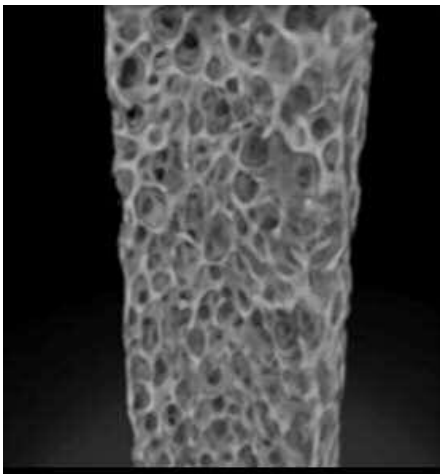
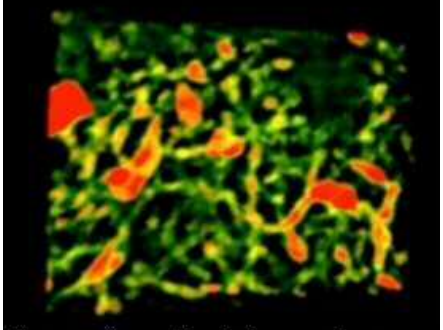
Future Technology Centre - Local Growth Deal Application

Full Business Case



X-ray of trabecular bone, showing the porous structure



X-ray of synthetic bone tissue scaffold to help grow new bone

Future Technology Centre - Local Growth Deal Application

Contents

Summary

The Future Technology Centre (FTC) addresses the Solent LEP imperative to develop 'world-class skills' for the region in which the skills base meets international standards and supports business competitiveness. This project represents a significant opportunity to address the Solent Region's higher level and STEM skills challenge, enhance the capacity for supporting design-led innovation amongst local companies and attract a global technology company to Portsmouth.

LEP support for this project is sought to provide additional activity and functionality of the building to achieve business support, employee and apprenticeship skills outputs, adding value to a project which has also been supported by HEFCE for its student learning outputs. The Local Growth Deal funding will augment the services delivered through this centre, by creating a regional resource centre for businesses which provides workspace offering synergy through design, manufacture and evaluation. This will centre will also enable use of the design innovation facilities to a wider business base. Additional activities featured include offering apprenticeships and delivering short courses for companies. Local Growth Deal funding will also attract a world leading technology provider to attract engineering and manufacturing companies, increasing investment and employment.

Scheduled to open in 2017, this major investment by the University will create a central hub for 3D imaging, simulation, design and modelling used in digital engineering and applied sciences such as biomechanics and healthcare. Innovative solutions to a practical problem solving approach will lead to advanced manufacturing of products that offer high-value industrial applications. This will support growth of the private knowledge-intensive high-value industries, particularly in the cities of Portsmouth and Southampton which account for 37% of all highly-skilled jobs in the Solent LEP area. With a firm focus on the priority sectors - advanced engineering, including aerospace and marine & maritime technologies this project will generate significant long-term value for the Solent economy.

The Future Technology Centre will complement and augment other design and engineering facilities in the Solent region and aims to both engage young people in engineering and technology subjects and assist companies to take advantage of new production technologies to translate innovation into business growth. The FTC will deliver a radically changed curriculum designed to deliver the highly skilled graduates employers demand. Close collaboration with industry will underpin this project based curriculum to develop the skills and confidence of students, including tailored, flexible part-time courses, industrial placements and applied projects with employers.

The University will also utilise the FTC to provide European Space Agency (ESA) accredited skills training to the space industry. As the sole UK provider (and one of only 6 globally), the University will provide ESA accredited training in manufacturing for mission critical space electronics applications. The customer base for this is any contractor and every employee concerned with assembly or testing of products or system for an ESA sponsored mission. The employer specific training is designed to meet both industry and the ESA exacting standards and it is expected that over 200 employees will benefit from the training on an annual basis, supporting both local employers such as Airbus Space and Defence as well as those located outside of the region. The ESA training offered will also service the wider industry needs, particularly in the manufacture of high reliability of electronic devices. The ESA school will also feature prominently in Open Days, further encouraging the uptake of STEM courses at the undergraduate level.

Strategic Case

Project Rationale

The Solent LEP Skills Strategy 2014 – 2016[1] identified 'Developing world-class skills' as one of the LEP's four strategic themes. It noted that the proportion of jobs requiring higher-level skills has increased substantially with changes in technology and the global economy. Higher-level and STEM skills are becoming increasingly important in the global economy, driving growth, innovation and are crucial for world-class management and leadership. The Solent region is currently a net importer of students and there is high competition for vacancies, with insufficient graduate opportunities. More graduates would wish to stay within the Solent region if there were the appropriate opportunities, but a significant number leave, taking their newly acquired skills to other parts of the country.

Developing world-class skills as a strategic theme for the Solent region identified five priorities, the most relevant to this application are:

- Priority 2 - Increase take-up of Apprenticeships, particularly in technical/STEM subjects and at Advanced and Higher levels.
- Priority 3 - Raise the level of STEM skills in the economy to create a world-class skilled labour pool
- Priority 5- Address sector-specific skills requirements of employers, support new emerging high-growth sectors and service industries. Linking employer and learner need to local provision to meet skills gaps and shortages

Evidence Base

The need to develop high level STEM skills to grow the Advanced Manufacturing sector in the region is supported in the Solent Skills Strategy Evidence Base[2], with the following points highlighted;

- Advanced manufacturing supports the marine sector and related aerospace, defence, advanced manufacturing and engineering activities. The Government's Plan for Growth places advanced manufacturing at the heart of its strategy for economic recovery.
- The future of Advanced Manufacturing and Engineering will be shaped by continued growth in the extent and complexity of global value chains. (BIS)
- Firms will focus on product differentiation and investment in: new technology; intangibles, such as design, branding and Research and Development (R&D); and in people and skills.
- The introduction of new technologies, the development of new products and services, and increasingly complex supply chains as being the key drivers of new skills requirements (Semta Sector Skills Council).
- Mass production is likely to continue to drift east to developing economies, particularly China and India, resulting in a continued shift to higher-level occupations and higher skills within domestic industry. This supports the need for investment in capital, R&D and enterprises adopting higher-value added product market positions.

