Annex A: BUSINESS CASES

A.1 The Science and Innovation Audit has demonstrated that the South of England has outstanding strengths in relation to the development of digital enabling technologies. Building on these strengths, the Innovation South SIA Steering Group identified five opportunity areas in which intervention could accelerate the commercialisation of research and innovation. These are:

- **Opportunity 1: Knowledge-to-Market Accelerator –** a business and university-backed body which could identify, and potentially co-finance, joint projects that could help to increase the commercial application of digital enabling technologies in both SMEs and larger businesses
- **Opportunity 2: Linking Innovation Hotspots** – supporting a more strategic and planned approach to the future provision of innovation centres and support which should benefit SMEs particularly
- **Opportunity 3: Quantum Supply Chain Initiative –** helping to build capacity and presence (across both SMEs and larger businesses) in the development of products using quantum technology in advance of significant commercial demand
- **Opportunity 4: Developing the 5G Innovation Centre** – building on the 5GIC's existing presence at Basingstoke and planned facility at Brighton to offer similar resources (to SMEs, larger firms and other organisations) elsewhere across the South
- **Opportunity 5: Advanced Skills in Digital Technologies –** a business-led programme to increase awareness in the range of opportunities available in digital enabling technologies and to aggregate business demand for skills (across SMEs and larger companies)

A.2 This Annex provides further details on each opportunity. The guidance for Wave 2 SIAs states that each opportunity should be presented using the headings for a standard 'five case' business case model. The business case templates in this paper follow this guidance. However, it should be noted that at this stage, the proposals are at an early stage. The focus within each business case is therefore on the 'strategic case' (the overall rationale for the intervention), and the additional work that will need to take place to bring each opportunity forward is set out.

Opportunity 1: Knowledge-to-Market Accelerator

1. Project outline	
Brief summary of the project	The Innovation South SIA has highlighted a need for greater collaboration to identify and commercialise opportunities that could emerge from digital enabling technologies and to 'join up' the regional innovation ecosystem (across SMEs, larger businesses, universities, and a range of other organisations). The **Knowledge-to-Market Accelerator (KMA)** responds to this need by establishing a region-wide partnership, led by business and the South's universities, to support initiatives to broker the development of new technologies and new industrial products between businesses and universities across a vibrant and integrated supply chain. The KMA partnership will be based on the existing arrangement established by the Science and Innovation Audit. It will bring together major *businesses* that are engaged in the procurement and development of digital enabling technologies (such as those in the defence and telecoms sectors, highlighted in the SIA Report), *universities* with world leading capabilities and a track record of commercialising research and the region's network of local enterprise partnerships. The KMA will: • **Act as a focal point in the region for innovation** in digital technologies that specifically links the world leading developments in communications (5G) security (cyber) hardware (electronics and photonics), software (machine learning, AI and big data analytics) and creativity (CGI, augmented reality and computer gaming) undertaken in the region • **identify new opportunities** which may arise from the as yet unforeseen application of combinations of different digital technologies and bring together the various stakeholders from business and academy to develop and commercialise these new business sectors. • **respond to industrial input** where a solution needs to be found for a clearly identified business need that can be solved by the combination of digital enabling technologies that exist in the region but which at present are developing in isolation. • ensure that companies of all sizes from large multi-nationals to SMEs and start-ups, as well as all **partner agencies** within the regional 'innovation system' (such as LEPs and Growth Hubs) are aware of these potential opportunities

	• **pool a modest resource from partner organisations** to enable small early stage projects to take forward promising ideas. Proof of concept work will allow the development of major project proposals supported as appropriate by industry and government to take these new ideas up through the technology readiness levels ready for full commercialisation). Initially, the resources could take the form of a joint university-LEP fund, which could be used to lever in resources from the private sector and/or match Government, private or remaining ERDF resources.
Who are the key partners?	Partners will include • businesses, including major corporates (starting with those that have already been engaged in the SIA process), and industry bodies representing SMEs • universities engaged in the development and commercialisation of digital enabling technologies • non-university research institutions with a presence in the region (such as the Pirbright Institute and the National Physical Laboratory) • local enterprise partnerships • innovation and commercialisation support bodies – including Innovate UK as well as regionally-based support organisations such as SETsquared.
2. Strategic case	
What problem are you trying to solve – what is the rationale for intervention?	The Knowledge-Market Accelerator seeks to address three challenges: **Collaboration across institutions and sectors is not as good as it could be** Throughout the SIA process, businesses and universities emphasised a need to 'collaborate more'. In several of the SIA workshops, participants said that they had not previously had the opportunity to come together. At the same time, the cross-sectoral application of digital enabling technologies was repeatedly highlighted. A key problem is that most research and development in the various digital sectors is linear and undertaken in relative isolation. Experience shows however that genuinely disruptive new technological developments that lead to new industries result from the interaction of simultaneous advances in multiple sectors to create products and capabilities that could not have been foreseen by simple linear developments in a field. There is a need to support projects which will bring together industry and academic talent from the differing but potentially complementary digital sectors (communications, security, hardware, software and creativity) to

	identify ways in which the commercial development of new applications, services and products can be supported. **There is an imbalance between the *scale* of the potential in the South and the *capacity* of regional agencies to respond to it** The SIA demonstrates that the South has substantial research strengths in digital enabling technologies and a stock of major firms that are investing in their development. However, the opportunities are complex and generally extend beyond the boundaries of individual LEP areas. So potential benefits are not always recognised, and it is difficult to bring forward projects of regional scale. **Innovation is challenging and fragmented** Linked with the first two challenges, while partners across the South support innovation through a variety of programmes, regional coordination and coherence is weak.
What are the links to current policy and what are the existing gaps in provision?	Following successive Government reports, the *Industrial Strategy Green Paper* notes that *"historically, we have not been as good at commercialisation and development as we have been at basic research [and] we have often been slower than competitors to take up and deploy existing technologies"*[170], including for the reasons set out above. The Strategy identifies 10 pillars. This opportunity supports five of those pillars directly, namely: • Investing in science, research and innovation • Supporting businesses to start and grow • Cultivating world-leading sectors • Driving growth across the whole country • Creating the right institutions to bring together sectors and places
What is the potential scope of the project?	The Knowledge-to-Market Accelerator will operate across the Innovation South area, identifying and taking a coordinating role in relation to interventions that are likely to be of regional significance.
Economic case	
What are the anticipated benefits and risks?	The project will ensure delivery of a programme of action to take forward the outcomes of the SIA. Anticipated benefits include: • clearer identification by LEPs, universities and others of the opportunities associated with digital enabling technologies

[170] HM Government (2017), *Building our Industrial Strategy: Green Paper*, p.15

	• translation of identified regional priorities into the direction of relevant funding (e.g. ERDF innovation funds) • greater collaboration between business, universities and Government • increased number of SMEs participating in the development and exploitation of digital enabling technologies Possible risks include: • creation of a new regional body on top of an already confusing strategic landscape. This will be mitigated through the establishment of the KMA as a light-touch partnership, focused on identifying key regional challenges and opportunities and channelling modest resources towards regional priorities.
What are the likely costs of the project?	The running costs of the KMA will be limited to a small staff contribution, potentially seconded from a partner organisation. However, it will be important that the KMA has access to some resource to drive forward those projects that are of regional significance (although potentially relatively limited in terms of their funding requirement) and identified through the SIA. Potentially, a contribution of £75k per LEP and higher education institution in the Innovation South consortium, matched by Government, could yield around £3 million over 3 years, sufficient to cover much of the activity proposed in Opportunities 2-5.
3. Commercial case	
Can the project be delivered? Is it viable?	Yes, assuming that there is partner support. It is anticipated that the KMA will be 'light touch' in governance terms, probably constituted as an informal partnership.
4. Financial case	
Is the required funding available?	Not at this stage (although see potential funding sources in the Economic Case above)
5. Management case	
How will the project be managed? Is there sufficient capacity?	It is envisaged that the KMA will be based on the existing Innovation South consortium. However, it will require significantly more coordination than the consortium in its current configuration (which is quite light-touch and informal) is able to provide. Further work will therefore need to take place to consider how the consortium can evolve a more formal structure.

Opportunity 2: Innovation Hotspots

1. Project outline	
Brief summary of the project	This project aims to develop and coordinate a network of 'innovation hot spots' for SMEs and larger businesses using digital enabling technologies across the Innovation South area. The Innovation South SIA has evidenced that there is a very high concentration of organisations in the region with expertise, research, development, commercial ambitions, and commercial activities in the broad spectrum of digital enabling technologies. There are already several 'innovation hotspots' in the region – innovation centres, science parks and support programmes - and there is an opportunity to build on these and to connect and coordinate them with other resources and areas across the region. There are already demonstrated activities and successes to provide guidance for this project. Two of the SETsquared universities, Southampton and Surrey, are in the region. They have very well established innovation centres, with incubators and business accelerators, that bring forth and provide access to the research and resources of those research intensive universities. Over the past few years, SETsquared in cooperation with the Enterprise M3 LEP and other regional organisations has developed a Digital Innovation Hub in Basingstoke. This Hub works very closely with the 5GIC at the University of Surrey, and a number of new companies have been created and many companies in the Basingstoke area have benefited from this activity. In addition, the region has a number of other innovation centres, some associated with other universities and some privately owned and operated. There are several Enterprise Zones and Science Parks: combined, these have substantial resources, both personnel and facilities, these innovation hotspots will provide the focal points for further sector and cluster development. This project has these key elements: • Across the Innovation South region, continue the linking and coordination of existing innovation centres (e.g. via the expansion of the SETsquared programme). • Extension of the Government funded ICURe (Innovation & Commercialisation of University Research) programme that is currently piloted by SETsquared and InnovateUK to bring the market validation capabilities of the programme to be oriented toward start up and existing SMEs. This will enable small companies to determine the commercial potential of their technologies and business ideas at an early stage by gaining feedback from potential customers, reducing their overall costs

	and substantially increasing their potential for success in the marketplace. • Around the Innovation Hotspots, facilitate the development of sector clusters and networks that bring together SMEs, large companies, universities, and research organisations, facilitating the interchange of ideas and expertise (Open Innovation) and building supply and value chain ecosystems. • Provide equipment brokerage capabilities. It is well accepted that many SMEs are constrained in their development by the lack of access to expensive and specialised equipment. Universities and large companies frequently have surplus capacity on this type of equipment, but an organised brokerage is necessary to facilitate. With support channelled in the Innovation Hotspots, the networks will help to drive demand for wider business support and coaching services from SMEs, with support targeted on businesses developing and exploiting new applications for digital enabling technologies.
Who are the key partners?	Partners will include • Commercialisation partnerships, such as SETsquared • Local enterprise partnerships in the region • Local authorities throughout the region • Existing Enterprise Zones and innovation/ incubator facilities throughout the region • Larger businesses in the South with needs to build their local supply and value chains (and skills pool) • Universities • Further education colleges • Industry associations such as the Farnborough Aerospace Consortium, Marine Southeast, etc. • Innovative small and medium size companies in the region, particularly those that have the desire and capability to scale-up • The Scale-up Institute • NHS Hospital Trust Research Offices
2. Strategic case	
What problem are you trying to solve	The project follows from the recognition in Government strategy that commercialisation of innovative technologies requires active

