org
² setsquared.co.uk/start-support/uk-space-incubator-network
³ sa.catapult.org.uk/people/space-placements-industry-spin

“Our expertise in robotics and AI, structural engineering and materials testing, means Oxford Brookes is able to collaborate with the Harwell Space Cluster to support the national ambition of achieving 10% share of the global space-related economy.”

Professor Linda King
 Pro Vice Chancellor Research & Global Partnerships, Oxford Brookes University

STAKEHOLDER ORGANISATIONS



One of the key attractions of the Harwell Space Cluster is the co-location of all the key organisations that are supporting the space industry in the UK.

These national and international organisations are stakeholders in the success of the Harwell Space Cluster and are actively working to support it. Over the coming pages we highlight these organisations, their capabilities, facilities and how they support companies at the Harwell Space Cluster and beyond.

“The University of Oxford works closely with Harwell Campus on high energy physics, life sciences and increasingly in the space sector, with collaborations working on novel satellite instrumentation, robotics and downstream applications of data for uses ranging from disaster management to financial services.

Professor Ian Walmsley FRS
Pro-Vice-Chancellor, Research and Innovation, University of Oxford

EUROPEAN SPACE AGENCY (ESA)



The European Centre for Space Applications and Telecommunications (ECSAT) is the headquarters of ESA's Directorate of Telecommunications and Integrated Applications. ECSAT has over 100 people drawn from the majority of ESA's 22 Member States.

Its main focus is on the development of commercial satellite communication products, services and applications, through ESA's programme of Advanced Research in Telecommunications Systems (ARTES). This is designed to stimulate innovation in everything from business applications to satellites and from ground stations to user terminals.

The ESA Climate Office manages ESA's climate-related activities including the Climate Change Initiative programme, which produces data sets of Essential Climate Variables that are vital contributors to the Global Climate Observing System.

The Human and Robotic Exploration Directorate supports activities in robotics and autonomy as well as the development of an analogue Sample Curation Facility at Harwell, contracted to London's Natural History Museum. The facility curates materials like rock and soil that are analogues of the Moon, Mars and other alien bodies, for engineering and scientific use.

ESA participates in the Harwell HealthTec Cluster to develop new services in tele-medicine and environmental monitoring,

and the commercialisation of microgravity research in areas such as healthcare for the ageing population. The new EnergyTec Cluster brings the prospect of addressing the latest developments in battery technology and electric propulsion systems.

The ESA-RAL Advanced Manufacturing Laboratory provides expertise and test services to investigate and optimise materials destined for future space projects and associated manufacturing processes.

ECSAT has conference and meeting facilities for free use by space organisations from ESA Member States, especially those from the Harwell Space Cluster, in line with ESA's aim for its centre at Harwell to help anchor ESA in the UK and the UK in ESA.

“Having the ESA team located at Harwell has been really helpful in facilitating the process and providing easy access to technical expertise.

Mike Lawton
CEO, Oxford Space Systems



esa.int



ESA BUSINESS INCUBATION CENTRE



For any start-up, spin-out or entrepreneur, coming up with a great idea is just the first step. Turning it quickly and effectively into a winning commercial offering can be an even bigger challenge. The European Space Agency Business Incubation Centre Harwell (ESA BIC Harwell) helps young space-related companies to meet this challenge, enabling them to leverage the funding, support, skills and facilities they need to transform technology into successful, vibrant businesses. Both companies developing technologies for use in space and companies applying space technologies in non-space sectors are eligible to apply.

Set up by ESA in 2010 as part of its rapidly-growing Europe-wide BIC network, and managed by the Science and Technology Facilities Council (STFC), the ESA BIC Harwell draws on the outstanding track record of both organisations in high-tech business incubation, providing a unique environment at the heart of the Harwell Space Cluster geared exclusively to accelerating innovation. Each year 10 or more start-ups are accepted into the ESA BIC Harwell and provided with a comprehensive incubation package of technical support, access to specialist facilities and equipment, business support, grant funding to accelerate product development, networking events and office accommodation.

The ESA BIC network is now the largest single incubation network in Europe, with 18 ESA BIC's which had supported 546 start-ups by the end of 2017. The ESA BIC Harwell celebrated the graduation of its 50th company in August 2017. It has supported 65 start-ups in total which between them have raised equity investment of more than £30 million (Beauhurst, February 2018). During 2018 both the size and the geographical reach of the ESA BIC Harwell will be expanded as it develops into the ESA BIC UK, with new locations at STFC's science and innovation campus at Daresbury Laboratory in Cheshire and the new Higgs Centre for Innovation at the Royal Observatory Edinburgh.

Graduation of the 50th company from the ESA BIC Harwell, August 2017



“ESA BIC Harwell and the space networks in Harwell enabled Open Cosmos to launch its first satellite in less than a year. Today, we are offering our satellites and space mission services to customers all over the world.

Rafel Jorda Siquier
 Founder and Chief Executive,
 Open Cosmos Ltd



esa-bic.org.uk

RAL SPACE



STFC RAL Space has launched over 211 instruments into space and undertakes world-leading space research and technology development, provides space test and ground-based facilities, designs and builds instruments, analyses and processes data and operates ground-station facilities, as well as leading conceptual studies for future missions. It works alongside the UK Space Agency, which co-ordinates UK civil space activities, and it works with space- and ground-based groups around the world. RAL Space has been involved in many high profile projects, such as the Ptolemy instrument aboard the Rosetta Philae lander with the Open University.

RAL Space is currently working on several aspects of the EUMETSAT / ESA MetOp-SG collaboration, a programme to provide low Earth orbiting meteorological satellites for the coming decades. RAL Space is providing critical millimetre wave receiver components for MetOp-SG's Microwave Sounder, Microwave Imager and Ice Cloud Imager instrument series, and is developing cryogenic ground calibration apparatus for pre-launch testing of the first two of these instruments.

RAL Space is one of only a few facilities worldwide with the expertise to design and produce highly specialised calibration targets for millimetre and shorter wavelength instruments. RAL Space supports Space Surveillance and Tracking in collaboration with partners around the world through its Chilbolton Observatory in Hampshire.

R100 – Testing and Validation Facility

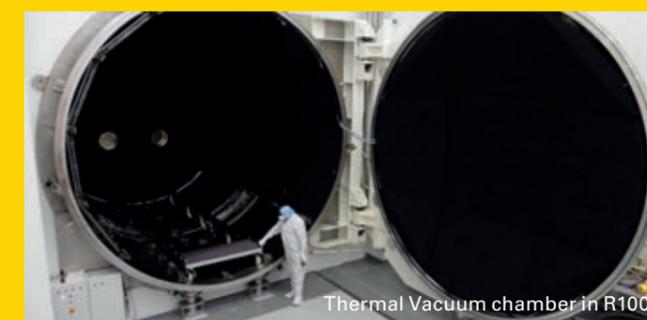
RAL Space opened R100 in July 2015, which houses its facilities for industry and RAL Space to test and calibrate space instruments from nanosats through to 7-tonne communications satellites. Existing facilities include two new 5 metre diameter Space Test Chambers, both sited over active seismic blocks to provide vibration isolation. The building also houses a vibration facility, a suite of clean rooms and the Assembly, Integration and Verification control room.



RAL Space R100 building

National Satellite Test Facility

As part of the Government's Industrial Strategy, RAL Space was awarded £99 million in 2017 for the National Satellite Test Facility. From spring 2020 UK companies will have access to a comprehensive set of satellite test capabilities in one location.



Thermal Vacuum chamber in R100

“RAL Space made substantial contributions to developments, which helped develop the SME business that Thales Alenia Space bought in 2014 as the foundation of its UK footprint. RAL Space continues to provide similar support to other SMEs developing in the space industry and entering the Thales Alenia Space supply chain.

Ben Olivier
 CEO, Thales Alenia Space, UK



ralspace.stfc.ac.uk
 /Pages/home.aspx

SATELLITE APPLICATIONS CATAPULT



The Satellite Applications Catapult is an innovation and technology company transforming the way the world uses satellite technology and data. The company helps organisations large and small to overcome barriers to innovation in the use of satellite applications to grow their business in the UK and internationally. The Catapult team challenges these barriers by bringing together industry, researchers and end-users to explore and develop new ideas, and accelerate products and services to market.

