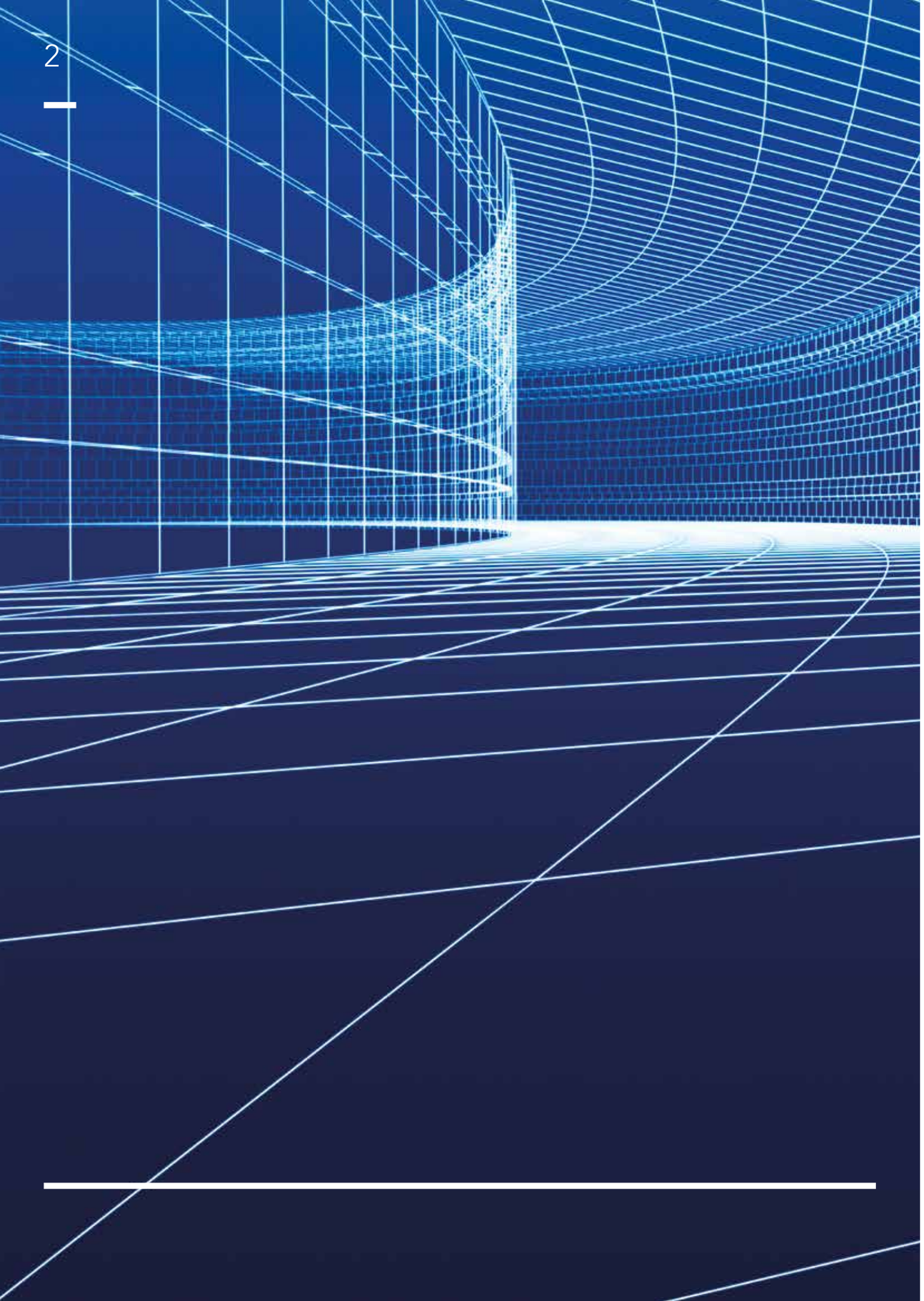
From fragile to agile:
A blueprint for growth and prosperity

scdi
Scottish Council for Development and Industry

Engaging Civic Scotland: Driving Economic Growth

#SCDIblueprint

scdi.org.uk



Contents

#SCDIblueprint

Foreword

Ross Martin, Chief Executive, SCDI

It is The Year 2025. Looking back over the last 10 years, Scotland's successful progress during a decade of disruptive global changes stands out amongst developed economies.

Work in Scotland, wherever it takes place, is now highly productive and a culture of opportunity and improvement pervades education and employment. This enables everyone to make the most of their potential and attracts talented people. Many of Scotland's businesses, large and small, are at the global frontier of innovation, and improvements to how they operate and what they offer diffuse rapidly across Scotland's economy. Scotland's products, from iconic brands to the tech sector, are competitive in every global market – indeed, tech is a new iconic brand.

Scotland's public services have risen to the challenge of austerity, contributing to economic growth; prosperity is intrinsic to what all of them do, and their quality is now a major attraction to living and working in Scotland - as well as a growing Scottish export. Social businesses are mainstream in every part of Scotland's economy and in public services.

The competitiveness of Scotland's infrastructure is being transformed and there is a pipeline of low carbon investment which reinforces Scotland's reputation for leadership and delivery on climate change. Scotland's cities are among the most liveable, enlightened and dynamic powerhouses of activity in the world; its towns have adapted to a changing economy and are thriving based on their strong characters; and its rural areas have successfully combined their quality of life with their natural resources to play a full part in national economic growth. Smart technologies are key in a fully agile economy as Scotland capitalises on its size and networks to be at the forefront of evolving business models and the Internet of Things.