– what is the rationale for intervention?	interventions to successfully move them to the marketplace. It seeks to address: • Uncertainty regarding the market potential of innovative products and services, and the challenges associated with market validation. This is particularly difficult with small and early stage companies. • Lack of support in the early stages of companies and further support in the scale-up stages of companies that have dynamic growth opportunities. • Cluster development of key growth sectors requires significant interventions, even in locations where there is already a well-established group of companies and research universities. • Limited access to high-cost and specialised capital equipment. It is difficult to know where the desired or potentially useable equipment is located, and even when it is known that the equipment exists, equipment sharing presents multiple commercial barriers.
What are the links to current policy and what are the existing gaps in provision?	The *Building Our Industrial Strategy Green Paper* notes that *"historically, we have not been as good at commercialisation and development as we have been at basic research [and] we have often been slower than competitors to take up and deploy existing technologies"* The Innovation South region overall does tend to follow this statement but has significantly demonstrated an ability to commercialise in a number of key areas.. This project will build upon specific strengths within the region to fulfil the objectives of the Industrial Strategy to grow a vibrant future economy with innovative and growing global markets.
What is the potential scope of the project?	It is anticipated that the project will operate across the Innovation South area. However, it is scalable, and could be developed on a rolling/ sequential basis across the region.
3. Economic case	

What are the anticipated benefits and risks?	Anticipated benefits include:
	• Creation of interconnected sector clusters across the Innovation South region in digital enabling technology areas such as
	  ○ Photonics
	  ○ Quantum
	  ○ Big data & data analytics
	  ○ Digital electronics

	○ Cyber security • Creation of interconnected business sector clusters such as: ○ Marine & maritime ○ Advanced engineering ○ Connected digital ○ Biosciences • Increasing growth in the economy (GVA and jobs) of Southern England • Substantial increase in the number of new company creations in the high technology sectors • Higher business survival rates particularly for early stage SMEs • Substantial increase in the number and growth of scale-up businesses • Improved access to business support services • Greater collaboration between SMEs and larger companies Possible risks include: • Likelihood of some businesses failing after investment has been made. This is inevitable to some extent in a programme focused on start-ups dealing with novel technology, although will be mitigated through the links with SETsquared and other business development agencies. • Movement of some companies from one location to another in order to take advantage of clusters that are more appropriate to their businesses. This should be somewhat mitigated by the interconnection of clusters across the region.
What are the likely costs of the project?	To be determined with a more comprehensive assessment of the existing businesses, their locations, the number of existing innovation centres and their location and current activities. As stated above, this project can be ramped-up across the region and over time in order to spread the cost and time expansion to the availability of funding.
4. Commercial case	
Can the project be delivered? Is it viable?	Yes - there is already a track record of delivery of these types of programs by SETsquared, and the project can be rolled out incrementally across the region

5. Financial case	
Is the required funding available?	Not at this stage. There are some recently funded ERDF programs along with at least one more that is scheduled for funding later in the year that could be slightly modified to begin some of this roll-out. Some of the LEP areas could incorporate elements of this programme into future requirements for some of their ERDF and other funding calls.
6. Management case	
How will the project be managed? Is there sufficient capacity?	Delivery will be via providers of innovation/ incubator space, with overall management provided by a lead agency - potentially SETsquared.

Opportunity 3: Quantum Supply Chain Initiative (QSci)

1. Project outline	
Brief summary of the project	Although the South has great potential to take advantage of new applications for quantum technologies, many of these remain a long way from commercialisation. The **Quantum Supply Chain Initiative (QSci)** aims to build capacity within the South's SMEs and universities to to develop components and materials to sell into the growing research market for quantum technologies, enabling the development of a strong regional supplier base that can respond to commercial demand as the viable application of new technologies is proven. Linked with the South's existing Quantum Technology Hubs, including Sensors and Metrology, NQIT and with Innovate UK, QSci will offer: • **Element 1:** a centre for **information on research procurement** in areas where the UK has strengths, linked with the UK National Quantum Technologies Programme • **Element 2:** direct **financial and advisory assistance to quantum technology SMEs**, where they are seeking to enter new markets in the UK or overseas, potentially via Innovate UK competitions. This funding will need to coordinate strongly with Research capacity in the Universities (both as exemplar end-users and utilizing infrastructure), and to target specific development of products for the research market. It could include a priming fund to catalyze the formation of new SMEs in the region • **Element 3:** facilitation of **links between SMEs and 'primes'** within the region (particularly, although not exclusively, within the defence sector) • **Element 4:** routes to **utilise the outstanding facilities** held within the region at universities and Government labs for the benefit of both SMEs and primes to accelerate, for example, prototype device manufacturing, digital design, and testing This might take the form of a "Quantum Technology Park", acting as a hub for an inclusive region-wide network.
Who are the key partners?	Partners are likely to include: • Innovation South Knowledge to Market Accelerator consortium (see Opportunity 1) • UK National Quantum Technologies Programme (NQTP), particularly the National Quantum Technology Hub in Sensors and Metrology and Networked Quantum Information Technologies (NQIT)

- Innovate UK
- Potential quantum technology 'primes' (e.g. major defence-related industries)
- Quantum technology SMEs
- The strong research base, including Dstl, NPL and the universities

2. Strategic case	
What problem are you trying to solve – what is the rationale for intervention?	Building a market for quantum technologies: The challenge and the opportunity There is a widespread belief that quantum technologies will be transformational in their impact and will lead to commercial application, for example in sensors, quantum computation and secure encryption. Consequently, tech giants such as Google and Microsoft are developing quantum-technology research programmes and the UK currently has the world's fourth highest level of public investment in quantum research. This is reflected in recent investment in the South, for example at the UK National Quantum Technology Hub for Sensors and Metrology and NQIT, in which the University of Southampton and the University of Sussex participate; and the new EPSRC-funded National Centre for Superconducting and Hybrid Quantum Systems at Royal Holloway. The timescales for deployment of QT vary widely, so for quantum computing, despite the consensus that the potential opportunities could be enormous, "*very few in the field think it will take less than a decade, and many say far longer*"[171]. However not all quantum technologies remain a long way from commercialisation, with quantum secured communications networks already being installed. While it is likely that defence applications will be the first to come forward, the major defence technology companies (such as BAE Systems, Thales and QinetiQ, all of which have a significant presence in the South) are unlikely to invest heavily in quantum devices unless there are clear procurement signals from Government – and this is unlikely until the application of the technology is proven. So, while there is likely to be a huge commercial market in the future, there isn't one at the moment. However, the scale of pure research investment means that there is an emerging market in the supply of quantum technologies for research purposes. As reported earlier, McKinsey's have already estimated this as >$1.5n worldwide, and the South already has some commercial strengths in this area[172], and the market is likely to grow.

[171] *The Economist* (2017), 'Technology Quarterly: Quantum Devices', 11 March
[172] For example, Covesion (based at Romsey), which supplies non-linear optical crystals; Fibercore (based at Southampton), which is a major producer of optical fibres; and M Squared (with an office in Guildford) which develops and manufactures lasers and photonic instruments

	This is likely to be important for the South's – and the UK's - future ability to build a presence in quantum technologies when their wider commercial application takes off. New defence applications will require a supply chain, and an existing stock of expertise will help to attract future investment. So the challenge is: how can we support the growth of a quantum supply chain in preparation for the long-term expansion of commercial quantum technology opportunities?
What are the links to current policy and what are the existing gaps in provision?	The need to bridge the gap between the potential of quantum technologies and commercial demand has been recognised by Government. For example, the NQTP aims to make the UK *"a leading player in the global quantum technologies supply chain"*[173], and the NQTP's recent report on the quantum technologies landscape identifies a need to build an SME supply chain to support the UK's longer term prospects[174]. As part of this, the NQTP supports investments in research, innovation and technology demonstration to help UK industry commercialise quantum technologies – particularly in the production of niche devices for the defence, cyber security and oil and gas industries, and a round of grant funding for industry-led projects has been supported by Innovate UK, the EPSRC and Dstl. However, the focus of this work in NQTP has largely been on end-users and creation of a supply of sub-systems – while the focus here is on underlying components and materials, for example, optical fibres, superconducting materials, nonlinear optical materials, vacuum components, etc. The network of Quantum Technology Hubs also provides a gateway for industry to new research, and funding is available (via the NQTP in conjunction with SETsquared) to support academics in establishing new quantum technology businesses. However, much of the *current* market for quantum technologies is within research institutions, and this provides an opportunity for SMEs that are already active to increase their scale. The 'gap' in existing provision is at this level: in supporting businesses in the South to scale up over the short-to-medium term to develop a greater market presence over time.
What is the potential scope of the project?	Ultimately, QSci could operate nationally. There would be a strong case for it to do so, linked with the other National Quantum Technology Hubs. However, the South provides a strong starting-point, recognising the regional concentration of research expertise, likely commercial consumers and SMEs operating within the sector. It is particularly important that there is clustering of research and particularly hardware/ fabrication capacity, including Dstl, NPL and the cleanroom facilities at Southampton. Both Royal Holloway and Southampton also offer the scope for the manufacturing of