[1] Solent LEP Skills Strategy 2014 – 2016, March 2014

[2] Solent LEP Skills Strategy Evidence Base Report, Produced by Marchmont Observatory University of Exeter, January 2014

- The most important challenge facing the sector is keeping up to date with technological developments. This requires continuous investment in R&D and taking time to understand how relationships with external partners, such as HEIs, might help them in developing new products and techniques.
- Higher-level engineering skills shortages exist, with an ageing workforce, particularly the retirement of highly-skilled engineers, generating a shortfall in the supply of technicians and engineers trained to Levels 3/4.
- Graduate retention. STEM skills, (e.g. numeracy, problem-solving, scientific thinking etc.) are central to advanced manufacturing. The difficulty that manufacturers face in matching wages offered by competing sectors (such as financial services) results in a significant proportion of STEM graduates taking up work in other sectors. There is a need to take steps to ensure the sector can attract and retain the talent it needs.
- Technological advances are changing the occupational make-up of employment in the sector, resulting in a growing need for graduates and post-graduates with highly specialist skills relevant to their area of industry. Employees are increasingly being asked to take on higher levels of responsibility and greater autonomy, while the rapid development of new techniques and processes is generating a continuous need to upskill existing staff.
- A significant gender bias is still seen in many occupations. For example, 83% of the workforce in Aerospace is male[3]. As a result, the sector draws on a restricted labour pool. It should benefit from drawing upon a wider range of talent.
- Ensuring access to state-of-the-art equipment and facilities The National Audit Office identifies the quality of teaching equipment as having an important role in shaping young people's attitudes to education (Educating the next generation of scientists, 2011). It is also concerned that cuts in the education budget may disproportionately affect sciences, engineering and design and technology courses, as these require expensive consumable items. Industry can make an important contribution through donating equipment and supporting its acquisition through public/private partnerships.
- Apprenticeships are central both to enabling employers to access the skills they need and for providing entry into employment for young people. Encouraging advanced manufacturers to grow the number of Advanced and Higher Apprenticeship opportunities is a clear priority.
- Higher-level skills. Skills levels in advanced manufacturing are rising. Solent LEP should continuously review take-up of skills at Level 3 and above and, where these are lacking, make the case for targeting resources at delivering Level 3/4 skills required in advanced engineering.
- HEIs are under pressure to reach out and improve HE participation among under-represented groups of students. Universities offer a growing range of campus visits, mentoring, masterclasses, summer schools and work experience. They may also provide bursaries and financial assistance to disadvantaged young people[4].
- Solent's HEIs have notable strengths in STEM subjects. The LEP should build on this strength by encouraging the development of programmes that promote graduate retention by linking STEM graduates with advanced manufacturers in the local area.

[3] Reach for the Skies. A Strategic Vision for UK Aerospace, BIS, July 2012

[4] Have Bursaries Influenced Choices Between Universities? Office for Fair Access 2010

- The Advanced Manufacturing Sector Skills recently conducted a study which concluded that although the sector was positioned for growth, this growth ambition was limited by failure in the provision of support of the following enabling activities – translating innovation into growth, increasing investment and taking advantage of new production technologies.

Evidence from North America[5] [6] demonstrates that technology-enhanced learning improves outcomes for 'at risk' students, particularly ethnic minorities, while women prefer the cooperative, social learning approach that this engenders. The new design approach includes working collaboratively with selected STEM students as 'co-producers'; to develop student-led learning spaces which promote creativity, problem-solving and diversity.

Meeting Solent LEP Strategic Priorities

The Solent LEP seeks to focus investment on those parts of the economy that need to develop or change the most to accelerate growth. In its strategy for the region 'Transforming Solent' it sets out six strategic priorities, three of which are addressed by the Future Technology Centre, these being;

- Investing in skills to establish a sustainable pattern of growth, ensuring local residents are equipped to take up the jobs that are created and businesses can source local skills and labour to underpin growth.
- Developing strategic sectors and clusters (interconnected groups and businesses) of marine, aerospace and defence, advanced manufacturing, engineering, transport and logistics businesses, low carbon, digital and creative and the visitor economy – establishing the area as a business gateway, at both local and international levels and developing local supply chains.
- Building on our substantial knowledge assets to support innovation and build innovative capacity in the Solent area to stimulate growth in Solent businesses and in new high growth sectors, particularly linked to our HE excellence.

The Future Technology Centre delivers on these priorities by capitalising on the University of Portsmouth's potential to enhance economic growth and support innovation in the Solent region. The FTC will act as a hub for both students and companies to exploit knowledge, build skills capacity and drive successful innovation.

The Future Technology Centre will comprise impressive, flexible teaching and social learning spaces, with excellent IT facilities and industry standard resources, including equipping laboratories for applied physics and fabrication/prototyping. This flagship development will change perceptions of engineering, providing sophisticated, accessible and engaging facilities for outreach activities and learning and teaching. The LGD contribution will enhance this with dedicated business space, for companies to locate in and undertake their own R&D using the he world-leading facilities. There will also be dedicated training space designed for delivering professional education and upskilling for those in work.