How did Scotland do it? This Blueprint is SCDI's view on the question Scotland must answer.

The opportunities and threats before Scotland are stark. An Emerging Economy is being created and connected in the 'white space' of technology. This revolution will become a reality whatever we do - but only those who adopt new approaches across their economy and society, with a willingness among everyone to embrace change, will reap the benefits. For instance:

- Nearly one half of current jobs in the US (across 702 occupations) are estimated as being at high risk of automation by computers within the next two decades[1]
- Asset-light, idea intensive firms are creating a winner-takes-all dynamic, capturing a growing profit share (31% in the West from 17% in 1999) and, as they radically reduce consumers' costs, disproportionately cutting sectoral profits e.g. Skype's revenues were $2bn in 2013 but it reduced those of traditional telecoms companies by $37bn[2]
- Shared fleets of self-driving cars with high-capacity public transport could deliver the same mobility with 10% of the vehicles in a mid-sized European city by 2025, removing cars, taxis and buses from the roads, as well as all on-street parking and up to 80% of off-street parking, releasing significant swathes of valuable land for alternative uses[3]

On initiating the refresh of its Policy Blueprint, SCDI identified tackling the long-term underperformance in Scotland's productivity, innovation and internationalisation as critical if a still fragile recovery is to become resilient and economic and social prosperity be secured.

We welcome the increasing focus on these areas by both governments and other organisations. Based on extensive and intensive discussions with SCDI's unique gathering of knowledge from all sectors and geographies, SCDI's Blueprint not only offers our own proposals to speed that journey, but it attempts to define the characteristics of what a successful Scottish economy would look like. This is based on two fundamental points - firstly, these weaknesses can only be turned into strengths through long-term, sustained action and, secondly, while government has an essential role, this action will only be successful with industry-led partnerships.

While it will take time to accelerate Scotland's economic performance, a sense of momentum can be generated more quickly. Registration to vote of 97% in the Scottish independence referendum revealed a common willingness to be part of the big questions about Scotland's future direction and many diverse sources of energy. A 'First 100 Days' mentality can establish a tempo which generates a sense of clear and shared purpose, with early actions such as:

- Agreeing and delivering city region deals for Edinburgh and South East Scotland, Aberdeen City and Shire, and Inverness and Highland, following the lead of Glasgow and the Clyde Valley, which accelerate the reversal of 100 years of centralisation within the UK
- Appointing the first Chief Digital Officer for Scotland to progress Digital Scotland discussions from infrastructure to economic growth and public service improvements
- Launching a review to fundamentally reform the business rates system and introducing further reforms to the planning system to make both more reflective of and responsive to the changing economy, and supportive of investment into local growth and jobs

The Blueprint includes key recommendations on Productivity (p.8), Innovation (p.18), and Internationalisation (p.28), which are underpinned by Infrastructure and Place (p.34). We have analysed the evidence of what has and has not worked with the many previous attempts to make advances in these areas. We emphasise the critical need throughout for substantially better information about what is happening in the Scottish economy, particularly with the devolution of more policy levers for the economy and revenue-raising, so we can understand and optimise the effectiveness of our efforts across these priorities going forward, with robust, real-time and high-profile Scottish and city region data. Here I highlight four recommendations:

- A Scottish Productivity Commission, modelled on those of Australia and New Zealand, should provide independent research, advice and performance monitoring to government and all sectors, under the direction of the Council of Economic Advisers
- A network of TechHubs should be developed to bring together innovators, entrepreneurs and creatives with professional support in flexible, affordable and high-tech spaces in cities, towns and smaller communities - with opportunities for revitalising private and public sector property assets as economic changes and financial pressures drive "capacity exit" an immediate priority for policy and partnership support
- A genuine partnership on trade and investment activity to light up and capitalise on business/ sectoral, civic and educational resources and relationships, maintain and improve our relationships in the EU and develop a Scottish 'Commonwealth Plan'
- An independent Scottish Infrastructure Commission to recommend long-term priorities which develop the planned investment programme from catch-up to transformation of Scotland's competitiveness, and integrates national and city region pipelines with a focus on smart and low carbon, and new legislation to fast-track delivery

SCDI has a track-record of significant and successful interventions in the Scottish economy (p.42). The SCDI family is where the temperature of the Scottish economy can most accurately be taken, but our role must be to become the authentic barometer for Scotland's future growth. Given SCDI's belief that industry must take ownership of this agenda, we also set out what SCDI will do with our partners, such as expanding our Young Engineers and Science Clubs into every secondary and primary school. SCDI's role is to catalyse Scotland in thought and in deed and this Blueprint is the start of a journey. SCDI would like to thank all those who support us and we would like to invite everyone who feels like being more agile to join us.

I believe that we will have answered the question I have asked – how did Scotland become that high performance, agile economy – when we can no longer talk of the private, public and social sectors as distinct elements of the Scottish economy, but of one Scottish economy.

December 2015

#SCDIblueprint

1. Oxford Martin School (2013), The Future of Employment: How susceptible are jobs to computerisation?, Programme on the Impacts of Future Technology
2. McKinsey Global Institute (quoted in Fortune, Why every aspect of your business is about to change)
3. OECD International Transport Forum (2015), Urban Mobility System Upgrade: How shared self-driving cars could change city traffic

Introduction

Our productivity, innovation and internationalisation challenges

Working smarter… almost everything

Being able to produce more of the higher-quality goods and services which we need and which enhance our quality of life - with fewer raw materials and less costs and time spent working - is understood by us all as likely to improve our wealth, health and happiness.