[173]EPSRC, UK National Quantum Technologies Programme (www.uknqt.epsrc.ac.uk)
[174]See Dstl/ EPSRC/ Innovate UK (2016), *UK Quantum Technology Landscape 2016*; reports of the Innovate UK Quantum Technologies Special Interest Group

	quantum devices, allowing SMEs to prototype in a way they cannot elsewhere.
Economic case	
What are the anticipated benefits and risks?	Anticipated benefits include: • increased access to existing (mostly research-based) quantum technology markets by SMEs in the South (quantified through increased sales by firms participating in the programme) • stronger regional cluster of quantum technology companies (quantified through number of inter-SME collaborations, and number of businesses engaged in the QSci network) • increased collaboration between quantum technology SMEs and (potential) primes (quantified by participation in collaborative research programmes and SME-to-prime sales) • increased commercialisation of university research (quantified through number of university spin-outs) • increased exports of quantum technologies (quantified through increased overseas sales) Possible risks include: • lack of coordination with existing initiatives (mitigated through engagement in the QT Hubs of the researchers at Southampton and Sussex and the large number of Innovate and EPSRC projects including Fellowships, and coordination via Innovate UK and the proposed Knowledge to Market Accelerator) • lack of long-term commercial demand (possible, although the supply chain initiative will also focus on identifying likely areas of strength) • use of state aid, particularly in the allocation of financial assistance to SME expansion and commercialisation outside of grants for R&D (mitigated through a state aid assessment as part of the completion of the full business case)
What are the likely costs of the project?	At this stage, detailed costs have yet to be determined.
3. Commercial case	
Can the project be delivered? Is it viable?	There are a number of bodies with a role in supporting the development of quantum technologies, and there is a national programme in place. It is therefore intended that QSci is delivered through existing channels. These are likely to include: • The existing Hubs which, while hosted elsewhere in the UK, are strongly dependent on facilities in the region, with particularly

	strong links to the **National Quantum Technologies Hubs for Sensors and Metrology and NQIT** (linked with the other two QT Hubs) supported with additional capacity to develop a centre to access research institution procurement, in the UK and overseas • **Innovate UK**, as the national provider of support for the commercialisation of innovation. Currently, Innovate UK does not provide a supply chain development programme, although it has in the past managed supply chain competitions (for example, the Advanced Manufacturing Supply Chain Initiative). Potentially, financial assistance via QSci could be channelled via Innovate UK, if this could avoid the need for duplicate administration and ensuring consistency with existing Innovate programmes • **Dstl and NPL**, both of which provide strong leadership to the UK Quantum Tech initiative and which, together with the leading university researchers (particularly at Southampton and Sussex) will ensure that a focus is given to the supply chain.
4. Financial case	
Is the required funding available?	At this stage, there is no fixed source of funding identified for the project. However, funding could be sourced from the potential 'pooled' resource described in relation to the Knowledge-to-Market Accelerator programme (Opportunity 1), as well as from Government via (for example) the Industrial Strategy Challenge Fund. It should be noted that as the QSci project is directed primarily at established businesses that are seeking to enter research-procurement markets, it is envisaged that any financial assistance will either be offered on a repayable basis or will require business match.
5. Management case	
How will the project be managed? Is there sufficient capacity?	As set out in s.4, it is envisaged that QSci could be delivered via existing mechanisms, with a coordinating role taken by the Innovation South consortium. It will therefore draw on existing management capacity, although will depend on the formalisation of the consortium, as set out in Opportunity 1. Lead investigators at Universities and SMEs have already been identified, and would provide a working group to champion the initiative.

Opportunity 4: Developing the 5G Innovation Centre

1. Project outline	
Brief summary of the project	The 5G Innovation Centre is an asset of international significance as the UK's largest academic centre dedicated to the next generation of mobile and wireless communications. From its base at the University of Surrey, the 5GIC has recently invested in a demonstrator in Basingstoke, providing firms engaged in 5G applications access to the latest technology. It has also secured funding via Enterprise M3 LEP's Local Growth Fund allocation to deliver a 5G Open Innovation programme across part of the Innovation South area, connecting SMEs with the 5G 'testbed' facility currently being developed. This project will build on the 5GIC's extension to Basingstoke and the Open Innovation programme by: • providing similar facilities elsewhere in the South, where there are clusters of businesses (including SMEs) that are likely to benefit • extending the Open Innovation programme to include SMEs across the South
Who are the key partners?	Partners will include • University of Surrey and the 5G Innovation Centre • local innovation/ incubator centres • businesses likely to benefit from (or identify commercial opportunities for) 5G technologies
2. Strategic case	
What problem are you trying to solve – what is the rationale for intervention?	The strategic case for this project is based less on a 'problem' and more on the realisation of the opportunity that the 5GIC presents. The 5GIC is acknowledged within the SIA as a key asset for the Innovation South area, and is itself the product of collaboration between the private sector (especially the telecoms sector), universities and Government. The 5GIC is also extending its collaboration to SMEs within the wider region. This includes: • the launch of a 5G Open Innovation programme • provision of a remote demonstrator at the Basing View innovation hub in Basingstoke • proposals for a 5G retail demonstrator in Guildford As part of its wider programme, the 5GIC aims to support collaboration between SMEs and larger businesses and assist the

	growth of SMEs at the early stages of developing products which will take advantage of 5G communications. Elsewhere in the region, the Brighton 5G testbed is supporting the local digital sector in developing applications for 5G uses. The wider region could benefit from improved links with the 5GIC and the Brighton testbed. This could take the form of: • demonstrator centres in other parts of region, especially where these might be associated with local sector strengths • wider access to the Open Innovation programme. This is currently open to businesses in the Enterprise M3, Coast to Capital and Thames Valley Berkshire areas (as well as some LEP areas beyond the South), but could be extended • expansion of the 5GIC's Small Enterprise Tech membership, which offers SMEs the opportunity to collaborate with larger corporates and to participate in 5GIC research
What are the links to current policy and what are the existing gaps in provision?	There is strong strategic support for the 5GIC, which has received substantial Government and industry investment. More generally, the UK's *5G Strategy* states that Government *"expects to build on existing projects through the 5G testbeds.. and will work with the private sector to prove where and how 5G can be commercialised"*[175]. It also highlights the value of a 'hub and spoke' approach to publicly-backed R&D infrastructure, consistent with the development of the 5GIC.
What is the potential scope of the project?	The project is focused on the Innovation South area, expanding from the 5GIC's central presence at Guildford. Potentially, it could be scaled beyond the Innovation South area.
3. Economic case	
What are the anticipated benefits and risks?	Anticipated benefits include: • increased access by SMEs in the South to collaboration with the 5GIC and larger businesses to develop 5G applications • wider dissemination of 5G research • increased prospects for commercialisation ahead of international competition • over time, increased demand for 5G infrastructure Possible risks include: • unproven commercial demand

[175] HM Treasury/ DCMS (2017), *Next Generation Mobile Technologies: A 5G Strategy for the UK*, p. 35

What are the likely costs of the project?	To be determined. Currently, £5 million is committed from the Enterprise M3 LEP Local Growth Fund allocation to develop the 5GIC locally. Potentially, this could be matched to facilitate wider roll out across the region, supported by income from business members.
Commercial case	
Can the project be delivered? Is it viable?	Yes. The project currently exists and has a governance structure. The ability to extend to demonstrator sites beyond the core has already been proven via the Basingstoke facility.
4. Financial case	
Is the required funding available?	Funding is already available for the expansion of the 5GIC offer within the Enterprise M3 LEP area. Beyond that, funding is not allocated, although the 5GIC has been successful in securing significant private investment.
5. Management case	
How will the project be managed? Is there sufficient capacity?	Via the existing 5GIC management structure, with the collaboration of LEPs and other partners, and coordinated via the Innovation South consortium.

Opportunity 5: Advanced skills in digital technologies

1. Project outline	
Brief summary of the project	This project aims to **raise the profile** of digital enabling technologies in creating wealth, employment and business growth and **drive an increase in the long-term supply of skills**. Access to a skilled workforce is one of the South's strengths. However, the workforce is ageing and businesses report a strong reliance on international recruitment. More generally, there is a lack of awareness of the career opportunities available making use of digital technology. This project will: • inspire the workforce of the future to seek new opportunities in digital enabling technologies. This will involve building stronger and better coordinated relationships between businesses (both SMEs and corporates) and schools and colleges. It will also involve raising awareness among the public more generally, recognising the role that parents and others have in shaping career choices. Major events in the South (such as the Farnborough Airshow and Goodwood Festival of Speed) already showcase the South's potential, and more can be done to build on these with business support • provide a clearer skills evidence base which can be used by industry bodies, universities and further education • work with business (both SMEs and larger firms) to help aggregate demand for advanced skills. This could involve the development of a brokerage service, linking SMEs with new entrants to industry from the region's universities and further education colleges
Who are the key partners?	Partners will include • businesses and industry trade bodies (such as the EEF) • universities and Further Education Colleges • skills providers and funding bodies
2. Strategic case	
What problem are you trying to solve – what is the rationale for intervention?	During the Science and Innovation Audit, businesses frequently commented on an imbalance between skills demand and supply: despite generally good workforce skills levels (and access to skills being frequently cited as a strength), several employers, especially in the advanced engineering and digital sectors, reported difficulty in accessing the skills that they need.

	This issue is frequently reported by businesses in most sectors. However, there are three particular challenges: • first, **the skills required and the career opportunities available, are complex and often poorly understood**, both by entrants to the labour market and by those with influence on choices (parents, teachers, careers advisors, etc.). Perceptions of occupations are frequently at significant variance with the reality. Whilst career paths into large corporates is well understood, the South is experiencing significant growth in the number of SMEs, which require a diverse and less well understood skills base. • second, while the South (generally) attracts skilled people, it is also a place where **competition for skills is strong**. Easy access to the London labour market contributes to this and The relatively high cost of living in the South potentially discourages new entrants to the labour market • third, **recruitment difficulties are not always the same as 'skills gaps'**. Some highly specialised occupations may only be reasonably sourced in a global market; some recruitment difficulties may reflect pay gaps between different types of job, rather than skills shortages *per se*. Understanding the detailed nature of the challenge is beyond the scope of the SIA, although it is likely that recruitment difficulties reflect a combination of factors In addition, the uncertainties associate with the process of Brexit are creating a particular need to secure a stronger pipeline in relation to the supply of highly skilled people.
What are the links to current policy and what are the existing gaps in provision?	Support for developing STEM skills has been a consistent feature of Government policy for many years, and was recently reinforced within the Industrial Strategy Green Paper. This project does not attempt to fund or deliver new provision, given the range of initiatives that already exist. However, there are gaps in articulating the opportunities that are available (which could best be filled by employers) and in demonstrating demand for skills in a way that providers can respond to.
What is the potential scope of the project?	The project is focused on the Innovation South area. This geography is large enough to encompass a significant number of major institutions and businesses, but is small enough to allow for local collaboration and the identification of issues of common concern. However, it could be scaled, or rolled out by LEP area if required, and initially, a brokerage service would need to be operated on a pilot basis.

3. Economic case	
What are the anticipated benefits and risks?	Anticipated benefits are likely to be long-term and indirect, and include: • greater level of understanding of opportunities arising from digital enabling technologies among entrants to the labour market, providers and intermediaries • better understanding of the nature of and reasons for skills gaps in areas requiring digital skills • in the long term, an improved supply of commercially-relevant skills • creation of a business-led educational eco-system which feeds training and development opportunities with real-world experience and requirements Possible risks include: • lack of impact: the skills landscape is complex and there are multiple initiatives at national and local level to address reported shortfalls. Any intervention will need to be carefully targeted to make a difference • lack of employer interest and involvement
What are the likely costs of the project?	To be determined, and largely based around the costs of a campaign focused on promoting sector opportunities
4. Commercial case	
Can the project be delivered? Is it viable?	Yes. Initially, it is suggested that the project is developed within a single LEP area, so that it can be subsequently rolled out more widely.
5. Financial case	
Is the required funding available?	At this stage, there is no funding identified. However, the scheme could be developed to secure match funding from employers and industry bodies, as the key beneficiaries.
6. Management case	
How will the project be managed? Is there sufficient capacity?	While the project may be overseen by the Innovation South consortium via the Knowledge to Market Accelerator (Opportunity 1), it is likely that delivery will take place via an industry body (or consortium of industry bodies). To develop the right management structure, it would be helpful in the first instance to identify a

	couple of pilot initiatives (for example, with a small number of SMEs relevant to the target market).