[5] Beichner, R.J. *The SCALE-UP Project: A Student-Centered Active Learning Environment for Undergraduate Programs.* Retrieved 15/09/14 from http://physics.ucf.edu/~bindell/PHY%202049%20Fall%202012/Beichner_CommissionedPaper.pdf
[6] Streitmatter, J. *(1994). Toward Gender Equity in the Classroom: Everyday Teachers' Beliefs and Practices*

This project will provide access to businesses in the Solent to access state-of-the-art prototyping, simulation and visualisation facilities provided by a leading global manufacturer, coupled with access to the knowledge base to help companies exploit the innovation associated with them. The combination of approaches is deliberately complementary, allowing manufacturing to be underpinned by simulation and visualization for evaluation of products. This approach provides the only such facility in the country, enabling our companies to compete in a global market. For example, the value of the additive manufacturing (3D printing) industry is predicted to grow by 56% in 2015 to US$5.2 billion, and US$20.2 billion within 5 years. This unprecedented sector growth is due to the wide variety of applications that can benefit from this technology.

The FTC will become known for facilitating innovation through brokering collaboration and networking, including business-to-business and University-to-business as well as very early exposure to business and innovation within local schools. This will help raise the international profile of the Solent as a centre of excellence in the Advanced Engineering and Manufacturing sector linking to new developments at the Universities, major businesses such as BAe Systems, Lockheed Martin, QA Hospital and exciting marine and maritime opportunities in conjunction with Ben Ainslie Racing. Businesses will be able to use the simulation and production facilities in the centre to generate prototypes and create new designs. Where appropriate they will be able to access the knowledge base of the University to refine their models, and together identify sources of research and development funding to fund feasibility studies and further research and development.

Having the only ESA Approved Skills Training School in the UK, a sector which contributes £11bn to the UK economy will help the FTC reinforce the Solent Regions position in the Satellite Sector.

The FTC will engage a greater number of enterprises in innovation, research and technological development, by making it easier and cheaper to identify and access the support available via the knowledge base within all three of Solent's HEIs.

The Future Technology Centre will provide a regional boost for manufacturing and engineering skills development, supporting the new developments at Daedalus Enterprise Zone and Solent Growth Hub as part of capacity to deliver an innovation ecosystem that will support future growth in our economy. This joined up ecosystem builds on existing strengths and focused on strategic sectors and both attract and build innovative companies.

The FTC will address recognised skills shortages in the region by delivering an additional 300 students pa. The curriculum studied will be informed by local employers, ensuring a close fit between academic and business requirements. It will also offer bespoke and standardised training opportunities for those in employment working in partnership with employers. The new facilities will enhance the quality of the learning experience. Students will emerge with the necessary practical and theoretical skills to take a leading role in imaging, design and manufacture, developing Advanced Manufacturing technology and business optimisation for their future employers.

The technologies that are associated with the Future Technology Centre are relevant and appropriate for the key strategic sectors of marine and maritime industries and advanced manufacturing. They are also key in supporting emerging technologies and sectors such as healthcare. The centre is a cross-disciplinary activity, bringing together for example the creative industries and advanced manufacturing sector.

The Case for Change

The FTC will be a significant catalyst for change; addressing inequality of opportunity, improving progression opportunities, enhancing student experience and meeting essential skills needs identified through the Government's Industrial Strategies, Solent Local Enterprise Partnership (LEP)[7] [8] [9] and Perkins' Review[10]. The decision to cease shipbuilding in Portsmouth makes support for regional economic diversification essential, with the University taking a key leadership role [11] [12].

The Future Technology Centre will support the University's aims to work with employers to overcome the negative economic impact of the Strategic Defence Review, the level of educational under-achievement and low H.E. participation in Portsmouth. This initiative has synergy with new regional skills-escalators:

- our lead role in the University Technical College[13];
- building progression from the CEMAST centre[14];
- developing Higher Apprenticeships with employers;
- Marine task force recommendations[15]

We will enhance graduate employability through industry-defined projects in problem-based learning and final-year projects, along with work experience opportunities and internships. Practical engineering and digital skills, combined with leadership skills, will ensure our graduates have optimal knowledge, skills and experience required in STEM-based jobs across the UK and region19.

The Local Growth Deal project will provide additional benefits over and above those already anticipated from the FTC.

[7] Solent LEP. (2014). *Transforming Solent, Solent Strategic Economic Plan 2014-20*
[8] Solent LEP. (2014). *Solent LEP Skills Strategy 2014-16*
[9] Solent LEP. (2013). *Solent LEP EU Structural and Investment Fund Strategy 2014-20*
[10] Perkins. J. (2013). *Review of Engineering Skills*
[11] Stevens, R. Rear Admiral. (2014). *Transforming Solent. Marine & Maritime Supplement*
[12] Portsmouth City Council. *Business growth and skills plan*
[13] University Technical College Portsmouth, a new school for pupils aged 14-19, specialising in Engineering www.utcportsmouth.org
[14] Centre of Excellence in Engineering and Manufacturing Advanced Skills Training (CEMAST) at Fareham College, opened September 2014
[15] Stevens, R. Rear Admiral. (2014). *Transforming Solent. Marine & Maritime Supplement*

Economic Case

The Options Appraisal Process

The FTC project was devised and developed in response to a funding opportunity from HEFCE, which had invited universities to submit bids for up to £5M for teaching capital for new and upgraded STEM teaching facilities, to support an increased flow of STEM graduates into the industries that underpin the Government's Industrial Strategy. This would require a contribution from the University of up to £6M and was specifically for money to support teaching. Ideas were developed by the University's Management Team that included support for knowledge transfer, community links and research activity.