Producing more of real value with what you put in, or the same with less, is so important for our future prosperity because it is the basis for growth to continue in the long-term. This opens up opportunities in and for societies which may not otherwise be as readily available.

Productivity - how effective we are at producing a large amount of output with little input - is key to our success as individuals, organisations and societies. High productivity does not mean working longer, and sweating people and assets harder, which is not sustainable in any sense of the word. It does mean successfully introducing smarter ways of working and new products, supported by public and private investment for the long-term rather than short-term results. Increasing productivity across an economy is not the only thing which matters for our prosperity - higher levels of jobs and wages are important too - but it is "almost everything"[4].

> "High productivity societies are characterised by smart choices about savings and investment versus current consumption; dynamic and competitive markets; openness to trade and to international connectedness; high awareness of external influences; rapid uptake and smart application of new technologies, products and processes; and increasing demand for highly skilled and creative people. These are the successful societies that attract and retain people, ideas and capital." Productivity Commission of New Zealand[5]

Many developed economies have experienced weakening in underlying productivity in recent decades. However, the slowdown over the past decade has increased concerns about the prospect of low or no growth[6]. Productivity performance in the UK has been exceptionally weak in historic and global terms. While productivity in Scotland is approaching the UK average[7], both are significantly lower than in many other developed economies. There are specific sectoral issues, but poor performance is evident in many parts of the economy.

There are significant long-term regional imbalances in Scotland, as Aberdeen City & Shire, Edinburgh City and Glasgow City are the only areas with productivity above the Scottish average[8], and there are regions of disadvantage which clearly require co-ordinated and comprehensive action to address their long-term need for economic regeneration.

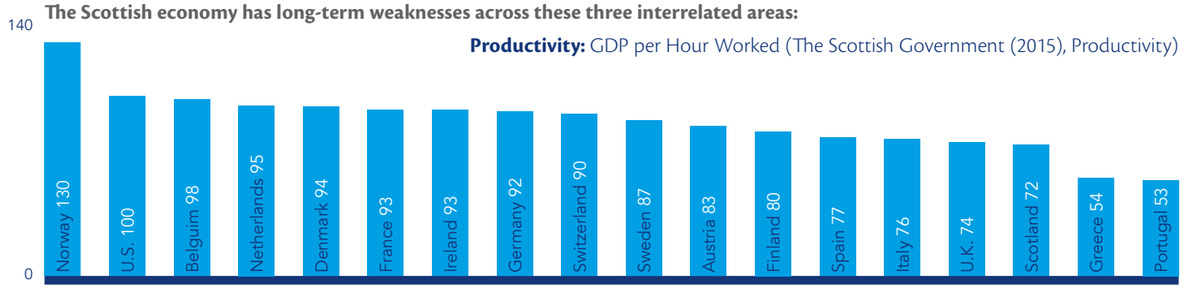
According to the OECD, "knowledge diffusion" propelled productivity growth for much of the 20th century, but while the most globally advanced firms continue to innovate, there is a slowing of the pace at which innovations spread throughout the economy[9]. A range of possible explanations has been advanced for the UK's very weak performance – its Productivity Puzzle – but analysis by the Bank of England concluded that reduced investment, for example in innovation, and reduced implementation of innovation are likely to be key factors[10].

Productivity, innovation and internationalisation are all interrelated. The most productive firms tend to be the most innovative and internationalised, and so on. The OECD finds that knowledge diffusion depends on four key factors – global business and skilled labour connections; experimentation by firms with new ideas, technologies and business models; competitive markets and finance for innovative firms; and strategic investments in R&D, skills and organisational know-how, particularly leadership and management capability[11].

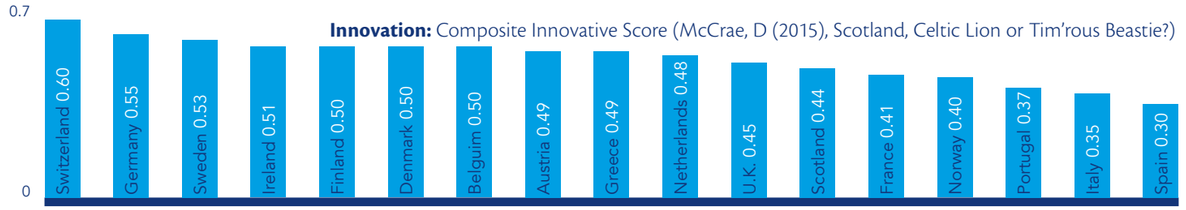
4. Krugman, P. (1994), The Age of Diminished Expectations, Cambridge, MIT Press
5. http://www.productivity.govt.nz/about-us/why-is-productivity-important
6. OECD (2015), The Future of Productivity
7. University of Strathclyde (2015), Fraser of Allander Economic Commentary Vol 39 No 2, Scotland's Productivity Performance: Latest data and insights

The Scottish economy has long-term weaknesses across these three interrelated areas:

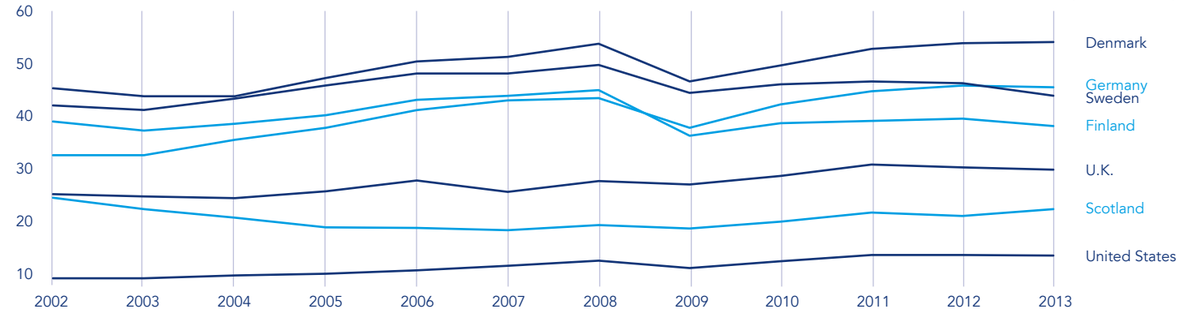
Productivity: GDP per Hour Worked (The Scottish Government (2015), Productivity)



Innovation: Composite Innovative Score (McCrae, D (2015), Scotland, Celtic Lion or Tim'rous Beastie?)



Internationalisation: Scottish international exports and those of other countries as a % of GDP (OECD, GCS)



This Blueprint is focussed on action which, underpinned by new infrastructure, would help to transform Scotland's underperformance in productivity, innovation and internationalisation.

Changes on the horizon…

We live in a time of profound technological, economic and geopolitical disruptions which are changing the world around us at an accelerating pace and will shape the context for action.

SCDI's discussions with our members about what they expect to be their main customer, employee, community, and shareholder drivers over the next 5 to 10 years identified:

- The rise of new, potentially significantly disruptive business models, in response to which traditional business models will need to compete, adapt or collaborate;
- Digitalisation, including significant changes to the interface with customers;
- The need to attract and retain talented people, especially the young, who may have significantly different expectations of and motivations in life and work;
- Globalisation and the need to maintain a competitive cost base;
- Continuing budgetary pressures and increasing demands on and expectations of public services from the public, due to factors such as demographic change.

Amid these global disruptions, a high value is placed upon certainty. The context for action will be influenced by the uncertainty caused by the referendum on the UK's membership of the European Union and, potentially, a second referendum on Scottish independence.

As well as global competition, the competitiveness of Scotland within the UK is a key concern. London, the Golden Triangle and the wider south east continue to attract capital, talent and infrastructure investment. Scotland has done relatively well in comparison with other parts of the UK over the last 30 years, with stronger educational, business and government performance and partnerships. However, with the strengthening leadership and governance at the heart of the Northern Powerhouse, supported by investment in innovation and infrastructure, and high-profile national and international promotion, there is a perception that this poses an increasing threat to Scotland's ability to retain and attract talent and investment. Scotland cannot be in any way complacent about its future competitiveness. As with the proximity of London, Scotland needs to turn the Northern Powerhouse into an opportunity.

8. University of Strathclyde (2015), Fraser of Allander Economic Commentary Vol 39 No 2, Scotland's Productivity Performance: Latest data and insights
9. OECD (2015), The Future of Productivity
10. The Bank of England, The UK productivity puzzle, Quarterly Bulletin 2014 Q2, Alina Barnett, Sandra Batten, Adrian Chiu, Jeremy Franklin and Maria Sebastia-Barriel of the Bank's Monetary Analysis Directorate
11. OECD (2015), The Future of Productivity

Key priority 1
Productivity

Firing on all cylinders… or an unaffordable future?

The Scottish economy has performed relatively well since the Global Financial Crisis and Great Recession in 2007-09 in spite of its weaknesses in productivity, innovation and internationalisation. However, more recently, the lack of robustness and resilience in its growth has become more evident. Without higher productivity, growth is unlikely to continue in the long run. Scotland faces two future scenarios:

If we are a high productivity society, economic and social policy will work together towards the same end of increasing prosperity. People will have greater opportunities for progression in their careers and wages and to achieve their preferred balance between work and leisure. Organisations will better serve customers, reduce costs and pay staff more. Businesses will increase market share and profits. Public services will more effectively meet the demands and expectations on them, achieving more even as the funding available becomes less.

Our society will be able to afford higher living standards and increasing investment in health and care, education, safety, support for people in need, homes, and modern economic and social infrastructure, and to repay national debts with less impact on services and society. As it ages, our society will be better able to afford the pressures on public spending. We will all be able to reduce the use of costly raw materials and our footprint on the environment.

Increasing Scotland's total factor productivity by even 0.1% per year could boost GDP by 1.3%, and in turn, employment by 11,000 and tax revenue by £400m a year after ten years[12].

On the other hand, weak productivity growth is, in the long-term, a slow strangulation. People will have reduced opportunities and living standards, businesses will be less competitive, public services will be forced into ever more substantial reductions and cutbacks, the economy and society will lack the resilience to cope with external shocks and growing pressures, and we will continue to use natural resources at a rate which the Earth cannot sustain.

The productivity puzzle… and future prospects

There is debate about whether the UK's productivity weakness is cyclical or persistent, and the extent to which mis-measurements of output and employment may be giving a less than accurate picture. Specific problems in some key sectors are a drag on overall performance:

The table opposite sets out differences in the productivity of key Scottish sectors. With the exception of life sciences, all GVA experienced growth throughout the period from 2012-13. Key sector strengths have an important role in this development; however there are a range of weaknesses which each sector can improve on to boost productivity and growth levels.