Through Catapult's Market Programmes – Intelligent Transport, Sustainable Living, Blue Economy, and Government Services – it connects the satellite applications sector with end-users' building collaborative programmes that address their challenges.

Catapult's Technology Programme builds capability, helping companies advance their products and take advantage of new emerging technologies such as, artificial intelligence and smart analytics, robotics and autonomous systems, visualisation technologies, 5G and the Internet of Things.

At Harwell, the Catapult hosts world-class facilities and provides business and technical support services, connecting organisations with the resources they need to launch and grow. The team hosts a large business networking event, Satuccino, at the Harwell Campus every month and offers support across the UK regions through five Centres of Excellence in Scotland, the North East, the East Midlands, the South Coast and the South West.

BUSINESS SUPPORT

- Business modelling, market research and financial planning
- User-centred design
- Start-up support
- Access to finance
- Networking

FACILITIES

- Far field antenna range
- Operations centre
- SatComms lab
- Climate, environment and monitoring from space (CEMS) cloud-based services
- Conference and meeting facilities

“The Catapult has created the ideal environment for Deimos Space UK to grow and gain credibility in the UK market.”

Michael Lawrence
Business Development Director,
Deimos Space UK



sa.catapult.org.uk

The Satellite Applications Catapult is part of a network of 10 Catapults set-up by Innovate UK, the government's innovation agency, to transform the UK's capability for innovation in specific areas and help drive future economic growth.

UK SPACE AGENCY



The UK Space Agency, an executive agency of the Department for Business, Energy and Industrial Strategy, is at the heart of UK efforts to explore and benefit from space. The Agency is comprised of around 140 staff based in Swindon, London and Harwell.

The UK Space Agency is the lead for UK civil space, responsible for all strategic decisions on the UK civil space programme and providing a clear, single voice for UK space ambitions. The UK Space Agency focuses on ensuring that the UK retains and grows a strategic capability in space-based systems, technologies, science and applications in order to win sustainable economic growth, secure new scientific knowledge and provide benefit to all citizens.

The UK Space Agency has strategic responsibility for supporting growth of the space sector across the whole of the United Kingdom, including development of the UK Space Gateway at Harwell. Harwell has been developed as an important Space Cluster within the UK as a result of a clear and sustained UK Government policy led by the UK Space Agency. The UK Space Agency regards Harwell as a national and international gateway into the UK's space strengths, with its major institutions (RAL Space and the National Satellite Test Facility), the Satellite Applications Catapult and the European Space Agency's European Centre for Space Applications and Telecommunications providing expertise and facilities to support growth at Harwell and across the country.

“The clustering of resources and industries in specific locations can provide a conducive context for success – this is already evident through the coordinated investment in the UK Space Gateway at Harwell.”

National Space Policy, 2015

The roles of the UK Space Agency include:

- leading the UK civil space policy and maximising the UK contribution to European initiatives, including the European Space Agency
- building a strong national space capability, including scientific and industrial centres of excellence
- co-ordinating national strategic investments in space
- working to inspire and engage a growing, skilled UK workforce of space technologists and scientists
- working on national and international space projects in co-operation with industry and academia
- regulating UK civil space activities and ensuring we meet international treaty obligations




gov.uk/ukspaceagency

STFC manages over £2 billion of the UK's world-leading national physical sciences laboratories at Harwell.

Capabilities range from genetics and genomics, cellular and structural biology to pharmacology, big data, space technologies, advanced materials and engineering. These rare 'open access' facilities and associated skills provide a powerful platform to help accelerate innovation, using leading-edge new technologies and applications, taking advantage of opportunities for collaboration between partners from different disciplines to inspire fresh thinking.

In April 2018 UK Research and Innovation was formed, bringing together nine Councils including STFC into a single organisation that aims to be the best research and innovation organisation in the world. For more information visit ukri.org



DIAMOND LIGHT SOURCE

Diamond Light Source is the UK's National synchrotron. It harnesses the power of electrons to produce light 10 billion times brighter than the sun that scientists can use to study anything from fossils and fuels to viruses and vaccines. Diamond plays a major international role in biomedical research from infectious disease treatments and drug resistance through to cancer research.

ISIS NEUTRON AND MUON SOURCE



STFC's ISIS facility is a world-leading centre for research in the physical and life sciences through its suite of neutron and muon instruments which give unique insights into the properties of materials on the atomic scale.

SCIENTIFIC COMPUTING DEPARTMENT



The Scientific Computing Department provides large-scale High Performance Computing facilities, computing data services and infrastructure, including the JASMIN 'super-data-cluster', a globally unique platform for exploiting climate and an e-infrastructure for climate and Earth system science.

STFC TECHNOLOGY



STFC Technology provides advanced technology and engineering in support of both STFC-funded activities and other high-profile international projects. This includes support for the space programmes in RAL Space and developing new technologies that were instrumental in the breakthrough detection of gravitational waves in 2015. By leveraging commonality across STFC facilities and programmes, STFC Technology provides researchers with access to a much broader and deeper pool of technical expertise than would be possible individually, thereby enabling them collectively to tackle challenges that would otherwise be beyond reach.

CENTRAL LASER FACILITY (CLF)



CLF is one of the world's leading laser facilities, providing scientists from the UK and Europe with an unparalleled range of state-of-the-art laser technology and expertise across the scientific disciplines.

Applications include experiments in physics, chemistry and biology, accelerating subatomic particles to high energies, probing chemical reactions on the shortest timescales and studying biochemical and biophysical processes critical to life itself.

COMPANIES DRIVING INNOVATION AT HARWELL

The 80 organisations at the Harwell Space Cluster offer a wide variety of products and services, from those producing equipment and satellites to go into space to those generating services and solutions using the data generated by space instruments, including Earth observation, satellite communications and navigation.

Many companies are taking space capability to new market sectors, such as KEIT, which supplies spectrometers designed for space for use in heavy industrial processes.

These companies range in size:

- Start-ups, many of which are, or have been, part of the ESA Business Incubation Centre here at Harwell and companies that utilise the hot desk facilities at the Satellite Applications Catapult.
- Satellite majors that have a presence at Harwell, such as Airbus, Lockheed Martin, Reaction Engines.
- Increasingly there are a number of companies with a larger presence here such as Thales Alenia Space, Deimos, Rezatec, Open Cosmos and Oxford Space Systems, now employing 20–50 people each.

“Diamonds supplied by Element Six, due to their outstanding optical, thermal, chemical and mechanical properties, are already being used by the space industry. Element Six is excited by their many opportunities to exploit diamond’s properties with more organisations based at the Harwell Campus. Harwell Space Cluster is pioneering this innovative technology and we are committed to supporting its continued success.

Daniel Twitchen
Head of CVD Business Development,
Element Six

The following pages give a sense of the companies and capabilities at Harwell as well as highlight why so many companies are choosing to be part of the Harwell Space Cluster.

For more details about these and other UK space organisations visit the Space and Satellite Applications Landscape visit: space.ktnlandscapes.com.

ÅAC-CLYDE



ÅAC-Clyde provides market-leading innovative space solutions and services. Operating internationally, the company offers a wide range of mission experience, specialist expertise and commercially-focused space solutions. Their full turnkey mission service covers everything from constellation design to satellite operations and enables their customers to reach their mission goals with a single, trusted point of contact.

ÅAC-Clyde’s office in Harwell UK serves customers across Europe and Asia, including space agencies like ESA and JAXA as well as leading industrial groups.

“Harwell offers a flourishing environment to establish key business relationships and address a growing global need for small satellites.

Mr Iraklis Hatzithanasiou
VP Business development Europe



aacmicrotec.com
clyde.space

AGSPACE



AgSpace Agriculture Ltd was formed in 2013 in response to the growing demand for precision farming services in the arable sector. AgSpace develop and sell online farming software to agronomy service providers, seed and fertilisers retailers who then sell on direct to the farmer. AgSpace’s online software contains modules for crop recording, yield mapping and variable rate applications. In addition AgSpace provides users with satellite imagery of the growing crop. AgSpace has worked with the Satellite Applications Catapult to develop crop growth indices for a variety of UK arable crops, based on radar data which will revolutionise farmers’ understanding of their crops. In January 2018 AgSpace launched its new, improved online software incorporating the new crop growth index with the aim to provide end users with better, more frequent information on their crops.