Three options were presented to Governors in September 2014.

Option 1 Extension to the Portland Building

The proposal to build an additional wing on the University's Portland Building was felt to be good use of the University's existing land holdings and would maximise value from the new build by integrating this with the Portland Building, following the major £10m refurbishment of that building completed relatively recently. Co-location would provide students with access to excellent learning resources and social space, meaning that all the space in the new building can be focused on learning and teaching use.

Additionally as a new build there will not be the same level of design constraints as would be experienced in a refurbishment project. Consequently, it is anticipated that the University would wish to progress with this development within its Estates' Master Plan.

Option 2 Refurbishment of Surplus Space in Mercantile Building

There is surplus space available in Mercantile Building which could be refurbished, although this was been discounted as there would be no co-location opportunities. Additionally the constraints of the existing structure would limit the flexibility of the design of the new facility.

Option 3 – Do Nothing

The opportunity to secure HEFCE funding of £5m for teaching capital to support the provision of new and upgraded STEM teaching facilities would be lost.

The recommendation supported by both the University's Estates and IT Committee and the Finance Committees were to proceed with Option 1, with endorsement of the associated match funding. The timescales for capital spend were noted and recognised as important project milestones. These committees also identified an appropriate external governor to join the project board for this development.

The Preferred Option

The overall vision for the Future Technology Centre is based on 3D imaging, digital modelling and manufacture via rapid prototyping. The Centre's facilities have been put together to support this comprising;

1. Ground Floor – in partnership with Carl Zeiss, will site high quality 3D imaging capability based on the latest non-destructive x-ray systems. A particular feature of the imaging is the level of high resolution and high contrast in relatively large parts to see detailed material features that define function. This link with Carl Zeiss is of mutual benefit, offering the University state of the art equipment for learning and business support projects and to provide Zeiss with an international base to showcase their products and to develop their training. This will expand the range of equipment available to include light microscopy, x-ray and electron microscopy for non-destructive material evaluation.
2. The ground floor will also host the 3D printing technology where digitised models can be sent for printing to enable rapid prototyping. These facilities, provided in partnership with 3D Systems, provide a range of material solutions from plastics, composites and metals that can be manufactured on demand. These combinations of materials can be critical for added value. For example, medical implants replicated the hard and soft regions of tissue can be manufactured in the facility. Synergy with imaging capability is available so that existing products can be images, redesigned based on the image and the improved product manufactured using a 3D printer.
3. First and Second Floors – will hold 160 students in total in the form of design studio / workshop spaces, acknowledging that traditional lecture based training – training techniques are not effective for everyone. The students enter the spaces, pick up a mobile device and are given problem-based design engineering tasks e.g. to design a new medical prosthetic, and other product-based tasks. These tasks are supported by interactive online learning material which, with tutorial sessions, provide individual feedback and additional resources help provide the underpinning learning. The best examples of training of this nature were found to be design led, with big developments in prestigious universities such as the Jacobs Institute of Design Innovation at Berkeley, and the MIT-Singapore University of Technology and Design, blending design with technology using problem based approaches.
4. Third Floor – is a digital level that provides high level computation power for image analysis, digital design, virtual reality and simulation. Local resources will be further integrated with supercomputing capability that are currently used as a national centre of excellence, for example forming part of the UK National Cosmology Supercomputer Consortium.
5. Fourth Floor (Mezzanine) – is the industrial engagement area, which will provide space for working with companies, offering learning packages in flexible way, with high quality bespoke training for short courses. This will local companies to be competitive and upskill staff, or downstream begin training for apprentices.

Initial stages of this project are already underway, at the University's risk, to ensure the FTC can be successfully delivered within the prescribed timescales, with expenditure of HEFCE's £5million contribution by March 2016 and completion by July 2017.

The University has recently completed a £10million refurbishment of our Portland Building for our Faculty of Technology, which was delivered to time and budget. The FTC will be a new wing on this building. Consequently, the FTC will be incorporated into an existing high-specification building at the heart of our campus and our existing STEM provision. This will reduce risks and assist with obtaining planning permission, particularly as the Portland building was designed to accommodate an additional wing if the opportunity arose.

Pre-existing information about the proposed site has been reviewed to inform the feasibility of developing in the proposed location. A project risk register will be developed and maintained for the duration of the project. This will be reviewed on a quarterly basis by the Project Board. Comprehensive site and geotechnical surveys will be undertaken at the University's risk to inform the risk register and the design process.

The University and the Faculty of Technology has a key strength in innovative and flexible learning. Through this initiative the University seeks to create a new facility as part of University's Manufacturing Group within the Department of Mechanical and Manufacturing Engineering. The centre will provide new equipment and technology including rapid prototyping and precision measuring techniques to give companies access to design and development support for their new products and processes.

The equipment proposed is the latest technology enabling the rapid generation of new product designs as well as short-run production to facilitate trials and market-testing of new products. The new Centre will also enhance the learning of students within this field, giving them access to the latest workplace technology to provide them with the skills which employers will require to take their manufacturing technology forward.

Table 1 – Future Technology Centre Project Outputs

New employment / education space enabled	Total for the FTC is 1458.8m^2. Dedicated business engagement space within this is 218m2
Skills outputs (apprentices / learners)	30 Apprenticeships pa 300 Employees receiving training per annum
Other outputs to be delivered as a result of this project.	Companies accessing R&D facilities Events and Networking Opportunities 2 Collaborative Research and Development bids.

Project Outcomes

This technology is particular valuable as an innovation tool, and will support the current shift of some of the businesses working in declining markets in the Solent region into other sectors with greater growth potential.