Most economists think that weak productivity is a real, important and pressing problem for the UK. However, it is also concerning many developed economies. There are optimistic and pessimistic views of how easily this can be addressed. Some believe that a new wave of technological innovation will soon raise productivity. Others warn of 'secular stagnation' in which growth is fundamentally slowing due to demographic and "sociological factors"..

There is also debate about whether the increasing prevalence of quarterly profit reporting has encouraged a culture of short-termism and focus on quick returns at the expense of long-term, sustainable business strategy and reinvestment in productivity and innovation.

12. Scottish Government (2015), Launch of the Scottish Business Plan
13. University of Strathclyde (2015), Fraser of Allander Institute Economic Commentary Vol 38 No 3
14. The City UK (2014), Driving Economic Growth Creating Sustainable Jobs
15. Scottish Government (2015), Growth Sector Statistics

Table 1: Productivity Strengths and Weaknesses across Scotland's key sectors

	Gross Value Added (2013)	GVA Change 2012-13	GVA Per Employee (2013)	Strengths	Weaknesses
Financial Services	£11.9B	+2%	£67,232	Increasing productivity in asset management.	Vulnerability to global market. Post-financial crisis, downsizing in banking and loss of HQ jobs.
Life Sciences	£1B	-11.8%	£59,596	One of the biggest life science clusters in Europe. Research excellence.	Lack of investment in R&D. Bridge to commercialisation. Lack of home-grown companies of significant scale.
Energy Sector (Including Renewables)	£24B	+4.4%	£354,324	Global energy hub in Aberdeen. Research excellence. Increasing development of renewables.	Oil price volatility and mature/ high-cost basin, low innovation and removal of subsidies for renewables.
Creative Industries	£3.7B	+23.8%	£58,968	Growth of tech clusters in cities. Gaming.	Supply of digital skills. Lack of venture capital. Digital connectivity in some locations.
Food & Drink	£3.9B	+8.4%	£87,551	Premium global brands. Investment. Export growth.	Global competition. Lack of scale outwith major subsectors. Low innovation.
Tourism Related Industries	£3.5B	+7.5%	£16,832	Natural and cultural attractions and major events. Investment in visitor centres.	Productivity in small businesses. Lower pay. Lack of digital utilisation. Visa regulations. Global connectivity.
Construction Industry	£6.2B	+4.2%	£50,024	Infrastructure and city regeneration projects. Growth in the maintenance subsector.	Shortage of housing development. Low innovation. Skills supply.

Drivers of productivity… priorities for Scotland and the UK

The five main drivers which are generally understood to interact to influence long-term productivity performance are investment; innovation; skills; enterprise and competition. In its 'The Future of Productivity', the OECD has highlighted the following as key to growth:

- pro-competition reforms to product markets, especially in services to incentivise and facilitate diffusion of new technologies and managerial performance
- closer collaboration between firms (of all sizes) and universities in order to benefit from access to the global knowledge frontier
- a level playing field that does not favour incumbents over entrants (e.g. regulatory frameworks)
- greater labour mobility in order to reduce skill mismatch (e.g. education, housing and visas)
- public investment in basic research

The UK is a class-leader in a number of these areas. However, in its latest report on the UK economy the OECD highlighted the need for improvements in education and skills and measures to reduce income inequality; to develop further the knowledge-based economy; strengthening infrastructure; and improving the financing of the economy. It identified the need to improve productivity in public services, particularly health and education services – with public service reform contributing to increasing economic growth and prosperity .

SCDI members identified the following priorities to significantly improve their productivity:

- Attracting and retaining talent and increasing investment in workforces
- Improving leadership and management to make better use of workforces
- Greater workforce self-management, self-motivation and embrace of change
- Digitisation to improve knowledge exchange and performance monitoring
- Simplification to focus on core purposes
- Sectoral collaboration and cost reduction
- Improving national infrastructure to make better use of people's time
- Higher adoption of innovation

16. The Scottish Government (2015), Scottish Annual Business Statistics
17. BBC News (2015), Solving the Productivity Puzzle
18. Andrew Haldane, Chief Economist, Bank of England, Who owns a company? – speech given at the University of Edinburgh Corporate Finance Conference on Friday 22 May 2015
19. OECD (2015), Economic Surveys: UNITED KINGDOM 2015

A competitive business environment… funding for growth

The UK consistently ranks highly in international comparisons of ease of doing business. Corporation tax has been reduced to the lowest in the G7 and is to be cut further to 18%. The annual investment allowance is being increased permanently from £25,000 to £200,000.

Access to finance has been a concern for some businesses since the financial crash. This would appear to have become less of an issue, with increasing competition and diversity in the sources on which businesses are drawing, albeit with specific challenges remaining in areas such as innovative businesses and infrastructure. An aversion to risk and emphasis on business survival rather than growth by owner-managers, particularly in the sectors most badly burned in the Global Financial Crisis and Great Recession in 2007-09, would appear to be limiting some demand for finance.

Competition and diversity should continue to be encouraged. Improving awareness, transparency and confidence around all funding models and options across more businesses. Such signposting may be a role for the Scottish Business Development Bank. There will be a need for regulators to monitor and ensure the continuing robustness of all sources of financing the economy. Collaboration between traditional and alternative lenders could create long-term funding packages for businesses, especially SMEs, which are better suited to their individual needs, including tailored balances between safe access and innovative funding.