“Being based in Harwell is really important for a company driven by new technology and frequently now by the influence of satellite data.

Mike Geeves
Technology Director



ag-space.com

AIRBUS DEFENCE AND SPACE

AIRBUS

Airbus Defence and Space is UK’s premier space company, employing over 3,000 staff in the UK. Airbus provides mechanical platforms and payloads for over 25% of the world’s telecommunications satellites and delivers world-leading Earth observation and science programmes including ESA’s Sentinel-5 Precursor, Solar Orbiter and ExoMars Rover. Airbus continues to support the development of the Harwell Space Cluster to spearhead the development and promotion of space-based data and applications. Airbus’s office at Harwell allows the flexibility to provide on-site resources in accordance with project and business needs and the opportunity to access expertise across the Harwell Campus and, in particular, to connect with user communities outside the space sector.

“Airbus is delighted to see the continuing success of the Harwell Cluster to stimulate the downstream space sector which is key to developing the overall space value chain.

Andrew Stroomer
Business Development Director



airbus.com

ARCHANGEL IMAGING



Archangel Imaging develops edge AI (artificial intelligence) applications and hardware. Can't get the data back to the cloud in time? No problem. Archangel Imaging push the intelligence right out to the sensor instead. Archangel Imaging has developed several machine vision cameras and payloads to help fight crime, save lives and protect the environment in remote areas where cloud-based artificial intelligence solutions simply cannot work. Archangel Imaging products can be integrated onto different platforms and improve with every mission. Welcome to the Internet of Smart Things.

“ As an edge artificial intelligence company, we wanted access to Oxford's AI talent and space industry customers with problems in remote places. Harwell is a natural home for us.

Dan Sola
CEO



archangel.im

ARRALIS



Arralis is a rapidly scaling company, providing world-leading expertise in RF, micro and millimetre-wave technology. Arralis has offices in Ireland, UK, USA, Hong Kong and a fabrication facility in China. Arralis has a core focus in W, Ka and E Bands and is building fully integrated RF front ends. Arralis designs and manufactures MMICs, modules and antennas for these bands and provide fully integrated systems for vision and radar applications. Arralis's products, which are the ultimate in precision and innovation, are used in both global and space environments where accuracy and reliability are critical. Arralis provides the invisible edge to some of the world's largest aerospace, defence and communications companies.

“ We recently opened an office at Harwell for our business development activities, as we thought it would be the perfect fit as Harwell is a hub for space technology and innovation.

Gary Soul
Vice President,
Business Development



arralis.com

ASTROSCALE



Astroscale is a private company dedicated to the maintenance of long-term spaceflight safety through the provision of a low-cost and reliable space debris removal service. The first private company with a mission to secure orbital sustainability, Astroscale is designing and building a mission to demonstrate satellite capture and deorbit technology.

Astroscale Ltd, the UK branch of the international company, is responsible for mission licensing, insurance and business development activities. Additionally, Astroscale Ltd is leading the development of the In-Orbit Servicing Control Centre National Facility, operated from the Satellite Applications Catapult and funded by Innovate UK, with support from the European Space Agency.

“ Harwell Space Cluster is a natural home in the UK for our innovative new space company. We have developed strong commercial partners at Harwell, helping us to grow our business.

John Auburn
UK Director



astroscale.com

AVS



AVS is a technology development company that produces bespoke solutions to science and technology markets, from the initial concept through to manufacture, integration and test: astrophysics, particle accelerators, neutrons, synchrotrons, fusion, lasers and space. AVS UK focuses mainly in the space market and is working in new electric propulsion technologies, space mechanisms and developments for exploration, scientific missions, telecommunications and Earth observation. AVS is producing an innovative catalogue of unique space products that will enable new mission capabilities.

“ The Campus has changed drastically since I arrived in 2009. It hosts large science facilities that we work with, but it is now becoming the Space Cluster in the UK with great potential opportunities. This has allowed AVS UK to grow from 2 to 8 employees in the last year.

Alberto Garbayo
Business Director of AVS UK



a-v-s.uk.com

BDE SPACE



BDE Space is an engineering consultancy that designs satellite ground stations and VSAT networks for international carriers, ISPs, broadcasters and system integrators. By not selling physical hardware, BDE Space is able to provide clients with technically justified and economical solutions reinforced by over 30 years in the satellite industry including first-hand experience in handling RF power levels to 10kW and frequencies up to Q Band. Services include undertaking feasibility studies through writing tenders and managing the final project, enabling clients to concentrate on running their company confident in the knowledge that the engineering aspects of their business are in safe hands.

“ We moved to Harwell Campus in June 2015 and have found it to be a great place to meet like-minded people and access world-leading technical facilities.

David Bookham
Managing Director



bdespace.com

COBHAM RAD SOLUTIONS



Cobham RAD Solutions is a leading test house for assessing the effects of ionising radiation on electronic components, materials and sensors. Cobham RAD Solutions provides services for customers in the space, nuclear, medical and industrial sectors where equipment is used in a radiation environment. As well as aiding part selection at the design stage, test data helps provide assurance that equipment will operate in service as planned, whether against total dose or single event effects. Cobham RAD's test house in Harwell has ISO 9001:2015 certification and is the only one outside the USA to hold full DLA laboratory certification for total dose radiation testing. This enables European manufacturers of high reliability components to use a local source for their testing requirements.

“ Our location at Harwell is important to us, being at the heart of the UK space community. Coupled with the nuclear heritage of the site, this gives us links into the two primary sectors for our services.

Richard Sharp
Managing Director, Europe



cobham.com/rad-solutions

DATABASIX UK



Databasix UK is a people-focused data consultancy based at Harwell. Databasix has extensive experience leading on the technical development of information management systems in a healthcare setting, which involves engaging with a wide variety of stakeholders, with differing information needs and differing levels of competency in relation to IT/technology. Databasix acts as a bridge between the technical development teams and the end users of a system, translating technical capabilities and user need so there is clarity on both sides. The team has experience spanning both the UK and European healthcare environments and increasingly in the space sector.

“ Harwell has a variety of businesses of all sizes, across the space sector which presents us with a fantastic opportunity to collaborate and apply our expertise.

Kellie Peters
Data Rockstar & Chief Executive



dbxuk.com

DEIMOS SPACE UK



Deimos Space UK is a subsidiary of the Spanish company Elecnor Deimos, which employs more than 400 people in four countries – Spain, UK, Portugal and Romania. Deimos Space UK was created in 2013 to address the UK and UK-export market for space systems, services and applications. The company has grown rapidly and now employs 20 people in the UK. The team has expertise in flight systems, ground systems, space situational awareness, satellite navigation, applications and services. This knowledge of satellites, data systems and location-based services puts the company in a unique position when developing satellite applications. Future target markets for new applications of Earth observation data based on deep learning include agronomy/environment, urban mapping and coastal monitoring.

“ Harwell Campus has been the ideal environment for Deimos to grow and gain credibility in the UK market. We have established profitable business relationships with companies based at Harwell through the many networking opportunities here.

Michael Lawrence
Business Development Director



deimos-space.co.uk

DIGITALGLOBE



DigitalGlobe is a leading provider of commercial high-resolution Earth observation and advanced geospatial solutions that help decision makers better understand our changing planet in order to save lives, resources and time. Sourced from the world's leading constellation, DigitalGlobe's imagery solutions deliver unmatched coverage and capacity to meet customers' most demanding mission requirements. Each day customers in defence and intelligence, public safety, civil agencies, mapmaking and analysis, environmental monitoring, oil and gas exploration, infrastructure management, navigation technology, and providers of location-based services depend on DigitalGlobe data, information, technology and expertise to gain actionable insight.

“ DigitalGlobe is excited to be at the Harwell Campus working with Satellite Applications Catapult and several of the exciting start-ups present there.