Raising Productivity in the Solent

The Government has identified a 15 point plan for raising productivity, and this project delivers directly against 3 of these; delivering targeted skills training to those in work who need it, specifically designed for local employers' needs, opening up the education provision of the University to a wider section of society and improving access to the science, facilities and the knowledge base so that

businesses can directly benefit from their local university. This programme will directly benefit more than 500 businesses each year. Businesses will be encouraged to work with staff at the University to design skills based training that will meet their existing and future needs. The addressing of future needs is a key aspect of the programme, and having the ability to offer training on the latest equipment available in the market place will ensure maximum benefit to the companies and their employees.

A key route to increasing productivity will be through improving the speed with which companies can innovate particularly through new product development.

Additionality offered with LGD

The Local Growth Deal funding will create a Regional Fabrication and Simulation Centre which will provide industry leading equipment and facilities to the businesses in the region. The nearest similar facility is in Manchester, but the proposed version being developed in Portsmouth will offer a wider range of equipment and facilities, with cutting edge machines bringing new technology into the region. As well as providing relevant skills training, it will provide businesses with a resource to identify potential innovation gains from using this new technology.

Without the additional funding, the project will focus on the core undergraduate curriculum with limited opportunities for businesses to use the facilities for their own economic gain. The ability to deliver customised, flexible and appropriate skills training for local businesses will also be severely reduced.

The additional funding will allow the creation of business workspace to allow business to rent offices within the building on flexible terms. This is a tested open innovation model that has been proven to increase the value of the interaction.

Access

The FTC will be open from 8am until 9pm during the week and open at weekends subject to demand in order maximise accessibility. This will be supplemented by opportunities for companies to undertake remote working and web-based technology, thus saving on time and training costs. The Future Technology Centre will contain the following common core features:

- FTC to act as an advisory/outreach hub to manage learning provision including the registration & certification of candidates with the awarding bodies.
- FTC to maintain interactive links with other providers of training / education in order to direct the optimum resource facility to suit the individual requirement. This would include identifying and developing ways in which larger firms can make available equipment which is not used to capacity for training purposes for their supplier companies.

A clear focus on high level technology skills

The Future Technology Centre will give local and regional industries access to the latest equipment specifically designed to reduce the time to market and to increase the quality of new products. The facility may be accessed by business customers by a personal visit or through the Internet. The facilities provide the capability for students, staff and industrial clients to develop prototypes from concept to initial prototype to pre-production digitising and finally manufacturing capability. By

using the 3D digitiser it will be possible to take existing 3 dimensional physical models or prototypes, scan in dimensional co-ordinate and produce pre-production volumes using rapid prototyping technology. This level of technology is usually only within the reach of a large company.

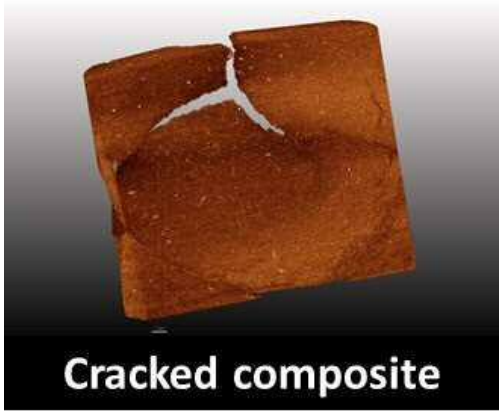
Wider Economic Impacts

There is an opportunity to develop relationships with the equipment providers to harness their own customer basis to offer them training, research and development, providing additional opportunities for both the Higher Education sector and the wider business base within the Solent region.

Social Impacts

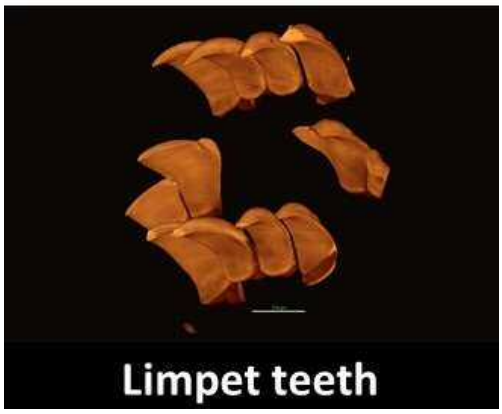
The flexible modes of delivery, to those already in the workforce will also improve access to higher education of those who may not have experienced higher education before. The University has an agreed pathway where credit can be awarded for non-traditional forms of study which individuals can translate into a full undergraduate degree where appropriate, thus creating a new mechanism for local people to improve their qualification levels and help to address the education deficit in the Solent Region.

X-ray images showing detail of different material available using 3D imaging equipment

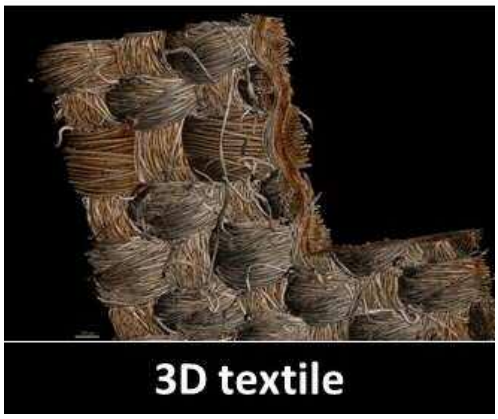


Cracked composite

Textile with oil droplet



Limpet teeth



3D textile

Commercial Case

The support received by the University from our strategic industry partners and large company customers gives us the confidence that the preferred option for the FTC will result in a viable well-structured project that will deliver significant outputs and outcomes set out in the Economic Case. Enclosed with this Business Case are two letters of support from our key project partners Zeiss and 3D Systems (ANNEX D).