While not every business can or should be a 'unicorn', the reallocation of financial resources from less to more competitive companies, the 'up or out' dynamic, drives productivity growth and the Bank of England has identified the misallocation of resources to 'zombie' companies as a potential cause of weak productivity. Scotland has had a strong record on start-ups in recent years, but more analysis is needed of whether these continue to grow or stagnate.

Higher performance workplaces and workforces… keeping the customer satisfied

With 90% of the 2020 workforce already in work[20] and the working age population expected to contract from the 2020s, there is a need to develop a higher vision for Scottish workplaces.

Responsiveness to the customer is fundamental to making improvements in products and processes which create higher value output, but this is often overlooked. Scotland needs to aim to be a world-leading customer-friendly and responsive nation. Digitalisation and data offer opportunities to do this more cost-effectively and accurately. However, there is a need for more leaders, managers and staff who understand, value and act on this information.

Leadership, strategic management and planning skills are among Scottish employers' most commonly cited skills gaps[21]. UK managers are less likely to have high-level qualifications and receive less training than those in other advanced economies. While the UK's best-managed businesses are among the best anywhere, there is a 'long tail' of more poorly managed firms, particularly among SMEs, family/founder, and government owned companies.[22] Businesses need to invest in and encourage progression, and these qualities should be emphasised in education, extra-curricular activity and recruitment to create a critical mass of new expertise.

This is key to enhancing opportunities to employees to develop and use their skills, enriching roles and improving wellbeing. Greater transparency around challenges and opportunities can increase the sense of a common stake in them.

Disruptive Trends – Social Enterprise

Social enterprises, businesses which trade for social purposes, blur the traditional boundaries between the private, public and not-for-profit sectors, operating in the market economy while progressing significant social and environmental changes. Leading social enterprises can encourage productivity, sustainable wealth creation and active citizenship. They may fill market gaps where profits are too low for private providers or where the public sector has pulled back provision. They are playing an increasingly central role in Scotland's economic strategy – and their innovative and affordable consumer product and service solutions can build communities of engaged customers which disrupts traditional markets.

There are now over 5,000 social enterprises operating in Scotland, 42% of which were formed in the last 10 years, with over 200 new enterprises continuing to be formed each year, operating across all geographies and a range of diverse sectors.[23] Seven per cent operate internationally, selling goods and services internationally or attracting international visitors to Scotland, collaborating with international partners or contributing to the delivery of international projects; and 5% have exported to overseas markets in the last 12 months.

With grant funding declining, social enterprises identify as key to growth: changing a cultural aversion to risk and alternative sources of finance, which will also foster greater innovation; capacity and capability building via specialist business support and leadership development; and significant expansion in consumer, public service and private business markets.[24]

For example CEIS, based in Glasgow, is the UK's largest social enterprise support agency and its training, support and investment programmes have been widely adopted internationally. CEIS encourages cooperation, collaboration and innovation between Scottish social enterprise and those in other countries, including inward and outward visit programmes.

20. City Growth Commission (2014), Human Capitals
21. SCDI (2014), Skills Pulse Survey
22. Van Reenen, J. (2011), How Competition Improves Management and Productivity
23. Social Enterprise Scotland (2015), Social Enterprise in Scotland Census 2015 (research by the Social Value Lab)
24. Social Enterprise Scotland etc, Scotland's Vision for Social Enterprise 2025: Moving Social Enterprise in from the Margins to the Mainstream

This should encourage and must lead to more everyday leadership, self-motivation and willingness to develop skills throughout careers, retrain and embrace changes of roles in workforces. A wider diversity of company structures and business models which aim to foster positive workplace partnerships would support this, and should continue to be encouraged in businesses and public services which may benefit.

Colleges have an essential role in providing upskilling and retraining opportunities, including for those in work and those furthest from the labour market. There has been a large reduction of part-time provision to focus resources on young people, but in order to improve the skills of those in work, encourage a culture of lifelong learning and build on college regionalisation, there needs to be a higher recognition of and funding for colleges over the next five years.

Greater diversity in leadership, management and workforces broadens the pool of talent, protects against 'Group Think' and can offer innovative perspectives – it also means that organisations look more like their customers. Change is taking place, but there are still imbalances in profile, progress and pay and it is taking time to feed through to higher levels.

Employers should support family-friendly working policies and changing workplace culture to emphasise that these are in place to support women and men alike with families and caring roles. Childcare policies around the world have been evidenced to benefit the economy through increasing the supply of labour (short-term) and improving the life chances of disadvantaged children (long-term). However, few countries have successfully married both in one policy.[25] The Commission for Childcare Reform, established in partnership by Children in Scotland and SCDI, proposed how Scotland can lead the world in developing a universally affordable, available, high-quality and flexible childcare provision, which improves participation and the productivity of people in work, and early years education.[26] Plans for significant investment offer the chance to design the optimum infrastructure. This needs to be supported by interventions which help women with young children who are furthest from the labour market back into work.

The availability of excellent childcare (as with other public services) for themselves and their families can also be a major attraction for talented people.

Skilled immigration and post study work visas for international students would enable employers to improve ethnic diversity, supporting a more global mindset in workplaces.

Scotland faces demographic challenges which will put increasing pressure on the economy and public services, with the dependency ratio (number of 'dependants' per 100 people of working age population) expected to rise from 60 per 100 to 64 per 100 by 2035.[27] Employers will need to support employees in managing the demands of productive work and caring. More should be done to raise the profile of the Carer Employer Positive kitemark with employers.