Annex B: HOW THE SIA WAS DEVELOPED

Introduction

B.1 This annex explains how the Innovation South Science and Innovation Audit was developed. summarises the policy background to the preparation of SIAs and the Government guidance that was followed and sets out the steps that were taken to gather data and other evidence during its preparation.

Science and Innovation Audits: Background

B.2 Science and Innovation Audits were launched by BEIS to help to "identify and validate where existing and growing research excellence is coupled with emerging innovation strength"[176]. They are not intended to be exhaustive compilations of all science and innovation activity in a region; rather they are intended to test the hypotheses that each SIA consortium proposed as part of their expression of interest.

B.3 Each SIA therefore has a different focus, depending on the hypothesis it is testing and the nature of the region it covers. However, all SIAs in the second wave (including Innovation South) were developed to common guidance and a common timetable. The guidance specified the structure and approximate length of the report and recommended data that could be used.

Methodology

B.4 Development of the Science and Innovation Audit took place over five months from February 2017. It was overseen by a Strategic Steering Group, which consisted of business (both SME and corporate), university and local enterprise partnership representatives and which met monthly. The Steering Group was supported by a wider Advisory Group.

B.5 Preparation of the SIA involved:

- **Analysis of core data,** provided by Technopolis, the national contractors to BEIS. Technopolis prepared a core data report in January 2017, which included standard economic and demographic information, REF output data, details of research active organisations (derived from Gateway to Research) and participation in FP7 and Horizon 2020.

  This was supplemented with supplementary analysis commissioned from Technopolis of research strengths in relation to the key themes of the SIA. SQW carried out further analysis of REF data and Innovate UK grants.

- An **open call for evidence**. Universities, LEPs, businesses and other partners were encouraged to submit evidence of innovation assets and activities: in total, we received around 170 separate pieces of evidence from a wide spread of partners across the region

- A **series of five stakeholder workshops**. One of these focused on the South's strengths in digital enabling technologies; the others focused on the SIA's four sector themes. Around 70 people attended the workshops.

- Nine in-depth **case study interviews**, examining the growth of individual companies and institutions.

[176]Technopolis (2016), SIAs: Guidance for Wave 2 Consortia, p.1

- A wider **review of the literature**, including the LEPs' strategic economic plans and area and sector focused reports. This included a 'horizon-scanning' review of global trends within each of the SIA's themes, drawing on national and international research.

B.6 These informed the Audit and supported the analysis of gaps and opportunities in the concluding section. In addition, a 'long-list' of potential interventions was prepared, drawing on the evidence, which the Strategic Steering Group subsequently reviewed and prioritised.

Annex C: WORKSHOP REPORTS

Background

C.1 To inform the development of the SIA, a series of five workshops were held in March 2017. These had an attendance of 70 stakeholders from business, business representative and support organisations, universities and research institutions. Each workshop was independently facilitated by SQW, and took the form of a discussion focused on identifying assets and strengths as they apply to digital enabling technologies, future opportunities and the actions that could take place to help to realise them. Stakeholders attending each workshop were also asked to complete two short proformas, setting out their individual perceptions of the region's science and innovation strengths and opportunities.

C.2 One of the workshops brought together experts with a deep technical understanding of the digital enabling technologies on which the SIA is focused (quantum, photonics, cyber security and big data analytics). The other four focused on digital enabling technologies as they relate to the study's four broad industry sectors:

Innovation South SIA workshops	
Workshop 1: Connected Digital	Brighton, 1 March
Workshop 2: Digital Enabling Technologies	Guildford, 7 March
Workshop 3: Advanced Engineering	Reading, 13 March
Workshop 4: Marine and Maritime	Southampton, 15 March
Workshop 5: Bioscience	Crawley, 21 March

C.3 This annex contains the notes of each of the workshops, plus a summary of the proforma material submitted by stakeholders. *While the notes provide an overview of the points raised and themes discussed, they are not formal minutes. Nor were the workshops necessarily attended by a representative sample of stakeholders: some geographies and institutions were better represented than others.* However, they did bring together a range of expertise and insight which has informed the final report.

Key themes

C.4 Some common themes that emerged from the five workshops include:

- **The cross-sectoral impact of digital enabling technologies is critical.** Although four of the five workshops were focused on one of Innovation South's key sector themes, all identified cross-sector links (for example, in the development of autonomous systems). This reinforces the focus of the SIA on regional strengths in the technologies themselves and their potential application, rather than on individual sectors.
- **Some key centres of research excellence were highlighted** several times. These included university-based facilities, such as the 5G Innovation Centre at Surrey, the Satellite Applications Centre at Portsmouth and the National Oceanography Centre at Southampton, as well as key strengths (such as cyber security at Royal Holloway and photonics at Southampton). The South's non-university research base was also

highlighted, for example at Pirbright, the National Physical Laboratory and the Animal and Plant Health Agency at Weybridge.

- **Key clusters of activity** that were identified included computer games (particularly around Guildford, as well as Brighton and Bournemouth); defence and aerospace engineering in the M3 corridor around Farnborough and Basingstoke, as well as on the Solent; and IT in the Thames Valley.
- However, **the diversity of the South's economy was repeatedly highlighted as a strength**, with the absence of any one dominant sector (or centre) cited as a source of resilience. This diverse economy was also considered to be successful in generating a strong skills base.
- **Proximity to London was considered to be an important part of the wider economic picture.** Although London's impact is 'double edged' (it both generates a market and sucks in talent), it was considered to be positive on balance. Access to London's infrastructure, talent pool and investment market was felt to be an important part of the South's offer.
- **Major firms play an important role.** This particularly emerged in relation to defence and aerospace (QinetiQ, BAE, GKN, Airbus, etc.) and the 'connected digital' sector (where the stock of major telecoms and IT firms in the Thames Valley were seen as important both as generating the talent pool and contributing – for example via their support for the 5G Innovation Centre – to the local research stock).
- However, **business networks were generally seen as weaker**, perhaps reflecting the diversity of the business base and the lack of a dominant city in the geography of Innovation South. The need to develop stronger networks across businesses and the universities was frequently highlighted, although it was noted that establishing successful networks is often quite challenging.

Workshop 1: Connected Digital

To inform the development of the Innovation South Science and Innovation Audit, an expert workshop was held on **1 March 2017 at the University of Brighton**. This brought together 20 stakeholders with expertise in the connected digital sector to consider:

- the South's **strengths and assets** in the application of digital enabling technologies to the connected digital sector
- key **future opportunities**, and the actions that will need to be taken to realise them

This note summarises the key points emerging from the discussion. Stakeholders were also asked to contribute further views via a short proforma: a summary of responses is attached at Appendix 1.1. A full list of attendees follows at Appendix 1.2.

Strengths and assets

Strengths were particularly highlighted in:

- **Gaming** and the technologies associated with it, especially around Guildford and the 'M3 Games Corridor'
- **Artificial intelligence**, robotics and connected/ autonomous vehicles
- **Big data analytics**, especially associated with the University of Reading
- **Creative technology** and the links between connected digital industries and creative design
- **Cyber security**, associated with strong links to GCHQ as well as with the financial sector, which has a significant presence in the region itself (for example in Bournemouth)
- **Fintech**, for example linked with American Express at Brighton and West Sussex

However, weaknesses and challenges were highlighted in:

- A lack of **test facilities** for autonomous vehicles and a lack of **major vendors** of IT equipment in the South
- **Support for SMEs**, both in securing finance on the right terms to bridge the 'valley of death' and in finding easy and coordinated access to business support
- **Skills mismatches**, including an under-exploitation in some cases of the skills that are available in the South.

Opportunities… and actions

- There is an opportunity for **universities to work more closely together**. It was noted that current collaboration works well in supporting students, but is less effective in supporting innovation. The idea of promoting **'spin-ins'** – described as active mechanisms to encourage and enable businesses to be supported by universities – was highlighted. It was suggested that the requirements of the REF could potentially help to drive this).
- Linked with this, more should be done to break down research and institutional silos to create **clusters of university/ business interaction** (building on some of the positive experience highlighted in the first part of the meeting). For example, building links

between tech businesses and customers in the care sector could sharpen the focus on innovation. As part of this, it was suggested that more should be done to **understand the supply/ value chain** and the barriers to making it work effectively.

- The suggestion of a **Catapult** in the region was raised, perhaps focused on autonomous systems.
- It was noted that there are strong links between **tech/ digital** and **art and design**, and that these could be exploited further, given that both are areas in which the South has key strengths. Particularly with regard to the gaming sector, it was suggested that universities should be more open minded - *"less stuck up"* – about the opportunities that are available.
- Regarding barriers and challenges, **skills challenges** were particularly noted, as were transport/ congestion constraints
- Finally, it was noted that the South needs to be proactive given the Government's general focus (at least in terms of explicit regional policy) on the Northern Powerhouse. In particular, it will be important for partners in the South to identify solutions that can be delivered by institutions themselves, within existing local resources.
- A request was made at the end of the workshop for any further evidence that partners may wish to submit, as well as for any specific case studies.

SQW

13 March 2017

Appendix 1.1: Summary of proforma contributions

Table 1-1: Strengths and assets

Research centres	Firms	Networks and clusters	Business environment
5G Innovation Centre at the University of Surrey	BAE Systems, Lockheed Martin, GKN	M3 Games Corridor/ computer games development at Guildford	Diverse culture for creativity and innovation
Centre for Robotics at University of Surrey	Arqiva	Tech cluster at Croydon	Active early stage investor community
National Physical Laboratory	Large IT firms (e.g. Oracle, Amex)	Creative digital clusters at Brighton and Guildford	Skilled graduates/ skilled workforce
Orthopaedic Research Institute, Bournemouth		Digital business acceleration hubs at Basingstoke, Guildford, Farnborough	Links between creative industries, design and digital
Brighton Digital Catapult		SETsquared	Proximity to London
Vectronics Research Group, Brighton		Connect TVT, linking Thames Valley tech businesses	Scale and diversity of the sector
Surrey Satellite Centre		Wired Sussex	International connectivity
Future Photonics Group, Southampton			
South Coast Centre of Excellence in Satellite Applications, Portsmouth			
University of Surrey Cyber Security Research Group			

Research centres	Firms	Networks and clusters	Business environment
National Oceanography Centre, Southampton			
South Coast Centre of Excellence in Satellite Applications, Portsmouth			

Source: Proformas completed by workshop participants

Table 1-2: Big opportunities: Ideas for…

Sectors/ technologies	Networks/ communications	Centres of excellence/ major projects
Fintech	Networks of collaboration linking business and HE	Connected Vehicle Test Centre
Digital health and social care	Stronger ecosystems	Regional Digital Manufacturing Innovation Hub
Media and computer games	Relationships between corporates, SMEs and universities	Grow Digital Catapult Centre at Brighton
Gamification	Supply chain development	Testing facilities for digital health
Leisure and entertainment sector	Supporting the growth of university 'spin ins'	More testing facilities at central locations
Medtech	Open platform to showcase innovation	

Source: Proformas completed by workshop participants

:

What needs to happen…?

