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What role does Government procurement play in manufacturing in the UK and internationally and how might this change in the future?

Future of Manufacturing Project: Evidence Paper 24

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What role does Government procurement play in manufacturing in the UK and internationally and how might this change in the future?

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Executive summary

This report, commissioned by the Government Office for Science, has the general aim of reviewing the available evidence concerning the impact and role of public sector procurement on UK manufacturing. Specifically the report addresses the following questions:

1. What is the current framework for Government procurement in the UK?
2. How does Government procurement directly and indirectly impact on manufacturing activities?
3. How do UK procurement frameworks compare to other competitor nation procurement in terms of supporting manufacturing?
4. In what ways could co-ordinated procurement (procurement that meets multiple Government departmental goals) catalyse and support UK Manufacturing?

Previous research has shown that public procurement can have an impact on societal outcomes (McCrudden, 2004; 2007) including innovation and manufacturing (Edler and Georghiou, 2007). However, public sector procurement is dominated by services rather than manufacturing expenditure; hence, the impact of procurement frameworks on manufacturing is limited. The impact of public procurement on manufacturing is also constrained by economic, legal and regulatory factors which are discussed in the report.

This review revealed five key approaches that can catalyse the impact of public procurement on the manufacturing sector in the UK. These are:

- 1. Procurement mentality / culture:** For public procurement to impact on UK manufacturing the culture needs to change from one purely focused on short term costs to one that takes a complete life-cycle or whole-life costing approach, including social and environmental considerations. This change can also involve a move from simply buying products towards the provision of complete solutions.
- 2. Procurement methods:** Alongside the cultural change, the methods used in procurement will need to change to enable the evaluation of broader and more complex objectives. This will require a re-thinking of supplier selection and evaluation practices as well as standards. This has implications for procurement skills and capabilities, since public sector organisations will need to be able to better articulate unmet needs, to move towards procuring functionality and outcomes and towards applying risk- and opportunity-based methods in procurement.
- 3. Inter-departmental strategies:** Inter-departmental strategies such as the Government Procurement Service and other approaches to coordinated procurement can help to deliver effective solutions to multi-faceted public policy challenges. However, a careful change management programme would be required to deal with resistance to collaboration across departments and local government.
- 4. Innovative procurement models:** Approaches such as Forward Commitment Procurement (FCP) and SBRI, can help catalyse innovation and support manufacturing SMEs. However, it should not be assumed that innovation alone will

have a major impact on large scale manufacturing, as economic conditions would need to be appropriate for mass production in the UK.

- 5. New business models:** A move towards a circular economy that reflects increasing pressures around material scarcity, would help to create a more sustainable and resilient economy. This will also support manufacturing sectors that can design closed-loop supply chains and that are able to re-use and recycle disposed materials on a regional or national basis.

The review also revealed that the impact that public procurement can have on UK manufacturing is not evenly spread across the different manufacturing sub-sectors. Key sectors including defence, healthcare, energy and environmental technologies are more likely to be stimulated by public spending. This is not only because these sectors are considered strategic, but also because public procurement tends to dominate spending in these areas.

In this review we intended to separate medium (2020) and long term trends (2050) in public sector procurement that are likely to affect the UK manufacturing sector. However, given the available evidence and the uncertainty around many of the trends identified, it was difficult to make specific predictions around the two timeframes. Nevertheless, it is possible to speculate that initiatives that involve process changes and moderate investments, such as changes to procurement methods, are likely to start delivering results in the short to medium term; while initiatives that require radical cultural change or large infrastructural investments, including more complex business models, are likely to take longer to produce results.

I. Introduction

The Government Office for Science commissioned a research paper, based on current literature to answer the following questions:

1. What is the current framework for Government procurement?
 - What are the strengths, weaknesses and opportunities that specifically impact upon current manufacturing?
 - How may this change in the future? (It is noted that procurement budgets tend to be large and often spend through many small scale decisions.)
2. How does Government procurement directly and indirectly impact on manufacturing activities? Which manufacturing sub-sectors/activities is Government procurement particularly important for and/or have most impact?
3. How do UK procurement frameworks compare to other competitor nation procurement in terms of supporting manufacturing?
4. In what ways could co-ordinated procurement (procurement that meets multiple Government departmental goals) catalyse and support UK Manufacturing? (e.g. using NHS procurement to catalyse a new UK industry in medical technology for the aged)

The review team was asked to consider where possible both the a) medium term (to 2020), and b) long term (out to 2050) aspects of each question above.

The document is structured around each of the four questions, highlighting future trends and uncertainties. Since the project considers the future of manufacturing out to 2050, but will also be considering near and medium term issues, the review also comments on the robustness of the evidence that underpins this analysis.

The review drew on a variety of sources of information and opinion including:

- Academic literature on public procurement, innovation and manufacturing.
- Publicly available reports and studies, accessed through web searches.
- Statistical information on public procurement, manufacturing and emerging technologies, for example, published by the OECD, European Commission, UK and other national government departments and others.
- Case studies published by government departments, UK devolved administrations and others.
- Interviews with public procurement officials in UK departments, identified through personal contacts of the review team.
- A short survey of members of the Strategic Supply Chain Group (SSCG) (a network of practitioners in sustainability and supply chain management from UK public and private sector organisations). The survey focused on their views of the likely future role of public procurement in driving innovation and the manufacturing sector, out to 2050.
- A special meeting of the Strategic Supply Chain Group (SSCG) held in February 2013 to test interim review findings, which was attended by a member of the Foresight Future of Manufacturing, Lead Expert Group.

2. What is the current framework for Government procurement?

This section of the review addresses the following questions:

- What is the current framework for Government procurement?
 - What are the strengths, weaknesses and opportunities that specifically impact upon current manufacturing?
 - How may this change in the future? (It is noted that procurement budgets tend to be large and often spend through many small scale decisions.)

2.1 Scope and definitions of 'Government procurement'

For the purposes of this review, 'Government procurement' has been taken to mean public sector procurement in the UK. Thus the review outlines the framework for procurement relating to organisations subject to the Public Procurement Regulations, including:

- central government and its agencies (including Government Procurement Service)
- local government
- the health and social care sector (including the NHS) and
- the higher and further education sector

Public sector expenditure by the devolved administrations of Scotland, Wales and Northern Ireland is included in the scope of this review.

The UK public sector as a whole spends some £238 billion on goods, services, works and utilities. This represents approximately 13% of Gross Domestic Product (GDP). UK public procurement gross expenditure on R&D, as a specific category of public procurement, accounts for 1.8% proportion of GDP in 2010 (BIS, 2012a).

According to the National Audit Office (NAO, 2013a) Central government (excluding the NHS), spent around £45 billion on goods and services from third parties in 2011-12; a reduction of about £9 billion from the previous year, adjusting for inflation. Purchases included goods and services that are common across departments, such as energy, office supplies, and travel, as well as specialist items such as such as defence equipment and welfare to work services.

2.2 Government procurement service

Since 2010, the Cabinet Office has led a procurement reform, in collaboration with government departments with the aim of improving procurement spent management and delivering centralized services through a new body; the Government Procurement Service (GPS, 2013) (NAO, 2013a)

The role of Government Procurement Service (GPS) is to deliver procurement services to the UK public sector. It plays a key role in the delivery of the UK Government centralised

procurement strategy, providing significant and sustainable savings for the taxpayer through centralised sourcing and category and data management. It covers the core commodities of: energy, ICT, property & facilities management, professional Services, learning & development, travel, fleet, e-Commerce, print, office solutions and communications services. GPS works closely with senior stakeholders in Central Government Departments and across the public sector, implementing policy to deliver savings and drive efficiency. There are strategic alliances with buying organisations in Local Government, Health and Devolved Administrations, combining purchasing volumes where appropriate to drive better value and improve efficiency and delivering savings that benefit the whole of the public sector (GPS, 2013).

The Government Procurement Service (GPS) in 2011/12 managed **£8.4bn** of public sector spend and delivered combined price and demand savings of **£759m** (excluding consultancy & contingent labour (CCL) demand). In 2012/13 managed spend target of **>£11bn** with combined price and non CCL demand savings target of **£1.1bn**. GPS had more than **2,000** suppliers of which >50% are SMEs. There were over **14,500** customers across **1,400** organisations. There are **C. 4,600** contracts currently in place and over **100** EU-compliant framework agreements (GPS, 2013).

The GPS strategy also seeks to fund improvements in procurement capability, and to support the wider growth agenda. “This includes an aspiration for 25 per cent of central government expenditure (direct and in the supply chain) to go to Small and Medium-sized Enterprises (SMEs) by 2015” (NAO, 2013a).

2.3 Legal and regulatory framework for public procurement

Directives - *EU Directive 2004/17 – Procurement in the Water, Energy, Transport and Postal Services Sectors* (EC, 2004a) and *EU Directive 2004/18/ - Procurement - Contracts for Public Works, Public Supply and Public Service* (EC, 2004b) have been transposed into UK law as Public Contracts Regulations (UK Government, 2006). Where appropriate, they have been transposed by the devolved administrations, resulting for example in the *Public Contracts (Scotland) Regulations 2012* (UK Government, 2012). However, these Directives are currently subject to review.

The proposed new EU public procurement rules seek to be more efficient and include the introduction of a life-cycle cost concept, which will encourage public authorities to consider the full life-cycle of products in their purchasing decisions. The life-cycle cost will include internal costs and monetised external environmental costs. Also it is anticipated that the rules may be more accommodating of environmental and social labels and social inclusion (EC, 2013c) (UK Government, 2013). These changes may make it easier for public bodies in the UK to deliver a wider range of policy objectives through procurement. There are already significant exemptions from these rules in areas likely to be relevant to the development of UK manufacturing. These include the procurement of energy, the procurement of vehicles by public sector bodies and procurement from SMEs. Public procurement in the UK is also subject to European State Aid rules (BIS, 2013b).

It is important to note that the present and proposed new EU procurement rules do not prevent the procurement of innovation, as borne out by EU Communications and studies such as *COMM (2007) 799 - Pre-commercial procurement: high quality public services in Europe* (EC, 2007a); *COMM (2007) 860 – A Lead Market Initiative for Europe* (EC, 2007b); *Creating an Innovative Europe: Report of the Independent Expert Group on R&D*

and Innovation (EC, 2006); and *Risk Management in the Procurement of Innovation – Concepts and Empirical Evidence* (EC, 2010).

The UK government is also a signatory to a wide range of ILO Conventions (ILO, 2013) and has made binding commitments in areas such as climate change, as well as pursuing policy objectives through procurement by seeking to secure chains of custody and labour standards, for example (DECC, 2013; LRQA, 2013).

2.5 Public procurement methods

A range of mechanisms are available to, and used by, public sector bodies in the procurement of goods, work and services. The public sector now places around £238 billion of contracts with the private sector each year, a third of its total expenditure. In several sectors it is responsible for over 10% of total demand (BIS, 2012a). However, these tend to be service rather than manufacturing sectors.

Table 1 shows government demand as a percentage of total UK demand for a range of sectors. However, it is clear that with the exception of air and spacecraft and related machinery, most of those sectors that depend heavily on government procurement are service rather than manufacturing based.

Table 1: Government demand as a percentage of UK demand (selected sectors)

Sector	
Education	61.2
Pharmaceuticals	33.9
Scientific research and development services	27.3
Printing and recording services	24
Computer, electronic and optical products	19.9
Legal Services	18
Air and spacecraft and related machinery	14.8
Postal and courier services	13.1
Architectural and engineering services: - technical testing and analysis services	8.6
Telecommunications services	7.6
Real estate services, excluding on a fee or contract basis	6.7
Accounting, bookkeeping and auditing services: - tax consulting services	6.3
Advertising and market research services	6.2
Computer programming, consultancy and related services	5.9
Whole Economy	16.3

Source: BIS calculations based on ONS supply and use data (from BIS, 2012a)

The Government Procurement Service follows a lean sourcing strategy (GPS, 2013) and deploys different procurement methods under the *Public Contract Regulations, 2006* (UK Government, 2006). The main methods are competitive dialogue, open procedures, and restricted procedures. The GPS provides clear guidance on when and how to apply these methods to try to optimise the sourcing strategy. The overall aim of these approaches is to reduce overall expenditure, but they also cater for other factors that can have an impact on UK manufacturing such as the inclusion of SMEs (GPS, 2013).

GPS is also putting in place a large number of framework agreements (some 117 in 2012) accessible by other public sector bodies (GPS, 2013). Framework agreements are used by purchasing consortia in the health and social care sector, the local government sector and the further and higher education sector, for example. The devolved administrations operate collaborative procurement through a range of organisations including Value Wales and Scotland Excel, the centre of expertise on procurement for local government in Scotland, for example (Value Wales, 2013) (Scotland Excel, 2013).

Procuring bodies in the UK have tended to act relatively cautiously with respect to the public procurement regulations, the need to avoid discriminating against potential suppliers from outside the UK and the risk of having their procurement processes challenged as anti-competitive (or against EU Treaty principles) (EC, 2013f). The nature of public procurement in the UK could be said to be more risk averse than is the case in some EU Member States (see section 3 on approaches adopted in other nations).

Characteristics of the manner in which public procurement is conducted can be summarised as follows:

- Defence - close relationships with the market; long-term relationships; joint development of solutions
- Local authorities, NHS, Higher Education - arm's length or more distant relationship with most suppliers and contractors; focus on 'value for money' and efficiencies; exceptions are one-off or special equipment procurements - e.g. laboratory equipment and high-tech medical devices
- GPS, public sector procurement consortia and others responsible for developing framework agreements - focus is on aggregating demand and driving cost reduction / efficiencies
- Procurement of major infrastructure projects - role of Major Projects Authority (MPA) or Scottish Futures Trust allows closer engagement with markets through adoption of competitive dialogue process for example, in which requirements are expressed in outcome terms and suppliers/contractors have a role in shaping the solution (Cabinet Office, 2013a) (Scottish Futures Trust, 2013).

The extent to which UK spending power has been used to tackle environmental and socio-economic challenges has varied over recent years, as illustrated by the attention given to the sustainable procurement in the mid 1990s and the current focus on reducing carbon emissions while driving efficiencies and promoting SMEs (HM Treasury, 2008) (NAO 2013b). UK public bodies are still being encouraged to address environmental challenges through their procurement practices as part of the 'Greening Government' commitment (Defra, 2013b). One of the mechanisms used is a set of 'Government Buying Standards' covering a wide range of products (Defra, 2013a). These standards help buyers develop 'green' specifications, award criteria and contract conditions and help ratchet-up environmental performance across the public sector. While these standards are not designed specifically to promote the UK manufacturing base, they are based on close engagement with markets, having originally been developed through the Market Transformation Programme's work on energy-efficient 'white goods' (Defra, 2013a). As evidence from numerous Environmental Audit Committee and National Audit Office reports confirms, UK government departments and other public bodies have not yet adopted these standards in their procurement practices routinely (UK Parliament, 2013) (NAO, 2013b). This suggests that scope exists for Government Buying Standards

to be applied by the public sector, to influence consumer buying behaviours and to signal future requirements to manufacturers, including UK manufacturers.

Government Buying Standards could in the future focus attention on areas in which the current and emerging strengths of the UK manufacturing base combine with clear policy objectives and perceived needs or challenges.

Government Buying Standards are designed to make it easier for government buyers to buy sustainably. They include:

- Official specifications that all government buyers must follow when procuring a range of products. Also included is information about sustainable procurement and how to apply it when buying;
- The standards are mandatory for all central government departments, their executive agencies, Non Departmental Public Bodies (NDPBs) and Non-Ministerial Departments (NMDs).
- They currently cover a range of products and services in ten priority product groups, and will be maintained over the coming years.
- Government Buying Standards are aligned to the European Commission's Green Public Procurement (GPP) initiative.

(Defra, 2013a)

3. Innovative models of public procurement

3.1 Forward commitment procurement (FCP)

The Forward Commitment Procurement (FCP) model is one response to the challenge of 'unmet need' which appears to offer opportunities for public procurement to help stimulate manufacturing (including UK manufacturing) (BIS, 2011). It is already in place in the UK, having taken several years to get off the ground. Examples of its application in the UK are provided below. Its application could potentially be much wider by 2020 and beyond. Factors influencing its application by public sector bodies emerge from the case shown below and include:

- The procuring organisation's appetite for risk
- The procuring organisation's willingness to take a 'long-term view'
- The procuring organisation's attitude to the procurement of innovative solutions, including defining requirements in 'outcome' terms

FCP looks at purchasing from an outcome-based specification need instead of purchasing for the immediate perceived need. The model is used to alert the market of a procurement need and commits to purchasing the solution once it becomes available, given a defined specification and price. Since the solutions being demanded are not currently available in the market, this forces suppliers to deliver innovative solutions, which can include both products and services. This model is designed to promote investment and innovation in the suppliers, at the same time as delivering cost effective solutions.

The FCP model can be broken down into three stages (BIS, 2011):

- identification – finding problems that require new solutions to be developed
- market engagement – talking to potential suppliers an early stage to inform them of the requirements and gaining feedback and support from them.
- procurement – initiate the procurement process in a way that supports innovation and enables the delivery of the solution in a cost effective manner.

An example of Forward Commitment Procurement in action in the NHS is shown in Appendix. It illustrates the use of forward commitment procurement to develop innovative lighting systems for Rotherham NHS Foundation Trust.

The BIS publication, *Delivering Best Value through Innovation: Forward Commitment Procurement - Practical Pathways to Buying Innovative Solutions*, refers to "how the public sector can become effective supply chain managers, demanding from the market for ever better, more efficient solutions that serve the public good" (BIS, 2011). This points to the potential of the Forward Commitment Procurement model to change the nature of procurement insofar as procurers will need to develop their skills and capability to engage effectively with markets.

Demanding more efficient solutions that serve the public good will put the onus on commissioners of services, policy makers and politicians to articulate clearly what they

mean by the 'public good'. This in turn has to be communicated to the marketplace by procurers and others. Therefore, it is clear that this will present both challenges and opportunities for the procurement profession.

A number of reviews have highlighted the need for public procurement to build capabilities, become more professional and to adopt some of the approaches of the private sector, for example. These include the *McClelland Report*, (Scottish Government, 2006) National Audit Office reports (NAO, 2012, 2013a and 2013b); *Heseltine Report*, BIS (2012a); *Risk Management in the Procurement of Innovation - Concepts and Empirical Information in the European Union* (EC, 2010).

3.2 Innovation models for supporting small business

The Small Business Innovation Research (SBIR) programme is a tried and tested method that originated in the United States (Connell, 2007) (Kidalov and Snider, 2011). The government uses this instrument to provide incentives for companies to develop and market innovative solutions to societal issues. SBIR is a good way for the government to solve specific societal problems or accelerate a desired transition. SBIR is used if there are no ready-to-use products or services to address a challenge. This approach is used when innovation is necessary to make products or services available and market them to customers.

The SBIR programme in the UK uses the power of government procurement to try to drive innovation. It provides opportunities for innovative companies to engage with the public sector to solve specific problems. SBIR encourages public sector organisations to take the lead customer role, helping to develop and de-risk innovative solutions for which it might be the potential future customer. According to the Technology Strategy Board (TSB) "we will continue to support and encourage the SBIR across government, aiming for more than £40 million of new SBIR contracts and 35 new competitions" (Technology Strategy Board, 2013).

3.3 Innovation platforms

The Technology Strategy Board is planning to invest more than £1bn over the next few years on a network of world-leading Catapult centres with the aim of transforming the UK's capability for innovation (Technology Strategy Board, 2013). Seven centres have been launched in areas that are considered to be strategically important for the UK, including: High value manufacturing; Cell therapy; Offshore renewable energy; Satellite applications; Connected digital economy and Transport systems (Technology Strategy Board, 2013).