Employer support

Strong employer support is demonstrated through feedback from our Industrial Advisory Boards [16] [17] and individual employers:

Les Gregory, Product and Training Services Director of BAE Systems;

“BAE has a voracious appetite for talent, specifically in the STEM fields. Our future success is predicated on our ability to collaborate with local academia to develop leading skills and capabilities to work on a wide range of mission critical systems …

A collaborative model - which invokes job placement and applied projects - is becoming increasingly more critical as we seek to find the best fit, making students "match fit" and optimising the transition from University to work.

As a result, BAE is delighted to support this submission. “

Dave Hill, Managing Director, Industrial Rubber

“The requirements for my company include the need for well-trained ready to go students who can fit quickly into a working environment that is increasing becoming digitally based with more emphasis on innovation and advanced manufacturing.

This capital investment can only enhance the region’s manufacturing ability to compete in an increasingly global market.”

Value for Money

This project represents an exceptional opportunity to develop engineering skills in this new Centre and improve access to leading edge design and development technology.

The FTC will support Apprenticeships, Degree and Postgraduate, part-time and full-time engineering programmes and in supporting new part-time and short programmes directly tailored to industry needs. The FTC will promote training in specialist areas not able to be supported on an in-house basis by companies themselves.

Using the criteria adopted by the National Audit Office this project will provide value for money in a number of ways.

[16] The University’s Engineering Industrial Advisory Board has 18 industrial members industry including Pall Europe, NATS, Seagate (Xyratec), DSTL, Raymarine, Thunderer Squadron, BAE systems, Connectus, Captec, Apollo Fire Detectors & Petrophase.

[17] The University’s Applied Physics Industry Advisory Board has been influential in curriculum innovation and change as part of a previous HEFCE funded HE STEM curriculum change initiative.

As this project is creating additional functionality and therefore outputs within an existing construction project it is able to save costs through the enabling stages of a large construction projects – these have already been covered by other funding streams. This project will be able to reduce its project management overheads, both from an administrative and construction basis, necessary for a project this size.

The University has significant purchasing power, owing to its size and range of activities that it is involved in and this enables it to negotiate prices which generate good value for money.

The additional outputs that can be leveraged by the University through this programme, both tangible as listed in the document but also intangible (e.g. greater student exposure to the business environment, additional research and development opportunities arising outside the scope of this project) will also improve the value for money for the Solent LEP.

Procurement

The Management Case section details the planning and management of the procurement in line with the University's regulations.

Project Risks

The risks associated with the FTC project have been well defined, documented and reported against by the project management team.

Refer to Annex A Project Risk Register (*commercially confidential)*

Financial Case

The cost of the Solent LEP Future Technology Centre project is £3,150,000. £1,050,000 is sought from LGF as an overall contribution to the project and specifically to fund the construction and fitting out of the fourth floor mezzanine, where the business support, apprenticeship and employee outputs will be delivered, and towards the ground floor simulation centre.

The Solent LEP Future Technology Centre project represents just under a quarter of the overall construction costs for the capital build, at £13.15M. The main construction costs are met by a combination of HEFCE (£5M) and University (£5M) contributions and have been considered separate to the overall scope of this application so as not to double-count funding or leverage of University contributions.

Match funding of £2.1M for the construction for the establishment of the Solent LEP FTC will be met by the University. Partner companies will contribute their time and equipment during the delivery phase of the project.

The following section under the Management Case details the process by which we have sought to achieve best value and the minimum we believe to be required to establish the Centre to the appropriate specification.

Project Capital Requirements for FTC Project

	2016/17	2017/18	2018/19	2019/20	2020/21	Total
Local Private Sector Contribution (University of Portsmouth)	£2,100,000	£	£	£	£	£2,100,000
Local Public Sector Contribution		£	£	£	£	
LGF Funding Request	£1,050,000	£	£	£	£	£1,050,000
Total Project Costs	£3,150,000	£	£	£	£	£3,150,000

The University has considered to its satisfaction that the impact of the FTC project cashflow on the overall balance sheet is manageable.

A breakdown of costs and associated cashflow is provided in Annex B.

Overall Funding and Affordability

The preferred option for the FTC has been considered in a fundable and affordable project. The LGF funding is sought to complete the funding package and generate the additional benefits as set out in the Economic Case.

Key Financial Risks

Inadequate funds available – mitigated through project redesign to suit the availability of the budget

Unexpected additional construction costs due to unidentified services work not identified prior to enabling works commencing – mitigated through skilled and experienced Estates Team at the University undertaking thorough preparatory work

Costs of discharging Planning Conditions greater than those budgeted for – mitigated through productive conversations with the planners and discharging conditions in a timely manner

Poor financial management through the construction programme – mitigated through using highly qualified and experienced project management and finance staff to ensure that the project is managed on time and in budget, and that decisions are taken by the Project Board in a timely manner to ensure that the project is appropriately managed

EU State Aid

The proposal is compatible with EU State aid regulations and falls within the GBER (Aid for Research & Development & Innovation). The training aspects of the project are outside of the scope of State Aid. Full Market Price will apply to any activities undertaken within the centre when it is operational and all purchasing decisions will be compliant with the University's financial regulations which are routinely subject to external audit.

Current status of the scheme

The construction project is currently at Stage E and enabling works have commenced. Design work for the additional business facing components has been completed. The main contractor has been secured.

Full Planning Consent has been granted subject to conditions which the project team are responding to currently.

The LEP funded works will all have been completed by end March 2017.