- Eliminate the culture of competition between the universities in the region
- Collaborate more
- Improve university-business links
- Identify where we should be focused
- Invest in facilitation and networking
- Improve the skills base
- Reduce contract-based working and risk aversion in university-business partnerships
- Focus on commercialisation

Appendix 1.2: Attendees

Stevie Seccombe	American Express
Jaime Lee-Choon	American Express
Jennifer Wells	University of Brighton
Eduardo Hernandez	University of Sussex
Gary Wills	University of Southampton
Colin Hayhurst	University of Sussex
Gary Hellen	Consultant (on behalf of University of Surrey)
Malcolm Parry	Surrey Research Park
Peter Fussey	University of Sussex
Dave Cooper	University of Chichester
Chris Lord	University of Southampton
Ann Swift	University of Portsmouth
Rhys Lewis	National Physical Laboratory
Maziar Nekovee	University of Sussex
Phil Jones	Wired Sussex
Thomas Nowotny	University of Sussex
Ruth Spencer	Bournemouth Borough Council
Frauke Behrendt	University of Brighton
Paul Nightingale	University of Sussex

Workshop 2: Digital enabling technologies

Introduction

To inform the development of the Innovation South Science and Innovation Audit, an expert workshop was held on 7 March 2017 at the 5G Innovation Centre, University of Surrey. This brought together 14 stakeholders with expertise in digital enabling technologies to consider:

- the South's **strengths and assets** in digital enabling technologies as they apply to the SIA's sector themes of advanced engineering, connected digital, marine and maritime and bioscience
- key **future opportunities**, and the actions that will need to be taken to realise them

This note summarises the key points emerging from the discussion. Stakeholders were also asked to contribute further views via a short proforma: a summary of responses is attached at Annex 2.1. A full list of attendees follows at Annex 2.2.

Strengths and assets

- The **5G Innovation Centre** (5GIC) was highlighted as a key asset, and as an example of the way in which government, industry and academic expertise had come together to invest in research and development. In particular, it was noted that a number of major industry providers (such as Telefonica/ O2 and Fujitsu, based in the Innovation South area), had provided some of the early investment in the Centre, which is the UK's largest academic research centre focused on next-generation telecoms.

  The presence of major industry players within the Innovation South geography (particularly in the Thames Valley) <u>and</u> the research excellence at the University of Surrey was important in explaining the origins of 5GIC and is unique to Innovation South – suggesting distinctive opportunities to bring together major businesses and academic research. The SIA report will need to reflect on these.

  It was also noted that the 5GIC had been successful in developing a wider network linked with local SMEs through its membership model and its business incubation centre in Basingstoke. The establishment of the 5GIC had happened relatively quickly, reflecting both partner commitment and the speed with which the technology is developing.

- More generally, strengths were highlighted in the **ability of SMEs to receive support from the university sector**, with a spin-out from the University of Southampton particularly highlighted as a potential case study for the Audit.
- The **defence sector** was noted as a key driver of innovation, with a cluster of major defence businesses (such as Lockheed Martin, Boeing, BAE Systems and Dstl) with a significant presence in the region, as well as Government facilities such as Porton Down and the National Security Centre at Basingstoke. The defence sector is important in bringing a diverse range of technologies together.
- Within the South, local **clusters of major technology companies** were noted. In particular, the presence of Fujitsu, Siemens Nixdorf, Oracle and Microsoft in the Reading/ Bracknell area was highlighted as of national significance.
- While the South is not a major **automotive** manufacturing centre, it was noted as a 'centre of excellence' for automotive technology, particularly in connected and

autonomous vehicles, and there could be opportunities for collaboration with the Midlands manufacturing base.

- Strengths in **photonics** included research centres at Sussex and Southampton and an established network across the region of firms developing applications in areas such as medical sensing.
- **Aerospace** is also a key strength, again partly linked with the defence sector. Airbus's presence at Portsmouth and Guildford was noted, as was the region's ability to offer both defence and terrestrial capabilities.
- In **quantum technologies**, the role of the National Physical Laboratory in setting standards which could help to drive innovation was noted as a key asset for the region.
- Importantly, it was noted that the region has been able to **sustain innovation** over the long term. Some of the area's strengths are long-standing: for example, Southampton's capabilities in photonics go back to the early 1960s, and the South's strengths in big data analytics can be traced to IBM's early investment in data storage technologies. The region has been successful in building on this over time, and this was felt to be a key strength.
- Taihai Chen explained how he had set up a small firm, with links to the University of Southampton and with a virtual presence at the 5GIC. In describing the firm's formation, he pointed to the significance of organisations like SETsquared. He agreed that the story of his firm's formation and growth could be a case study.

Opportunities… and actions

- In **quantum technologies**, there are opportunities to build the supply chain. It was suggested that specific SMEs could be identified, providing potential case studies for the Audit. Peter Smith agreed to provide contact details
- Similar supply chain opportunities are available in **photonics**, although SME links with photonics are better developed (because the technology is more mature).
- In relation to photonics, the point was made that there are major inward investment enquiries because of the South's unique mix of locational assets and technological/science-based expertise and resources. This in itself signals something that is special on a global stage.
- There are opportunities to **integrate terrestrial and space activities**. Specifically, the potential link between the South's space capabilities and the 5GIC is possibly globally unique.
- There are opportunities to break down sectoral and technology barriers, as evidenced by the development of animal health opportunities at University of Surrey.
- It was suggested that the South could be more joined up in **articulating skills needs, for example in the cyber security sector** (a comparison was drawn with the success of the utility companies in supporting the establishment of the Power Academy)
- A challenge was noted in winning **'trust in data'.** The National Physical Laboratory has a key role in helping to ensure that quality and trust through standards leads to wider adoption and development of technology.

Continued **investment in SME growth** is important. In particular, there is a need for Government support for early stage development (for example, via Innovate UK).A request was made at the end of the workshop for any further evidence that partners may wish to submit, as well as for any specific case studies.

SQW

13 March 2017

Appendix 2.1: Summary of proforma contributions

Table 2-1: Strengths and assets

Research centres	Firms	Networks and clusters	Business environment
Photonics at Southampton	IBM at Hursley	Clusters at Farnborough/ Fleet and Basingstoke	Proximity to customers, transport links etc
GCHQ Centre for Cyber Security, Southampton	Major mobile operators based in region	Emerging clusters at Whitehill and Bordon	Skills and strong universities
Cybersecurity/ cryptography at Royal Holloway	Airbus	Commercial cluster in photonics	Economic scale
Portsmouth Satellite Applications Centre	Cisco	Marine and maritime	Connectivity to London
National Physical Laboratory	Space technology providers, e.g. Spur Electronic	Southampton Science Park	Established customers and co-investors
5G Innovation Centre, Guildford	Financial sector (e.g. JP Morgan)	SETsquared	Good quality of life
	Rolls-Royce		
	Northrop Grumman		
	Lloyds Register		
	Defence sector (e.g. Dstl, QinetiQ)		

Source: Proformas completed by workshop participants

Table 2-2: Big opportunities: Ideas for…

Sectors/ technologies	Networks/ communications	Centres of excellence/ major projects
'Connecting' the technologies	Inward investment activity	Build on the 5GIC

Sectors/ technologies	Networks/ communications	Centres of excellence/ major projects
Collaboration with mobile operators to exploit 5G	Supply chain development	Testbeds/ living labs, etc
Connected vehicles/ AI	Developing the technology ecosystem	Incubator facilities for start-ups
Integrating terrestrial and space capabilities	Better alignment across technology, business and commercialisation	
Quantum-enabled military applications	New equity arrangements between universities and start-ups	
Ports and logistics	Greater cross-sector networking and open innovation	
Rail and connected digital		
Investment in 5G		
Wearable medical technology		
Autonomous vehicles		

Source: Proformas completed by workshop participants

What needs to happen…?

- Improved broadband
- Better infrastructure – skills, transport, housing
- Reduced red tape
- Legislation and standardisation; agreement on technical standards
- Build on the model established at 5GIC to support other areas
- Collaboration between industry and universities
- Proof of concept support
- Access to bridging finance

Appendix 2.2: Attendees

Mike Short (Chair)	Telefonica Europe and Visiting Professor, University of Surrey
Adrian Blizzard	Former Business Manager (Enterprise), Telefonica
Don Spalinger	Research & Innovation Services, University of Southampton & Co-Founder, SPI Lasers
Paul Hogg	Vice Principal and Dean of Science, Royal Holloway University of London
Chris Ward	Head of Space R&D UK, Airbus Defence & Space
Mel Redding	Director, JuMelia Ltd and Enterprise M3 Growth Champion, former SERCO Defence, Space, Security
Gary Hellen	Innovation Grant consultant working for University of Surrey
Sundeep Bhandari	Strategic BD Manager – Digital, National Physical Laboratory
Taihai Chen	Director, AccelerComm (semiconductor solutions for 4.5G and 5G telecoms)
John Newton	Head of Strategy, Public Sector, Fujitsu
Alan Brown	Head of the Department of Digital Economy, Surrey Business School
Peter Smith	Professor of Optoelectronics, Optoelectronics Research Centre, University of Southampton
Tom Carr	Business Development Manager, Optoelectronics Research Centre, University of Southampton
Brian Watson	Enterprise M3 Growth Champion, SME Growth/M&A consultant with particular focus on autonomous vehicles

Workshop 3: Advanced manufacturing

To inform the development of the Innovation South Science and Innovation Audit, an expert workshop was held on 13 March 2017 at the University of Reading. This brought together five stakeholders with expertise in advanced engineering to consider:

- the South's **strengths and assets** in the application of digital enabling technologies to the advanced engineering sector
- key **future opportunities**, and the actions that will need to be taken to realise them

This note summarises the key points emerging from the discussion. Stakeholders were also asked to contribute further views via a short proforma: a summary of responses is attached at Annex 3.1. A full list of attendees follows at Annex 3.2.

Strengths and assets

Research strengths were highlighted at the **University of Southampton** (particularly in photonics and in advanced engineering generally) and at the **University of Reading** (in robotics and food science). Examples were also given of collaboration between industry and academia (for example, through the creation of the Impactech Hub at Southampton, linked with the National Microelectronics Institute).

However, business-university links extend beyond the Innovation South geography. For example, a business leader highlighted the collaborations between his firm and universities in Leeds and Sheffield, based on the expertise within those institutions.

The **broader economic strengths** of the region were also discussed. These included the **concentration of major IT companies** (such as Microsoft, Oracle and Fujitsu) in the Thames Valley. These were described as important in developing a large pool of skilled workers, which acts as a draw for further business investment. More generally, the region was described as having a **'market-led'** and **'diverse'** economy, without dependence on a limited number of sectors, making it more resilient and responsive to new opportunities.