Catapult Centres, previously known as Technology Innovation Centres (TIC), can be supported through public procurement. The Hauser Report made some specific recommendations on how public procurement could play a critical role in the success of such centres and the development of supply chains (which will include UK manufacturers) (BIS, 2010a). In particular, the report recommended the use of innovative procurement initiatives, such as the Forward Commitment Procurement programme and the SBIR programme and advised organisations in the public sector to encourage procurement in technology areas in which the centres are active, to help create the demand stimulus for commercialising these technologies. However, it is difficult to see how government departments and public sector organisations might deliberately

encourage procurement in these specific areas, under the current constraints of procurement regulations. These regulations are currently under review and will be subject to further change in the future, meaning that future procurement may have greater scope to intervene more directly.

3.4 Strengths, weaknesses, opportunities and threats

In this section, we evaluate the evidence concerning the strengths, weaknesses, opportunities and threats in using public procurement to stimulate UK manufacturing now and in the future.

The scale of UK public procurement, particularly in sectors such as Defence, Energy and Healthcare, provides a strong mechanism, which can potentially shift the market (Defra, 2006). The formation of the Government Procurement Service (GPS) in 2010 has strengthened this potential, opening opportunities for improving procurement capabilities across the public sector and supporting a wider growth agenda (GPS, 2013).

A number of opportunities exist for the UK government to use public procurement to support manufacturing. For instance Government Buying Standards could focus attention on areas of current and emerging strength in terms of UK manufacturing, including food, defence, environmental technologies, healthcare, and infrastructure. Other initiatives and models such as Forward Commitment Procurement, Small Business Research Initiative and innovation platforms (i.e. Catapult Centres) also present opportunities for public procurement to support UK manufacturing.

Further evidence that new 'business models' are needed in government is the work of the Natural Capital Committee in HM Treasury (HM Treasury, 2013). This work of this Committee and others has led to a greater appreciation of the value of, for example, ecosystems. In time this and similar work could lead to a greater appreciation of the true costs of an under-utilised workforce, for example.

The devolved administrations in the UK are already actively promoting the use of public procurement to stimulate the development of skills and training opportunities for local communities (The Scottish Government, 2008; Zero Waste Scotland, 2012). This has had a direct impact on the construction sector in Scotland and Wales (Scottish Government, 2013) (Value Wales, 2013). Community benefits tend to be more readily achieved through procurements involving labour and services, but there is already abundant evidence that these approaches will be extended beyond infrastructure projects into mainstream procurement in the future (Scottish Futures Trust, 2013).

Also in Scotland, recent activity has seen public procurement targeted for capability building, alongside Scotland's *Government Economic Strategy* with its focus on SME and third sector development (The Scottish Government, 2011; 2008). Apprenticeships are being re-introduced in the shipbuilding industry, for example. The fact that some of these apprentices are engaged in the building of new hybrid ferries for routes in Scotland is another example of public procurement being used as an instrument of economic policy, as well as having an immediate impact on manufacturing, within the rules governing public procurement (Caledonian Maritime Assets, 2013). See Appendix 2.

Where the public good can be described to the market and is appreciated as crossing many Government departmental boundaries, it will be essential in the future that public expenditure 'rules' allow for effective decision-making. The European Procurement

Directives continue to be subject to review, with the next major revision imminent (EC, 2013c) (UK Government, 2013). Those seeking to supply the UK public sector (including those in the UK manufacturing base) face a number of barriers relating to the mechanisms of public procurement. These barriers extend beyond aversion to risk. They go to the heart of public finance and accounting structures. Some or all of these are likely to have to change if the UK manufacturing base is to benefit from action by UK public procurement.

The barriers have been analysed in the report, *Costing the Future: Securing Value for Money through Sustainable Procurement*, (Westminster Sustainable Business Forum / Policy Connect, 2008). Many of the same barriers and threats had been identified by the UK's Sustainable Procurement Task Force (Defra, 2006):

1. Lack of leadership
2. Focus on cost reduction/ lowest price
3. Failure to integrate sustainability into organisation
4. Lack of information, training & accountability
5. Decentralisation and lack of control
6. Ignorance, the term sustainability has little impact
7. Suspicion, buyers are not convinced of merits
8. Confusion, guidance needs improving
9. Supply chain size, complex and time consuming
10. Long term benefits vs. short term costs
11. Organisation bearing cost may receive no direct benefit
12. Difficulty in calculating intangible benefits

Some mechanisms have been introduced or extended to overcome the challenges, such as 'invest to save' models that allow savings in one year to be re-invested in energy-efficiency schemes to deliver on-going revenue savings (Scottish Futures Trust, 2013). Looking to 2020 and beyond, the extension of these finance models would appear to offer opportunities to align revenue saving with the production of more resource efficient products, potentially being supplied by the UK market.

E-procurement and the emergence of 'big data' can be expected to play a role in the immediate future, however; stakeholders were unconvinced of their ability to transform procurement and UK manufacturing. Details of the stakeholders who attended a special meeting of the Strategic Supply Chain Group to discuss this review are to be found at Appendix 4 and a full list of stakeholders consulted is at Appendix 5.

Following from the discussion above, Table 2 presents a summary of the strengths, weaknesses, opportunities and threats related to public procurement and its potential impact on UK manufacturing.

Some of the elements of this SWOT analysis are addressed in more detail in Sections 2, 3 and 4 of this review.

Table 2: SWOT Analysis

STRENGTHS	OPPORTUNITIES
The UK spends some £238 billion on goods,	Government Buying Standards could focus

<p>services, works and utilities. The Government Procurement Service (GPS) provides significant and sustainable savings through centralized procurement. Some sectors (e.g. Defence) encourage close relationships with local suppliers; long-term relationships; joint development of solutions</p>	<p>The environmental technologies sector is one of the main markets in which public procurement can have an impact Forward Commitment Procurement model offers opportunities for public procurement to help stimulate manufacturing The Small Business Research initiative (SBRI) programme provides opportunities for innovative companies Supporting Catapult Centres through procurement mechanisms has potential E-procurement can play a role in the immediate future Changes to accounting and budgetary rules, could make a contribution to procurement</p>
<p>WEAKNESSES Relatively high cost of manufacturing in the UK Difficulty in calculating intangible benefits Complex set of rules and regulation (EU and other agreements such as ILO) Public procurement in the UK appears to be more risk averse than in other countries Lack of leadership Focus on cost reduction/ lowest price Failure to integrate sustainability into organisation Lack of information, training & accountability Decentralisation and lack of control Suspicion, buyers are not convinced of merits Supply chain size, complex and time consuming Long term benefits vs. short term costs Organisation bearing cost may receive no direct benefit</p>	<p>THREATS Loss of local skills and expertise in some manufacturing sectors Other countries are less risk averse in following EU regulations Other countries have greater economies of scale UK's diminishing economic presence in a global scale Other countries do not comply with ethical and environmental standards</p>

3.5 Concluding remarks

UK public sector procurement is dominated by spending on services rather than on goods and products. Public procurement can be used as a lever to drive the development of solutions to complex societal challenges and as these challenges increase over years, the role of procurement may become more significant. The SWOT Analysis summarises the major features of public procurement's role, as they have emerged through the course of this review.

The rules governing public sector procurement tend to constrain direct intervention in support of UK manufacturing at present. There is some indication in the current review of the EU Public Procurement Directive that these constraints may be reduced in the near future, such as the requirement to apply life cycle costing and to take greater account of environmental and social issues.

Acting together, innovative procurement models such as Forward Commitment Procurement, the SBRI approach and initiatives such as Catapult Centres can help

catalyse innovation and support manufacturing SMEs. Some sectors, including parts of defence and healthcare encourage joint development of solutions.

Collaboration and 'orchestration' of procurement are trends that may be deployed to a greater extent in coming years. Section 4 of this review examines the potential for collaborative procurement in more detail.

More widespread use of Forward Commitment Procurement, pre-commercial procurement and similar techniques, particularly when they are used as part of a strategic approach to public procurement, may help to deliver future national policy objectives.

4. How does Government procurement impact on manufacturing?

This section of the review addresses the following questions:

- How does Government procurement directly and indirectly impact on manufacturing activities?
- Which manufacturing sub-sectors/activities is Government procurement particularly important for and/or have most impact?

4.1 Emerging technological sectors in the UK

A discussion of emerging technologies up to 2050 requires the examination of the future global context within which UK manufacturing will take place, the present emerging technologies and sectors in the UK, the impact of future resource scarcity, the importance of the circular economy and the increasing move from products to services. Following will be a discussion of the form technologies and sectors will develop in the UK and the influence of public procurement on manufacturing activities in light of the above review.

Global context

Up to 2050 there will be significant geopolitical change, such as the global shift of economic growth from the developed world to the developing world including China, India, Brazil and Indonesia. There will be significant population growth from 7 billion to over 9 billion people in 2050 (World Business Council for Sustainable Development, 2010). The UK population is projected to reach 70 Million by mid-2027 (Office for National Statistics, 2013). Populations will be more aged especially in the developed world. Climate change will occur and depending on how much it is controlled it is likely to lead to higher global temperatures, desertification, water shortages, melting of polar ice caps and sea level rise. Resources will become more scarce and expensive. Fossil fuel energy resources are finite and contribute to global warming and the transition to renewable resources will be challenging. Material resources such as minerals and in particular rare metals will become particularly scarce. Land and ecological services, such as soils, marine and fresh water, forests and other biodiversity, will become under population and resource pressure (World Business Council for Sustainable Development, 2010). This global economic, social and environmental context must be considered when determining the future of UK manufacturing and the role public procurement can play in stimulating it.

Emerging technologies and sectors

Table 3 below identifies the emerging technologies in the sectors that are most likely in the short to medium term, to have potential to lead to R&D and subsequent UK manufacturing. The table is an adaption of Table 4.1 in the publication, *Manufacturing in the UK: an Economic Analysis of the Sector*, BIS Economics Paper No 10a.

Table 3: Emerging technologies and their application (Adapted from BIS, 2010b)

Emerging Technologies	End-use application
Digital	Consumer electronics and ICT sectors
Micro and nanoelectronics	Automotive Medical instrumentation Consumer electronics Spacecraft Aeronautics Defence Green technologies
Nanotechnology and nanomaterials	Aerospace Space Automotive Life Sciences Electronics and ICT Green technologies Food and drink
Industrial biotechnology	Life Sciences Chemicals Green technologies
Photonics	Life Sciences Green technologies Electronics and ICT
Advanced materials (e.g. composites)	Green technologies (e.g. batteries) Plastics (e.g. smart packaging) Aerospace Automotive Transport equipment Electronics and ICT
Defence	Ship-building Aerospace Electronics Instrumental/telecoms
Healthcare	Medical equipment Pharma / Biosciences Food and beverage
Energy	Renewable energy technologies (e.g. wind, solar, tides, anaerobic digestion, nanotechnology) Energy efficient technologies (e.g. construction, manufacturing processes, recycling)
Food	Sustainable food production (e.g. alternatives for animal proteins, local, organic) Packaging technologies (e.g. smart packaging) Waste reduction and recycling technologies

4.2 Manufacturing sector innovation in the long term

While this review has drawn on published evidence of activity focused on manufacturing sectors and the potential applications of their outputs, stakeholders were much more sceptical about a sector-based approach. Stakeholders consulted included public procurement officials in the UK and participants in the Strategic Supply Chain Group, from both the public and the private sector. Evidence was also gathered from attendance at a number of events on manufacturing and innovation (Associate Parliamentary Manufacturing Group, 2013). There are so many variables to be taken into account in looking out to 2050 in relation to UK manufacturing (and UK public sector procurement) that stakeholders were strongly of the view that any analysis of 'emerging technologies' for example, is unlikely to hold true beyond the short term. 3-D printing, for example, may be one of the technologies 'of the moment' but stakeholders were keen to stress that it and similar technologies are unlikely to revolutionise UK manufacturing.

This review has identified - and built on - a list of enabling technologies and their potential future applications in areas such as advanced materials, industrial biotechnology and renewable energy. Evidence from many of our stakeholders indicates that both the technologies themselves and their potential applications are likely to change significantly over time. This is all the more true when we try to look out as far as 2050. So, for example, in the case of the report, *Future from Fibre - from Forest to Finished Product*, new products and services are expected to emerge from a number of different technologies (World Business Council for Sustainable Development, 2012). Their description of how technologies will be applied seems particularly apt: something old, something new, something borrowed, something blue'. Stakeholders participating in this review felt that, in the longer term, UK manufacturing will be based not only on the technologies identified above but also from R&D and commercial application of a combination of these technologies and others yet to emerge. Seeing the future of manufacturing developing only from particular sectors was seen by the stakeholders as being limited by a 'silo' based way of thinking which would limit future potential up to 2050. This cross-sectoral approach is particularly apt for a future of scarce resources and a need for a circular economy. Stakeholders believed that the issues of resource security and resilience will be amongst the mix of influences likely to determine the future form of manufacturing in the UK.

4.3 Resource security and resilience

The manufacturing sector is increasingly concerned with resource security such as energy availability, scarcity of materials including rare earth metals, water and biodiversity (Technology Strategy Board, 2008) (World Business Council for Sustainable Development, 2010). Resource shocks caused by finite stocks, rare mineral availability, high prices, international competition, transport costs, ethical issues and unstable political situations will increasingly cause concern and pose national strategic risks (BIS/Defra, 2012c). Businesses are now recognising the need for resilience. The management of ecological services provided by land, water, soils and biodiversity is also increasingly acknowledged as vital to future business sustainability (World Business Council for Sustainable Development, 2010).

The challenges presented by resource security and building resilience point to the need for more effective management of resources, including 'smarter' use of existing materials. So the review has identified potential for the growth - and stimulation - of new business models to address these challenges. Public procurement has a part to play in the development of the circular economy and closed loop business models as illustrated in

the work of the Green Alliance's Circular Economy Task Force (Green Alliance, 2013) (Royal Society of Arts, 2013) (Ellen MacArthur Foundation, 2012 & 2013).

The issue of resilience - this time in terms of cost resilience - is raised again in *2020 Vision: An Agenda for Transformation* (Legatum Institute, 2013). Here the case is made for government to lead by example by showcasing technologies developed to address another major threat at the heart of this review, arguing for "Making the Green Economy the Mainstream Economy" (Legatum Institute, 2013).

Private Sector Innovation supported by Government Policy and Leadership

Back Renewables, Substitutes and Re-engineering

We have to focus research on the widest range of renewable resources—not just energy. Similar to the support delivered to graphene, we should be supporting synthetic rare earth development, renewable replacements for minerals and of course support the re-engineering of some key industrial processes away from high-intensive energy consumption.

However, it is not only replacement products that support a greening of the economy but also processes, design and management. We must recognize that the softer business engineers and managers are key to reducing dependency on natural resources — from carbon through to minerals and water (Legatum Institute, 2013).

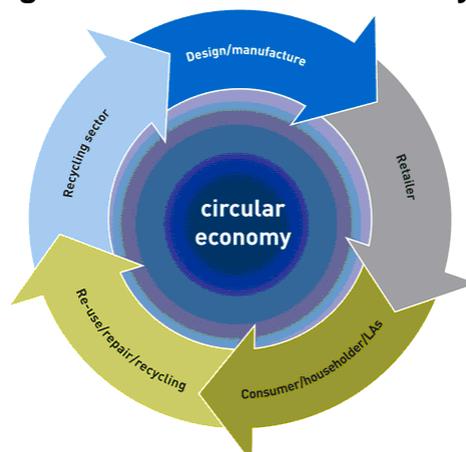
4.1 Circular Economy

Stakeholders consulted during this review were firmly of the view that technologies will not develop in silos (or specific sectors) and their applications will be cross-cutting. So we can expect cross-sectoral research and development to offer greater advantages to UK manufacturing in the future. One reason given for this view is the emergence of the global circular economy (Royal Society of Arts, 2013) (Ellen MacArthur Foundation (2012, 2013)). Many of our stakeholders anticipate that approaches based on the circular economy help the UK economy build resilience in the face of resource shocks and threats to the security of supply of key raw materials. In this respect trends in the UK follow those of other nations, since the European Commission called for a 'circular, resource-efficient and resilient economy in December 2012, while a 'large-scale circular economy' is one of China's environmental goals for 2020 (ENDS Report, 2013).

WRAP (Waste Resources Action Programme) states that the "circular economy is an alternative to a traditional linear economy (make, use, dispose) in which we keep resources in use for as long as possible, extract the maximum value from them whilst in use, then recover and regenerate products and materials at the end of each service life" (WRAP, 2013).

The diagram below illustrates the components of a circular economy.

Figure 1. The Circular Economy



(Source: WRAP, 2013)

WRAP's vision for the UK circular economy to 2020

The adoption of a circular economy offers considerable economic benefits; Defra calculates that UK businesses could benefit by up to £23 billion per year through low cost or no cost improvements in the efficient use of resources, whilst McKinsey estimates that the global value of resource efficiency could eventually reach \$3.7 trillion per year.

Our vision for UK's economy by 2020 assumes (compared to a 2010 baseline):

- 30Mt fewer material inputs into the economy
- 20% less waste produced (50Mt less waste)
- 40Mt more materials recycled back into the economy

Based on 2011/12 actuals, the Office for Budget Responsibility's forecast for 2013-17, and assumptions of 2% per annum GDP growth for 2018-20, we estimate GDP will grow by about 20% in the 2010-20 decade.

The Office for National Statistics predicts that UK population will grow by 8% in the decade. The headline 30Mt less materials going into the economy is close to WRAP's 2010 research *Securing the Future: The Role of Resource Efficiency*. This identified potential savings of 38Mt for selected materials by 2020 based on quick win resource efficiency actions. This included several materials considered as being of strategic importance, such as rare earths.

Four key ways of realising these savings are:

- lean production (i.e. making goods with a lower material requirement);
- reducing waste in manufacture and commerce;
- reducing the amount of working products thrown away, and;
- goods to services (i.e. increasing the proportion of products which are leased).

The increase in waste recycled (40Mt) is less than for the 2000 to 2010 decade (70Mt). We suggest the easy wins in recycling have been achieved, especially with the landfill tax escalation during the decade and greater business awareness of the economic benefits of diverting waste from landfill.

20% less waste produced is about 50Mt less waste. This will require ambitious waste prevention plans from all nations to set the framework for business and public sector to take action (WRAP website, 2013).

The UK remanufacturing sector is already reported to be worth £2.4bn and employ 50,000 people. So there is potential for UK public procurement to stimulate the emerging remanufacturing sector through its specification of goods and services (ENDS Report, 2013).

The case for government action to stimulate the circular economy was made by stakeholders involved in this review. Mervyn Jones from WRAP suggests:

“Use sustainable procurement as a driver to encourage innovation and market development for more environmentally sensitive products – this would contribute to Sustainable Procurement and Greening Government commitments as well as reducing the overall environmental impact of our production and consumption.”

“Other opportunities lie in growing a manufacturing capability in line with changing demand, i.e. linking more to sustainable consumption & production (decoupling resource consumption from production) and also linking to a more sustainable closed loop approach to economic growth” (Pers.Comm. Mervyn Jones, 2013).

4.5 Products to services

Increasingly, public procurers will be operating in markets offering service based solutions which allow for higher specifications of design and materials that increase life and durability. Digital platforms will allow for greater sharing and leasing of products as an alternative to buying (Royal Society of Arts, 2013). The public sector is increasingly adopting the concept of buying functionality, although stakeholders reported resistance on the part of UK public sector to the widespread adoption of ‘leasing’ or buying services rather than goods. This was attributed at least in part to the accounting models currently in use in the UK public sector. Customer resistance is currently slowing the pace of change to more resource efficient business models.

The UK public procurement of the future is also likely to have to grapple with the challenge of buying solutions – or outcomes – rather than buying to ‘traditional’ specifications. This raises challenges for the profession in terms of capabilities to articulate needs in a solutions oriented way. Where public procurers have been used to buying ‘goods’ they are seen to have some difficulty moving to specifying and buying services or functionality. Articulating a demand in terms of an ‘unmet need’ or a sustainable solution is an even bigger challenge. However, this is precisely the sort of response that will be required if the UK public sector is going to play its part in stimulating novel forms of manufacturing.