Dave Benson
Regional Director



digitalglobe.com

EARTH-I



Earth-i is a leading global Earth observation company, providing very high-resolution satellite imagery and data services for advanced analytics and insights. Earth-i launched VividX2, the first satellite in the new Vivid-i Constellation, in January 2018, to deliver the world's first full-colour high definition video from space. The purpose of the Vivid-i Constellation is to provide a rapid response service delivering very high-resolution full-motion video and still imagery of anywhere on Earth, multiple times of day. The company already supplies high-resolution image data services from the DMC3 and KOMPSAT satellites, and aggregates commercial satellite imaging capacity to assist policy makers and innovators make more effective decisions, fast.

“ Earth-i's presence at the Harwell Space Cluster has helped us to identify R&D funding, collaboration opportunities and connected us to potential customers.

Gareth Crisford
Sales and Business Development



earthi.space

EFFECTIVE SPACE SOLUTIONS



Effective Space is pioneering last-mile logistics in space. It deploys and operates a fleet of small SPACE DRONE™ spacecraft that will deliver, position, maintain, monitor and guarantee space assets in orbit and beyond. Phase One rollout is based on a solid business case: life-extension services to operators of satellites in GEO. Services include station-keeping and attitude-control, relocation, orbit and inclination correction, deorbiting and 'bringing into use' (BIU). Next phases will support the evolving low-earth-orbit (LEO) constellations, as well as active-debris-removal (ADR) missions. Long-term services will also support asteroid-mining, deep-space exploration and space manufacturing logistics.

“ Harwell is a great place for us to develop links into the supply chain to accelerate Effective Space's growth.

Daniel Campbell
Managing Director

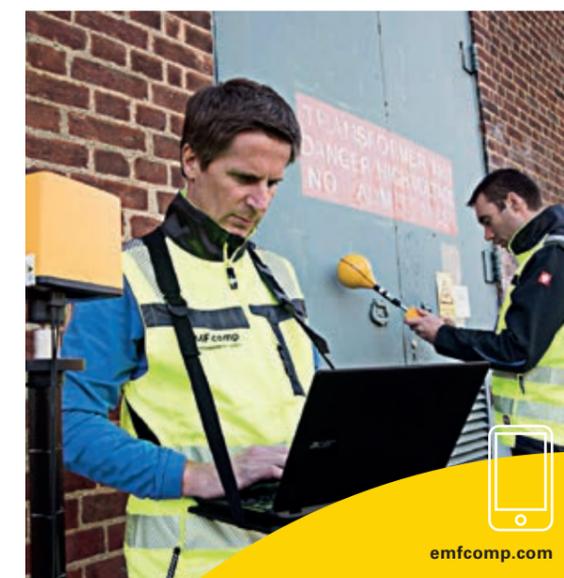


effective.space

EMFCOMP



EMFcomp is an award-winning organisation that helps companies manage hazards related to electromagnetic field (EMF) exposure. EMFs are present wherever there is electrical power and, if these fields are high enough, they can cause adverse health effects in people. Because of this, new UK legislation in the form of 'The Control of Electromagnetic Fields at Work Regulations' now requires all employers to assess the exposure of their workers to electromagnetic radiation. EMFcomp is the only company in the UK that can provide a complete service to measure, model and give advice on EMF exposure across the full frequency range. With our Chartered Radiation Protection Specialists, we make it easy for businesses to comply with the new EMF Regulations.



emfcomp.com

ENVIRONMENT SYSTEMS



Environment Systems is an established environmental and agricultural data company, providing trusted evidence and insight to governments and industry across the world since 2003. The consultancy delivers bespoke advice and solutions for land management, monitoring and policy for ecosystems, natural capital evaluation, agricultural trials and agricultural supply chains. The company's recently launched satellite data services deliver always-on, accessible open data insights from satellite Earth observations analytics.

“ Harwell provides a central base in addition to our Aberystwyth headquarters.

Steve Keyworth
Commercial Director



envsys.co.uk

EOSPHERE



eOsphere Limited is a UK company developing innovative satellite earth observation techniques and services. eOsphere's satellite receiving ground stations provide a turnkey solution for EOS Terra, Aqua MODIS, NPP and JPSS data reception, serving many environmental and hazard monitoring applications: fires and hot-spot detection, smoke and volcanic ash, sea surface temperature, sediment and chlorophyll, drought monitoring, snow and land cover and biomass. eOsphere ground stations are designed, and built in the UK and installed all around the world: Mongolia, China, Vietnam, Indonesia, Malaysia, India, Ecuador, Greece and Cuba. eOsphere is actively looking to build on its international relationships to further develop Earth Observation services.

“ We enjoy the campus atmosphere here in Harwell. It helps us to meet people from other companies and to start useful conversations, which in the case of Deimos Space UK has led to a new UK Space Agency supported project to improve resilience for Mongolia herding communities.

Nick Walker
Director



eosphere.co.uk

EXACTEARTH EUROPE LTD



Established in 2012, exactEarth Europe Limited (eEE) is the UK subsidiary of exactEarth Ltd (eE), a Canadian SME. eE is the leading provider of global maritime vessel data for ship tracking and maritime situational awareness solutions. eEE is responsible for product and business development for eE services related to small vessel tracking (exactTrax) and real-time sensor data retrieval from maritime assets (exactASM). In October 2017 eEE, in partnership with the Catapult and others, demonstrated a new global maritime machine-to-machine platform/service using 'application specific messaging' (ASM) as part of an European Space Agency programme.

“ With so many space organisations based at Harwell, the networking and collaboration possibilities are excellent.

Simon Chesworth
Director Sales Europe,
Sales & Marketing



exactearth.com

GEOCENTO



Geocento is aggregating and consolidating access to imagery of our planet, leveraging the collective imaging capabilities of a range of suppliers to provide a powerful observational capability. Geocento uses this capability to offer business intelligence that is based on strong sampling and strategic business partnerships to offer best-in-class intelligence for different markets. Geocento established its head office in Harwell at the end of 2011 and has a wholly-owned subsidiary company in Madrid, which focuses on technology development. Company turnover reached £500,000 in 2017 and is currently in the process of scaling up.

“ Harwell is ideal for a company like ours: strong aspirations for growth and recognition that collaboration is essential for success.

Kim Partington
CEO



geocento.com

GEOGER



Geoger delivers environmental data projects primarily using open-source software and open data, helping clients to generate solutions to their specific problems. The mission of Geoger is to provide a cost-effective data service (management, provision, analysis and visualisation) primarily to businesses working within the environmental sector. Geoger aims to provide the best advice and solutions, and where possible to ensure this is open-source or open-data led. Geoger works closely with both academic and commercial clients, to transfer knowledge and create new networks wherever possible.

“ Being part of the buzz at Harwell really helps Geoger stay at the forefront of new developments and provides great networking opportunities.

Alastair Graham
Director



geoger.co.uk

GMV



GMV is a privately-owned technological business group with an international presence. Founded in 1984, GMV offers its solutions, services and products in diverse sectors: aeronautics, finance, space, defence, health, cyber security, intelligent transportation systems, automotive, telecommunications and information technology.

GMV UK started in 2014 with a single person in Harwell committed to growing the business in the UK and contributing to the development of the UK space sector. Now GMV UK has more than 10 employees, several open positions and projects in areas such as: robotics and autonomy, guidance navigation and control systems, development of space mission ground segments, Earth observation data processing and space-based applications in sectors such as forestry, emergency response, maritime surveillance, energy and agriculture.

“ Harwell has a unique vibrant environment where space and non-space organisations exchange ideas and develop business opportunities together.

Celestino Gomez-Cid
Director of Space



gmv.com

ESA BIC HARWELL

Each year 10 or more start-ups are accepted into the ESA BIC Harwell. These are the current incubatees:



business
incubation
centre
Harwell

ENTOCYCLE

ENTOCYCLE

Entocycle is transforming the \$150 billion animal feed industry with an innovative technology that converts waste treatment costs into new revenue streams. Entocycle combines nature with high-tech engineering to produce high-value, insect-based protein feed for animals, replacing environmentally destructive fish and soya meal. Entocycle is transferring space assets into the everyday, using robotic automation, big data analysis, life support systems and scheduling protocols.