Proximity to **London** was seen as a key strength, in relation to *connectivity* (access to airports), *finance* (access to London-based investors) and *skills* (in particular the strong pool of people with management skills who are resident in the South, linked with the London market). These factors help to make the South an attractive location for medium-sized firms.

London is sometimes seen as a major draw for recent graduates, limiting the talent available locally. However, it was noted that **the advanced engineering sector in the South remains attractive to graduates** because of the quality of some of the major employers and the inherently interesting work that is available.

Set against these strengths, the following challenges were highlighted:

- **Networks are seen as relatively weak**, perhaps reflecting the diversity of the economy and the fact that there is no single focal point of activity. In particular, it was noted that there are limited opportunities to link (and provide support to) mid-sized companies, even though these are vital to wealth creation. The BizUnited network in Reading and the Thames Valley was cited as an exception to this, with potential to grow elsewhere in the region. It was also suggested that supply chains are poorly linked within the region, and more could be done, involving a stronger leadership role for major firms.

- **The advanced engineering sector in the South is seen as less visible** than areas such as the North West, despite its strengths in areas such as aerospace and defence. It was noted that this is reflected in relatively limited national funding and the lack of a strong regional brand identity
- **The wider public understanding of the significance of 'embedded software' is limited**. This is a general issue, rather than one that is specific to the South - but it does present a risk to developing talent.
- **Support to growing firms – in particular, access to finance to bridge the 'valley of death' – is poorly coordinated.** This was cited as a national issue (for example, the absence of a UK equivalent to the German KfW was highlighted). The willingness of Government to invest in capital infrastructure, rather than in (revenue) support to develop capabilities and networks was also noted.

Opportunities… and actions

- The application of digital enabling technologies presents a great opportunity for the advanced engineering sector. It was noted that *"the future of the country is in knowing, applying and analysing science".* However, while the South has strengths in areas such as autonomous vehicles and robotics, it was considered important to **make opportunities within the sector** more visible to the public and to Government.
- Developing a **better-integrated network** was seen as important. It was suggested that major firms such as QinetiQ could take a leading role in supporting the growth of businesses within the supply chain, perhaps leading to a sort of large specialist 'growth hub' focused on the application of digital enabling technologies. To support this, it was suggested that a more comprehensive 'map' of supply chain opportunities would be helpful. Potentially, this could be initiated in the South, but then be applied nationally, perhaps with a strong role for Innovate UK – although it would require the commitment of further resources.
- It was also noted that **sector-specific approaches are increasingly redundant**, given the cross-sectoral impacts of technology and the relevance of the use and management of data to all aspects of the economy.
- A request was made at the end of the workshop for any further evidence that partners may wish to submit, as well as for any specific case studies.

SQW

24 March 2017

Appendix 3.1: Summary of proforma contributions

Table 3-1: Strengths and assets

Research centres	Firms	Networks and clusters	Business environment
Robotics at University of Reading	QinetiQ	Aerospace/ defence at Farnborough and South Coast	Diversity of technologies and firms
Computing and photonics at Southampton	Lockheed Martin	Space industries	Skilled graduates
	Automotive (McLaren, Ricardo, Rolls-Royce)	Strong aerospace partnerships	Research expertise
		Satellite engineering (Surrey/ M3)	
		Virtual technology cluster linked with Lockheed Martin	

Source: Proformas completed by workshop participants

Table 3-2: Big opportunities: Ideas for…

Sectors/ technologies	Networks/ communications	Centres of excellence/ major projects
Renewable energy	Links between sectors (e.g. IT, health, etc.)	
Internet of things	Support for spinouts and SMEs	
Remote monitoring of processes	Collaboration	
Advanced telemetry		
Mobilising cross-technology applications		
Advanced data monitoring		

Source: Proformas completed by workshop participants

What needs to happen…?

- Seed funding
- Increased use of products linked with remote monitoring
- Building a brand for the South
- Mapping of industries and assets

Annex 2: Attendees

Chris Dodson	Torftech
Saarim Siddiqi	QinetiQ
Nigel Penn-Simkins	Independent entrepreneur
Roger Gardner	University of Southampton
Michael Butler	University of Southampton

Workshop 4: Marine and maritime

Introduction

To inform the development of the Innovation South Science and Innovation Audit, a workshop was held on 15th March 2017 at the National Oceanography Centre in Southampton. This brought together stakeholders with expertise in marine and maritime sectors to consider:

- the South's **strengths and assets** in the application of digital enabling technologies to the marine and maritime sector
- key **future opportunities**, and the actions that will need to be taken to realise them.

This note summarises the key points emerging from the discussion. Stakeholders were also asked to contribute further views via a short proforma: a summary of responses is attached at Appendix 4.1. A full list of attendees follows at Appendix 4.2.

Strengths and assets

- A whole series of strengths were identified in relation to the marine and maritime sectors; some are well established, others are emerging. For example, there are particular strengths relating to **sensors** in the context of marine and maritime sectors, and their application, particularly through **autonomous systems, minitiarisation and energy efficiency.** In these domains, the University of Southampton, QinetiQ and National Oceanography Centre are seen as world-leading.
- Across the piece, **there are two fundamentally important drivers** which are heading in the same general direction (towards unmanned vessels). These are **cost and safety**; both are critical and they are defining a "blue growth" agenda which presents major opportunities.
- In a related area, the links between **sensors, data capture and data transmission** were considered to be essential. Increasingly, sensors are gathering so much data that they are outstripping the capacity of users (i.e. people) to cope. The next stage in the process will be to make better judgements more quickly in terms of which data matter and which do not. *Are there opportunities here to define key projects and collaborations?*
- Already the use of data – gathered through sensors – is transforming key marine and maritime sectors, e.g. shipping and supply chain logistics. There are very strong links to **cyber security** – and **satellite connectivity** has big applications in the field of **marine connectivity**. In this context, the **Satellite Applications Catapult** – based at Harwell in Oxfordshire but with a presence in Portsmouth – needs to be seen as a key regional asset
- Although there are some major marine and maritime businesses in parts of Innovation South, links are often in place with non-local universities: **the big companies collaborate with universities from all over the UK and internationally**. In part this reflects the consequences of successive ownership changes (e.g. Marconi – EADS Astrium – Airbus, etc.)
- However the University of Southampton does have particular expertise in the domain of digital design and it is recognised in these terms

- More generally, the question was posed as to whether there was a "*pipeline of talent problem*" across the coastal area within the geography of Innovation South: is there a shortage of high calibre graduates who are prepared to work in the marine and maritime field?
- Marine engineering does not attract would-be entrepreneurs from among the undergraduate population – i.e. the entrepreneurial young people are much more interested in developing apps than embedded software. This does present a challenge [*noting that this point was also made in one of the other workshops*]
- In addition, businesses commented that universities can be extremely difficult to work with. Universities are too bureaucratic. For example, contracts take much too long to develop and involve far too many lawyers. Universities need to be vastly more "fleet of foot" to have a generally good relationship with firms in the marine and maritime sectors
- **Ben Ainslie Racing** is based at Portsmouth and a yacht is being developed for the Americas Cup. This is reaching out to a whole new constituency (and the parallels with Formula One in motorsport are significant). Does this potentially represent a game-changer for "marine and maritime" sectors (which tend to be seen as tired and unexciting)? Americas Cup racing might be much more attractive for young engineers, etc., (just as Formula One is seen as the pinnacle in automotive/motorsport). *[Note though that Ben Ainslie Racing has been renamed Land Rover BAR, reflecting a major sponsorship deal with JLR; and although it remains in Portsmouth, its website makes significant reference to Gaydon (JLR's main engineering centre in Warwickshire and to Warwick University)]*
- More generally, there ought to be more sailing/racing teams based in the South taking part in major events. These can be a route to significant innovation with consequential commercialisation opportunities. The South lacks sponsorship and other deals to make teams viable.
- It is important to recognise the scale of opportunity linked to the **leisure market**. This in turn highlights the importance of **environmental quality** and in this domain too, there are major opportunities in relation to **sensors**.
- There is nothing like ATI (Aerospace Technology Institute) in Marine and Maritime. Should there be?

Opportunities… and actions

- Are there potentially opportunities in relation to **International Offset Agreements**?
- Within the geography of Innovation South – and particularly on the south coast – there are the makings of a cluster focused on **marine autonomous platforms** and **sensors.** However this needs to be considered in more holistic terms, working from research into commercial growth (e.g. with better and stronger links to the National Oceanography Centre, etc., but also good provision of move-on space locally). The Solent "*potential*" can be contrasted with Plymouth which has "*got its act together*". Solent is seeking to collaborate with Plymouth (e.g. R&D linked to marine autonomous systems in Southampton, and testing in Plymouth)

- In the South, the marine and maritime sector is seen as diverse and fragmented, and it needs to develop a unifying theme. Should there be (something like) a Marine Digital Technology Institute, galvanising a strong set of providers using marine internet of things? Or perhaps a Catapult? Or something like ATI?
- Rather than "marine and maritime" (tired, old, dull) – what about "blue tech" – and what about the lessons from the San Diego cluster? (noting that there are other key international hubs in Norway, Singapore, Ireland, Korea, Japan, Sweden and Scotland) Given the blurring of sector boundaries, can marine data be made useful to other applications?
- There need to be some higher profile projects that communicate better with the general public. "Boaty McBoatface" is helping – as is Ben Ainslie Racing – but what else? In Plymouth, the Mayflower 400 is proving very effective
- Major shipbuilding is highly commoditised and the UK cannot compete on cost, but there are significant opportunities at the higher end…. Key growth opportunities exist in energy, surveillance, food and fisheries, and environment – and **digital security is imperative throughout (linking to digital enabling technologies)**
- "Green shipping" will be a key driver – is there something like "turquoise" or "aqua" futures, linking "green" with "blue"?
- There need to be better links between maritime services (e.g. finance, etc.) and technology. A marine and maritime cluster should provide better support for enterprise and entrepreneurship – and the scope to link better to the University of Southampton in particular is significant
- In addition, it is important to recognise that the marine and maritime supply chain is not only on the coast – there are major suppliers inland (and many general engineering firms have links to the marine and maritime sectors).

SQW

20th March 2017

Appendix 4.1: Summary of proforma contributions

Table 4-3: Strengths and assets

Research centres	Firms	Networks and clusters	Business environment
Portsmouth University Space Applications Centre	Port of Southampton	Composite ship/ boat building	Talent and skills
National Oceanography Centre	SAAB	Advanced engineering and ocean science activities	Russell Group universities
Satellite Applications Catapuly		'Silicon valley of maritime technology'	High levels of workforce retention
		Marine autonomous systems/ robotics	Prominence of boat show, maritime leisure etc
		Concentration of like-minded organisations	Large number of SMEs
		South Coast Marine Cluster	Strong industrial base
			Diverse capabilities
			Maritime heritage

Source: Proformas completed by workshop participants

Table 4-4: Big opportunities: Ideas for…

Sectors/ technologies	Networks/ communications	Centres of excellence/ major projects
Smaller/ cheaper/ faster/ safer	Greater work as a cluster/ address issue of diversity of the sector	Equivalent institution to Aerospace Technology Institute
Port logistics and operations	Stronger academic/ business networking	

Sectors/ technologies	Networks/ communications	Centres of excellence/ major projects
'E-manifest'/ National Single Window	Developing an entrepreneurial workforce	
Oil and gas operations		
Marine autonomous systems		
Information services		
Cyber security		

Source: Proformas completed by workshop participants

What needs to happen…?