4.6 The influence of public procurement on manufacturing activities

Having considered the global context for UK manufacturing, the likely emerging technologies that the UK has strengths in, the need for an wide view of cross-sectoral technologies of the future, the impetus of future resource security issues and the potential of the circular economy, this review will now look at particular existing and emerging technologies and sectors to determine the potential of public procurement to stimulate the UK manufacturing sector up to 2050.

In the UK, public sector expenditure is dominated by the procurement of services rather than goods or products. Areas of expenditure in which the public sector has a particularly strong influence include defence, healthcare and infrastructure. This is illustrated by feedback from stakeholders:

“UK manufacturing has been declining for decades. It is not a homogeneous sector. The shape and influence of manufacturing has evolved however, and the overall result is a more flexible manufacturing base that is increasingly focused on key areas like secondary assemblage, hi tech electrical equipment, light manufacturing (e.g. pre-fabrication), aerospace, energy industries, defence and to a decreasing degree automotive & plant” (Pers. Comm. Mervyn Jones, 2013).

The 2012 report, Technology Innovation Futures, UK Growth Opportunities for the 2020s, shows the potential for future manufacturing.

“Service robotics is highlighted as being of growing importance, whereby devices work alongside humans, adapting to contexts rather than simply repeating actions. Additive layer manufacturing (such as 3D printing) has moved from a largely research and development environment to being a core component of some industrial strategies. This links to the major breakthroughs in developing new materials and tailored medicine. There is also a stronger trend in the way that sensors, miniaturised communications and processing provide constant feedback and permanent connections to networks” (BIS, 2012b).

4.7 Defence procurement

Examples of the use of public procurement to stimulate UK manufacturing can be found in the defence sector. The UK is the world’s 2nd largest exporter of defence equipment and technology only behind the USA (UKTIDSO, 2013). The industry is considered highly strategic not only for economic reasons but also for national security reasons and it is important the industry is supported. Defence procurement has a very large impact on R&D and manufacturing industries in the UK. Some manufacturing sectors are completely dominated by defence procurement. For instance, the government is the largest single buyer of aviation equipment and shipbuilding in the country and it also has a large impact on the electronics industry. Support for defence related industries goes beyond procurement as the government actively engages in arranging export deals with other countries, which in turn help achieve economies of scale in manufacturing. This ultimately helps to reduce cost for the UK and makes supplying companies more globally competitive and sustainable in the long term. Given the strategic importance of military capability of the nation, the government would like to maintain a significant impact on Defence R&D, including emergent technologies. This is generally done through public procurement.

4.8 Health procurement

Health procurement for the clinical part of the NHS has sought high -tech innovative solutions, in close collaboration with the market, which has resulted in the UK manufacturing of clinical products. Andes (2010) quotes the NHS case study; “... the UK’s Department of Health and the National Health Service’s (NHS) Purchasing & Supply Agency has developed an open innovation initiative called “Design Bugs Out” to assess and develop hospital equipment to reduce hospital-related infections. In 2007, an

estimated 9,000 patients died from hospital-borne infections. NHS hospital procurements have traditionally been supplied by a group of trusted incumbent manufacturers who, although sensitive to deadlines and prices, are not accustomed to innovating their products or services. In 2008, a team of NHS and academic researchers developed a list of the dirtiest places within hospitals and created a competition among private sector manufacturers to redesign everyday hospital equipment that poses hygienic risks, and the new designs were required to meet existing incumbent unit costs. In 2009, as a result of this new procurement process six new items were produced for UK hospitals—blood pressure cuffs, oximeter clips, intelligent mattresses, curtain clips, cannula time trackers and patient packs. For example, the intelligent mattress has a layer of hydrochromic ink that changes colour if the outer plastic hygienic layer is punctured, reducing bacterial traps where diseases can be transferred amongst patients...” (Andes, 2010); (Design Council, 2013).

In the future NHS led innovations such as smart textiles could involve a combination of traditional fabrics or new fabrics with healthcare requirements, such as uniforms or patients’ clothing having sensors to detect changes in body chemistry. Similarly smart packaging with sensitive colour coding could be used in pharmacy to indicate when drugs will be out of date.

However, one of the lessons to be learned from both the defence and health sector is that the success of procurement stimulating UK manufacturing is to do with innovation taking place where the lead customer is seen to be acting strategically or driving relatively ‘high-tech’ solutions. Often this is done in close collaboration with the market. Across the rest of the organisation, where routine goods and services are being purchased, the picture is entirely different. So in the case of healthcare, for example, clinicians may be involved with the leading technology providers in the search for innovative solutions. Meanwhile for the purchase of a vast range of non-specialist, routine items including cleaning, catering and office supplies, opportunities for innovation are almost completely neglected, as borne out by evidence, albeit anecdotal, from our stakeholders.

Similarly in defence, innovation is taking place in the strategically important elements of supply, such as avionics, electronics and naval equipment. But when considering routine items that support defence activities, including buildings and maintenance, it appears that procurement is regarded as less important, so opportunities for innovation are more likely to be missed.

4.9 Infrastructure procurement

The infrastructure and construction sectors are also influenced by public expenditure on buildings, road and rail projects as well facilities management, amongst others. Infrastructure procurements are often one-off uniquely designed projects such as bridges, high speed railways, roads, flood prevention works, waste water and port infrastructure that fit into a particular geographical context. UK manufacturing could have an opportunity for unique designs, high cost, low volume and high tech solutions. At the other end of the scale is the potential to manufacture construction products that are low cost, high volume and geographical close to projects, thus reducing transport costs. Low carbon solutions for vehicles can provide manufacturing opportunities through public procurement but also poses major challenges. Some of the challenges facing producers of low carbon technology solutions are illustrated in the following example taken from the

BIS Economics Paper No 10A, *Manufacturing in the UK: An economic analysis of the sector*, (BIS, 2010b).

Uncertainty of demand in the UK Electric Vehicles sector

Buying a vehicle is a major purchase and so consumers want to be sure they are getting a reliable product. Low carbon technology which involves unfamiliar powertrains such as electric cars presents a risk to most buyers as they are not used to driving such vehicles. They have no experience of the vehicle's reliability and are unsure what it may be worth in three years time when they might be looking to sell the vehicle. While such risk aversion may be understandable, it can significantly impair the roll-out of innovative low carbon technologies. This can create a vicious circle where consumers will not buy a new product until it is proven, but the product cannot be proven until it is bought and consumers get used to running it.

Source: (BIS, 2009) *Towards a Low Carbon Economy* BIS Economics Paper No 1

Ambitious responses to such challenges on the part of public sector procurement are demonstrated by the Scottish Government's commitment on the procurement of electric vehicles. This is an illustration of government 'leading by example' in the procurement of low carbon solutions, which will have an impact on the UK vehicle manufacturing base.

Stakeholders at the Strategic Supply Chain Group's discussion of this review quoted examples of how UK public sector procurement is already supporting infrastructure development in line with the circular economy and 'resilience'. The MOD uses lean manufacturing to deliver its 'SLAM' accommodation projects but, significantly, does not highlight these as examples of innovation in the same way as it does for the procurement of high tech equipment. The reasons suggested for this include the fact that procurement of 'infrastructure is undertaken by a different part of the MOD.

Design of public buildings, roads and other infrastructure is also increasingly seen to be taking account of climate change challenges, threats to the security of supply of key raw materials as well as the need to support local economies. SSCG members and others provided illustrations of projects, including the Olympic Games and plans for the 2014 Commonwealth Games in Glasgow which have been developed with sustainable procurement principles at their core (London 2012, 2012) (Glasgow 2014 Commonwealth Games, 2013). The transportation of aggregates by canal barge to the Olympic Games site is one small example of how procurement specifications and contract requirements can be applied (London 2012, 2012). Similar considerations are now routinely applied in contracts for major infrastructure such as the Crossrail project, the Forth Replacement Crossing in Scotland and High Speed 2 (hs2 (Phase 1 &2)) (Crossrail, 2013) (Transport Scotland, 2013) (High Speed 2, 2013).

Our stakeholders felt that the public sector can be expected to continue to demand new technologies in water and wastewater treatment, flood defence and integrated traffic management, for example, all of which offer opportunities for the UK manufacturing base.

The Scottish Government has recently put in place a framework agreement for energy that takes account of the capabilities of the UK manufacturing base, now and in the foreseeable future. The biomass-based energy supply framework in Appendix 3 illustrates how consideration of the potential impacts on the manufacturing base have been taken into account in the procurement strategy and this is discussed further in Section 4. Similarly, the Caledonian Maritime Assets hybrid ferry case study described above shows how public procurement can stimulate innovation, manufacturing, employment and skills development (Caledonian Maritime Assets Ltd., 2013). See Appendix 2.

4.10 Concluding remarks

Public sector procurement has both a direct and indirect impact on manufacturing activities in the UK, particularly in industries such as defence, healthcare and construction. Furthermore it has a potential for influencing emerging technology sectors such as biotechnology, photonics and nanotechnology.

Looking into the future the stakeholders we consulted felt that a number of trends are likely to affect availability of non-renewable natural resources, raising concerns from government and industry regarding resource security. These trends can help promote a move towards a circular economy and increase the servitisation of products, which will affect UK manufacturing through increased demand for design, maintenance repair and overhaul (MRO) and re-manufacturing operations, as well as services such as reverse logistics.

Stakeholders were clear that 'emerging' technologies will change in the medium and longer term. Evidence is necessarily limited, but it is possible to envisage solutions to societal challenges of the future being developed through a combination of 'smarter' public procurement and a package of technologies delivered at least in part through the UK manufacturing base.

5. How do UK procurement frameworks compare to other nations?

This section of the review addresses the question:

- How do UK procurement frameworks compare to other competitor nations' procurement in terms of supporting manufacturing?

This review considers how governments support innovation, development and manufacturing through public procurement. The review covers a number of countries including the United States, the European Union and Asia. Finally the review examines the situation in the UK highlighting the successes, weaknesses and opportunities to improve public procurement to deliver innovation, R&D and manufacture of products in the UK. It aims to provide a snapshot of promising practices, rather than an in-depth analysis of public procurement as a whole.

5.1 How Governments support, innovation, development and manufacturing

In OECD countries historically, “much of the role of government on the demand side of innovation has focused on “getting prices right” in order to foster markets for innovation. In recent years, however; OECD countries from Finland to Australia and emerging economies such as China and Brazil have used more targeted demand-side innovation policies such as public procurement, regulation, standards, consumer policies and user-led innovation initiatives, as well as “lead market” initiatives, to address market and system failures in areas in which social needs are pressing” (OECD, 2011).

The OECD and INNO *TrendChart Mini Country Reports* provide analysis of numerous countries' approaches to demand-side initiatives. Specific reference is made below to a number of these, relating to the procurement of innovation in practice (OECD, 2011) (INNO, 2011).

United States

US Small Business Innovation Research (SBIR) programme

The United States' Small Business Innovation Research Program (SBIR) helps small firms acquire government contracts by allocating 2.5 percent of agency research budgets to small business research projects (Andes, 2010). The US-SBIR scheme has many variants (depending on the US Agency involved) and a majority of the SBIR agencies do not move towards actual procurement of the outputs of R&D projects, with the exception of some R&D projects conducted for the Department of Defence (DOD) and NASA (National Aeronautics and Space Administration). DOD-SBIR has additional incentive schemes to stimulate companies to be successful in the commercialisation of their projects, however. US-SBIR mobilises R&D funds from all policy domains and only to a limited degree public procurement funds, and it is not a public procurement programme per se, although the sheer size of all the Agencies involved (roughly \$2.5 billion per year) makes its overall impact on small firms quite large (Manchester Business School, 2012).

“...This pre-commercial procurement model has been used successfully in the US since the 1980s. The scheme is designed to encourage small business to develop new processes and products and to produce quality research in support of the US Government’s policy priorities. It was introduced due to concerns in the US about: the country’s ability to compete in the face of Japanese performance in automotive, steel and semiconductors, failure to translate research prowess into commercial advantage, the declining share of federal R&D going to SMEs and the problems faced by innovative small business in raising capital. Technology based small businesses employ nearly 40% of the science and engineering workforce in the US and SMEs account for 60-80% of net new jobs created annually. The programme lets \$2 billion of contracts annually. Since inception the SBIR50 programme has worked with over 15,000 firms, developed more than \$21 billion worth of research and over 45,000 patents. Qualcomm and Symantec are often quoted as SBIR success stories. Qualcomm employs some 16,000 people with sales revenue in excess of \$10 billion and a market capitalisation in excess of \$60 billion. Symantec employs 17,000 people with sales revenues in excess of \$6 billion and a market capitalisation in excess of \$13 billion. The Innovation Development Institute estimates that SBIR delivers a multiplier of five to seven in terms of economic benefit accrued” (BIS, 2012a).

The US Small Business Innovation Research Programme has inspired similar initiatives in Europe, among them the SBRI in the UK and SBIR in the Netherlands (Technology Strategy Board, 2013) (Netherlands Agency, 2012).

In the United States, procurement by federal agencies is part of a suite of measures designed to tackle ‘environmental sustainability’. President Obama’s Executive Order 13514 on “Federal Leadership in Environmental, Energy, and Economic Performance,” sets out specific performance targets in water use, pollution and waste, buildings and infrastructure, greenhouse gas emissions, and the purchase of green products, specifically identifying the use of eco-labels Energy Star and EPEAT to ensure that 95 per cent of new contracts improve environmental sustainability. The EO also directs federal agencies to “leverage agency acquisitions to foster markets for sustainable technologies and environmentally preferable materials, products, and services” (United States Government, 2009).

A sister initiative of the Small Business Innovation Research (SBIR) program is the Small Business Technology Transfer Programme (STTR) which expands funding opportunities and includes joint venture opportunities for small businesses and non-profit research institutions. The unique feature of the STTR program is the requirement for the small business to formally collaborate with a research institution in the early phases of funding (United States Government, 2013).

President Obama’s 2013 State of the Union Address reaffirmed the government’s intentions, through the development of a network of 15 innovation hubs, to stimulate R&D and US manufacturing outputs (NY Times, 2013).

European Union

Pre-commercial procurement

Pre-commercial procurement is an approach for procuring R&D services, which enables public procurers to share the risks and benefits of designing, prototyping and testing new products and services with the suppliers (EC, 20123i).

Pre-commercial public procurement is a relatively new instrument and its popularity is growing in the EU Member States partly encouraged by EU level initiatives. It has a strong demand element in-built, but its support is to the supplier of an innovation and the actual uptake by public bodies is not automatically in-built (Technopolis Group, 2011). The two front-runner measures in Europe in terms of pre-commercial procurement are the pioneering SBRI/SBIR measures in the UK and in the Netherlands, both of which are coordinated by a government agency (the UK Technology Strategy Board and the Netherlands Agency respectively) and implemented in collaboration with the procuring authorities (Technology Strategy Board, 2013) (Netherlands Agency, 2012).

The key objective of both programmes is to foster the procurement of research and development, which contributes to solving a socio-economic challenge.

These measures share a structure consisting of a three-step implementation structure:

- a feasibility stage
- product development and
- the actual procurement.

The process usually starts with the identification of a challenge where a governmental organisation is seeking a solution in the format of innovation procurement plans or masterplans. Some of the schemes seek to improve international competitiveness and have a more or less explicit focus on SMEs. One of the challenges of these schemes is to transfer the demand for a solution and the investment in generating a solution into concrete purchase and roll out (Technopolis Group, 2011) (EC, 2013i).

The EU Directorate General on Enterprise and Industry has launched a series of dedicated funds to increase the procurement of innovation, and pre-commercial and first commercial procurement across Member States. (EC, 2013i)

Recent drafts of the EU Procurement Directives (revising Public Procurement Directives 2004/17/EC and 2004/18/EC) includes provision for eco-labels, fair trade labelling and life cycle costing intelligence to be included in award criteria (EC, 2013c) (UK Government, 2013).

European governments recognise the importance of international collaboration in research and technology development and that these investments are likely to contribute to the economy. Maldur et al. estimated that the contribution of € 7 billion/year in R&D in 2006 could generate a GDP increase of € 200 billion/year in the 2030s (Muldur, 2006). Since 1984 the EC has promoted a series of Framework Programmes to support R&D. These programmes are funded through instruments such as Integrated Projects, Network of Excellence (NoE) and Specific Targeted Research Projects (STReP) (EC, 2013e).

Framework programmes last between 5 and 7 years and we are currently in Framework 7 (FP7), which is coming to an end in 2013. The new programme starting in 2014 is called Horizon 2020 and is expected to have a budget of about €80 billion (EC, 2013a). One of the key aims of the Horizon 2020 framework program is to support the competitive industries by investing in key industrial technologies and letting business set the agenda.

Horizon 2020 will:

- build leadership in enabling industrial technologies, with dedicated support for ICT, nanotechnologies, advanced materials, biotechnology, advanced manufacturing and processing, and space, while also providing support for cross-cutting actions to capture the accumulated benefits from combining several Key Enabling Technologies;
- facilitate access to risk finance;
- provide Union wide support for innovation in SMEs.

Leadership in enabling and industrial technologies: will support the development of technologies underpinning innovation across a range of sectors, including ICT and space. Horizon 2020 will have a strong focus on developing European industrial capabilities in Key Enabling Technologies (KETs) with a budget of € 5,894 million in constant 2011 prices. These include:

- Micro- and nano-electronics; photonics
- Nanotechnologies
- Advanced materials
- Biotechnology
- Advanced manufacturing and processing
- Development of these technologies requires a multi-disciplinary, knowledge and capital-intensive approach (EC, 2013a)

Although this programme is not directly related to public procurement, it is designed to promote inter-organizational collaboration between industry, government and academia. UK manufacturing companies are entitled to access this funding by collaborating with partners across Europe.

The European Lead Markets Initiative

Lead market initiatives support the emergence of lead markets. A lead market is the market of a product or service in a given geographical area, where the diffusion process of an internationally successful innovation (technological or non-technological) first took off and is sustained and expanded through a wide range of different services. (EC, 2007b) (EC, 2013i).

The Lead Market Initiative is the European policy for 6 important sectors that are supported by actions to lower barriers to bring new products or services onto the market. The policy instruments deal with regulation, public procurement, standardisation and supporting activities. The European Commission, Member States and industry work together to carry out the action plans for the 6 Lead Markets: eHealth, protective textiles, sustainable construction, recycling, bio-based products and renewable energies.

These markets were chosen because they:

- Are highly innovative;
- Provide solutions of broader strategic, societal, environmental and economic challenges;
- Have a strong technological and industrial base in Europe;
- Depend more than other markets on the creation of favourable framework conditions through public policy measures (EC, 2007b).

The importance of applying coordinated approaches is illustrated through the launch of the concept of European Innovation Partnerships “...where demand and supply side tools will work together to solve some of the major societal challenges Europe is currently facing” (Technopolis Group, 2013). So public procurement is one of several measures and the need for greater coordination of approaches has been reiterated in the review carried out for DG Enterprise and Industry as follows: “A main message one can draw from the various cases is that demand-side policies do not work in isolation but they need to be designed complementary to supply-side policies” (Technopolis Group, 2013).

Public procurement networks

A number of networks have been established in Europe to support the public procurement of innovation, as summarised below:

In 2009, the EU created three specific public procurement networks dedicated to innovation; Enprotex, Sci-Network, and LCB-Healthcare. Each programme had an initial budget of about €1 million (not including individual country funding) to fund operation of the programme, while actual procurement funding was separate.

Enprotex is a joint procurement program between the governments of England, Belgium and Denmark to increase innovation in the procurement of fire and rescue services. The program helps incentivize the private sector to develop new protective textiles by connecting end-users with manufacturers and by developing a European-wide network of public procurement organizations for fire and rescue services.

The Sustainable Construction and Innovation Network (SCI-Network) aims to bring together local and national public authorities to create cross-border innovation-driven benchmarks within public construction and regeneration; specifically in renovation of existing buildings, innovative building materials, and better life-cycle-analysis and life-cycle costing.

Low-Carbon Healthcare (LCB-Healthcare) is a consortium of the UK's Department of Business, Innovation and Skills, the Netherland's Organization of Applied Scientific Research, Norway's Directorate for Health Affairs, and the European Health Property Network (EuHPN). The consortium's goal is to collaborate around country-based pilot projects for low-carbon building and materials in the health care industry (Andes, 2010).