GROUND DATA



GroundData makes autonomous remote sensors for agriculture and other industries. Its solar-powered communications systems send data back to a secure cloud-based data warehouse 24 hours a day using a variety of wireless technologies. Data is stored securely in 'the cloud' and can be accessed via a web-based portal or can be exported to other systems.

The initial target market of agriculture is to be followed by other sectors needing to collect data from remote locations. The system also provides ground truth data for satellite operators and downstream users to calibrate satellite observations.

HAYBEESEE



HayBeeSee provides a novel robotics platform for assisting farmers in their fields. Operated by phone, and combining satellite data to find unhealthy patches in fields, the platform carries a sprayer, a weed-detecting camera and other devices for mapping.

LACUNA SPACE



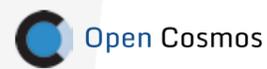
Lacuna Space provides low-cost, simple and reliable global connections to sensors and mobile equipment using satellite communications. The Lacuna Network just works everywhere, and all the time, so customers can focus on using data from their sensors or tracking the status of their moving asset.

MODAL



Modal is a real-time software service that connects people and transport through journey intelligence and insight. Modal's real-time analytics combine mobile app data with transport data, providing services that improve customer experience and business operations.

OPEN COSMOS



Driven by the vision of making space accessible to anyone, Open Cosmos provides affordable, fast, and simple space missions. Open Cosmos went from design to delivery of QB01, its first nanosatellite, in only four months, followed by a launch and deployment in LEO early April 2017. Open Cosmos is currently developing the next generation of satellites and end-to-end services for commercial and institutional customers to be launched in 2018.

ORBITAL WITNESS



Orbital Witness provides historic satellite imagery alongside property, land and ownership data to assist lawyers in the real estate due diligence process. This helps lawyers to work more efficiently with complex information and spot legal property risks earlier in a deal before the client incurs further transactional costs, ensuring a better client service and improved margins for law firms.

POWERMARKET



PowerMarket, a product of SunReign Ltd, has been developed with the support of Oxford University Innovation and the ESA BIC Harwell. Founded with a mission – sustainable energy for all – PowerMarket uses downstream satellite data and advanced AI to provide key solar intelligence for decision making by individuals, companies and energy utilities.

RIDERSMATE



Ridersmate helps riders of horses, bicycles and motorcycles by constantly tracking their location, speed, heading and altitude and sending an alert in the event of an accident. eCall Marine extends the product range for rescue at sea, through a new personal and professional marine safety tracker and automated emergency response request unit, using satellite communications to deliver the unique ability to have an inbound voice emergency call (eCall) to the unit.

SATAVIA



Satavia's mission is to be the world leader in digital environmental intelligence on atmospheric contaminants. Technologies from satellite Earth observation, numerical weather prediction, aircraft tracking, and prognostic health monitoring, are combined with machine learning to enhance safety, improve efficiency, and reduce costs in aviation.

SERELAY



Serelay is providing trusted media capture using camera capture and satellite navigation functionality on mobile devices, enabling media to be queried for authenticity of content and metadata. In practice, this means that it is possible to understand whether an image or video has had a single byte of metadata altered or a single pixel of content changed.



esa-bic.org.uk

HELIX TECHNOLOGIES



Helix Technologies is developing a range of high-performance, ceramic-based antennas for use in a wide range of demanding telecommunications and satnav/GNSS applications. The antennas out-perform incumbent antenna technologies and are particularly suited to applications where there is a need for precise positioning and downward pressure on device size, weight and power, for example the Internet of Things, autonomous vehicles, drone delivery platforms, personal body-worn devices and machine-to-machine communications.

“ Harwell has excellent business incubation facilities, a comprehensive portfolio of laboratory space and test equipment.

John Yates
Managing Director



helixtechnologies.co.uk

HONEYWELL



Honeywell is a Fortune 100 software-industrial company that delivers technology solutions for aerospace and automotive, and control technologies for buildings and homes and performance materials globally. As a major supplier to the global space industry, Honeywell drives innovation and offers leading products for radio frequency (RF) payloads such as ferrite switches, beamhopping solutions, multiplexers, isolators, circulators, power switching electronics, tracking, telemetry and command and payload data downlinking. Honeywell is proud to be able to claim zero equipment failures in space.

“ Access to the heart of the UK space community through the Harwell Campus puts us in regular contact with the innovative customers and collaborators we need to grow our business.

Chris Bee
Customer Business Manager



honeywell.com

HUDUMA



Huduma Limited is a young and ambitious emerging technologies consultancy based at the Harwell Campus. Huduma has over five years' experience helping businesses and project consortiums to take their innovations to market with sustainable business and services models, providing collaborative commercial support and practical hands-on project delivery. Examples of projects include developing remotely piloted aircraft systems (RPAS)/commercial drones for intelligent parcel delivery, connected and autonomous vehicles (CAV) and Internet of Things (IoT) with SatComs.

Huduma is a keen supporter of the Satellite Applications Catapult SPIN programme for summer interns, and has implemented a graduates programme, providing an opportunity to gain work experience in a collaborative business environment.

“ At Harwell Campus we have access to groups of amazing industry experts, which helps us achieve our goals.

Paulette Elliott
Managing Director



huduma.co.uk

INSECT RESEARCH SYSTEMS



Insect Research Systems Ltd is developing APOLLO: a bespoke solution that will enable the global hospitality industry to reproducibly and accurately monitor for the presence of bed bug infestations. Insect Research Systems' near real-time monitoring system can be used to rapidly screen premises and will be quicker, less subjective, more accurate and more affordable than a manual inspection.

APOLLO is based on years of practical pest control experience and know-how of developing instruments for planetary and solar systems exploration, including ESA's comet-chasing Rosetta mission.

“ Within this nurturing environment and with capital investment the company continues to go from strength to strength.

Jason Littler
CEO



insectresearchsystems.com

KAYSER SPACE



Kayser Space, recently established in the UK, brings a 30-year heritage in science payloads and subsystems built up by parent company Kayser Italia. Kayser has a longstanding and successful experience in the development of space systems, both as prime contractor and subcontractor. The experience obtained with different carriers such as the Space Shuttle and SpaceX, the Bion, Foton, Soyuz and Resource spacecraft, as well as with different platforms, like the International Space Station (ISS) and LEO (low Earth orbit) satellites, have enhanced a multidisciplinary engineering know-how in physics, electronics, software, mechanical and thermal design. In life sciences, the company has a longstanding and successful experience in experiments and payloads. Furthermore, experiments and facilities have been developed in the field of human physiology and many payloads for a variety of physical sciences experiments and applications.

“ The growth in the near future of the space commercial sector, linked to the life sciences sector, makes Harwell a unique place to develop partnerships and new business opportunities.

David Zolesi
Managing Director



kayserspace.co.uk

KEIT



Keit Ltd has taken a promising space technology and launched it into the global marketplace. The Keit IRmadillo™ FTIR spectrometer uses light and optics to analyse chemical reactions in real time and is shockproof, compact and low maintenance. All the attributes that made it ideal to survive space travel now help commercial organisations monitor industrial production processes, such as the production of biofuels, chemicals, petroleum products, beverages, and pharmaceuticals. Started in 2012 at the Rutherford Appleton Laboratory (RAL) in Oxfordshire, Keit provides solutions through improved analytical technology to companies around the globe. With backing from STFC, this innovative instrument enables manufacturing industries to make faster decisions for reduced waste and better resource management.

“ Harwell has given us access to world-class testing facilities in a uniquely collaborative environment where we are rubbing shoulders with experts in optics, lasers and technical engineering.

Dan Wood
CEO



keit.co.uk

LOCKHEED MARTIN



Lockheed Martin is a global security and aerospace company that employs approximately 100,000 people worldwide and is principally engaged in the research, design, development, manufacture, integration and sustainment of advanced technology systems, products and services. Lockheed Martin has built more interplanetary spacecraft than any other company. Systems built by Lockheed Martin and its partners are delivering global communications, weather forecasting, space exploration and national security. Headquartered in London, Lockheed Martin UK employs approximately 1,700 people across 16 key sites from Cudrose in Cornwall to Faslane in Scotland and Harwell in between.

“ Harwell provides a great opportunity to engage with small, medium and large companies who, like us, are passionate about growing the space sector to benefit the UK economy.