- Greater Innovate UK funding
- Exploit value of Portsmouth Satellite Applications Centre
- Careers planning
- Improved sector/ regional image
- Greater capacity for pulling together key stakeholders
- More waterfront premises for firms to grow into

Appendix 4.2: Attendees

Andrew Basu McGowan	Knowledge Transfer Hub
Mark Spearing	Uni. Southampton
Richard Westgarth	Qinetiq
Simon Gerrard	Uni. Southampton
Don Spalinger	Uni. Southampton
Geraint West	Sonardyne
Jonathan Williams	Marine South East
Rachel Mills	Uni. Southampton
Seumas Kilpatrick	Saab Seaeye
Ralph Dodds	Atlas Elektronik
Iain Vincent	Planet Ocean
Michelle McClean	Hampshire County Council
Chris Ward	Airbus
Kevin Forshaw	National Oceanography Centre

Workshop 5: Bioscience

Introduction

To inform the development of the Innovation South Science and Innovation Audit, a workshop was held on 21st March 2017 in Three Bridges, Crawley. This brought together stakeholders with expertise in the bioscience sector to consider:

- the South's **strengths and assets** in the application of digital enabling technologies to bioscience
- key **future opportunities**, and the actions that will need to be taken to realise them.

This note summarises the key points emerging from the discussion. Stakeholders were also asked to contribute further views via a short proforma: a summary of responses is attached at Appendix 5.1. A full list of attendees follows at Appendix 5.2.

Strengths and assets

- Agrimetrics should be seen as a regional strength – there is significant research at the University of Reading and some major businesses in the M4 Corridor, notably Syngenta and Bayer. Thames Valley Science Park is also home to SMEs in the field.
- Molecular Warehouse at Surrey Technology Centre is an example of an innovative SME in the field. It is concerned with monitoring and remote testing, and with new apps for data capture
- Pirbright – with significant investment from BBSRC – and the Animal Plant and Health Agency (based at Weybridge) should be seen as major assets.
- Another strength – and perhaps an unrecognised one – derives from the amalgamation of veterinary practices. Some of these (e.g. one in Horsham) are pioneering approaches to the use of data in relation to animal health
- SEEDA completed a survey of health technologies in the South East – and it ought to be used. Although the data are now relatively old, not much is likely to have changed. The NHS/NICE badge is important, but sales growth has tended to be easier in New Zealand, Australia and Canada, partly because the NHS has been a challenging customer
- The South has great science – but in making it into a commercial opportunity, there is a need for Business Schools to be involved. In this context, SETsquared's interest in London is instructive – in London, raising the capital needed to cross the Valley of Death is easier
- In relation to the Valley of Death, NPL also has a role. It is establishing regional hubs – e.g. on the Surrey University Campus, with links to the 5GIC and to quantum technologies
- Data models are changing. Increasingly it is recognised that data have value – but who owns those data? Patients should own their own data – and they have analytical questions and interests that should feature more strongly
- In relation to the value chain – and issues around data security – the strengths and assets of Royal Holloway ought to be noted particularly

- The ethics and complexity of patient-related data are such that the value of animal data is increasing (i.e. it is much less complicated – the South's strengths in this context are perhaps notable
- Looking ahead, healthy ageing presents a huge opportunity – sensors, devices, biomarkers, etc. The imperative is to collect, store, protect and use data, and to provide feedback. This needs to be linked to the value chain and the strengths of the South need to be understood in this context
- West Sussex County Council has mapped medtech and pharma companies in the county and it was surprised by how many it found. Since its report was published in 2015, more businesses have been identified. Currently, there are around 150 locally. Does this point to the implicit strength and potential of the South?
- In the Solent, mapping was completed focusing on prosthetics, orthotics and higher education
- Another distinctive strength relates to the military legacy and organisations which are, more or less closely, allied to it – e.g. DSTL, PHE, etc.
- The role of the Ordnance Survey and Met Office should also be acknowledged – and the links to satellites at the University of Surrey are important
- The high level of interdisciplinary study in the universities of the South is important – Southampton and Surrey were both mentioned in this context
- There are also strengths in neurosciences and audiology – and in contact lenses (with some big companies in the area)

Opportunities… and actions

- There was a detailed discussion of possible opportunities, but they focused on *"integrating people and data to solve problems"*, and they included:
  - recognising fully the value of data – including in relation to the people who ultimately generate those data (e.g. patients)
  - developing testbeds where novel uses of data could be trialled. developing a system of "enablers" and platforms (which join up components that might be fragmented)
  - directing these trials to major societal challenges (where there will be market opportunity) – e.g. ageing and sleep
  - involving major businesses (like retailers) which are close to the population.
- More detailed points included the following:
  - several testbed projects are underway, but they could be more effectively joined up and scaled up
  - The ageing population is a substantial opportunity – although the "balance sheet" needs to be defined in better ways (i.e. the value of earnings that don't have to be forgone because remote care is possible for elderly relatives)
  - This all links to Internet of Things applications, which are potentially substantial

- There is world-leading expertise in sleep monitoring at the University of Surrey
- Brighton and Hove has a living lab, and Healthy New Towns projects are leading to innovation opportunities
- Sensors are likely to be crucial for healthcare, and the region has real strengths
- The "ecosystem" is huge and diffuse – including state-funded research, the private sector and patients/customers
- But the network is not strong – *people inherently believe in networks but they are hard to engineer.* Is there an opportunity for a new one focused on the ageing population and 5G?

SQW

24th March 2017

Appendix 5.1: Summary of proforma contributions

Table 5-5: Strengths and assets

Research centres	Firms	Networks and clusters	Business environment
Pirbright	Syngenta	Gatwick Diamond	Scale of commercial sector
Surrey Vet School	Bayer	West Sussex bioscience cluster	Prosperous population likely to engage in research
Brighton Digital Catapult	Zoetis	ASHNs	Strong e-commerce sector
University of Surrey – sleep research	IBM Hursley		Presence of major corporates
APHA	Blatchford		
NPL	Elekta		
Epigen Consortium	Johnson & Johnson		
Reading/ Rothamsted collaboration in agrimetrics			

Source: Proformas completed by workshop participants

Table 5-6: Big opportunities: Ideas for…

Sectors/ technologies	Networks/ communications	Centres of excellence/ major projects
Ageing population/ maintaining independence	Developing joined up data processing and influence pipelines	Developing 'living lab' projects at scale
Burns/ wound healing		
'The hospital of the future is the community'		
Orthopaedics and prosthetics		

Sectors/ technologies	Networks/ communications	Centres of excellence/ major projects
Quantitative imaging		
Real-time health monitoring		
Wearable technologies		

Source: Proformas completed by workshop participants

What needs to happen…?

- Co-ordination of key players
- Collation of multiple individual data sources
- Networking and appropriate partnerships
- Data fusion and security
- Access to finance to bridge the 'valley of death'
- Certification of digital tools
- Enhance collaboration between technologies and applications
- "Don't focus on the technology – the business is in the data"

Appendix 5.2: Attendees

Peter JS Smith	University of Southampton
Alexandra Mant	University of Southampton
Michael Adeogun	National Physical Laboratory
Dee O'Sullivan	PatientView
Joanna Holbrook	University of Southampton
Rob Kemsley	Syntropy Medica
Bhavik Patel	University of Brighton
Robert Berry	NHS
Don Spalinger	University of Southampton
Simon Cutler	University of Reading
Susannah Davidson	University of Brighton
Emma Laing	University of Surrey
Richard Curry	South East Health Technologies Alliance
Kathy Vuillaume	Enterprise M3
Rachaeln Merriman	West Sussex County Council
Andrew Basu-McGowan	Smart Specialisation Hub
Simon Archer	University of Surrey
Alasdair Cook	Surrey Vet School

Annex D: THE INNOVATION SOUTH CONSORTIUM

Strategic Steering Group Members

Chair: Prof. Mike Short, Vice President Public Affairs, Telefonica Europe

Matt Albans, Service Design Manager, BAE Systems

Carole Barron, Director of Innovation & Enterprise, University of Kent

Ross Burton, Stakeholder Engagement Manager, Smart Specialisation Hub

Lorna Carver/Rob Dunford, Director/Interim Director, Dorset LEP

Prof. Dave Cooper, Professor of Management and Economic Development, University of Chichester

Sarah Duckering, Director of Research and Innovation Services, University of Portsmouth

Kevin Forshaw, Associate Director, Enterprise and Research Impact, National Oceanography Centre

David Gillham, Director, Thames Valley Science Park

Prof. Paul Hogg, Vice Principal and Dean of Science, Royal Holloway University of London

Daryl Landeg, Chief Technologist, AWE

Sue Littlemore, Higher Education Project Manager, Enterprise M3 LEP

Hema Marshall, Head of Country Digitisation & Skills, Cisco UK

Colin McKinnon, CEO, Institute for Environmental Analytics

Prof. Paul Nightingale, Professor of Strategy, Science Policy Research Unit, University of Sussex

Mel Redding, Director, Jumelia Ltd.