Financial sustainability

The University will support the ongoing running costs of this facility from additional income generated, including the additional fee income from growth in student numbers, potential CPD activity and in the longer term, knowledge exchange opportunities with employers. It is considered that the additional income received will be sufficient to ensure an excellent teaching experience, cover property and operating costs, additional outreach costs and to provide a long term fund for replacement and updating of equipment and resources. There is considerable evidence that

employers require the practical, technical and leadership skills that this development will promote, leading to further opportunities for flexible, part-time and CPD activity, and ensuring that collaborative work-based learning opportunities can be developed in accordance with our curriculum plans.

We will exploit opportunities to promote value for money and wider impact through this investment. For example, the University plans to invest £300,000 in direct digital manufacturing equipment with research and knowledge services applications. This will be located in the FTC, to provide students with supervised access to cutting-edge equipment. This purchase is already planned, so costs are in addition to our matched funding for this project.

The building will be designed to achieve a BREEAM rating of 'very good' or better in accordance with the University of Portsmouth Environmental Policy. The designers will be required to consider whole life costs to ensure that the ongoing maintenance and energy costs are minimised.
Lifetime of assets and replacement schedule

This schedule will be planned in accordance with our capital depreciation policy, with more frequent review of specialist and IT equipment to ensure this remains technologically current

Asset type	Lifespan
Building	50years
Specialist scientific equipment	10 years
IT equipment	5 years
Audio-visual equipment	3 years

Management Case

The University has undertaken an extensive process of consultation and engagement with all relevant parties to ensure that this project is achievable. The University has a successful track record of delivering capital projects on time, within budget and in accordance with recognised best practice. A full project delivery plan is attached in Annex C. (*Commercially confidential*)

This section describes the programme and project management methodology and to demonstrate that there are robust arrangements in place for contract management, the delivery of benefits and the management and mitigation of risk.

Governance Framework

Appropriate tried and tested governance arrangements for the project will be implemented, with the Project Manager reporting to a Project Director and a Project Board. The Project Manager and Project Director will have delegated authority to make operational decisions within appropriate agreed limits for their roles. Project Board will be responsible for oversight of the project and for decision-making in relation to any material change to scope, cost or programme. All contract award decisions relating to consultants and contractors will be made by the Project Board, in accordance with our financial regulations. The Project Board will be led by a "champion" from the University's Executive Board and will include a University Governor.

The Purchasing Manager is responsible for formulating and delivering the University's Procurement Strategy. The Purchasing Manager is responsible for the delivery of an effective cycle for the acquisition of goods, materials and services together with the provision of a policy-making, advisory and monitoring service. The Purchasing Manager also acts as focal point for general procurement issues and escalation of specific procurement problems. The Director of Finance or the Finance Committee are the final arbiters on all matters relating to procurement at the University.

Procurement Principles

The University is committed to a rigorous procurement process which emphasises the principles of:

- Value for money
- Competitive tendering
- Sustainability
- Transparency
- Fairness & equality
- Best practice
- Legality (e.g. in accordance with EU Procurement Regulations
- Confidentiality, subject to the Freedom of Information Act

These principles underpin all University procurements.

Procurement Process

The Board of Governors has approved a set of financial regulations to be observed by the University, such rules applying with equal force to all employees and members of the Board of Governors and to all transactions of the University and its wholly owned subsidiary companies.

Procurement procedures emphasise that it is the duty of all personnel involved in the area of purchasing to observe the highest standard of conduct in ensuring that the University derives the best value for money for purposes necessary for the University to undertake its various roles.

The Director of Finance is responsible for all work, goods or services required by the University except for supplies of utility services and periodic payments such as rent and rates. Where the estimated sum is likely to exceed £500,000 the Chairman of Finance Committee or his/her nominated member of Finance Committee or other member of the Board of Governors, who shall be an independent Governor will:

Consider and decide upon the recommendation of the Purchasing Manager, the appropriate Budget Holder and Director of Estates or Director of Information Services as appropriate, the short list of tenderers to be invited. This is to ensure that the process is independently validated

Consider and decide upon the recommendation of the Purchasing Manager, the appropriate Budget Holder and Director of Estates or Director of Information Services as appropriate, the supplier to be awarded the contract, again to ensure the process is independently validated.

In cases where it is deemed advantageous to accept the tender of a non-approved supplier, this supplier will be subject to the University's standard checks procedures prior to the placement of any official order.

Appointed Project Managers and Building Contractors

An external firm has been appointed by the University as a multi-disciplinary practice to provide consultancy services to project manage the delivery of the Future Technology Centre. A tender process to procure the main contractor for the construction work was undertaken in the autumn of 2015. Market engagement was undertaken which resulted in six contractors shortlisted for tender.

The tender received from the successful contractor was subject to value engineering exercise in order to seek savings conducted by the Project Board. A further period of negotiation subsequently followed prior to the tender being awarded. The successful contractor has since been confirmed.

The savings achieved a total reduction in budget, enabling achievement of the Main Works contract within the overall project budget. The Contractor provided confirmation that they will deliver the design that they consider to be compliant with both the University requirements and Building Regulations.