The analysis of the Lead Markets Initiative Final Report shows that communication services, financial services and computer services are best suited for lead market development. Business services, R&D services, insurance, renting and real estate share

a high degree of tradability and opportunities for industrialisation too; the degree of customised or bespoke services, however; is higher in these sectors. Transport services, in contrast, have high service specificity, but only little innovativeness and also lower opportunities for labour-saving industrialisation strategies than other service sectors. The same is true for hotels and restaurants (Technopolis Group, 2013).

Reflecting on this in terms of 2020 and beyond, the potential of the Lead Markets Initiative approach is summarised under the Industry Policy Flagship which prioritised a number of sectors for which the LMI-type approach could be used in the future, as well as continued: construction, textiles, chemical industry, bio-based products, KETs and resource efficiency.

Some very pertinent conclusions are drawn from the evidence gathered by the Technopolis study for DG-Enterprise and Industry, of a move away from isolated policy initiatives towards a more systemic approach as follows (Technopolis Group, 2011):

“There are indications of more systemic policies, combining different demand-based instruments or even demand and supply side approaches. This ranges from demand led supply-side policies, whereby supply support is focused on areas with a clearly defined demand (e.g. societal challenge) to lead market type of mixes focused largely on the demand side itself with some underpinning supply side support. This points in the right direction, indicating that in the future interventions might be designed in a more holistic approach, focusing on the specific context of challenges and sectors rather than launching trendy but isolated innovation policy initiatives”.

“Only an “intelligent learning” rather than a policy copying can make the roll out of demand based measures successful. To that end, the EU can provide a test bed (as it does with pre-commercial procurement and the lead market initiative). It is essential that the challenges of those policies and the importance of context and accompanying policies are stressed, and evaluations of early applications should be widely shared and discussed” (Technopolis Group, 2011). Out to 2020 and beyond, therefore it seems reasonable to suggest that policy makers will be able to take lessons from the early application of pre-commercial procurement and lead markets initiatives, directing public procurement towards those areas most likely to be fruitful in generating innovations to meet societal needs. Public procurement and policy makers together are likely to have to be sufficiently flexible to respond to changing and newly emerging needs and opportunities.

Green public procurement in the EU

Green technologies have been a particular focus of current demand-side policies. Particularly, green public procurement is recognised as priority and efforts are driven towards increasing the share of green public procurement in total procurement (EC, 2013g).

EU Member States set a voluntary target of 50% of public procurement to be ‘green’ by 2010 (EC, 2013g). In this case ‘green’ was defined as compliant with the core Green Public Procurement criteria (EC, 2013h).

Through its use of criteria and standards for goods and (some) services, green public procurement plays a part in stimulating demand for higher performing products and can indirectly impact on manufacturing. Once again however, at least in the short term, more

direct influence on the manufacturing base of EU Member States is constrained by the rules governing public procurement.

Sweden

The Swedish Energy Agency, which since the early 1990s has initiated, co-funded and participated in nearly 60 separate technology procurements aimed at accelerating the shift towards more energy-efficient products and systems, is singled out internationally as an example of success in this area.

A study carried out by VINNOVA for the Swedish Government and published in 2007 made a number of recommendations on how to spur innovation through public procurement:

1. Introduce public procurement of innovation, i.e. procurement that includes R&D, as a general procurement form in Sweden. Create supporting structures of expertise with the help of public authorities that have R&D-review as core business. Introduce clear incentives to procuring public authorities by stating that one percent of the total volume of procurements should be allocated to innovation procurements. In addition, highlight successful procurements and reward them. In this manner, public innovation procurement can become a strategic issue for Swedish public authorities.
2. Strengthen the organisation and simplify the process for public procurement to enable co-ordination of demand. Thus, critical mass regarding methodological expertise can be achieved. This should be done in consideration of how to utilize the innovation potential and increase the efficiency of small and medium enterprises (SMEs).
3. Create reliable information for follow-up and statistics on public procurement. Evaluate the scope of public procurement and distribution as well as its effects on public organisations regarding organisational renewal and increased efficiency. Also, evaluate its effects on innovation in the private sector.

Well-known cases quoted in the study are the collaboration between Televerket (the Swedish Agency for Telecommunications) and Ericsson, which led to the AXE switching system and NMT, NordicMobile Telephony. Also, the collaboration between Swedish energy company Vattenfall and electrical engineering company ABB led to advanced power generators. Public innovation procurement can also be applied to promote innovation processes in smaller scales, for instance, procurement to boost software development, energy conservation techniques, and new telephony solutions in the public sector (VINNOVA, 2007).

The Netherlands

The Netherlands has recently produced, *SBIR the Power of Public Procurement: Innovative Solutions to Societal Challenges*, a summary of 25 case studies of how funding for small businesses can stimulate novel approaches to solving some of society's major issues (Netherlands Agency, 2012) (See Appendix 6). Inspired by American successes, the Netherlands developed their own SBIR programme in 2005. The Dutch Government uses its procurement power to mobilise the innovative capacity of Dutch companies to solve major societal challenges, such as mobility, sustainability, safety and health. At the same time, it promotes innovation, especially in small and medium sized companies, strengthens the business climate and increases the competitiveness of

Dutch companies. The case studies in the document shows how much innovative power, creativity and entrepreneurship Dutch companies have shown in developing and marketing new products, services and methods in very diverse areas.

PIANOo, the Dutch Public Procurement Expertise Centre, was set up to professionalise procurement and tendering in all government departments, with a view to improving efficiency and compliance with the rules (PIANOo, 2013). PIANOo is part of the Dutch Ministry of Economic Affairs, bringing together procurement and tendering experts, pooling knowledge and experience and providing advice and practical tips. The Expertise Centre also fosters dialogue between public contracting authorities and private sector companies. PIANOo works for and with a network of around 3,500 public procurement and tendering professionals.

PIANOo provides a stimulus to government bodies to elicit innovation from their procurement procedures. PIANOo brings together experts within the “Public Innovation Procurement” expert network, combines knowledge and experience, and gives advice. PIANOo also advises government bodies on how they can achieve innovative solutions in tenders, for example, in the field of protective clothing, cleaning and transport services. Furthermore, a budget is available for risk assessments and market surveys. PIANOo uses manuals, presentations and articles in professional journals to raise awareness of public innovation procurement opportunities. During themed meetings and in a PIANOo online discussion forum, buyers and procuring parties can exchange knowledge and experience.

PIANOo’s Top Tips for Buyers (see Appendix 7) provides advice on how to deliver ‘public innovation procurement’ through the procurement process and within the constraints of public procurement regulations (PIANOo, 2011).

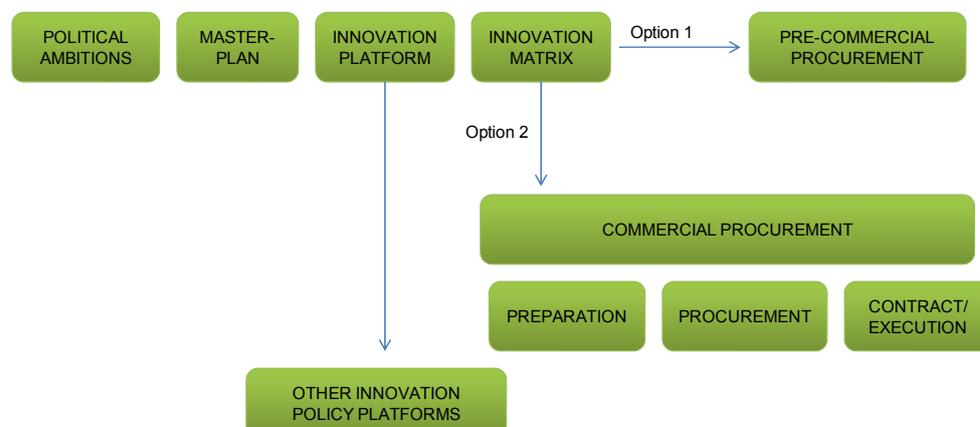
Belgium

Procurement of innovation – case study of Flanders

The case study attached at Appendix 8 provides details. Briefly, the instrument “Procurement of Innovation” (PoI) aims at fostering innovation in Flanders, in order to improve international competitiveness and to deal with societal challenges. The PoI model consists of an integrated public procurement trajectory, ranging from the initial demand of public bodies to the final commercial procurement. Importantly, all departments of the Flemish government are included in the PoI approach (Technopolis Group, 2011). The Flanders case provides important lessons for the UK and others. Figure 2 shows the model.

- The measure has an integrative policy approach and enables all ministerial departments to procure innovation; this opens many opportunities for policy mixes. Moreover, budgets were allocated to the minister responsible for innovation, as well as for the other ministers, thus creating ownership at several governmental levels.
- The measure has an integrative innovation approach, acknowledging different phases in innovation trajectories, as well as the systemic nature of innovation. Both pre-commercial procurement and commercial procurement is targeted by the measure. Even more important, innovation agency IWT is involved in finding synergies with other innovation policy instruments, so that demand-side measures are flanked by supply-side measures if necessary.
- The design of the measure and the implementation of it were well-prepared; this has avoided disillusion (regulatory issues, mismatch of ideas, managed expectations). (Technopolis Group, 2011).

Figure 2 – Procurement of innovation – case study of Flanders (Technopolis Group, 2011)



Germany

In Germany the ‘Law against Restraints on Competition’ allows public authorities to set additional requirements from contractors towards innovative solutions (Technopolis Group, 2011). However, there are concerns in Germany over the issue of generating demand for innovation designs that later prove to be less efficient than alternative designs. Indeed, as the report, *Trends and Challenges in Demand-side Innovation Policies in Europe*, points out, “In Germany, public procurement of innovation is sometimes considered sceptically. It has been argued that, first; innovations should meet the market test, especially on international markets. Public procurement follows strict cost efficiency rules, which limit the possibility of public entities to demand innovations that are more expensive than standard products and cannot clearly proof super-performance. Moreover, public demand is sometimes seen as highly idiosyncratic that may result in innovations that only fit to a certain public user, but cannot be marketed elsewhere” (Technopolis Group, 2011).

Challenges and concerns over the public procurement of innovation

A number of challenges have been reported across EU Member States and more widely. Amongst these, the Technopolis study comments on a Polish study (Panasiuk and Kloda 2010), a Nordic study (Weihe 2011) and evidence from Austria suggesting that the tools, techniques and skills for public procurement of innovation are still lacking (Technopolis, 2011).

Concerns have been raised in Austria, Ireland and Portugal too, over the public procurement of innovation. These concerns include the perceived waste of public funds, the dangers of potential anti-competitiveness and the risk of imposing regulations or standards that are counter-productive to future technological developments.

South Korea

Strategic Procurement Policy for Innovation

The key features of the policy are:

- The New Technology Purchasing Assurance Scheme: Public agencies give preference to the procurement of goods and services from SMEs, which receive a new technology guarantee from the government (price and purchasing assurance).
- Procurement-conditioned SME R&D programme: Government finances the Technological development of SMEs, and public institutions purchase the products for a certain period.

The lessons learned from South Korea include:

- A binding system (as compared to non-binding recommendations) can be effective in promoting the procurement of SME innovation.
- Adopting a performance insurance system and a buyer immunity clause in SME procurement can help to mitigate risk aversion as it reduces the burden of responsibility of procurer.
- The lack of quality verification and difficulty for the repair and maintenance of a purchased product are identified as the main barriers for procuring products from SMEs. A Performance Certification System and Performance Insurance System could be a solution.
- Procuring innovations from SMEs requires a combination of various policy instruments to enhance linkages (e.g. pre-commercial R&D programme linked with procurement, public-private partnerships, venture capital funds) (OECD, 2011).

South Korea has a particular reputation for investing in SME innovation support programmes. There is, for instance the SME Technology Innovation Development Programme and INNO-Partnering Forum for better SME Innovation support services and from a financial perspective there is the Korean Technology Finance Corporation (KOTEC) which gives loan guarantees for high tech SMEs (EC, 2012).

The South Korean 2009 stimulus package of 50 trillion won was dedicated 81 per cent to environmental and energy efficiency improvements and was targeted to generate 940,000 green jobs (Andes, 2010).

Japan

The approach to innovation, standardisation and procurement of Japan illustrate how demand-side policy-making can be used to tackle major environmental and social issues such as the effects of climate change and an ageing population.

The OECD Report summarises the approaches adopted in Japan: “Measures for a Problem-Solving Country; promotion of International standardisation. The New growth strategies of Japan focus on green innovation and life innovation” (OECD, 2011).

The lessons drawn from the experience of Japan include:

- Innovation strategies should be broad-based and STI policies should be linked to economic, foreign and social policies.

- Demand-side innovation policies can address global and social challenges such as climate change and ageing populations.
- In a tight public fiscal situation, government can consider utilisation of demand-side instruments such as regulation and standardisation, which do not rely on financial resources, to promote innovation.

From a public procurement perspective, Japan's Green Purchasing Law of 1990 and its Top Runner Programme raised the bar on environmental standards and successfully drove markets to innovate, with impacts that have been felt worldwide. It could be argued that Japan has been one of the first countries to address issues of the ageing population and the potential impacts of climate change precisely because of its propensity to take a longer-term view of societal issues than is the case in many other nations (Government of Japan, 2013) (International Green Purchasing Network, 2013).

Japan's Ministry of Economic Trade and Industry, for instance, developed an integrated procurement process aimed at expanding technology procurement horizontally across government which promoted the rapid adoption of ubiquitous 3G networks across the government.

5.2 UK experience and lessons learnt from other countries

In this section, the review seeks to answer the following questions: What are the UK successes of public procurement delivering innovation, R&D and manufacturing of products in the UK? What are the weaknesses and what can the UK learn from the international experience?

The UK's SBRI initiative, along with the SBIR programme in the Netherlands have been acknowledged as front-runners in the public procurement of innovation (Technopolis Group, 2011). These programmes display some significant differences, insofar as the approach adopted in the UK addresses the concrete functional needs of public sector organisations, while the Dutch model involves a focus on certain societal challenges, which have been shown to include climate change and health, for example (The Netherlands Agency, 2012) (PIANOo, 2011). In the case of the Netherlands, the SBIR programme is also applied for catalytic procurement where the private sector is the main end user. In the UK and across European Member States, green public procurement standards have been promoted as a mechanism which could help stimulate private consumption of resource-efficient, energy-saving products. In this case government and public sector agencies act as lead customers, but the impact is intended to spread to the private sector (through supply chains for example) and to the level of the individual consumer (Defra 2013b).

In the UK, public procurement can be seen to be stimulating manufacturing in two key sectors in particular - defence and healthcare which was discussed in Section 2 (Question 2). However, one of the lessons to be learned from both UK and international experience is that innovation is taking place where the lead customer is seen to be acting strategically or driving relatively 'high-tech' solutions. Often this is done in close collaboration with the market. Across the rest of the organisation, where routine goods and services are being purchased, the picture is entirely different. In defence, innovation is taking place in the strategically important elements of supply, such as avionics, electronics and naval equipment. But when considering routine items that support

defence activities, including buildings and maintenance, it appears that procurement is regarded as less important, so opportunities for innovation are more likely to be missed. Similarly in the case of healthcare, for example, clinicians may be involved with the leading technology providers in the search for innovative solutions. Meanwhile for the purchase of a vast range of non-specialist, routine items including cleaning, catering and office supplies, opportunities for innovation are almost completely neglected. The particular characteristics of high-tech defence and healthcare procurement mean that it is likely to be difficult to replicate achievements in other areas of public procurement.

In terms of skills and capability, the UK may be able to learn from the experience of PIANOo and others in developing networks of practitioners and experts. This could strengthen efforts to produce guidance on how public procuring agencies can promote innovation and stimulate manufacturing.

The feasibility study on future EU support to public procurement of innovative solutions proposed ‘horizontal support’ for community development, capability, learning and dissemination as one of the three strands of activity (Manchester Business School, 2012).

Figure 3 - Main Policy Options

Strand One: Strategic Sectors	Strand Two: Contracting Authority Driven
Lead Market Initiative & European Innovation Partnership Led (60%)	Response Mode Contracting Authority Innovation (35%)
Strand Three : Horizontal Support	
Community Development, Capability, Learning & Dissemination (5%)	

The OECD Report also draws attention to the implications for public procurers and others in terms of skills, competences and the need for cultural change: “A demand-side innovation policy gives a more pivotal role to public administrations (e.g. through procurement, regulation, and setting and certifying standards). This requires investments in skills and competencies in public administration, as well as organisational and cultural change” (OECD, 2011).

The experience and sometimes scepticism of some countries in the public procurement of innovation can also assist the UK to ensure that it continues to pursue this agenda in ways that are not likely to bring challenges of anti-competiveness or wastefulness of public funds, for example. The UK should also beware of the risks of stimulating the development of products and services that cannot be marketed widely across the public and private sectors.

The UK government’s Commissioning Academy may be one model of capability building through which more innovative procurement and the procurement of innovation may be promoted (Cabinet Office, 2013c). While the Commissioning Academy has a focus on public service delivery, it may be an example of the type of skills development mechanism that will be required in future for the stimulation of outcomes-focused demand side behaviours.

One of the key strengths of the UK, as pointed out in the Technopolis Group survey and elsewhere, is the role of the Technology Strategy Board in the SBRI programme and the Catapult Centres (Technopolis Group, 2011). The development of platforms such as the Knowledge Transfer Networks (KTNs), including the Environmental Sustainability KTN could potentially provide mechanisms through which the procurement of innovation can be fostered, alongside established platforms for public procurers as in the models of Enprotex, SCI-Network and LCB-Healthcare. Closer working with both public and private sector procurers through networks of practitioners, such as the development of sector-focused groups in local government, health, higher and further education may offer another route to effective promotion of the procurement of innovation in the future.

Public procurement innovations and SMEs

One area of concern often raised concerning government procurement is the lack of contracts being awarded to small- and medium-sized enterprises (SMEs). While small and young firms often enter the market with new products and business models, they often have difficulty winning government contracts because of rules favouring incumbent firms, such as weighing contracts towards firms that have received contracts in the past. Also current trends in public sector procurement towards larger and longer contracts, and Government and the private sector rationalizing the number of suppliers, means that smaller businesses often find the resulting contracts too large for them. To alleviate this problem the European Union publishes "Tender Electronic Daily" (TED) to alert SMEs to upcoming contracts in their area (EC, 2013d). In the UK, for instance, the Scottish Government uses the Public Contracts Scotland portal which gives free access to contract opportunities in Scotland (The Scottish Government, 2013). This portal improves access for SMEs and may contribute to SMEs entering the market with new products manufactured in the UK.

Also in Scotland, the Ready for Business initiative is aimed at building capability amongst third sector organisations, including SMEs and social enterprises, enabling them to compete for public sector contracts, for example (Ready for Business, 2013). Significantly, this programme provides training to public procurers to develop their understanding of how to procure innovative solutions from a relatively 'young' market, including firms involved in the re-manufacturing sector.

Since launch in April 2009 there have been 82 SBRI competitions run with 26 separate public sector organisations and over £60m of contracts issued. It has resulted in 570 contracts involving 24 government departments and agencies and with the participation of 2,100 companies. 74% of the support went to SMEs at various lifecycle stages from pre-start-up to mature company, however; the spending of overall procurement budgets on SMEs could be improved according to the recent analysis undertaken on behalf of DG-Enterprise and Industry (Technopolis Group, 2013).

In 2011-2012 new partners adopted SBRI including the Environment Agency, the Welsh Government, WRAP, NHS London, NHS Midlands and East, and the National Centre for the Refinement, Reduction and Replacement of Animals in Health. Ministry of Defence continues to be a major user of SBRI, and use by the Department for Environment, Food and Rural Affairs is increasing (Technopolis Group, 2013).

Since 2009, 286 contracts have been awarded through the SBRI program totalling 12 million pounds (Technology Strategy Board, 2013).