Prof. Nick Reed, Academy Director, Transport Research Laboratory

Keith Robson, Chief Operating Officer, 5G Innovation Centre, University of Surrey

Iain Shepherd, Chair, Marine South East Ltd. & Chair, National Oceanography Centre Advisory Council

Prof. Peter J S Smith, Director, Institute for Life Sciences, University of Southampton

Prof. Mark Spearing, Vice President (Research and Enterprise), University of Southampton

Chris Ward, Head of Space R&D, Airbus UK

Advisory Group Members

Stuart Baker, Solent LEP

Carole Barron, University of Kent

Sue Baxter, University of Brighton

Malcolm Brabon, Coast to Capital LEP

Frances Campbell, Thames Valley Berkshire LEP

Carolyn Carr, West Sussex County Council

Lorna Carver/Rob Dunford, Dorset LEP

Dave Cooper, University of Chichester

Sarah Duckering, University of Portsmouth

David Fletcher, Hampshire County Council

Tony Greenwood, Royal Holloway

Eduardo Hernandez, University of Sussex

Paul Hogg, Royal Holloway

Emma Hunt, Arts University Bournemouth

Nigel Jump, University of Bournemouth

Catherine Lee, Southampton Solent University

Thalia Liebig, Greater Brighton Economic Board

Sue Littlemore, Higher Education Project Manager, Enterprise M3 LEP

Kevin Lloyd, Surrey County Council

Susan Matos, University of Reading

Malcolm Parry, Surrey Research Park

John Richardson, University of Winchester

Keith Robson, University of Surrey

Consortium Members

LEPs

Coast to Capital LEP

Dorset LEP

Enterprise M3 LEP

Kent and Medway Economic Partnership (part of the Federated South East LEP)

Solent LEP

Thames Valley Berkshire LEP

Universities

Arts University Bournemouth

Bournemouth University

University of Brighton

Canterbury Christ Church University

University of the Creative Arts

University of Chichester

University of Greenwich

University of Kent

University of Portsmouth

University of Reading

Royal Holloway, University of London

University of Southampton

Southampton Solent University

University of Surrey

University of Sussex

University of Winchester

Jo Simmons, East Sussex County Council

Don Spalinger, University of Southampton

Clare Wunderly, University for the Creative Arts

Research, Innovation and Incubation Institutes

Agrimetrics, Reading

Automotive Engineering Research Centre, Brighton

Biogateway, Kent

Canterbury Innovation Centre

Clinical Imaging Sciences Centre, Brighton

Centre for Computational Neuroscience and Robotics, Brighton

Digital Catapult Centre Brighton

Centre for Integrative Neuroscience and Neurodynamics and the Brain Embodiment Laboratory, Reading

Centre for Maritime Intelligent Systems, Portsmouth

National Oceanography Centre, Southampton

National Physical Laboratory, Teddington

Orthopaedic Research Institute, Bournemouth

Pirbright Institute, Woking

SETSquared, multiple locations

South Coast Centre of Excellence in Satellite Applications, Portsmouth

Sussex Innovation Centre, Brighton

Transport Research Laboratory, Wokingham

Businesses and Business Groups

ANGLE plc

AWE (Atomic Weapons Establishment)

Autonomous Surface Vehicles Ltd.

Dorset Engineering and Manufacturing Cluster

Business South

Carbon Limiting Technologies

Convert Energy

CRESS Systems

Deeson Group Ltd.

Diverse Interactive

Dryad Maritime

Earth-i

Ella's Kitchen

Field Seymour Parkes LLP

Gold-i Ltd.

Hampshire Chambers of Commerce and Future South Programme

He-Man Dual Controls

Hireserve

IDBS

Institute of Directors (Kent branch)

Indigo Loop

Kent Invicta Chamber of Commerce

The Manufacturing Engineering and Technology Alliance

MHI Vestas Offshore

MJ Allen Group

Optopod Ltd.

Qinetiq

Ricardo

Silicone South

Surrey Chambers of Commerce

Sussex Manufacturing Forum

Thames Gateway Kent Partnership

UKIE (UK Interactive Entertainment)

Valley Produce Ltd.

Wired Sussex

Local Authorities

Bournemouth Borough Council

East Sussex County Council

Hampshire County Council

Kent County Council

Surrey County Council

Tonbridge and Malling Council

West Sussex County Council

Royal Borough of Windsor and Maidenhead

Wokingham Borough Council

Inward Investment Organisations

Invest in Hampshire

Locate in Kent

Invest in Surrey

Strategic Area Partnerships

Greater Brighton Economic Board

Coastal West Sussex Partnership

Annex E: WORKING WITH OTHER SIA REGIONS

Maximising opportunities to combine our strengths with those in other parts of the UK is a key aspiration of the Innovation South Consortium. We have initiated contact with several other Consortia during the Science & Innovation Audit process and have identified a number of positive opportunities for potential collaboration which we would like to take forward:

- The "Quantum Supply Chain Initiative" identified in Innovation South's Audit has strong synergies with ambitions elsewhere in the country to place the UK at the forefront of developing quantum technologies through the QT Hub Network. This project will not only improve the supply chain for current research into quantum technologies, but will also develop the industrial capacity needed to support the production of the first quantum products once the technologies are market-ready. As well as the core importance of the supply chain, Innovation South contains key elements in the race to develop quantum computers – the recent publication of a blueprint for a trapped ion quantum computer led by the University of Sussex, including work by Google and Aarhus, provides an alternative architecture vying for leading spot in this key transformative breakthrough. Work in the Quintessence project from the University of Southampton leads on commercial exploitation, and builds on the geographical strengths of DSTL and NPL in the Innovation South region. Initial contact with Oxfordshire Transformative Technologies Alliance and Glasgow Economic Leadership, both of whom identify quantum technologies as a key pillar of their Audits, suggests there are promising, potential opportunities for future collaboration. Researchers throughout the country are engaged through the QT Hubs, and the key roles in these hubs will ensure strong coordination.
- The Oxfordshire region has significant strengths centred around the University of Oxford and several Public Sector Research Establishments, such as the Science and Technology Facilities Council, UK Atomic Energy Authority and Harwell including the Satellite Applications Catapult. Innovation South's strengths are more widely distributed across a larger geography, including a number of excellent universities, the Pirbright Institute and NPL's South Hub and also including a very large number of major industry partners and many diverse, and innovative SME clusters, including marine and coastal sectors. The two regions therefore offer very complementary environments: Oxfordshire providing a more intensely focussed research aspect and Innovation South providing more of a balanced and diverse portfolio between corporate R&D, academic and PSRE research and SME innovation across a much bigger economic region. One good example of this complementarity is the Space sector, where Oxfordshire's focus is downstream on satellite data whilst Innovation South's key strengths lie in world-class upstream satellite innovation from Airbus, Surrey Satellite Technologies Ltd., NPL and the Universities of Surrey and Southampton with complementary satellite data analytical capability from the University of Portsmouth.
- The University of Southampton will be a core partner in the new £103m Rosalind Franklin Institute, also based at Harwell, which will bring together UK strengths in physical sciences, engineering and life sciences to create a national centre of excellence in technology development and innovation to solve key challenges in

health and life sciences. The partnership includes the University of Oxford as well as universities from across the UK including Cambridge, Edinburgh, Manchester, Leeds, Birmingham, Imperial College, King's College London, and University College London.

- Innovation South and Glasgow Economic Leadership share outstanding expertise in photonics, and we would very much like to explore potential synergies in more depth, creating strong pull of technology through the outstanding University facilities in both regions.
- Informal engagement has been facilitated by South East LEP's direct interest in two Wave 2 Audits: whilst the area to the north of the Thames has been included in the East of England Audit, the area to the south is part of the Innovation South Wave 2 Audit. The SELEP region will benefit from a broader view on the science and innovation within other LEP regions as well as identifying opportunities to collaborate across borders. The universities will ultimately benefit from being part of a pan-region innovation system.
- Innovation South have engaged in discussions with Leeds City Region around the potential for a mutually supportive relationship on med tech, particularly how digital enabling technologies can drive innovation in areas of shared specialism between our two regions, such as orthopaedics.
- There has been dialogue between Innovation South and the Offshore Energy consortium about how our expertise in the application of digital enabling technologies in the marine & maritime industry might link to innovation in offshore energy.

Annex F: RESEARCH EXCELLENCE FRAMEWORK TABLES IN SIA SECTORS

Connected Digital:

Research Excellence Framework: Institutions ranked within the top 30 nationally

	Institution rank (of all UK institutions)	
Subject area	**Research power**	**Grade point average**
Communication, cultural and media studies; library and information management	Sussex (4) Bournemouth (5) Royal Holloway (25) Brighton (26)	Royal Holloway (9) Sussex (15) Bournemouth (17) Portsmouth (22) Brighton (25)
Computer science and informatics	Southampton (8) Kent (23) Royal Holloway (30	Southampton (16) Royal Holloway (24) Kent (28)

Source: Research Excellence Framework, 2014

Marine and Maritime:

Research Excellence Framework: Institutions ranked within the top 30 nationally

	Institution rank (of all UK institutions)	
Subject area	**Research power**	**Grade point average**
Earth systems and environmental sciences	Reading (3) Southampton (4) Royal Holloway (21) Portsmouth (24)	Southampton (4) Royal Holloway (9) Reading (14)
Geography, environmental studies and archaeology	Southampton (14) Bournemouth (23) Royal Holloway (24) Sussex (28) Reading (29)	Royal Holloway (2) Southampton (11) Reading (14) Sussex (18)

Aeronautical, mechanical, chemical and manufacturing engineering	Portsmouth (16) Greenwich (19) Brighton (21)	Greenwich (14) Brighton (17) Portsmouth (18
Chemistry	Southampton (8) Reading (28)	Southampton (12)
Biological sciences	Sussex (17) Southampton (26) Kent (29)	Sussex (10) Kent (23) Southampton (29)
Electrical and electronic engineering	Southampton (1) Surrey (2) Reading (23) Greenwich (27)	Southampton (6) Surrey (14) Reading (23)
General engineering	Southampton (1) Surrey (14)	Southampton (15) Surrey (25) Sussex (26)
Physics	Southampton (17) Surrey (24) Royal Holloway (27) Sussex (30)	Southampton (11) Surrey (21) Portsmouth (24) Kent (29)

Source: Research Excellence Framework, 2014

Bioscience:

Research Excellence Framework: Institutions ranked within the top 30 nationally

	Institution rank (of all UK institutions)	
Subject area	**Research power**	**Grade point average**
Clinical medicine	Southampton (13)	Southampton (28)
Biological sciences	Sussex (17) Southampton (26) Kent (29)	Sussex (10) Kent (23) Southampton (29) Portsmouth (30)

	Institution rank (of all UK institutions)	
Allied health professions, dentistry, nursing and pharmacy	Surrey (7) Southampton (24)	Southampton (3) Surrey (8) Brighton (27) Sussex (27)
Psychology, psychiatry and neuroscience	Sussex (13) Reading (15) Southampton (18) Kent (24) Royal Holloway (28)	Royal Holloway (6) Sussex (10) Southampton (22)
Public health, health services and primary care	Southampton (28)	Southampton (9)
Agriculture, veterinary and food science	Reading (4) Greenwich (17) Canterbury Christ Church (27)	Reading (6) Greenwich (23) Canterbury Christ Church (27)

Source: Research Excellence Framework, 2014

Advanced Engineering:

Research Excellence Framework, 2014: Institutions ranked within the top 30 nationally

	Institution rank (of all UK institutions)	
Subject area	**Research power**	**Grade point average**
Aeronautical, mechanical, chemical and manufacturing engineering	Portsmouth (16) Greenwich (19) Brighton (21)	Greenwich (14) Brighton (17) Portsmouth (18)
Chemistry	Southampton (8) Reading (28)	Southampton (12)
Electrical and electronic engineering, metallurgy and materials	Southampton (1) Surrey (2) Reading (23) Greenwich (27)	Southampton (6) Surrey (14) Reading (23)

General engineering	Southampton (1) Surrey (14)	Southampton (15) Surrey (25) Sussex (26)
Physics	Southampton (17) Surrey (24) Royal Holloway (27) Sussex (30)	Southampton (11) Surrey (21) Portsmouth (24) Kent (29)

Source: Research Excellence Framework, 2014