Patrick Wood
Director of International Business Development,
Lockheed Martin Space



lockheedmartin.com

MDA



MDA develops and delivers advanced surveillance and intelligence solutions, defense and maritime systems, radar geospatial imagery, space robotics, satellite antennas, and communication subsystems. MDA's global reach and heritage, serving international markets with innovative and iconic solutions for space and terrestrial applications, is unparalleled. MDA is committed to delivering innovation and value in next-generation space exploration, Earth observation, space awareness, and defense systems. The new space economy is based on agility, rapid technology development and harnessing capital to turn commitments into reality, generating benefits for humanity as well as a return on investment. MDA's 1,900 future-focused employees are working together to turn ideas into the products, services, systems, and solutions that make a better world.

“ Harwell is the emerging centre for UK space technology and application innovation, as such it is an ideal location for a world leading company like MDA to build its business.

David Kenyon
Managing Director, MDA UK



mdacorporation.com

MEVITAE



MeVitae was founded by the multi-award winning team, Vivek Doraiswamy (computer scientist) and Riham Satti (computational neuroscientist) during their time at Oxford University. The team has an effective advisory board, with members from Microsoft UK HQ and the University of Oxford. The approach uses technology developed for space, neuroscience and big data to make it easier than ever for people to find their perfect job, and businesses to make the perfect hire. MeVitae joined the European Space Agency BIC in February 2015, and graduated 2017, as the first incubatee within the HR space. MeVitae is working with Satellite Applications Catapult to apply this capability to the space industry.

“ Harwell's support network is brilliant. We've met with so many people within various sectors, from maritime to microarrays, and learnt. Perfect environment for collaboration and idea generation.

Riham Satti
Co-Founder and CEO



mevitae.com

MIRICO



MIRICO develops state-of-the-art instruments for environmental and industrial monitoring, having originated from the world-leading laser spectroscopy research group at RAL Space. The molecular sensing systems designed for space proved to be much more robust, precise and compact than those currently available on the market, leading to the inception of MIRICO, with the purpose of developing these systems into products for 'Earth' applications. Over the last two years MIRICO has developed systems for environmental monitoring of oil and gas facilities to help reduce greenhouse gas emissions, real time and highly precise monitoring of semiconductor fabrication to improve product yield and instruments for global environmental monitoring networks.

“ Harwell is MIRICO's birthplace and it has provided excellent facilities, access to skill sets and knowledge resulting in MIRICO's rapid growth over the last two years.

Mohammed Belal
Business Development Director



mirico.co.uk

NEPTEC UK LTD



Neptec UK was established in October 2014 on the Harwell Campus. The company has a staff of 18 people. Its offices are located in the Atlas building where it also has two labs for building and testing equipment. The company designs, builds and tests flight hardware for a variety of customers.

Its current products include:

- A landing LIDAR sensor for the next mission to the Moon
- A meteorology instrument for ESA's Proba 3 Mission
- IR camera developed for the UK Space Agency

“ The Harwell Campus has been an ideal environment for fostering the growth of our company.

Mike Kearns
Managing Director



neptecuk.com

ORBITAL MICROSYSTEMS



Orbital Micro Systems (OMS) is a US-based provider of innovative weather intelligence solutions that leverage small satellite technology, advanced weather observation techniques, and powerful data analytics tools. Through OMS' services, aviation, maritime, agriculture, and insurance customers can use highly accurate weather data to optimise operations, increase safety margins, improve profitability, and enhance consumer satisfaction. OMS selected Harwell as its primary operations and business development hub for serving customer needs throughout the UK, Europe, Asia and Africa. After evaluating several options in other locations, OMS was impressed with many advantages associated with Harwell, including the facility's emergence as a leader in commercial space technology, its world-class facilities and talent, and easy access to major commercial markets across EMEA.

“ The comprehensive support from the UK government and related agencies made the decision to set up shop at Harwell an easy one.

William Hosack
CEO



orbitalmicro.com

OXFORD SPACE SYSTEMS



Oxford Space Systems (OSS) is an award-winning, early stage space technology business that's developing a new generation of deployable antennas and products that are lighter, less complex and lower cost than those in current commercial demand. Venture capital-backed OSS was founded on the Harwell Campus in late 2013, starting with a hot desk in the Satellite Applications Catapult. Oxford Space Systems has since expanded into an office and is about to have its own custom facility in the Zephyr Building in Q1, 2018. With desk space for up to 55 staff, a light industrial assembly area and one of the largest cleanrooms on campus, OSS will future proof its planned expansion over the next few years.

“ Harwell is an excellent place to establish a space start-up with the flexibility to accommodate growth. The Campus is all about connections and networking; from onsite technical expertise through to investor engagement opportunities.

Mike Lawton
Founder & CEO



oxford.space

PRINTECH CIRCUIT LABORATORIES LTD



PCL produces products based around printed circuit board techniques, including antennas for Cubesats. As suppliers to the space industry for over 25 years, PCL has been involved in various projects including the Gaia mission, partnering with Teledyne e2v and Airbus in the manufacture of the most sensitive camera ever flown. The experienced team can help design, manufacture and test products in PCL's production facility in Essex. Current space customers include Airbus, Teledyne e2v, Fraunhofer and DHV, producing a wide range of circuitry including flexible, flex-rigid, metal-backed, controlled frequency and high reliability designs. With some exciting space projects already secured for the next two years, PCL expects space to account for about a third of its turnover.

“ Being at Harwell gives us the opportunity to speak and meet with new potential customers and we really enjoy the networking events that expand our understanding of the new emerging space market.

Reece Bayliss
Business Development



pcbs.space

REACTION ENGINES



Reaction Engines is a UK-based company designing and developing the technologies for a new class of innovative hypersonic propulsion system. This includes an ultra-lightweight heat exchanger, capable of cooling airstreams from over 1,000°C to -150°C in less than 1/20th of a second. Developed for Reaction Engines' high speed SABRE engines, it will enable aircraft to fly at over five times the speed of sound in the atmosphere and allow more affordable space launch vehicles to be built. Reaction Engines offers a unique and extensive range of capabilities, from propulsion systems and advanced heat exchanger design and development, through to advanced manufacturing, precision machining and fabrication.

“ Being at heart of the Space Cluster at Harwell with the industry connections and facilities it offers, is key to the continued growth and success of our development and technology breakthroughs.

Paul Davey
Head of Business Development



reactionengines.co.uk

REZATEC LTD



Since its inception in 2012, Rezatec has been headquartered in Harwell and has since grown its business to an international organisation with customers around the world. Rezatec's proprietary algorithms process big data inputs from satellite, airborne and ground sensors to predict outcomes for key assets across a range of industry verticals. Users access Rezatec analytics, generated using advanced machine learning techniques, through a subscription model to the Rezatec geospatial portal. Rezatec enables yield optimisation for commodity crops in the agribusiness sector, and identifies harvestable inventory in the forestry sector and pipe bursts and subsidence movements in the infrastructure domain. Rezatec users include major utilities, agribusinesses, large forestry groups, consulting partners and governments worldwide.

“ Being located at the heart of the UK's Space Cluster has proven to be a key factor in the success of Rezatec and its fast-track growth over the last five years.

Philip Briscoe
Chief Operating Officer



rezatec.com

RHEA GROUP



RHEA Group is an engineering company offering services and technologies in the fields of space engineering, security, and cloud/edge computing in Europe and North America. In Harwell, RHEA Group is leading the development of the Drought and Flood Mitigation Service (DFMS) project funded by the UK Space Agency's International Partnership Programme (IPP). RHEA is also developing the mission control system for Astroscale's innovative ELSA-D debris removal satellite which will be operated from the Satellite Applications Catapult in Harwell. RHEA has also led a HealthTec project on pollution monitoring combining innovative sensors, satellite data and smart street furniture.

“ Harwell is a crucial location that provides excellent access to the other members of the Space Cluster, including SMEs and non-space organisations.