UK - Supporting emerging technologies

In the UK over £200 million has been invested through the Technology Strategy Board (TSB) to support a network of 7 Catapult Centres. These are due to open by June 2013. They are designed to provide investment in emerging technologies where the UK has the relevant expertise. Each Catapult works in an area which the government has already identified as strategically important in global terms and where there is potential for the UK to gain competitive advantage (Technology Strategy Board, 2013).

UK – innovation and decentralisation

Lord Heseltine's report, *No Stone Unturned in Pursuit of Growth*, makes the case for decentralised innovation centres (BIS, 2012a). The report also strongly makes the point that the funding and remit of Local Economic Partnerships (LEP) should be greatly strengthened to again tap into the potential of local enterprise and innovation which is not being developed to its full potential in the regions outside the South East. The Hauser Report also suggests that support for regional enterprise and innovation, including Innovation Centres, in the UK regions would strengthen UK manufacturing competitiveness (BIS, 2010a). Such decentralisation might also increase the opportunity for public procurement in the regions to influence innovation and manufacturing.

There is some evidence from the UK's devolved administrations, Scotland and Wales in particular, of innovative approaches to public procurement resulting in the generation of employment and skills development opportunities (see the cases of hybrid ferries at Appendix 2 and biomass-derived energy solutions at Appendix 3 as well as references below, for example). In these cases, a combination of political will, an appetite for innovation and an appreciation of the short-, medium and longer-term benefits of innovative procurement have delivered successful outcomes, albeit on a very limited number of projects to date (Caledonian Maritime Assets Ltd., 2013) (Zero Waste Scotland, 2012).

As part of this review, stakeholders discussed the possible consequences for public procurement of the heightened appreciation of socio-economic issues including labour rights, working conditions and rates of pay in global supply chains. Coupled with a greater focus on chains of custody for materials such as timber and wood-based products, stakeholders felt that these influences could possibly result in a withdrawal from certain 'high risk' supply chains. Supplier selection processes are already being given greater attention in major projects such as the Olympic Games, for example (London 2012, 2012). Were all of this to result in a move towards 'on-shoring' of manufacturing, some stakeholders argued that it could put UK manufacturers who were able to demonstrate strong social and environmental credentials in a stronger competitive position in the short to medium term.

5.3 Concluding remarks

The lessons that can be learned from the international experience are broadly two-fold. The UK is able to point to some achievements, notably in high-tech areas of defence procurement and healthcare. It has been acknowledged as one of the leaders in respect of its SBRI programmes and recent investments in new Catapult Centres builds on successful practice.

However, this international overview points to some weaknesses. One of these is the continuing perceived focus of government procurement on the procurement of the lowest cost, off-the-shelf overseas product at the expense of the UK manufacturing base. This focus on short-term, low cost buying can foreclose opportunities for sustainability as well as technological innovation. In Heseltine's view, public procurement practice in the UK "...ignores the issues about the country's industrial base – the exploitation of R&D, the skills we need and the creation of jobs... Although crucial in major policy areas such as defence or aerospace, the same issues are everyday challenges for ministers whether they are placing contracts for high speed trains or new IT systems" (BIS, 2012a). This suggests that the UK has room for improvement when compared with other nations, even some of those subject to the same EU public procurement constraints, such as Sweden and the Netherlands. The key difference may lie in attitudes to risk (of challenge from suppliers, for example) and the appetite of government to promote the indigenous supply base. It may be argued that the UK devolved administrations are displaying a greater appetite for public procurement of innovation.

In analysing the role of public procurement in stimulating green growth, for example, Andes points out that: "While countries have had varying degrees of success in implementing their green stimulus programs, the most successful have been those that complemented spending with policy incentives and commercial frameworks to catalyze future green investments long after the stimulus period ended. Two such instruments were green public procurement and green private finance initiatives" (Andes, 2010).

This seems to suggest that public procurement acting alone will not be sufficient to drive growth but that government has a role to play as a lead customer.

Lessons from this brief review of experience at international level for public procurement of innovation and stimulation of manufacturing in the UK include:

- The significant role to be played by governments as 'lead markets' in stimulating public procurement of innovation
- The potential benefits of both developing demand-side and supply-side policies so that they may become mutually reinforcing
- The need to build skills and capability in the area of understanding risk and opportunity in relation to the procurement of innovative solutions
- The need to build skills and capability in whole life costing and for public bodies to apply whole life costing principles to their acquisition decision-making processes
- The role public bodies can play in 'raising the bar' to meet higher levels of sustainability through the use of mechanisms such as the EU's Green Procurement product criteria and the UK's Government Buying Standards, for example (EC, 2011, 2013h) (Defra, 2013a).
- The benefits to be achieved through the development of platforms in which public procurers can share learning and interact with key markets.

6. In what ways could co-ordinated procurement catalyse and support UK Manufacturing?

This section of the review addresses the following question:

- In what ways could co-ordinated procurement (procurement that meets multiple Government departmental goals) catalyse and support UK Manufacturing?

6.1 The challenges for co-ordinated procurement

Evidence from the UK, including interviews with stakeholders as part of this review indicates that coordinated procurement is not widely practised in the public sector at present.

Co-ordinated procurement gets its legitimacy from need to be supported by co-ordinated policy-making. In the UK at present, policies are often competing rather than co-ordinated or complementary. This presents challenges for public procurement. It also presents challenges for commissioners of goods, works and services. Not least, it presents challenges for the supply side, including (but not limited to) the UK manufacturing base.

This message has been reinforced recently by the report, *2020 Vision: an Agenda for Transformation* (Legatum Institute, 2013) where the 'department focused nature of government' is reported as a major barrier, as follows:

“Moving towards a project based Government

A recent report from the National Audit Office, *Managing Budgeting in Government*, revealed that only 0.2 percent of government expenditure allocated in the 2010 Spending Review came from joint submissions from government departments (NAO, 2012). This demonstrates the stark nature of the still hierarchical and department focussed nature of government. Government departments continue to be focused on defending their own budgets and departmental defined priorities. The government policy of promoting community budgets, for example, which attempts to pool budgets to tackle complex issues like family intervention, has been met with internal resistance.

This resistance to talking issues on a cross-departmental basis and often in co-operation with local government on a decentralised basis is one of the key reasons why governments have been historically very poor at driving delivery of broader policy objectives. Delivering on the government's policy objectives is hampered by the still rigidly hierarchical nature of department structures.”
(Legatum Institute, 2013)

The National Audit Office report, *Managing Budgeting in Government*, also commented on the barriers to collaborative procurement associated with the way in which government organises budgets:

“The budgetary system does not incentivise departments to collaborate (paragraphs 2.21 to 2.23). The budgetary system encourages departments to bid for funds based on their specific needs. It does not promote cross-government working to tackle issues that do not fall neatly into the remit of one department. SR10 drew on co-ordinated submissions in just three areas – strategic defence and security, overseas development and local government” (NAO, 2012).

It is worth noting that strategic defence was one of the exceptions. Commenting on the opportunities for collaborative procurement in the defence sector, one of our stakeholders pointed out that:

“From a Defence procurement perspective, co-ordinated procurement can have its benefits, but it is generally very complex and can have a negative impact on individual buyers as some departments might not achieve the best “value for money”, particularly larger departments who already have strong bargaining power have little to gain and can lose flexibility and independence by participating in co-ordinated efforts. There are many trade-offs in co-ordinated procurement and the outcomes are not easy to analyse” (Pers. Comm. Defence sector interviewee, 2013).

He went on to reflect on the motivations for coordinated procurement in his sector:

“It is also important to note that many of the co-ordinated approaches, such as shared services and commodities such as computers, vehicles and even medicines is usually done to achieve a reduced prices (through increased bargaining power) rather than to support manufacturing” (Pers. Comm. Defence sector interviewee, 2013).

With regard to public procurement’s role in the development of infrastructure in the UK, budgetary rules seem to present similar challenges. Some of the issues and barriers in relation to procurement of public sector buildings and infrastructure were identified in the 2008 report, *Costing the Future: Securing Value for Money through Sustainable Procurement*, as follows:

“The public sector has enormous purchasing power. The Government has a crucial role in guiding procurement so as to raise environmental and social standards. It should be encouraging innovation, stimulating markets and promoting new technological solutions for a more sustainable built environment. Whilst the Government has recognised that it must use the procurement process to lead by example, progress has not been uniform. It almost seems that every instance of best practice in public sector construction is matched by a missed opportunity” (Westminster Sustainable Business Forum, 2008).

The recommendations of this report included:

Whole-life budgeting

The inquiry found that a lack of clear leadership on whole-life costing has perpetuated a perceived conflict between sustainability and value for money in public sector procurement.

Even where this has been overcome, there is still an existing conflict between affordability and value for money which often manifests itself in the allocation of unrealistic budgets for sustainable construction.

Recommendation 4

The Treasury must provide clear leadership on sustainable procurement and ensure that whole-life costing is applied in all public sector procurement. (Westminster Sustainable Business Forum, 2008)

This indicates that the scope for co-ordinated procurement is limited and so the scope for cross-government or cross public sector procurement to stimulate UK manufacturing will be subject to similar constraints.

6.2 Whole life costs

A study which included nine case studies from across the EU concluded that “One of the most important barriers to innovative procurement is failure to distinguish between direct purchasing cost and overall cost. The best overall value of procurement is realised through calculating life-cycle cost or even through the contribution of innovation to overall economic growth. The most economical procurement is an important clause for public funds and should by no means be eliminated but policies should highlight longer term aspects of return on public investment, like life-cycle costs, capturing high-technology markets etc. Gathering intelligence and calculating risks are inputs in this process and lead again to the crucial issues of training and professionalization” (Fraunhofer Institute, 2005).

Life cycle costing and whole life costing have been seen to be fundamental principles of public expenditure as a whole and public procurement in particular, as illustrated in the UK by HM Treasury’s ‘Green Book’ (HM Treasury, 2011). In practice, however; life cycle costing is one of the many tools currently under-utilised in many contracting authorities, due to the combined constraints of time, capacity and capability (Westminster Sustainable Business Forum, 2008).

Whole life costing tools and procedures are relatively advanced in the infrastructure and construction sector, with BS/ISO 15686-5 for example. Stakeholders confirmed that the UK public sector has not yet routinely adopted whole life costing as standard practice, using a single agreed model consistently. Various tools have been developed for use by public sector bodies (CIPFA, 2011). One of these emerged from the ‘Smart SPP’ project in Europe which itself was concerned with using public procurement to stimulate innovation and led to the development of a life cycle costing and carbon calculator tools (ICLEI, 2013).

6.3 What needs to change?

HM Treasury rules on public expenditure as laid out in the Green Book are clear that public spending decisions should be made on the basis of whole life costs. However, the term “whole life cost” is problematic because it depends on the unit of analysis. The way this tool is usually used refers to the total cost for a single organisation and overlooks the cost/benefits it can have on other organisations or departments. Any benefits public procurement could make to the UK manufacturing sector would not be captured by using a whole life cost approach in isolation.

So it seems that the rules while the rules themselves may not need to change, the way in which they are applied does. Numerous groups have been established and initiatives undertaken over the years to tackle these issues, amongst the most recent of which is HM Treasury’s Natural Capital Committee (HM Treasury, 2013).

6.4 The challenge of co-ordinated procurement

As Edler and Georghiou have pointed out:

“In state procurement two levels may be distinguished, which, in the literature at least, are usually not distinguished. At the first level, government procurement is generally organised such that innovation becomes an essential criterion in the call for tender and assessment of tender documents. Such an approach is being tried at present by the UK. As a rule, central procurement offices are generally responsible for procurement. They are located either in ministries of the interior or finance, but not in the ministries responsible for innovation policy.

The second level, strategic procurement, occurs when the demand for certain technologies, products or services is encouraged in order to stimulate the market. Strategic procurement is as a rule associated with sectoral policy and therefore to a large extent again is neither initiated nor co-ordinated by the ministries responsible for innovation. A systematic utilisation of both forms of government procurement calls for co-ordinated action, i.e. co-ordination between various ministries and authorities and their admittedly widely different targets and incentive structures” (Edler and Georghiou, 2007).

And later “Strategic public procurement is about selecting whole market areas in terms of their importance in the economy and their apparent ripeness for innovation” (Edler and Georghiou, 2007).

Co-ordinated procurement may need to be carried out in the context of more ‘enlightened’ resource allocation, so that the current patterns of silo-budgeting and short-termism are avoided. While challenges imposed by the budgetary regime need to be overcome if effective collaborative procurement is to be applied, then there also a need for more clarity and consistency in the articulation of policy objectives.

Co-ordinated procurement gets its legitimacy from, and needs to be supported by, co-ordinated policy-making. At present, policies are often competing rather than complementary or co-ordinated. This presents challenges for commissioners of works and services as well as procurers of goods. Not least, it creates obstacles for the supply side, including, but not limited to, the UK manufacturing base.

6.5 Examples of co-ordinated – and collaborative – procurement

There are some examples of co-ordinated procurement from which lessons can be drawn in terms of their potential impact on the UK manufacturing base. In defence, co-ordination takes place at pan-European level, with engines and wings for military aircraft being produced in the UK. Employment opportunities are created in the UK through the supply chains associated with these production processes. In the future, there may be potential for co-ordinated procurement to take place across nations, at pan-European level for example, in sectors other than defence. As manufacturing is already truly global, multi-national supply may be mirrored by more co-ordinated demand, including demand from the public sector.

New models of co-ordinated procurement are already being driven to some extent by changes to the procurement landscape under prevailing economic constraints. Private sector providers are stepping in to identify economies of scale in the provision of services such as facilities management and supply chain logistics (as in the case of DHL working with the NHS). Co-ordinated procurement of goods and services across multiple customers is currently driven by the quest for resource efficiencies. There may be opportunities in the future for coordination of demand to satisfy a broader range of policy objectives.

One example of multiple policy objectives being met through co-ordinated procurement - with innovation at its core - comes from the Scottish Government's approach to the procurement of a biomass-derived heating solution (Zero Waste Scotland, 2012) (See Appendix 3).

6.6 Opportunities for co-ordinated procurement

As the Scottish Government case illustrates, when co-ordinated policy-making is in place, UK public procurement, working with key markets, is likely to be able to deliver effective solutions to multi-faceted public policy challenges. Some of the most pressing challenges are to be found in areas such as healthcare including the ageing population, obesity and diabetes, for example.

In terms of infrastructure development, co-ordinated procurement could lead to solutions for challenges such as threats to energy security on a large scale or even fuel poverty at the level of individuals and families. Co-ordinated procurement can play a role in stimulating the development and use of low carbon technologies, as in the case of Glasgow Housing Association where combating fuel poverty goes hand in hand with addressing health needs; stimulating the development and use of low carbon technologies; and developing the skills base of the local economy (Glasgow Housing Association, 2013).

So, we may see a set of clearly articulated requirements (or unmet needs) expressed in outcome terms, being met by a UK-based provider or consortium of providers, offering innovative, sustainable solutions while enhancing the economic prospects and skills base of the UK population.

For example, in the healthcare sector this may involve a 'Future Healthcare Environment' (rather than a hospital or clinic for example). Such an environment could be designed,

built and operated with a view to stimulating innovation and sustainability in the UK manufacturing sector. Given that there are already numerous funding models for healthcare provision, it is not necessary to assume that public procurement will be responsible for all of the requirements of such an environment. But the needs of an ageing population or a population with particular healthcare requirements may in future be expressed at least in part through an agency of government.

While there are already some examples of innovative practice from the UK and while the UK can learn from the approaches adopted by other nations as outlined in section 3, perhaps one of the critical success factors for 2020 and beyond will be the ability to combine these strengths and opportunities into a 'package' of requirements to deliver multiple benefits. The potential combination of technologies has been referred to in a study by Technopolis for EU DG-Enterprise and Industry in 2013.

So, for example, the opportunities for UK manufacturing could possibly emerge from areas such as:

- The design of energy efficient buildings and facilities (if and when 'buildings' as such are actually required). UK manufacturers are currently able to supply more resource efficient products, including high recycled content building products, sustainable insulation, etc.
- The design, production and supply of medical devices using materials that help ensure security of supply for the UK healthcare sector into the future. This responds to current and predicted challenges around rare earth metals, so-called conflict minerals and other materials.
- The use of bio-based materials
- The use of fibre-based materials (responding to the challenges of biodiversity in global supply chains for example)
- Telemedicine as part of diagnosis, treatment and monitoring using technologies based in the UK
- Pharmaceuticals developed, patented and produced in the UK
- Packaging of medicines, medical devices produced in the UK
- Transportation of supplies using energy-efficient vehicles designed and manufactured in the UK
- The use of 'smart' textiles to monitor and respond to blood sugar levels (amongst others)

6.7 Government leading from the front

Commenting on the potential role of government, the Legatum Institute argues that:

“Government cannot choose winners and losers, but it can showcase some of the most effective technologies. What better test bed than using government procurement to assess some of the more innovative products and processes that could build greater resilience to cost” (Legatum Institute, 2013).

The group concluded:

“While Government cannot be responsible for establishing a green economic model, it does need to be the chief cheerleader in greening the UK’s economy. To achieve this 2020, low-carbon, low-input, more competitive model, ministers across Whitehall will have to encourage industries relevant to their portfolio to adopt a low-carbon, low-input business model. For economic benefits to reach the taxpayer and to set an example to wider industry, Government itself has a duty of responsibility to transition to and showcase this new economic model” (Legatum Institute, 2013).

This Legatum Institute document looks only as far as 2020. If we are to look out to 2050, public procurement might be tackling even more complex socio-economic and environmental challenges.

Multi-nation procurement may be necessary to tackle challenges on such a scale. Mechanisms designed to tackle multiple objectives may need multi-national budgeting approaches and could still be designed so as to ensure the security or even growth of the manufacturing bases of these nations, including the UK.

Co-ordinated procurement to achieve multiple policy objectives is also likely to need to exploit data gathering and manipulation technologies, to aggregate demand. It is likely to be more effective if co-ordination takes place much earlier in the decision-making process and at a much higher level within procuring organisations. SSCG members also expressed the view that public procurement will be more effective in the future if it can capture the benefits of several technologies, across a range of applications. All of this implies that procurement professionals and their colleagues will have the ability to appreciate and indeed exploit the potential of emerging technologies in a range of public sector environments.

This review gathered the views of stakeholders on the possible future use of co-ordinated procurement and asked them what else they thought public procurement might be able to deliver in the future. Dr Gordon Murray’s response illustrates the potential of public procurement:

“Develop an approach for prototype procurement - by this I mean quick prototypes which may or may not work but which can shape the final product” (Pers. Comm. Dr Gordon Murray, 2013).

If we read ‘final product’ in this case to mean ‘outcome delivered’ rather than ‘piece of equipment’ then we may have a model for future procurement.

Co-ordinated procurement could be supported by future regulation, including pan-European regulation, too:

“Extending producer responsibility requirements to encourage take-back and recovery of products for remanufacturing, reuse and recovery of component materials – this would reduce product footprints by improving lifetime optimisation” (Pers.Comm. Mervyn Jones, 2013).

At the very least, the evidence indicates that co-ordinated procurement will involve clear signals to the market about policy priorities and the direction of travel. It is likely to involve innovation centres and platforms for sharing knowledge (as in the Knowledge Transfer

Network model), as well as mechanisms such as SBRI to encourage and support innovation from small businesses. Taking lessons from other countries, notably the US, it appears that the UK may need to consider encouraging greater buy-in by the private sector to make some of these platforms and initiatives more effective.

Also, perhaps the brokering role called for in many quarters needs to include UK public sector procurement acting as a strong and focused lead customer, using co-ordinated forward commitment procurement as a model.

For co-ordinated procurement to have an impact on UK manufacturing, some would argue that there needs to be a Minister for Manufacturing (Associate Parliamentary Manufacturing Group, 2012).

6.8 Concluding remarks

The evidence gathered in this review suggests that there is limited application of co-ordinated public procurement in the UK at present. Co-ordination is taking place in some sectors, notably defence, at pan-European level. Employment opportunities are created in the UK through the supply chains associated with these production processes. In the future, there may be potential for co-ordinated procurement to take place across nations where countries have common goals such as responding to the impacts of climate change and the challenges of an ageing population.