Risk Management

The risk management log is subject to monthly scrutiny by the Project Board and appropriate action is taken through this process to respond to or mitigate risks as they are identified. A copy of the risk register is attached as Annex D

Key milestones

Project Stage	**Start**	**Completion**
Development of outline brief	01/09/2014	19/09/2014
Consultants tender	22/09/2014	03/10/2014
Project Board approval of Consultants appointment	20/10/2014	24/10/2014
Develop detail brief	27/10/2014	21/11/2014
Detail design	24/11/2014	27/02/2015
RIBA Stage C - Sign-Off	22/12/2014	15/01/2015
RIBA Stage D – Sign-Off	16/02/2015	27/02/2015
Planning	02/03/2015	22/05/2015
OJEU PQQ	05/01/2015	16/01/2015
Tender	16/03/2015	24/04/2015
Project Board approval	25/05/2015	05/06/2015
Mobilisation	22/06/2015	31/07/2015
Construction works start on site	03/08/2015	07/10/2016
Enabling works commence for mezzanine	01/11/2015	
Fit Out of mezzanine	10/10/2016	02/12/2016
Building Handover	March 2017	
Official Opening of Future Technology Centre	April 2017	
First businesses accessing the facilities	September 2017	

Concluding Remarks

This project represents an innovative solution to what is a longstanding skills issue. It is built on a great deal of commitment and goodwill through partnership working over the last twelve months with organisations with a keen interest in raising the supply of high level of engineering skills through University graduates and apprentices. The Future Technology Centre is offered as a model which could be replicated elsewhere in the region and, indeed, nationally. The overall benefits (including those funded through HEFCE) are as follows:

Overall Benefits of the Future Technology Centre

1. Creation of a global leading Design and Simulation Centre for commercial use.
2. Creation of a design-led engineering Centre of Excellence for the development of advanced engineering skills which are industry lead.
3. Growth of at least 250 full-time and 50 part-time students by 2020
4. Increasing the proportion of women on Technology courses from 12% to 30% by 2030
5. Reducing our graduate unemployment rate to 1.5% below national average by 2022.
6. Creation of intellectual property (IP) which can be licenced to UK manufacturing businesses leading to further growth.
7. Growth and significant leveraging in the wider Solent advanced manufacturing sector, both major firms such as BAe Systems and their immediate supply chain, capitalising on this “enabling technology” to increase product development, sales and exports.
8. Host for a European Space Agency (ESA) accredited skills training to the space industry.

Annex B

ANNEX B - FTC Construction and Mezzanine Fit-out Cash Flow

University of Portsmouth - New Future Technology Centre

Future Technology Centre - Construction and Mezzanine Budget / Projected Cash Flow

	Item	Budget	Value Quoted	Actual	Jul-16	Aug-16	Sep-16	Oct-16	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17		Totals
1	**Construction Costs**														
	Construction of FTC - UoP	2,100,000	2,100,000	2,100,000		199,416	271,512	271,512	271,512	271,512	271,512	271,512	271,512		2,100,000
	Construction of FTC - Solent LEP	865,000	865,000	865,000		£99,708	£135,756	£135,756	£135,756	£135,756	£135,756	£35,756	£50,756		865,000
2	**Mezzanine**														
	Fit-out costs - Solent LEP	185,000	185,000	185,000	0	0	0	0	0	0	0	100,000	85,000		185,000
	TOTAL	3,150,000	3,150,000	3,150,000		299,124	407,268	407,268	407,268	407,268	407,268	407,268	407,268	Total Project Costs	3,150,000
														UoP Contribution	2,100,000
														LEP Contribution	1,050,000

Annex D

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Division/Dept: Carl Zeiss Ltd, Division of Microscopy
Your Contact: Oliver Clarke, Head of Division

Your Ref: FTC
Our Ref: FTC
Date: 7th June 2016

Dear Asa,

University of Portsmouth - Future Technology Centre

On behalf of Carl Zeiss Ltd , I would like to confirm our support for the 'Future Technology Centre' (FTC) project. We have been working at a strategic level with the University for some time and the FTC represents an important step forward in our relationship.

We are pleased to be partners for this project and will supply, at discounted rates, a range of our high quality optical and x-ray imaging systems for use in teaching and for project work with UK companies. As we do not currently have a dedicated site in the region where we can showcase our equipment, Portsmouth represents an ideal place to develop our customer training, which will attract several companies to the FTC each month.

This collaboration had the potential for a physical training facility for ZEISS which would enable us, in partnership, to expand the range of available equipment to include light, x-ray and electron microscopy, working with the University of Portsmouth as the preferred global partner for ZEISS.

We have been involved throughout the development process of the FTC and have already been able to offer concessions on some of the equipment purchases and will continue to offer staff time and full access to our range of equipment.

We wish you all the very best success with this project.

Yours sincerely,

Oliver Clarke
Head of Microscopy Division
Carl Zeiss Limited

Paul Adderley
Managing Director
Carl Zeiss Limited

Asa Barber
Professor in Advanced Materials Engineering
School of Engineering
University of Portsmouth
Portsmouth
PO1 3DJ

25 May 2016

Dear Asa

University of Portsmouth - Future Technology Centre

On behalf of 3D Systems, I would like to confirm we are pleased to support for the 'Future Technology Centre' (FTC) project. Our partnership with the University offers some exciting opportunities to involve engineering students with the latest 3D imaging and additive manufacturing systems. As part of the advanced engineering and manufacturing suite at the FTC, our equipment will help engage young people with industry-defined projects people that will enhance graduate employability.

Where 3D Systems will best benefit from our collaboration is in showcasing our 3D printer technology, which can work with different materials from metals to plastics for a huge range of applications. We will be looking to offer high quality bespoke training as short courses to train on the new equipment in the FTC. This will have spin-off benefits for the University staff and students and help local companies to be competitive, upskill staff and provide downstream training for apprentices.

We have contributed to the development of this project, helping the University to identify a suitable range of equipment that supports the manufacture process that is the lead concept for the FTC. As part of our ongoing contribution to the FTC, we are committed to bringing in a company per month to work with the University.

We wish this project every success and look forward to working with you and your colleagues.

Best Regards.

Yours sincerely,

Charles Grace
Chief Revenue Officer