Alastair Pidgeon
Director, Business Development
Products & Projects



rheagroup.com

S&AO LTD



With the brand 'visionAIR-Klugmann', the innovation company S&AO Ltd is rewriting the atmospheric observations sector with new solutions. S&AO is an ESA BIC Harwell alumnus, and visionAIR-Klugmann combines scientifically established methods with latest components into sensor technique, providing affordable and reliable operational measurements. This enables organisations using meteorological data to optimise their operations, save money and prevent the loss of lives. S&AO Ltd offers bespoke remote sensing systems designed and built to order, including cloud radar, radar wind profiler, LIDAR aerosol and trace gases, and passive systems utilising RF/millimetre waves and light.

“ The available support, as well as the extensive networking opportunities, have significantly helped the business development.

Dirk Klugmann
Director



visionair-klugmann.com

SCI-TECH (POB) LTD



Sci-Tech operates a consultancy, advising on all aspects of software development and project lifecycle, and designing and implementing complex systems, one-off applications, and embedded code. We have provided embedded systems and software to major companies such as Qinetiq, BAe Systems, Marconi and ICL, as part of projects ranging from military flagship CCIS, aircraft simulation, radar and communications systems to industrial process control.

Sci-Tech is currently developing their award-winning tracking and telemetry system for the marine market, but with spin-off applications for remote and/or hazardous environments.

“ Having developed our tracking system in the ESA BIC Harwell, we recognised the importance of being part of the Harwell Space Cluster to engage with other growing companies on the Campus.

Peter Hall
Managing Director



scitechsystems.co.uk

SIHEALTH LTD



siHealth couples satellite remote sensing and personal diagnostics, driving end-users from 'data-information' to the 'healthy best decision' by mobile-health systems. siHealth leverages its know-how in space and satellite areas to implement innovative decision support systems for healthcare, thanks to high-performance IT solutions, opening new perspectives to doctors and pharmacists in professional diagnostics.

The capability to extract increasingly deep insight knowledge from data by exploiting both machine learning techniques and big data analytics, enables a more effective decision support to healthcare operators as well as to pharmacological companies active in disease prevention, diagnostics and telehealth sectors. The recently launched product, HappySun, is a satellite-based sun photoprotection integrated system, supporting healthy lifestyle and skin disease prevention in real-time.

“ We have been continually supported by the creative and stimulating research environment at Harwell Campus, through its HealthTec and Space Clusters, enabling siHealth's disruptive ideas to rapidly become product solutions.

Dr Emilio Simeone
CEO



sihealth.co.uk

SKYTEK



SkyTek is an award-winning software solutions company specialising in the creation of innovative solutions for a range of complex and demanding industries including the space industry. The key to SkyTek's success is taking the technology it has developed for space and applying it to other sectors, including aviation and marine, together with applications in security and crisis management, insurance and compliance. Since its formation in 1997 SkyTek has grown into a world-class software solution provider developing solutions that are intelligent, platform-independent and adaptable.

“ The Harwell Space Cluster offers a unique gateway to the UK space sector and affords Skytek the opportunity to build key business relationships and to capitalise and strengthen its commercial advantage in the space domain.

Dr Sarah Bourke
CEO



skytek.com

SPACE-EYES



Space-Eyes delivers geospatial analytics using synthetic aperture radar (SAR) satellite and AIS satellite data with related non-spatial maritime data. The diverse challenges addressed in the maritime domain include national and regional maritime security, block (supply) chain security and energy transit security. Space-Eyes' proprietary geospatial analytics platform CATE™, with embedded artificial intelligence, is delivered as a subscription model, allowing users to customize their business intelligence online in real time with 50+ integrated data sources for context.

“ The Harwell Space Cluster helps us leverage fractional satellite ownership.

Capt. Jatin S. Bains
CEO



space-eyes.co.uk

SPOTTITT



Spottitt Ltd is a Harwell-based start-up who are experts at providing cloud-based, cost effective, fully automated, complex Earth observation and geographic information system analyses. Services currently include the provision of land cover, land roughness, building recognition, and greenfield analyses for the optimal positioning of solar and wind installations. 2018 will see Spottitt transition from being a co-funded R&D project to a commercial service, initially for the renewable energy sector with plans for service developments tailored to two additional sectors by end 2018. By end 2018 Spottitt expects to comprise four FTEs working out of their own office in Harwell.

“ There aren't many places where in the morning you are discussing bugs with your developers and in the afternoon talking to the Chilean Ambassador about opportunities for space applications in Chile.

Lucy Kennedy
Co-founder and CEO



spottitt.com

TELESPAZIO VEGA UK



With a pedigree in space technology stretching back over 40 years, Telespazio VEGA UK (TVUK) is an experienced consulting, technology, engineering, space operations and service development business. A subsidiary of Telespazio, a 67/33% joint venture between Leonardo and Thales, TVUK has built its first-class reputation by exploiting technology developments in Earth observation and satellite navigation and communications, pioneering innovative services in space operations and applications. Using the broader capabilities of the Telespazio Group, TVUK provides novel solutions to the remotest regions of the globe.

“ The Harwell Space Cluster has provided an important catalyst for the growth of the sector.

Marco Folino
CEO



telespazio-vega.com

TERATECH COMPONENTS



Teratech Components Limited produces a wide range of air-bridged Schottky diodes for THz frequency multipliers, mixers and detectors. Teratech's diodes are used in a variety of commercial and space applications and will be a critical component in the next generation of metrological satellites for Europe, meteorological Operational Satellite-Second Generation (MetOp-SG).

“The Harwell Campus provides incredible networking opportunities for small companies.

Byron Alderman
CEO



lockheedmartin.com

THALES ALENIA SPACE



Thales Alenia Space's UK subsidiary, established in 2014, is proud of its world-leading design, test, integration and manufacturing capabilities at three sites in the UK: Bristol, Harwell and Belfast. It is a leading British player in propulsion systems, satellite subsystems and system design studies. Thales Alenia Space also deploys AIT (assembly, integration, testing) capabilities in the United Kingdom, along with considerable expertise in satellite systems, which will enable it to act as prime contractor for British-built satellites and constellations in the near future. The company created over 100 new jobs between 2015 and 2016 in the UK and currently has around 170 employees. This impressive growth is set to continue, giving it the full range of skills and capabilities needed to make an important contribution to the space industry's future in the UK, based on game-changing technologies.

“The National Satellite Test Facility planned to open in 2020 will be an important resource for all UK upstream space companies, adding to the RAL Space R100 facility to help the UK reach 10% share of the global space market by 2030.

Ben Olivier
UK CEO



thalesaleniaspace.com

UNIVERSITY COLLEGE LONDON (UCL) CENTRE FOR SPACE MEDICINE



Centre for Space Medicine (CSM) is part of the Mullard Space Science Laboratory (MSSL), University College London (UCL), established at Harwell to connect the space industry with the latest developments in space medicine. The Centre brings together MSSL's technological and analytical capabilities, and general space awareness with UCL's strengths in biomedicine. The CSM focuses on both the facilitation of human space exploration and the improvement of quality of life on Earth through open innovation and cross-disciplinary application of techniques and technology. The Centre is inherently interdisciplinary in nature, involving the biomedical, cognitive/robotics engineering, information technology and space science domains.



ucl.ac.uk/mssl/space-medicine

VIASAT UK



Viasat is a global communications company that delivers increasingly capable and market-leading satellite-based services to consumers and demanding defence and government customers. These services deliver high-quality, secure, affordable, and fast connections to impact people's lives anywhere. Viasat's high-capacity satellites meet the growing need for bandwidth and the company has committed to a future global constellation of satellites, each providing 1TB of throughput. Viasat continues to use satellite communications for innovation; working in partnership with the Scottish Ambulance Service, NHS Highland and the University of Aberdeen, Viasat has equipped five ambulances with satellite communications and integrated ultrasound scanners to provide essential services in areas of no mobile coverage.



viasat.com

VIDRONA



Vidrona (a European Space Agency incubated business) is a precision predictive asset management company that utilises data collected using sensors on various automated platforms like UAVs, ground robots, satellites, and even mobile phones. Vidrona gathers raw data, processes and analyses it using proprietary computer vision, artificial intelligence and machine learning algorithms; and return actionable reports to the client on an SaaS based software platform, vSense®. The product also allows clients' operations managers to better track their maintenance activity, by incorporating photos of maintenance requirements, allowing algorithms to analyse these images for fixes. Clients include renewable energy generation, power transmission, oil and gas, and water companies.



vidrona.com

WAVELENGTH ELECTRONICS LTD



Wavelength Electronics Ltd is a Manufacturer's Representative Company offering seven Principals, each of which has a long and successful heritage in providing frequency generation and passive components into the spaceflight market. The office on campus is evolving into a showroom where engineers can come and discuss what they are looking for. Then Wavelength can help them find the exact part they require, whether that is a standard part or one that is customised to meet their full requirements. All data sheets and product information can be found on the principal manufacturers' websites.