A major outstanding issue in delivering co-ordinated, cross-governmental public procurement has been seen to be that of resource management, including budgeting and accounting procedures. This is brought into sharp relief through an examination of the application (or otherwise) of government policy on whole life costing. While 'whole life costs' are narrowly defined, in terms both of timescale and scope of application, this policy alone will not be sufficient to drive public procurement of innovative solutions out to 2020 and beyond. Stakeholders have suggested that for public procurement of innovation to flourish, cross-departmental, or cross-governmental whole life costing with a longer time horizon might need to be combined with a less risk adverse attitude to public procurement and supply chain management.

Co-ordinated procurement has been seen to require co-ordinated policy-making, supported by innovative funding models. Whether or not the UK public sector, and the UK manufacturing base, can expect to benefit from such models is still under debate.

7. Conclusions

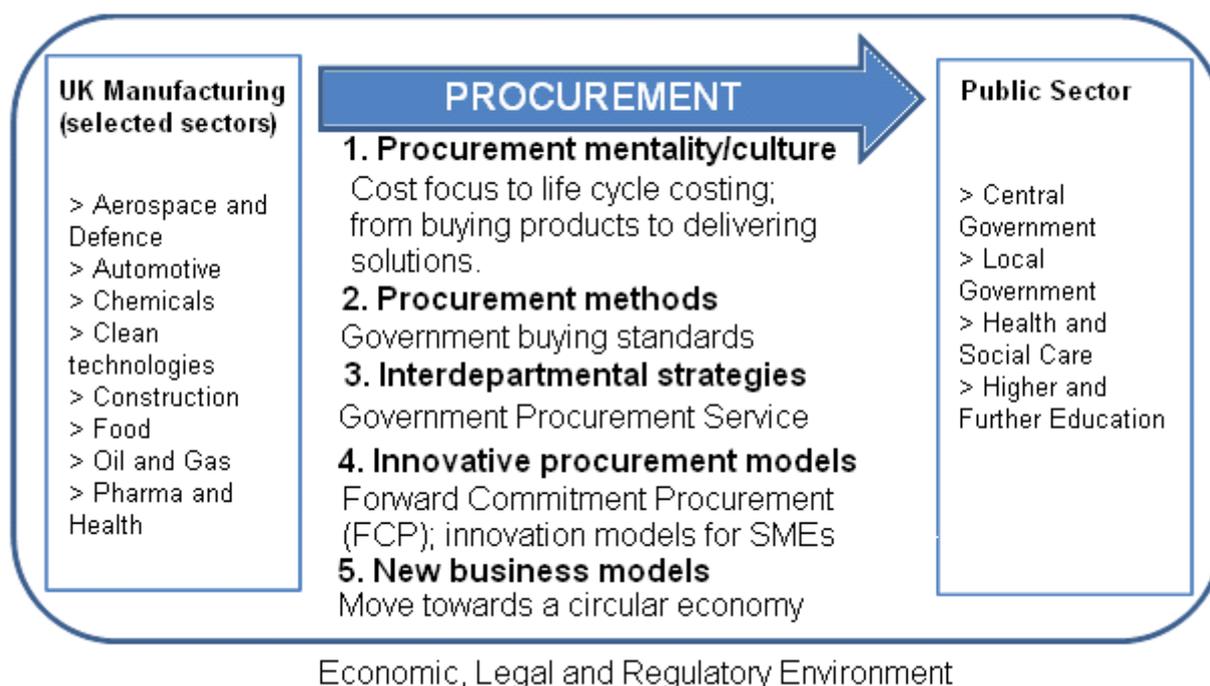
The UK public sector spends around £238 billion on goods, services, works and utilities, representing approximately 13% of Gross Domestic Product (GDP) (BSI, 2012a). This gives the government a strong lever that can be used to support specific initiatives, such as supporting manufacturing. Furthermore, previous research has shown that public sector procurement can have an impact on societal and economic outcomes (McCrudden, 2004; 2007) (Edler and Georghiou, 2007), and a number of cases discussed in this report show how this can work in practice. In this review we have also shown what the UK government is currently doing to support the manufacturing sector through public procurement and discuss what could be done in future to further strengthen this support.

The review has drawn on evidence from across the political spectrum, demonstrating the calls for the lever of public procurement to be used much more directly to stimulate markets and to help re-build the UK manufacturing base. Based on the review we have developed a conceptual model that proposes five key approaches that can catalyse the impact of public procurement on the manufacturing sector (see Figure 4). It should be noted that these approaches are closely inter-related. The approaches are:

- 1. Procurement mentality / culture:** For public procurement to impact on UK manufacturing the culture needs to change from one focused purely on short-term cost to one that looks at whole life costing and which takes into consideration social and environmental benefits. Procurement needs to engage internally, across departmental boundaries to specify outcomes required, as well as externally with supply chains, to stimulate the development of solutions to meet future needs.
- 2. Procurement methods:** Alongside the cultural change, the methods used in procurement will need to change to enable the evaluation of broader and more complex objectives. This will require a re-thinking of supplier selection and evaluation practices as well as standards. This has implications for procurement skills and capabilities, since public sector organisations will need to be able to better articulate unmet needs, to move towards procuring functionality and outcomes and to applying risk- and opportunity-based methods in procurement.
- 3. Inter-departmental strategies:** Inter-departmental strategies such as the Government Procurement Service and other approaches to co-ordinated procurement can help to deliver effective solutions to multi-faceted public policy challenges. Cross-departmental policy-making, budgeting and resource allocation can support public procurement in the delivery of wider societal and environmental outcomes. Demand expressed pan-nationally can mirror pan-European supply side trends in areas such as aerospace.
- 4. Innovative procurement models:** Approaches such as Forward Commitment Procurement (FCP) and SBRI, can help catalyse innovation and support manufacturing SMEs. Greater use of pre-commercial procurement, with public sector bodies acting as lead customers are also important strands that may help to catalyse both public and private sector demand.
- 5. New business models:** Public procurement can play a part in the development of new business models, by applying relevant standards and specifying outcomes that

capitalise on the application of emerging technologies. A move towards a circular economy, reflecting the increasing pressures around material scarcity and resilience will support manufacturing sectors that can design closed-loop supply chains.

Figure 4. The Impact of Public Sector Procurement on UK Manufacturing



Some of the most significant conclusions concern the prospects for building capacity in the UK manufacturing base to respond to the threats and opportunities associated with climate change and the need for resilience in supply chains more widely. Looking out to 2020 and 2050, this is necessarily subject to uncertainties but a majority of those participating reported it as an area in which there is likely to be opportunities to stimulate closed loop business models based on the concept of the circular economy, for example. Such models are already being adopted, as this review demonstrates and can help the public sector deliver multiple policy objectives including job creation and skills development alongside resource efficiency and the maintenance of security of supply in the context of increasingly scarce materials.

Looking out to 2050 one of the main issues likely to impact on the UK economy, including the UK manufacturing sector, is that of resource security. The review has highlighted the concerns already apparent in areas such as energy security; scarcity of materials; water and biodiversity. This points to the need for more effective management of resources, including 'smarter' use of existing materials. So the review has identified potential for the growth - and stimulation - of new business models, including closed loop business models, where public procurement has a limited involvement at present. The evidence if this review points to much greater use of such business models being one essential element of the procurement landscape of the future, in response to increasing volatility in markets and increasing concern over high risk supply chains.

The review has highlighted how procurement of services has gained pre-eminence over the procurement of goods in many sectors. This is linked to the concept of buying functionality, although stakeholders reported resistance on the part of UK public sector to the widespread adoption of 'leasing' or buying services rather than goods. This was

attributed at least in part to the accounting models currently in use on the UK public sector. Customer resistance is currently slowing the pace of change to more resource efficient business models.

Stakeholders also saw greater opportunities in the future for UK public procurement to gain advantages from reuse and remanufacturing, particularly of scarce materials, linking this to the possible development of a skills base as part of a future UK economy. The development of skills in reuse, refurbishment and remanufacture is seen as critical to attracting employment opportunities back to the UK. Where manufacturing has been outsourced to low cost economies, stakeholders commented on the scope for some parts of the UK manufacturing base to gear themselves up for a future trend towards 'on-shoring'. Similar trends are apparent in the energy supply sector. Evidence from the Ellen MacArthur Foundation (2012) suggests that there will be a role for intermediary organisations or matchmakers in this process, promoting and facilitating 'closed loops' and the circular economy.

Stakeholders also commented on findings from this review regarding the importance of activity being undertaken at the appropriate scale. This may mean that regional economies, or in the case of the UK, devolved administrations are best suited to deploy resources and stimulate markets, thereby promoting resource efficient and resilient manufacturing. This raises the possibility of a model that could be described as 'buying for Scotland, in Scotland' since many of the current constraints imposed by EU Procurement Directives are likely to have been reduced or swept away in the medium to long term, at least. The feasibility study on future EU support to public procurement of innovative solutions what it described as 'out-of-the-box' thinking when considering potential novel legal approaches, including amongst others, embedding reference to pre-commercial procurement into the public procurement directive; including definitions of the concept of pre-commercial procurement; and including the possibility to use value engineering as a contractual clause. (Manchester Business School, 2012).

While this review has drawn on published evidence of activity focused on manufacturing sectors and the potential applications of their outputs, stakeholders were much more sceptical about a sector-based approach. There are so many variables to be taken into account in looking out to 2050 in relation to UK manufacturing (and UK public sector procurement) that stakeholders were strongly of the view that any analysis of 'emerging technologies' for example, is unlikely to hold true beyond the short term. 3-D printing, for example, may be one of the technologies 'of the moment' but stakeholders were keen to stress that it and similar technologies are unlikely to revolutionise UK manufacturing.

This review has identified - and built on - a list of enabling technologies and their potential future applications in areas such as advanced materials, industrial biotechnology and energy. Evidence from World Business Council for Sustainable Development in association with the WWF for instance and many of our stakeholders have stressed that both the technologies themselves and their potential applications are likely to change significantly over time. This is all the more true when we try to look out as far as 2050. So, for example, in the case of World Business Council for Sustainable Development report, *Future from Fibre - from Forest to Finished Product*, new products and services are expected to emerge from a number of different technologies (World Business Council for Sustainable Development, 2012). Their description of how technologies will be applied seems particularly apt: 'something old, something new, something borrowed, something blue'. The technologies will not develop from silos, but from cross-sectoral applications of research and development.

UK public procurement of the future is also likely to have to grapple with the challenge of buying solutions - such as a cure for diabetes - rather than the drugs that treat diseases. This raises challenges for the profession in terms of capabilities to articulate needs in a solutions oriented way. Where public procurers have been used to buying 'goods' they are seen to have some difficulty moving to specifying and buying services or functionality. Articulating a demand in terms of an 'unmet need' or a sustainable solution is an even bigger challenge. However this is precisely the sort of response that will be required if the UK public sector is going to play its part in stimulating novel forms of manufacturing.

Putting several of these elements together in a package for the future, in which public procurement does stimulate UK manufacturing the scenario seems to involve at least the following:

- A vision of the challenges of the future
- A mature dialogue with the market about what is possible now and what may be possible in the future in terms of product and service development
- Clear articulation of demand for solutions, in the form of expressions of unmet need
- Sufficient investment (through innovation hubs or other platforms) to allow for development of appropriate solutions
- Sufficient lead time to allow these solutions to come to the market i.e. better forecasting and planning on the part of the public sector
- Sustained buy-in to the concept of circular economy at senior level by public sector organisations (in particular by HM Treasury)
- Relaxation of the rules regarding public sector procurement to allow for proportionate on-shoring of manufacturing
- Appropriate use of supplier selection and evaluation procedures to screen out high risk potential suppliers
- Sustained deployment of procurement standards and specifications to 'ratchet up' levels of socio-economic and environmental performance in supply chains
- Investment in procurement capabilities, including the articulation of unmet need and the application of whole life costing methodologies
- Investment in skills, training, apprenticeships and employment opportunities to support the growth of firms focused on reuse, refurbishment, remanufacturing of materials (closed loop systems)
- Continued investment in SBRI and similar approaches, taking learning from its application in other countries, using the lever of private sector investment
- Leadership by the public sector in the application of forward commitment procurement models (and similar)
- Greater focus on the use of forward commitment and similar models to respond to potential resource shocks and challenges to the resilience of the UK economy.

At the very least, coordinated procurement will involve clear signals to the market about policy priorities and the direction of travel. It is likely to involve technology innovation centres and platforms for sharing knowledge (as in the Knowledge Transfer Network model), as well as mechanisms such as SBRI to encourage and support innovation from small businesses. Taking lessons from other countries, notably the US, it appears that the UK will need to encourage greater buy-in by the private sector to make some of these platforms and initiatives more effective. Also, perhaps the brokering role called for in many quarters needs to include UK public sector procurement acting as a strong and focused lead customer, using coordinated forward commitment procurement as a model.

In the UK, public procurement can be seen to be stimulating manufacturing in two key sectors in particular - defence and healthcare. The SBRI has achieved success in these and other parts of the public sector. However, one of the lessons to be learned from both UK and international experience is that innovation is taking place where the lead customer is seen to be acting strategically or driving relatively 'high-tech' solutions. Often this is done in close collaboration with the market. Across the rest of the organisation, where routine goods and services are being purchased, the picture is entirely different. So in the case of healthcare, for example, clinicians may be involved with the leading technology providers in the search for innovative solutions. Meanwhile for the purchase of a vast range of non-specialist, routine items including cleaning, catering and office supplies, opportunities for innovation are almost completely neglected. Similarly in defence, innovation is taking place in the strategically important elements of supply, such as avionics, electronics and naval equipment. But when considering routine items that support defence activities, including buildings and maintenance, it appears that procurement is regarded as less important, so opportunities for innovation are more likely to be missed.

Despite the potential of public sector procurement to support manufacturing, a number of obstacles and constraints exist. This review has shown that UK public sector procurement is dominated by expenditure on services rather than goods. Furthermore, the public sector's influence on UK manufacturing is necessarily limited by its need to comply with European Public Procurement rules. However, the nature of the relationship between customer and supplier in some key sectors - including defence and healthcare - means that in such cases UK manufacturing is responding to lead customer requirements. Looking at current trends in these sectors leads us to conclude that it is likely that by 2020 and 2050 the public sector will be sourcing from a pan-European level manufacturing base. Manufacturing of military aircraft at pan-European level is a case in point.

Similarly, while some promising practices have been identified, for instance in stimulating small business growth through public expenditure on R&D (e.g. SBRI) as well as innovative procurement models including Forward Commitment, the UK does not appear to be leading the way and can learn from international experiences, from the Netherlands amongst others.

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Appendices

Appendix I - Forward Commitment Procurement Case Study

CASE STUDY:
Innovative Ultra
Efficient Lighting for
Future Wards

The Rotherham **NHS**
NHS Foundation Trust

Welcome to
Rotherham General Hospital

Sustainable Development Unit (SDU) in the NHS have been supportive and kept informed of the FCP process and quoted it as best practice on their website.



Rotherham Hospital is a 500 bed acute hospital in the north of England

Stimulating innovation in the economy and meeting society's needs

Supporting innovation for progress and growth

The NHS needs to deliver carbon reductions, save money and at the same time deliver excellent services to patients.

In an innovative project, The Rotherham NHS Foundation Trust has addressed these challenges by taking a new approach to procurement – Forward Commitment Procurement (FCP).

The Trust worked in partnership with the Department for Business, Innovation and Skills and the Department of Health in a forward commitment procurement project that sought to meet two key requirements:

- A step change in the patient experience
- A step change in the efficiency of lighting

The opportunity for innovation was presented by a 7 year refurbishment programme beginning in 2010. The vision of the CEO for a 'Hospital of the Future' was a key driver.

The pro-innovation approach has brought to the market an integrated 'future ward' modular solution, with integrated bio-dynamic lighting, trunking and storage.

Detailed costings, verified by an independent quantity surveyor, show that the innovative solution will cost the same as a standard ward solution, but will deliver both the required step change in patient experience and lighting efficiency, and also reduced on-site build time, minimising disruption to hospital staff and patients.

Innovation can enable you to do new things or provide you with a step change in effectiveness or efficiency.

FCP is a step by step approach to delivering innovation and better, more efficient, goods and services.

FCP provides the incentive, confidence and momentum for suppliers to invest and deliver innovative solutions.

FCP delivers value for money policy and is consistent with the legal framework that governs public procurement.

“The NHS is continually striving to improve the services they provide for patients and as can be seen from the outcome of this project – FCP can help them to deliver. I would like to see more Trusts adopting the FCP process and innovative techniques

to maximise the benefits available” – *David Whiteley Chief Engineer, Estates and Facilities Division, Department of Health*

“From the start we said that the solution had to be cost effective and affordable. We have not been disappointed – the outcome shows that better and more sustainable does not have to cost more” – *Steph Holmes, Head of Procurement, Rotherham NHS Foundation Trust*

Anticipated Benefits Realisation

Design features

- Increased storage
- Bio-dynamic lighting
- Daylight responsive
- Modular and flexible solutions
- Patient control over local environment

Operational benefits

- Future technology ready
- Easy to clean & maintain
- Simple pictorial controls
- Failure feedback
- Daylight linked control
- Efficient lighting design
- Ergonomic design
- Diversity of storage options

Construction benefits

- Factory made quality
- Adaptable standard components
- Tried and tested technology
- Clean dry construction
- Quick installation
- Same cost as the traditional

Financial benefits – Based on Rotherham General Hospital

- Reduced energy consumption / cost anticipated savings of 30% or ~£4,600 per 40 beds over 10 years
- Reduced maintenance time / cost anticipated saving of 88% or ~£13,600 per 40 beds over 10 years
- Reduced construction and disruption costs due to faster turn around

Sustainability

- Reduced energy use
- Long lamp life
- Green energy in manufacturing
- Low energy lamps
- Recyclable components



Taking a new approach to procurement

The project team, which included the Director of Estates and Facilities, the Head of Procurement and the BIS Consultant FCP Programme Manager, used the Forward Commitment Procurement (FCP) methodology to stimulate innovation in the supply chain to meet 'unmet needs' identified as part of the programme.

With the vision for a 'Future Ward' firmly in their minds and adopting FCP thinking, the project team set out to define what they needed in terms of outcomes, rather than in terms of the products that were available on the market.

Once identified this 'unmet need' was communicated to the supply chain in outcome terms as part of a market sounding exercise:

'The Trust wish to achieve a step change in the patient experience; creating a patient centred environment, including the incorporation of highly efficient, smart lighting systems that can deliver economical carbon reductions while at the same time contributing to a pleasant and healthy environment for both patients and staff'.

The project team drew on the expertise of the Photonics and Plastic Electronics KTN and other supply chain intermediaries to ensure all parts of the supply chain were aware of the opportunity.

By providing advance information on the requirement, in the context of a major procurement, and by stimulating cross supply chain cooperation the Trust gave the supply chain the time and motivation to come up with an innovative approach.

The market consultation process was enthusiastically received and culminated in the consultation workshop and a refined outcome based specification.

The Trust communicated their requirement and the market consultation via a Prior Information Notice in the OJEU 2 years before the solution would be needed on site. This gave the supply chain a chance to organise and innovate.

FCP 'pre-procurement' techniques

Give the supply chain time to innovate

Think ahead; signal your long and medium term 'direction of travel' to the market.

Communicate your forthcoming needs and procurement plans in advance.

Allow room for innovation

Communicate your needs in outcome terms;
State what you want, not what you think is available or affordable.
Look for progressive improvements and future proofing.

Invite feedback from the supply chain

Market sounding and market consultation allow you to test out your requirements and iron out problems in advance of the invitation to tender.

Facilitate communication between suppliers

Consultation workshops, site visits and publishing a directory of companies that have expressed interest all help.

FCP Know How

BIS and DH provided FCP Know How training and project support.