Wages have stagnated in the UK economy along with weak productivity. Higher productivity should lead to higher wages. Higher wages, particularly for lower earners, may also stimulate higher productivity. An increasing number of employers believe that there are benefits for them in paying the Living Wage, including reduced staff turnover, reduced absenteeism, reputational benefits, recruitment and retention of staff, worker morale, and productivity benefits, and also believe that it is the right thing to do for their staff and society.[28]

There are specific concerns for some low pay sectors about the implications for business sustainability of the significant uplift from the minimum wage to the National Living Wage, and, therefore, about loss of employment, economic activity in communities, and the economic and social services which they may provide. This is related to their ability to maintain pay differentials to their higher skilled and more responsible staff, and reward progression.

There needs to be a focus on higher rewards – it is hard to believe that productivity can be increased across all sectors without it. However, this needs to take into account the total pay and benefit packages which are available in some low pay occupations and can particularly suit some employees, and be accompanied by policies designed to improve career progression and reduce costs faced by people on low incomes, such as childcare costs. Targeted advice and support to improve productivity, for example by enhancing job design, and ensure business sustainability, for example through procurement from government at all levels and from larger businesses, is needed to help employers in lower wage sectors respond positively to the challenges of the Scottish Fair Work agenda by paying the Living Wage.

With the wide impact of an ageing population and growing demand for social care, it will be particularly important to ensure that there is sufficient funding to expand the provision available and recruit, retain and reward a larger, but more highly trained and productive workforce.

Digital skills…and working with our friends electric

The productivity gains possible from the introduction of new digital technologies – such as a deeper understanding and engagement with customers - cannot be captured if business models do not change, services are not redesigned and if staff do not have the range of coinciding digital, analytical and 'soft' skills. There is a need for digital to become integral to overall strategy and delivery in government, business and public services which requires understanding of the technology and leadership at the most senior levels (including political).

Scotland's new Digital Maturity Index classifies the vast majority of a large sample of Scottish businesses as disconnected doubters, basic browsers or tentative techies. Those businesses which are less digitally mature tend to be smaller, older and less likely to grow or export.[29] Supporting businesses to mature digitally can enable a range of positive business transitions.

Table 2:
Scottish Business Digital Maturity Index – Adoption, Usage, Benefits and Skills

Disconnected doubters	13%
Basic browsers	38%
Tentative techies	30%
Enthusiastic explorers	15%
Digital champions	3%
Digital pioneers	0.2%

25. IFS (2014), Green Budget
26. Commission for Childcare Reform (2015), Final Report
27. Scottish Parliament (2013), Demographic change and an ageing population, 2nd report
28. Coulson, A., and Bonner, J. (2015), Living Wage Employers: evidence of UK Business Case
29. Digital Scotland Business Excellence Partnership (2015), Digital Maturity Index

There is an urgent need to catalyse thought leadership on policies and practice and to make best use of digital capabilities to drive high performance productivity, innovation and internationalisation over the next five years across all sectors of the Scottish economy.

Automation allows businesses and organisations to drive greater output for reduced costs. Most businesses and public services foresee further opportunities, including in back office areas of services, routine processes in manufacturing and offshore in oil and gas. The productivity improvements are seen as a key to maintaining competiveness and, therefore, overall employment, although jobs will be lost and the profile of the workforce will necessarily change. Young people will need to be equipped with the higher level and digital skills, and there will be a need for flexibility and life-long learning opportunities for existing workforces.

Cyber-crime presents a great threat to the Scottish economy and action must be a strategic priority for government, businesses and public services. There is an urgent need to improve security systems at key industrial sites and for key infrastructure to protect sources of productivity and intellectual property in universities and sites of research and development to protect sources of innovation. This is a global challenge for which many are underprepared and taking a lead will create export opportunity for cyber security services and skills.

Developing Scotland's Young Workforce…not just doing it by the book

Finland's *Oivallus ("Insight") Project* on the future competence needs of businesses in their workforces found that they are changing because the ways of working are changing; jobs are becoming less and less routine and fewer jobs can be done "by the book". Work is increasingly done on a project basis where the key to success is the ability of people with different competencies to work together to identify new opportunities and find solutions to problems. These are skills that require practice and that should be developed from early on throughout education.[30] This should continue to be the ethos of Scotland's Curriculum for Excellence.

Science, Technology, Engineering and Maths (STEM) skills are particularly important and further action is needed to improve the knowledge and confidence of primary teachers; recruit, train and continually develop specialist teachers (particularly to address national shortages in Physics, Chemistry and Computer Science); and encourage pupils to choose these disciplines. Developing a digital literacy for all has to be integral throughout the Curriculum for Excellence.

Aspirations and opportunities are shaped from the earliest years of education and providing young people with a better understanding of the world of work from a young age allows them better insight into the educational pathways which will lead to employment opportunities. The Commission for Developing Scotland's Young Workforce's report[31] made the strongest case for closer engagement between education and employers.

There is a need to facilitate and co-ordinate contacts and partnerships to enable support for curricular and extra-curricular activities and work visits and experience. This should be a major consideration when assessing school performance. Industry-led Regional Invest in Young People groups are being developed to improve connections and the timetable for their rollout needs to be made clearer to ensure that employer enthusiasm is not frustrated by slow progress and lack of visibility. There is a need to champion successful engagement across employer and education workforces, and these groups should be means to do this among peers and supply chains.