“Being located at Harwell means that we are able to position the companies we represent right at the heart of the UK space community.

Jeremy Biggs
Sales Director



wavelengthelectronic.co.uk

LIFE AT HARWELL



HARWELL TOMORROW

The Harwell Science and Innovation Campus, 16 miles south of Oxford, covers 710 acres with 5,500 people and has embarked upon an ambitious expansion plan with 5.5 million square feet of current planned development and 1.5 million square feet to be added by 2025.

This will provide working and research space for organisations and will be supported by hundreds of new homes for people working on site, together with improved site amenities.

During 2018, planning permission will be sought for 500,000 square feet of new offices and labs to support the growth of existing Harwell organisations and to enable SMEs to major multinationals to locate new operations at Harwell. The ambition of the Harwell Campus expansion is matched only by that of the many brilliant entrepreneurs, businesses, researchers and scientists who call Harwell home.

MAJOR FUTURE EXPANSION PROJECTS

- **Expanded National Satellite Test Facilities**
- **Rosalind Franklin Institute**
- **Planning application for residential: hundreds of new homes to rent and buy, enabling people to work and live here**
- **University Quarter: a planned further 200,000 square feet**
- **Enlarged Space Cluster: up to 200,000 square feet**

NEW AMENITIES

- **A second hotel**
- **A new gym**
- **A new café**
- **Additional shops**

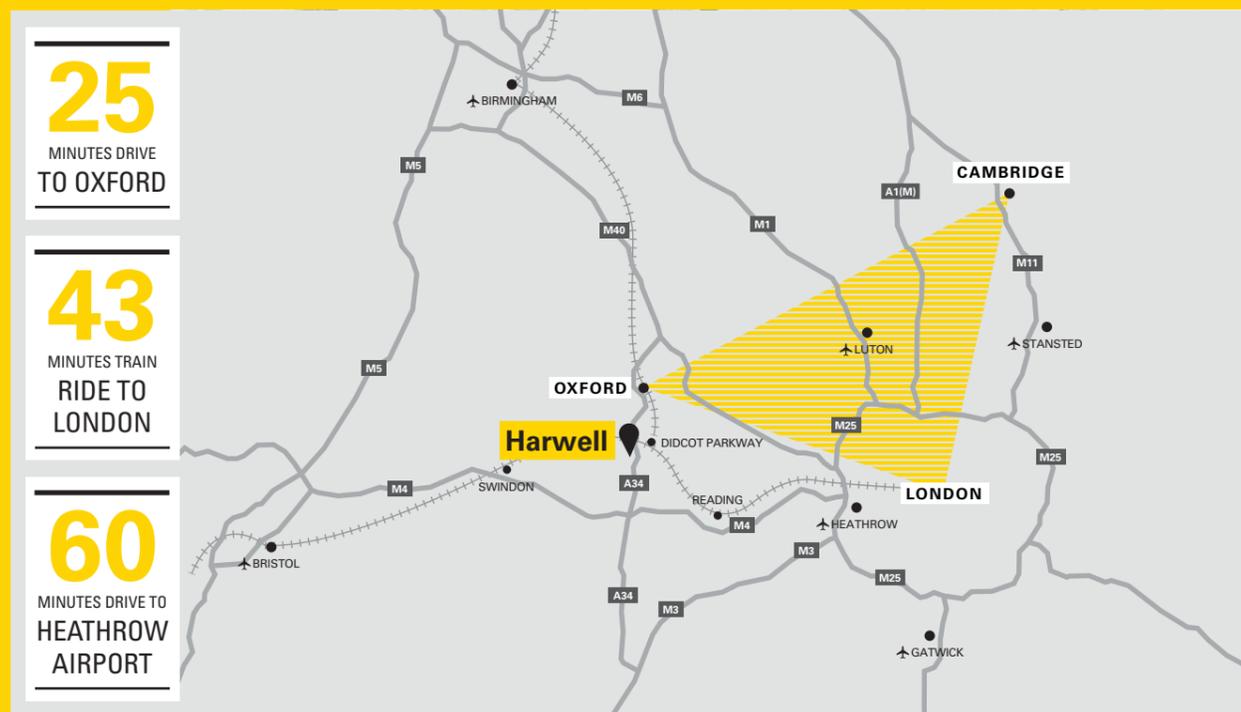


VISIT US

The best way to appreciate the breadth and depth of the facilities and opportunities at the Harwell Space Cluster is to visit the Harwell Campus.

Travelling to and from Harwell Campus is easy, just off the A34, just 16 miles from Oxford, offering easy access to the UK's two largest cities – London and Birmingham – via the M40 and M4 motorways. Less than an hour's drive from London Heathrow Airport.

Harwell Campus has its own bus station with direct links to Didcot Parkway for trains to London (train takes about 45 minutes), Bristol and Reading. The Science Shuttle regularly takes employees and visitors directly to and from Oxford. Other links mean Harwell is directly connected with local towns such as Wantage, Abingdon and Newbury and local villages.



The map shown is not to scale and all times quoted are approximate, with rail times from Didcot Parkway Station. Sources: nationalrail.co.uk; google.co.uk; crossrail.co.uk.

CONTACT

To arrange a visit please contact Dr Joanna Hart, Harwell Space Cluster Development Manager

Harwell Management Office

HQ Building
Thomson Avenue, Harwell Campus
Didcot, Oxfordshire, OX11 0GD
General enquiries: + 44(0) 1235 250091



Dr Barbara Ghinelli
barbara.ghinelli@stfc.ac.uk



Dr Joanna Hart
joanna.hart@stfc.ac.uk



Angus Horner
akh@harwellcampus.com



Gordon Duncan
gbd@harwellcampus.com

harwellcampus.com

 twitter.com/HarwellCampus



CATAPULT
Satellite Applications

 Science & Technology
Facilities Council

RAL Space

 **UK SPACE
AGENCY**

 **esa**

 **esa** business incubation centre
Harwell

 **AAC Microtec**

**C L Y D E
S P A C E**

 **AG Space**

AIRBUS

 **ARCHANGEL
IMAGING**

 **Arralis**

 **ASTROSCALE**

QVS

 **BDE
SPACE**

COBHAM

 **databasix**
bringing people and data together

 **deimos**
elecnor group

 **DigitalGlobe**

 **earth1**

 **Effective Space**

 **EMFcomp**
ELECTROMAGNETIC SAFETY

 **Environment
SYSTEMS**
evidence and insight

eOsphere

 **exactEarth**
Europe

 **GEOCENTO**
earth imaging

 **geoger**

 **gmv**
INNOVATING SOLUTIONS

 **HELIX**
TECHNOLOGIES LTD

Honeywell

 **Huduma**

 **insect**
RESEARCH SYSTEMS

 **KAYSER
SPACE**

 **KEIT**
spectrometers

 **LOCKHEED MARTIN**

 **MDA**

 **mevtae**

 **MIRICO**

 **NEPTEC**
UK Limited

 **Open Cosmos**

 **ORBITAL
MICRO
SYSTEMS**

 **OXFORD
SPACE
SYSTEMS**

 **P-C-L**

 **REACTION ENGINES**

 **Rezatec**

 **RHEA
GROUP**

 **VISIONAIR
KLUGMANN**

 **SCI-TECH (POB) Ltd**

 **SIHEALTH**
Sensing & Intelligence for HealthCare

 **skytek**

 **SpaceEyes**

 **spottitt**

 **TELESPAZIO**
a LEONARDO and THALES company

 **Teratech**
Components Ltd

 **ThalesAlenia
Space**
a Thales / Leonardo company

 **UCI**

 **Viasat**

 **VIDRONA**

 **WAVELENGTH
ELECTRONICS LIMITED**