“The market engagement not only gave potential suppliers advance notice and time to innovate, it also stimulated a valuable exchange within and between supply chains”. – *Dr Gareth Jones, Consultant for the Electronics, Sensors and Photonics KTN.*

Competitive Dialogue is a procurement process that permits discussion of options with suppliers before inviting best and final offers.

An outcome based specification sets out the end result to be achieved, not the means of delivering it: you effectively specify the problem and invite solutions. This gives the supply chain the opportunity to innovate.

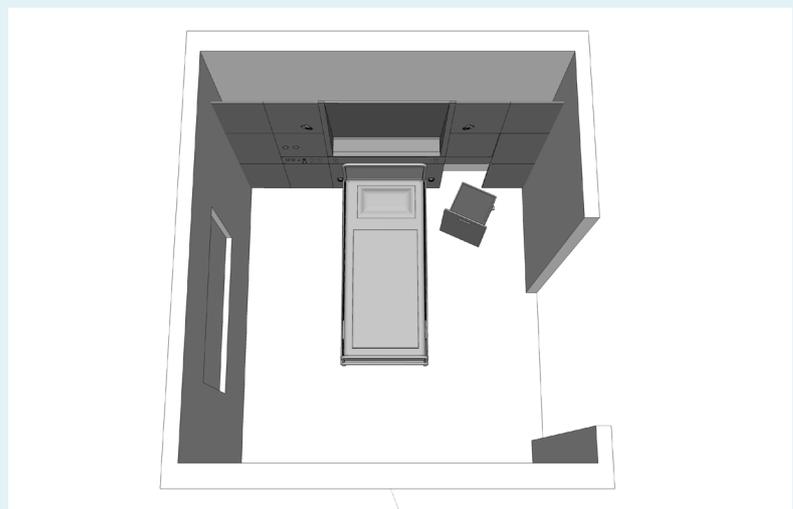
‘Innovative, value added, smart, ultra efficient lighting systems that can deliver the Trust’s vision for Future Ward lighting, meet the operational requirements and provide added value functionality, in a cost effective way. The core requirement outcomes are:

1. A step change in patient experience – i.e. creating a pleasant healing environment with patients being in control of bed zone lighting levels and ambience whilst providing the lighting to perform clinical requirements and incorporating measures to reduce the risk of hospital acquired infections;
2. A demonstrable step change in energy efficiency with progressive improvements in energy efficiency and operational performance over the life of the project;
3. A fully installed, maintained and future-proofed service, for example to facilitate upgrading to more energy efficient or better products as they become available.

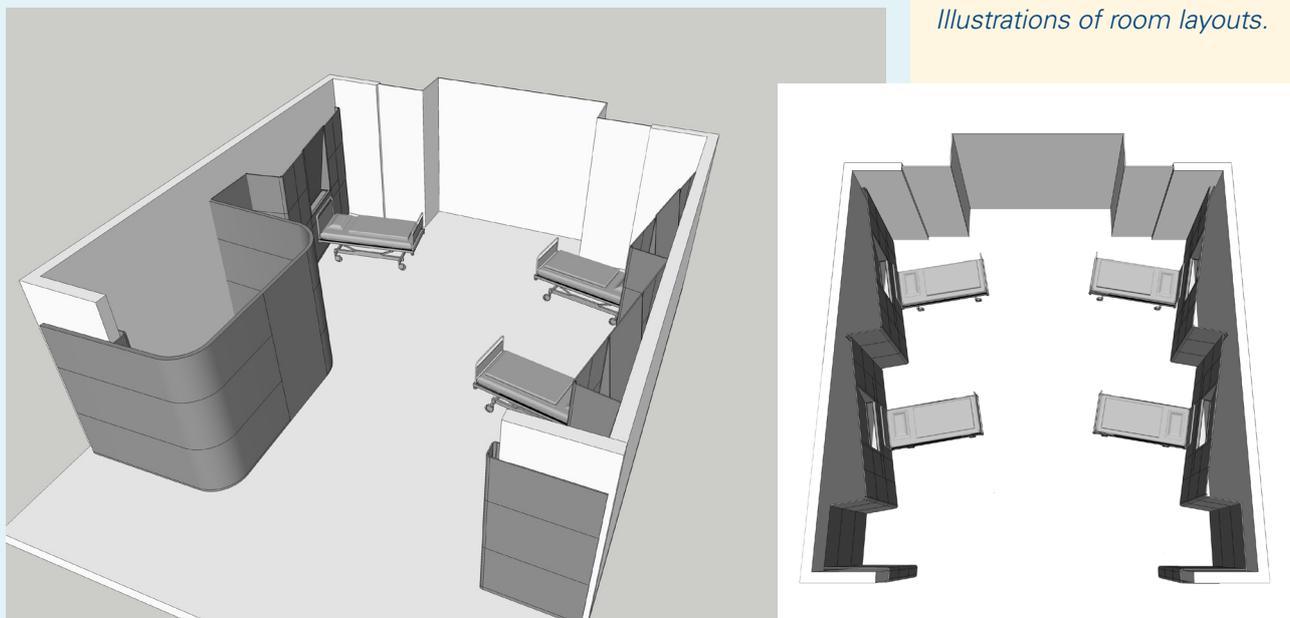
Greatly encouraged by the response of the supply chain, the Trust began a competitive procurement in the summer of 2009. A number of high quality proposals were presented as part of the Competitive Dialogue process. Among these were leading medical lighting companies and a pan-European consortium of companies including a lighting designer, architect, building systems manufacturer and lighting manufacturers.



The solution has been future proofed to enable adoption of new technology such as organic LEDs as they become available



Illustrations of room layouts.



The result: A new and innovative solution for the healthcare market

Stimulated by the advance warning of the forthcoming procurement, one consortium worked together in advance of the tender and was subsequently well prepared to come forward with an innovative solution that met, and indeed exceeded, the Trust's expectations.

The pro-innovation FCP approach has brought to the market an integrated smart 'future ward' modular built solution with integrated (bio-dynamic) lighting, trunking and storage.

The solution transforms the appearance and functionality of wards from a cluttered, hard to clean and poorly lit environment with little storage, to one that is stream lined, easy to clean and welcoming, with smart lighting that responds to patient and environmental needs and follows the circadian rhythm.

The new well lit environment will use one third less energy than the previous poorly lit environment. It will also benefit from reduced maintenance and is future proofed i.e. the pod is designed to be able to take new lighting technology as it becomes available.

A demonstration pod was built at Rotherham Hospital in March 2011 to undergo clinical and facility assessment. Following this it was installed at the Building Research Establishment."

"The key to success was to begin by asking for what was needed – not what we thought was available or affordable. The results have exceeded all expectations. FCP really works" –
*John Cartwright,
Director of Estates and
Facilities, Rotherham
NHS Foundation Trust*

The FCP process has been well received by suppliers

“This is what gets us excited. There is somebody here who doesn’t want to carry on doing the same old thing, just chipping away at energy efficiency but saying what they really need – a step change”. – *Andrew Bissell, Cundall Light4*

“What is great about this [Rotherham Foundation Trust FCP] process is the commitment – the 7 year programme gives a timeframe we can really work with to plan and bring new solutions forward”. – *Wayne Morgan, Elements Europe*

“This is what we suppliers need; information on our customers needs today, and even more helpfully their future needs. We can then plan and manage our supply chain so we are ready to respond”. – *Peter Jones, Director of Design, Skanska.*

FURTHER INFORMATION:
For more information on these projects go to www.bis.gov.uk/fcp

FCP is increasingly seen as best practice and more FCP projects are now underway in the NHS and in healthcare organisations across Europe.

In England...

Nottingham University Hospitals NHS Trust is using FCP to test the market for an ultra low carbon energy solution to replace their coal fired boiler plant.

Estates and procurement staff at the Scarborough and North East Yorkshire NHS Trust are embarking on the FCP Know How programme as part of their carbon reduction programme.

The Rotherham NHS Foundation Trust is looking to stimulate the market to provide a zero waste zero infection mattress.

Across the rest of Europe

Erasmus MC, Rotterdam is looking for a more energy and resource efficient bed cleaning solution.

Rawicz Hospital, Poland is looking for innovative low carbon refurbishment technologies.

In Norway, SINTEF Health Research are working with a new build acute hospital (nye østfoldsykehuset – NØS) to understand how the current planning process influences the introduction of innovative, energy effective solutions in the hospital and how the process presents barriers for innovative solutions and change.

These projects all received support from the European Commission Lead Market Initiative as part of the Low Carbon Buildings (LCB):HEALTHCARE Public Procurement Network programme

LCB:HEALTHCARE – Buying better building solutions

LCB-Healthcare stimulates demand for innovative low-carbon solutions for the healthcare sector by providing procurement decision makers with the knowledge and tools to achieve more sustainable buildings within their budget constraints.



To find out more about these projects, access information on low carbon solutions and continuing professional development materials and advice on how your organisation could benefit from adopting FCP go to info@lowcarbon-healthcare.eu

Join the LCB:HEALTHCARE network at:
<http://lowcarbon-healthcare.eu/cms/members/stakeholder.php>

Appendix 2 - Hybrid Ferries – Scotland

The world's first sea-going hybrid ferry was launched from the Ferguson shipyard in Port Glasgow after a £20 million investment in the green technology. The MV Hallaig is the first of two roll-on, roll-off ferries that will run on diesel and electric power, leading to 20% lower emissions. The construction of Hallaig provided a boost for commercial shipbuilding along the Clyde and has secured 100 apprenticeship jobs. Both hybrid ferries have been developed by a partnership between Scottish Procurement, Scottish Enterprise and Caledonian Maritime Assets which owns the ports and vessels used by CalMac on the Clyde and west of Scotland.

The cost of each hybrid is £2m more than a conventional vessel and will save £20,000 in fuel costs. Much of the cost was due to the risk associated with constructing the first vessel of its type and that this would be reduced when more vessels are ordered. This technological procurement exercise demonstrates an innovative procurement requirement with the use of significantly extra time and resource relative to traditional more standard procurement exercises.

While public procurement competitions cannot be limited to Scottish businesses, it is possible to target innovative procurements to industries where Scottish firms are most likely to benefit and therefore to achieve economic impact in Scotland. The lesson here is that where there is a public sector need with no current solution and the existence of a relevant market where Scottish companies are well placed to innovate, manufacturing and environmental, social and economic outputs can be achieved (Caledonian Maritime Assets, 2013).

Appendix 3 – Scottish Government biomass supply agreements case study

Note: appendix 3 adapted from the Scottish Government's GO Awards Submission – Innovation - March 2013

Scottish Procurement via regular customer dialogue and a supply market-analysis process identified that a biomass-derived heating solution across the Scottish public sector was required which was beyond the current disparate market capability. Supply chains were under-developed, there were instances of poor boiler maintenance and fuel quality was variable. Many existing biomass systems were insufficiently reliable for public buildings (e.g. hospitals and schools) and funding options were limited. There was therefore a reluctance to invest in new Biomass despite the desire for these systems. The latter being driven by the Government Renewable Heat Incentive, policy objectives and the need to reduce dependence on costly possible fuels.

The initiative was to lead the delivery of Biomass solutions across the Scottish public sector using our policy and commercial understanding to marry biomass demand with policy outcomes, funding sources and innovative suppliers with growth potential. This would address market capacity and capability and provide access to funding solutions. Every part of this initiative, from project initiation to our mini-competition process, breaks new ground by putting commercially-trained officials in the driving-seat of policy delivery.

Scottish Procurement's stakeholder engagement processes are built around regular contact with policy and industry leaders across Scotland and the rest of the UK. This ensures advanced, broad and deep understanding of policy targets for innovation, economic growth, lead-markets, carbon reduction, renewable heat and community benefits. The resultant framework was designed to deliver heat only – suppliers would be responsible for designing, installing and maintaining the biomass systems. This transferred risk to where it was best managed and delivered capital funding options via suppliers.

The result is a pan-public sector, £50m framework that increases biomass adoption, by giving access to novel funding models, reducing risk and using only wood from sustainable sources to displace fossil fuel usage. Financial savings of £8m relative to using fossil fuel accrue with sustainable benefits of a reduction in CO₂ by 48,500 tonnes per annum and the creation of 275 jobs. This is achieved by focusing current and future biomass requirements to create vital anchor demand encouraging further growth and investment in Scotland's renewable energy sector.

The requirement for this procurement originated from public bodies who wanted reliable biomass and suppliers who had identified that anchor demand was required to support market development and growth. In addition, a number of policy initiatives were converging on Biomass including economic development, climate change, sustainability and economic growth. It was critical that procurement engaged with policy-makers across national and local government to resolve any conflicts.

Commercially-trained officials engaging and leading in policy discussions allowed the formulation of a Biomass procurement solution to deliver across multiple policy areas, balancing competing initiatives where appropriate. The deployment of procurement skills in negotiating, consensus building and identifying innovative market-led solutions

ensured that customers' and policy makers' interests were properly recognised. In a number of areas there was an absence of nationally-adopted standards and the procurement team had to lead on several policy issues regarding the adoption of standards for wood fuel and sustainable sourcing. For example, innovating by identifying policies in forestry that could be translated into the commercial environment.

Potential suppliers were treated as stakeholders and a number of workshops were conducted to engage them in developing and agreeing consensus on technical specifications.

This early engagement with policy makers during policy design is the first of its kind and scale showing that procurement can lead on both policy development and delivery. Placing procurement at the heart of policy development and leading the resultant implementation maximises benefits and value to the public purse. This initiative has pushed the boundaries of 'Best Value' beyond even the most ambitious of targets which are being met through a single contract for heat contributing to;

- a carbon-free economy,
- renewable heat,
- economic growth,
- SMEs in public contracts,
- income generation via the Renewable Heat Incentive,
- college training,
- apprenticeships
- traditional procurement savings

As well as breaking new ground in policy development and delivery, using a collaborative framework model to deliver Energy Supply Agreements was a first for Scotland, and we believe, for the UK. This required the team to develop new ways of supporting customers, new mini-competition models, and new levels of supplier interaction.

Stakeholders were at the heart of the sourcing strategy and we began by identifying expertise across Government policy areas and the public sector to probe their requirements and identify the desired outcomes. We designed an engagement programme that identified and engaged stakeholder groups (policy, public bodies and suppliers) to identify and collate requirements.

Gathering information and drawing on appropriate expertise enabled the development of a draft strategy to be used during further engagement and consultation. A number of separate supplier and public sector workshops were held in venues across Scotland. In particular the supplier workshops were very useful as they provided a forum for suppliers to discuss competing standards resulting in a consensus supporting market development and consistency. Attendees noted that they were shaping a strategy that would ensure competition, market consistency, market growth and value for money.

130 public & supplier organisations and a wide range of stakeholders were consulted, including:

- wood fuel forums,
- rural development organisations,
- Forestry Commission,

- Scottish Government policy colleagues in Renewable Energy, Rural Development, Sustainability and Qualifications Authority
- Carbon Trust
- OFGEM
- UK's Department for Energy and Climate Change regarding policy issues.

The tender exercise was completed collaboratively, with policy colleagues being integral to the development of the ITT and the subsequent evaluation of tenders. This tender, and the engagement process around it, has established us as the benchmark for Biomass in the public sector, and we've since been asked to contribute to the Government's Expert Commission on District Heating.

Workshop Comments included:

"It is very encouraging to see such engagement before embarking on a major new procurement framework"

"The rest of the public sector would do well to copy your approach"

Barbara Morton of Sustainable Procurement, Project Manager of the business-led Sustainable Procurement Task Force chaired by Sir Neville Simms, said:

"Scottish Procurement's work on biomass highlights the importance of a mature approach to supplier engagement allowing innovative solutions to be developed. It demonstrates that the strategic involvement of procurement can help to squeeze multiple positive outcomes from every pound spent from the public purse."

Savings and CO₂

Savings and reduction in CO₂ output and savings are obvious metrics. 'Installed Capacity' is an accepted proxy for CO₂ reduction and of heat production (if in use) and so our target is 70mW of installed capacity, which will equate to 48,500 tonnes of CO₂ saved. This also gives a savings target of £8m over four years as we can calculate how much would have been spent on traditional fuel in order to produce the same amount of heat. This contributes to broader Scottish Government targets including a 42% cut in greenhouse gas emissions by 2020 and 11% heat production from renewables by 2020.

Economic growth / contribution

The EU Procurement Directives prevent us from favouring SMEs so our target was to ensure a level-playing field for them to compete, to be measured by the proportion of bids received from SMEs. Twenty six firms submitted bids, of which twenty one were SMEs. Of the firms that won places on the contract, 80% are SMEs and between them, the large firms employ over 7000 people in Scotland. In addition, using calculations from the Department of Energy and Climate Change, we estimate that hitting our 70mW target; will deliver 275 jobs to the Scottish economy. These targets are to be achieved across the framework's lifetime.

Social inclusion

Community benefits will be delivered through contract management with targets set for each firm as the framework develops (as this is a framework, apportioning targets to individual firms is still to come) but outcomes we are aiming at include:

- Apprenticeships
- Donation of RHI payments to local good causes
- Sourcing biomass fuel locally;
- Extension of training with local colleges and local school education programmes

Delivered

At least 60 sites tendered in the first 4 weeks of the framework delivering over 18% of our 70mW (four year) target.

Planned

Mini-competitions planned for release in summer 2013 include health-boards, councils, housing associations and colleges and we're in early discussions with Police, Fire, Universities, central government bodies and further health-boards, councils and housing associations regarding installations at their sites.

The largest issues we encountered were market readiness and customer confidence. The nascent nature of the Biomass market made it challenging to explain our vision and to gather information on how it might be achieved.

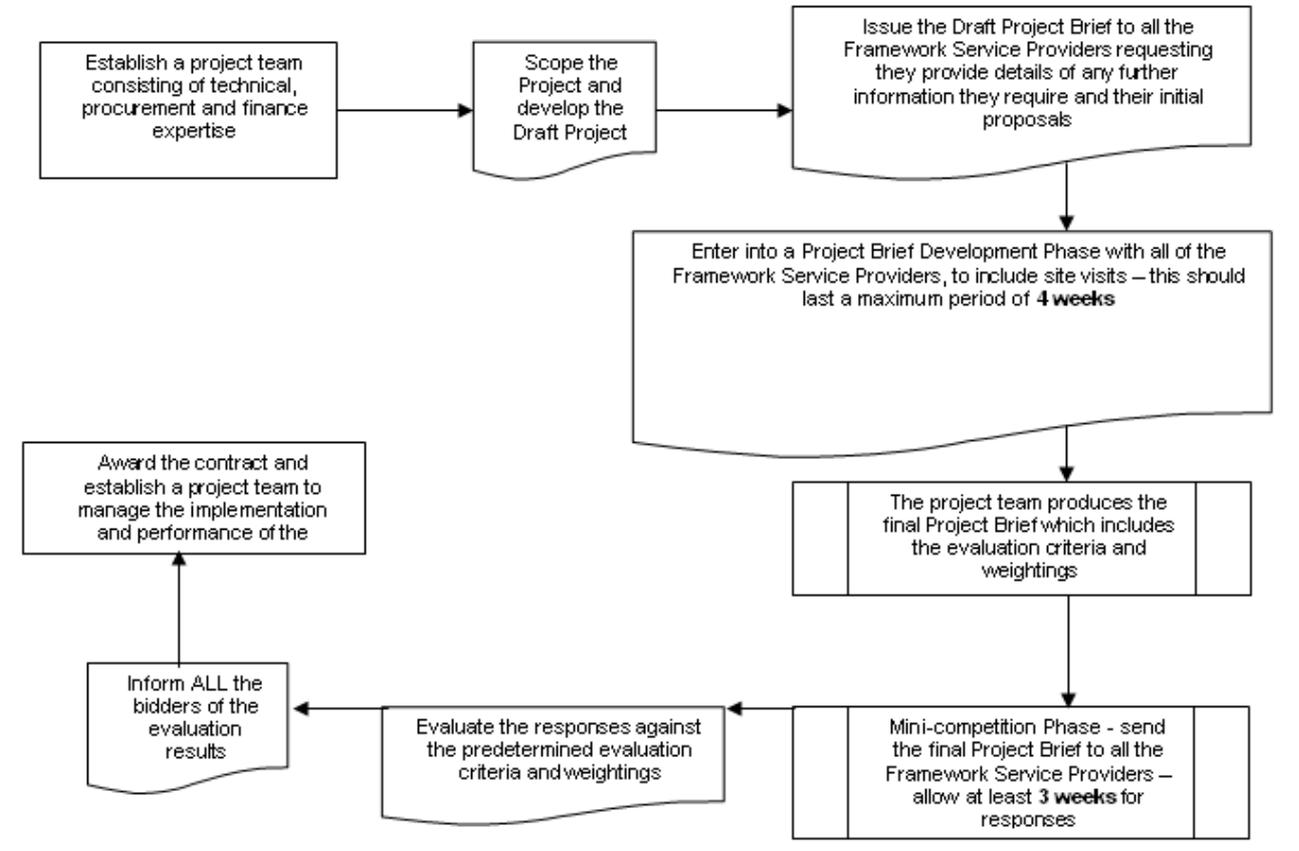
Customer engagement demonstrated a history of poor installations, unreliability, a general lack of expertise and a fundamental issue at a critical point in the supply chain. The efficiency of biomass boilers is affected by the quality of both boiler maintenance and fuel. Several existing installations were inefficient; when challenged, the boiler engineer would blame fuel quality and the fuel supplier would blame the quality of boiler maintenance. These problems had become well-known throughout the public sector and were further confounded by a lack of specialist biomass knowledge in the buying community. Public bodies were increasingly reluctant to invest in Biomass.

In response, Scottish Procurement designed an outsourcing model that places responsibility for all of these issues into the hands of the supplier while the innovative 'project-brief development' stage (similar to competitive dialogue but under a framework - see Figure One) brings bidders into the heart of specification-development and reassures buyers that they are buying the most sustainable and cost-effective system for their site.

Our Energy Supply Agreements pay for heat that is derived from biomass systems. The supplier installs and maintains the boiler AND, regardless of boiler efficiency, must ensure that the required level of heat is provided at a fixed price. It is therefore in the suppliers' own interest to ensure that all aspects of supply are of the optimum quality. Only those bidders that were willing to change their service offering, integrate their supply chains and manage risk would have a chance of getting onto the framework agreement. The framework therefore rewards innovative companies by giving them access to public business. New private sector partnerships have formed to bid for this business that had previously been restricted to large suppliers of fossil fuel, thus redirecting public funds

towards ambitious and innovative SMEs. This framework was designed not just to facilitate, but also to accelerate the growth of renewable heat in Scotland.

Figure 1 - Mini Competition Award Procedure



The framework was set-up for the use of the public and third sectors in Scotland. Aside from the normal benefits of collaborating at this scale, customers also gain a comprehensive suite of detailed technical and specification drafts that would otherwise take weeks if not months of research to achieve. This unprecedented level of sharing the knowledge gained during our tender allowed several public bodies to prepare tenders within the first couple of weeks of the framework being awarded.

We have shared our data and experience with other non-Scottish public bodies. These public bodies are benefiting from our experience and expertise in this new market and using our documentation to prepare their own, saving time and valuable resource. Note of our work has spread far with requests for further information such as that from an editor of a forestry, packaging and food organisation in Los Angeles.

As part of the strategy to embed sustainability at the heart of this procurement we used tools in the ‘Marrakech Process’. The Marrakech Approach is a risk and opportunity based approach that assists organisations and individuals to embed economic, social and environmental considerations in their procurement activities. This was the first time the tool had been used in collaborative procurement in Scotland. Seen as trailblazers, our use of this approach is used as an exemplar in training courses for Marrakech and has been show-cased in case studies for sustainable procurement in Scotland, thus further spreading the benefits of sustainable public procurement and more importantly showing how this can be achieved in a live procurement.

The framework also benefits stakeholders in the wider community. A wealth of Community Benefits are on target to be achieved via the framework including apprenticeships, recruitment of local service engineers, investment in new offices and depots in Scotland, training with local colleges and local school education programmes.

Several English and Northern Irish Authorities have requested copies of our documentation with positive feedback;

“Many thanks for your help and congratulations on writing such a clear guide to biomass for the non-specialist.” Dorset County Council

Note: adapted from the Scottish Government’s GO Awards Submission – Innovation - March 2013.

Appendix 4 - Strategic Supply Chain Group Meeting

21 February 2013
Dover House, Whitehall London
Hosted by the Scottish Government
Attendees

- Professor Steve Evans, Foresight Project - Lead Expert Group
- Tim Rudin, Transport for London
- Thomas Kohut, Policy Connect
- Mervyn Jones, WRAP
- David Gardner, Environmental Sustainability Knowledge Transfer Network - (BIS)
- Bruno Zago, HP
- Graeme Cook, Scottish Government
- Pete Brown, Sustainable Procurement Policy Team, Scottish Government
- Jo Mitchell, Sustainable Procurement Policy Team, Scottish Government
- Gregg Paget, Sustainable Procurement Ltd
- Barbara Morton, Sustainable Procurement Ltd

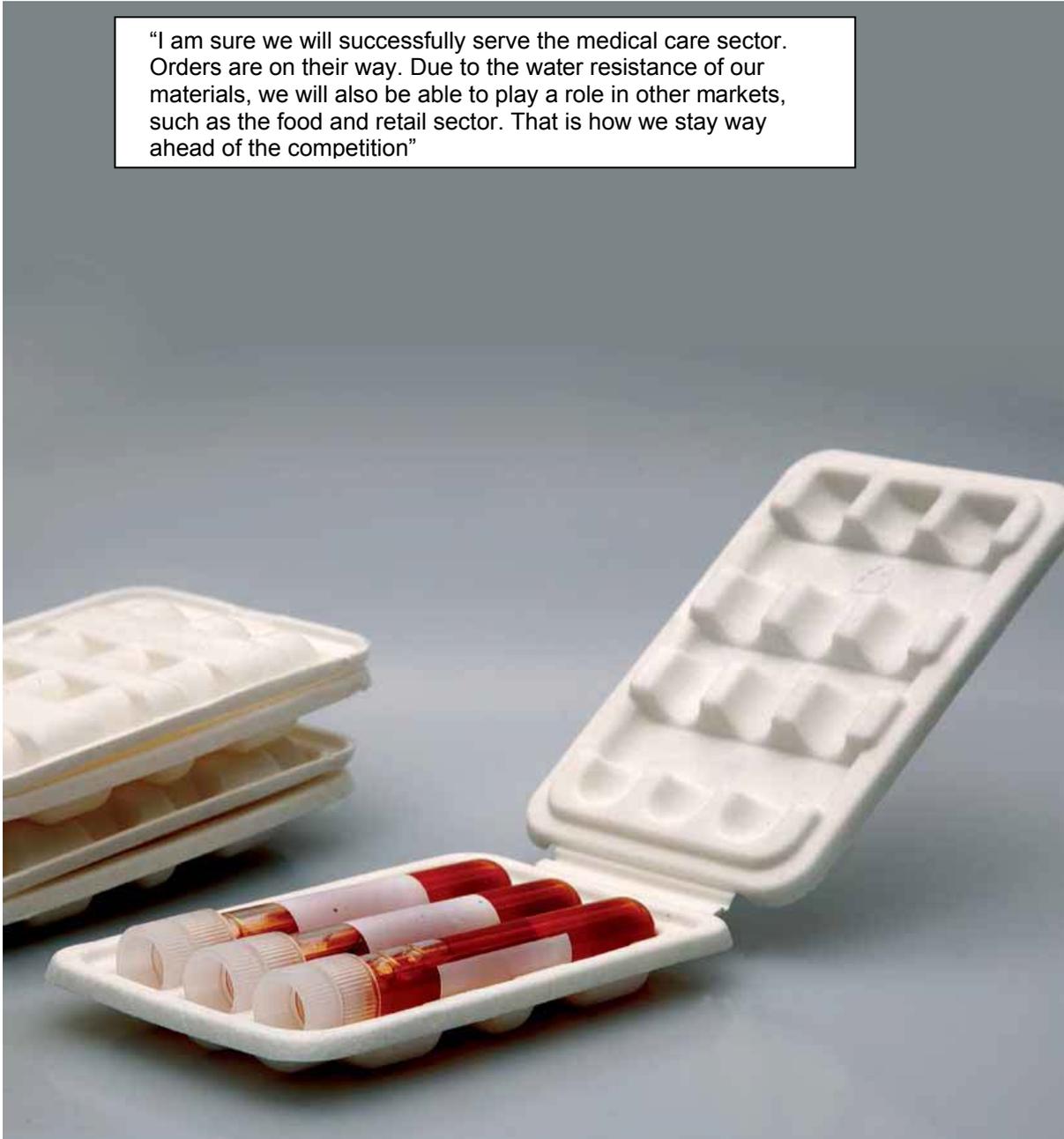
Appendix 5 - Stakeholders Consulted

Foresight *Future of Manufacturing* Project:
 Review of the Role of Public Procurement on UK manufacturing
 Strategic Supply Chain Group Members and those consulted in connection with this review.

Name	Organisation Note: several of those consulted responded in a personal capacity and some preferred to remain anonymous.
Ian Barham	Personal capacity
Stephen Boyd	STUC
Peter Brown	Scottish Government
Graeme Cook	Scottish Government
Philip Duddell	Olive Consultancy
David Gardner	Environmental Sustainability Knowledge Transfer Network
David Geere	Wiltshire CC / University of Bath
John Henderson	Environmental Sustainability Knowledge Transfer Network
Mervyn Jones	Waste and Resources Action Programme (WRAP)
Thomas Kohut	Policy Connect
Josephine Mitchell	Scottish Government
Dr Gordon Murray	Tata Consulting
Ben Peace	CTech Innovation & Environmental Sustainability Knowledge Transfer Network
Tim Rudin	Transport for London
Peter Scholes	Urban Mines
Jamie Thomas	Durham County Council
Bruno Zago	HP
Anonymous	Defence sector
Anonymous	UN

Appendix 6 - Bio-based packaging for the healthcare sector (The Netherlands)

“I am sure we will successfully serve the medical care sector. Orders are on their way. Due to the water resistance of our materials, we will also be able to play a role in other markets, such as the food and retail sector. That is how we stay way ahead of the competition”



Bio-based packaging for the health care sector

In a country of potato eaters, innovation sooner or later had to result in a special application of starch, and PaperFoam has made it happen. This firm in Barneveld develops, produces and sells bio-based packaging material made from foamed starch.

“And thanks to SBIR, it’s also available for the health care sector,” says CEO Mark Geerts.

In conversation with Mark Geerts from PaperFoam

Forget about polystyrene; foamed starch rules as far as packaging manufacturer PaperFoam is concerned. “Starch is a rich molecule, a beautiful material with many applications, and environmentally friendly too,” Geerts explains enthusiastically. “Combined with wood fibre, for example, it is an excellent ingredient for protective packaging. But also for egg crates – after all, we are from Barneveld, the poultry capital of the Netherlands.” Anyone who hasn’t heard about the versatility of foamed starch yet must not have been paying attention for the last twelve years. PaperFoam has been producing biodegradable packaging in all shapes since 1998, serving a growing group of clients, including Apple and Motorola.

80% less CO₂

The ‘bioplastics’ produced by PaperFoam® are not just biodegradable. Compared to normal plastics, the production process of these organic plastics is much more environmentally friendly: 80% less CO₂ is emitted. Such a green product would be perfect for the health care sector, Geerts realised. “Our products help hospitals and care institutions to reduce their carbon footprints. What is more, our material does not attract as much dust as standard paper pulp packaging. This is a big advantage in sterile environments where dust is out of the question.” To be used effectively in the health care sector, bioplastics have to be strong enough to safely transport heavy medical devices; in addition, they must be water and radiation proof.

Waterproof

PaperFoam decided to submit a proposal for the *SBIR Renewable biomass* for the green economy set up by the Ministry of Economic Affairs, Agriculture and Innovation to study the feasibility of the use of bioplastics in the health care sector. “On the basis of the first results, we decided to continue studying the water resistance of our materials,” Geerts says. “In order to make the materials water resistant up to a specific point, all we had to do was adjust the recipe. If you really want materials to be fully waterproof, it is possible to coat or laminate them.” Geerts emphasises that he would never have been able to reach this conclusion so quickly without the support of this SBIR. “After all, research takes time and money. The confidence we have gained thanks to the study is equally important. I am sure we will successfully serve the medical care sector. Orders are on their way. Due to the water resistance of our materials, we will also be able to play a role in other markets, such as the food and retail sector. That is how we stay way ahead of the competition.”

SBIR The power of public procurement: innovative solutions to societal challenges
Netherlands Agency, Ministry of Economic Affairs, Agriculture and Innovation (2012)

Appendix 7 – Tips for buyers

Tips for buyers - Dutch procurement expertise centre

The examples described in this manual contain a variety of lessons for buyers. The other examples presented by the Minister of Economic Affairs in late 2009 to the House of Representatives also provide a lot of tips for buyers and project managers looking to increase their role in the innovation process. The most important of these are set out below.

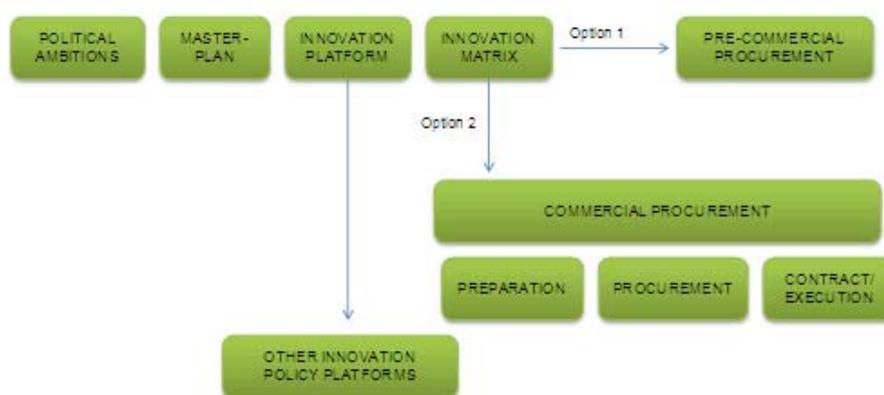
1. Ensure that you are engaged at an **early stage** and that you take on a **controlling** role in the entire tender procedure. Stand alongside the project manager as an equal partner. Link knowledge of innovative solutions in the market to a procurement strategy where the smartest procedure is chosen, based on the innovative solution required and the specific market situation. Innovative SMEs can gain better opportunities by dividing a single tender into a number of lots.
2. Ensure that you **are part of the project team** or put together a **procurement team** in which the various disciplines (lawyers, procuring parties, buyers) work together. This allows you to bring diverse objectives together, and you avoid the focus being on correct procedure alone. This requires extensive knowledge of the part of the buyers and, in particular, good communication skills.
3. **Identify the risks**, assess who is best placed to control them, and find out what this means for the contracts. Consult the procurement team and the market operators about this.
4. Innovation is not important in all tenders. Make sure you do not lose sight of innovation. In certain social issues, such as the ageing population and sustainability, innovation is essential in solving problems.
5. Ensure that you are involved in the development of the innovation strategy of your organisation. Make sure that elements of the innovation strategy are reflected in the procurement policy that applies to multiple tenders.
6. Take the time needed to **prepare well for the initial stages** of a tender, where:
 - consideration is given to the 'outline problem definition';
 - market research and analysis is conducted to determine how to approach the market and whether there is a need to encourage innovation with a design contest or SBIR.
7. In the market survey, **look beyond the known products and suppliers** (see the Statiq Cooling example).
8. Beware that **specific technical regulations** do not render new solutions impossible. Where necessary, amend the regulations - based on an innovation strategy - or make them less specific.
9. Make sure **contracts are tailor-made**. These could include incentives for innovation during the term of the contract. Public innovation procurement usually requires changes to the standard terms and conditions. Take, for instance, how the intellectual property rights are regulated.
10. Even after the conclusion of the contract, stay involved in the project. Come together with the other parties to make sure that the promised innovations are actually delivered in practice.

Appendix 8 - Procurement of Innovation (Flanders)

Note: adapted from Technopolis, 2011

Case I: Procurement of Innovation (Flanders)

The instrument “Procurement of Innovation” aims at fostering innovation in Flanders, in order to improve international competitiveness and to deal with societal challenges. The instrument is the outcome of a period of preparation by the innovation agency IWT with consent of the Flemish government. In the first stage (2006-7) the Pol was nurtured under the flag of an environmental innovation platform (MIP). In that period, the concept of Pol was developed and adjusted to the Flemish context. It resulted in a Flemish manual for procurement of innovation, and eventually to the launch of a pilot measure. In the period after that (2008-11) the instrument was implemented government-wide, targeting 13 ministerial departments as procurer, while companies and research institutes are to provide the innovative services or goods. All departments of the Flemish government are included in the Pol measure. The Pol model consists of an integrated public procurement trajectory, ranging from the initial demand of public bodies to the final commercial procurement. The following figure presents a graphical overview:



Three important stages are to be distinguished:

- *Composure of the Masterplan, ensuring high quality of demand.* All thirteen ministries of Flanders are invited to develop a masterplan. The drafting of such a masterplan goes as follows:
- In line with the *political ambitions* of the ministry a vision is created about a desired future, dealing with a societal problem or a challenge to the public body. Based on this problem analysis a list of requirements for desired innovations is composed. Preferably, Key Performance Indicators are designed that articulate the level of performance that is demanded from the innovation.
- Secondly, *an Innovation Platform is established, for market consultation and technical dialogue between the procurer, knowledge centres and companies.* The aim of the Platform is to crosscheck the innovativeness of the procurer's procurement needs (given in the master plan) with state-of-the-art technological developments in the field. It assesses the effectiveness of other available policy instruments (under IWT supervision) and seeks to identify synergies in an early stage between policies (e.g. procurement and complementary tax or standardisation). In a second phase, the platform helps the procurer to draft an *innovation matrix*: identifying the beneficiaries (direct, co-operative vs. catalytic procurement) and the position in the innovation trajectory (R&D vs. adaptation of existing products).
- *Commercialisation trajectories are realised.* If R&D is needed, the ministry starts a *precommercial procurement trajectory* with different participants that conduct R&D. Participants will develop prototypes, which are tested by the government. After the research phase the government initiates a *commercial procurement procedure* for full implementation of the innovation. This phase is carried out with respect to procurement rules (see 3.3).

The Pol pilot was approved by the Flemish government in July 2008 and is a first implementation of an integrated approach to procurement of innovation. All departments of the Flemish government have started pilots or are currently developing these. The budgets for this instrument are: €10m budget for the Minister responsible for innovation policy for the pre-procurement phase, and a maximum €1m for each other Minister for co-financing of Pol.

As of now, pilots are launched in culture (e-book and ICIS), health care (eye screening), public works (monitoring for building excavations), agriculture (sustainable horticulture), general government (visualisation of public roads), and projects are currently started up in other departments as well. Although it is too early to appraise the effects of this measure, the pilot was followed by a positive response from all governmental departments. Full roll-out of the measure is planned in near term future (2011).

Considerations to include the Pol pilot as a good practice are:

- The measure has an integrative policy approach and enables all ministerial departments to procure innovation; this opens many opportunities for policy mixes. Moreover, budgets were allocated to the minister responsible for innovation, as well as for the other ministers, thus creating ownership at several governmental levels.
- The measure has an integrative innovation approach, acknowledging different phases in innovation trajectories, as well as the systemic nature of innovation. Both pre-commercial procurement and commercial procurement is targeted by the measure. Even more important, innovation agency IWT is involved in finding synergies with other innovation policy instruments, so that demand-side measures are flanked by supply-side measures if necessary.
- The design of the measure and the implementation of it were well-prepared; this has avoided disillusion (regulatory issues, mismatch of ideas, managed expectations). As a result, it seems that Flanders was able to take the hurdle of Art. 78 (see 3.3).

For further information: Website (both English and Dutch) or this short description.

Source: INNO Policy TrendChart/ mini country report Belgium, 2011