Modern Apprenticeship programmes bridge the worlds of learning and work. In Germany and Switzerland, more than half of employers offer apprenticeships, compared to 15% in the UK. Of those that do, 72% report improved productivity as a result, with the average apprenticeship increasing business productivity by £214 a week.[32] Scotland has successfully expanded the number of apprenticeships and the focus now should be on further improving their quality, for instance by working with employers to develop 'gold star' frameworks and by increasing their diversity, particularly the number of female modern apprentices in engineering from 5% in 2014/15.[33] Foundation Apprenticeships, which allow young people in their final years of school to begin working towards a Modern Apprenticeship, should be rolled out to all schools.

More focus and promotion should also now be applied to increasing uptake of Advanced Modern Apprenticeships, enabling a greater level of career progression for some school leavers; aligning with those employers increasingly seeking more vocational qualifications; and developing in-house training schemes to support these routes.

Higher level skills are key to solving the most pressing problems of this hyper-connected world, translating innovation into productivity growth and higher employment, and to maintaining and enhancing economic competitiveness in a knowledge-based 'global race'. With skills "the global currency of the 21st century", many countries are investing in higher education due to the inherent skills imparted by a degree level course, such as self-directed learning and the utilisation of knowledge. Scotland needs to maintain the international standing of its higher education institutions for teaching and research excellence by sustaining funding and protecting their autonomy, and they must continue to strengthen their links with employers, the city regions in which they are located and the wider Scottish education system.

Skills planning and delivery needs to blend the best national and regional approaches. Local educational provision needs to become better aligned with the job opportunities available in the area. For sectors requiring higher level skills and/ or in rural areas with lower populations, it is essential to establish connections with educational excellence and talent across Scotland and develop a coherent framework for investment by the public sector and industry.

30. OECD (2012), Better Skills, Better Jobs, Better Lives – Skills Strategy
31. Commission for Developing Scotland's Young Workforce (2014), Education Working For All
32. DEMOS (2015), The Commission on Apprenticeships
33. Skills Development Scotland (2015), Equalities Action Plan: For Modern Apprenticeships in Scotland

Key Productivity Challenge

To mainstream and measure continuous productivity improvements as the priority for the Scottish economy and all sectors and sizes of businesses to achieve the Scottish Government's target of raising Scotland's productivity levels from the 3rd to the 1st quartile of OECD countries (closing a gap which is, at present, over 20%). To develop productivity plans, targets and regular reports for each part of the public sector, and, in partnership, business sectors with weak productivity and SMEs.

Recommendations on Productivity

Excellence in productivity in policy, leadership and management, including:

- A Scottish Productivity Commission, modelled on the international best practice such as those in Australia and New Zealand, should provide independent research, advice and performance monitoring to government and all sectors, under the direction of the Council of Economic Advisers
- A network of Productivity Champions should be established to lead by example, provide advice and encourage porousness to new ideas, with a programme of national and regional cross-sectoral and sectoral activity

World-class utilisation of digital infrastructure and technologies, including:

- The first Chief Digital Officer for Scotland, reporting directly to the First Minister, should be appointed to progress Digital Scotland discussions from infrastructure to economic growth and public service improvements
- Chief Digital Officers should be appointed in all public bodies and Digital Champions appointed to Industry Leadership Groups, and the role of the Digital Scotland Business Excellence Partnership should be enhanced (or a new Digital Scotland group created) to identify and drive where smart utilisation of digital technology can increase productivity across all sectors and sizes of business (whether private or public sector)
- Scotland should have clear targets (measured in 2017 and 2020) to develop businesses toward the upper end of the digital economy maturity index. The aiming point should be for all businesses in Scotland to be at "enthusiastic explorer" level or above
- The Scottish Government's Digital Transformation Service should be mandated to work with all public bodies and not just central government

Promote great workplaces as a competitive advantage, including:

- There should be an expansion of flexible demand-led and industry-specific in-work skills development opportunities, apprenticeships and vocational learning and improvements to skills utilisation to increase the proportion of the workforce with jobs which give scope to learn and problem solve to the level of the best performing EU countries (from 35% to over 60%)[34]
- The employment and workplace framework from the Fair Work Commission should launch a national conversation focused on increasing productivity and innovation through a world-class approach to people management, everyday leadership, intra-preneurialism, and the changing nature of work
- Sector-led strategies, targets, action and regular performance monitoring on workforce equality and diversity should be developed by all sectors
- Businesses, trade unions and government should develop a strategy and promote an action plan for all workplaces to adopt family-friendly, agile practices, enabled by the progressive transformation of childcare provision, to meet employers' and employees' needs in all regions with an entitlement by 2025, for every child up to the age of 12, of up to 50 hours of high quality free or subsidised childcare/ education per week throughout the year[35]

Develop skills and capabilities for the jobs of today and tomorrow, including:

- Every secondary school in Scotland and its feeder primaries should be supported by at least one business in a long-term partnership, with the acceleration of culture change and practical delivery on education-employer engagement to make the vision of 'education working for all' a reality
- The attractiveness of teaching careers, resources and profile of STEM subjects in primary and secondary schools should be raised (especially physics, chemistry and computer science) so that the curriculum can be fully delivered, more young people study them and the gap in performance with leading countries closed,[36] and demand from the Scottish science, engineering and manufacturing technology sectors for replacement skills (currently 2500 people per year) and higher level engineering qualifications (from 30% to 40% of the workforce by 2020) can be met as they grow[37]
- Foundation Apprenticeships should be rolled-out to every school by 2020

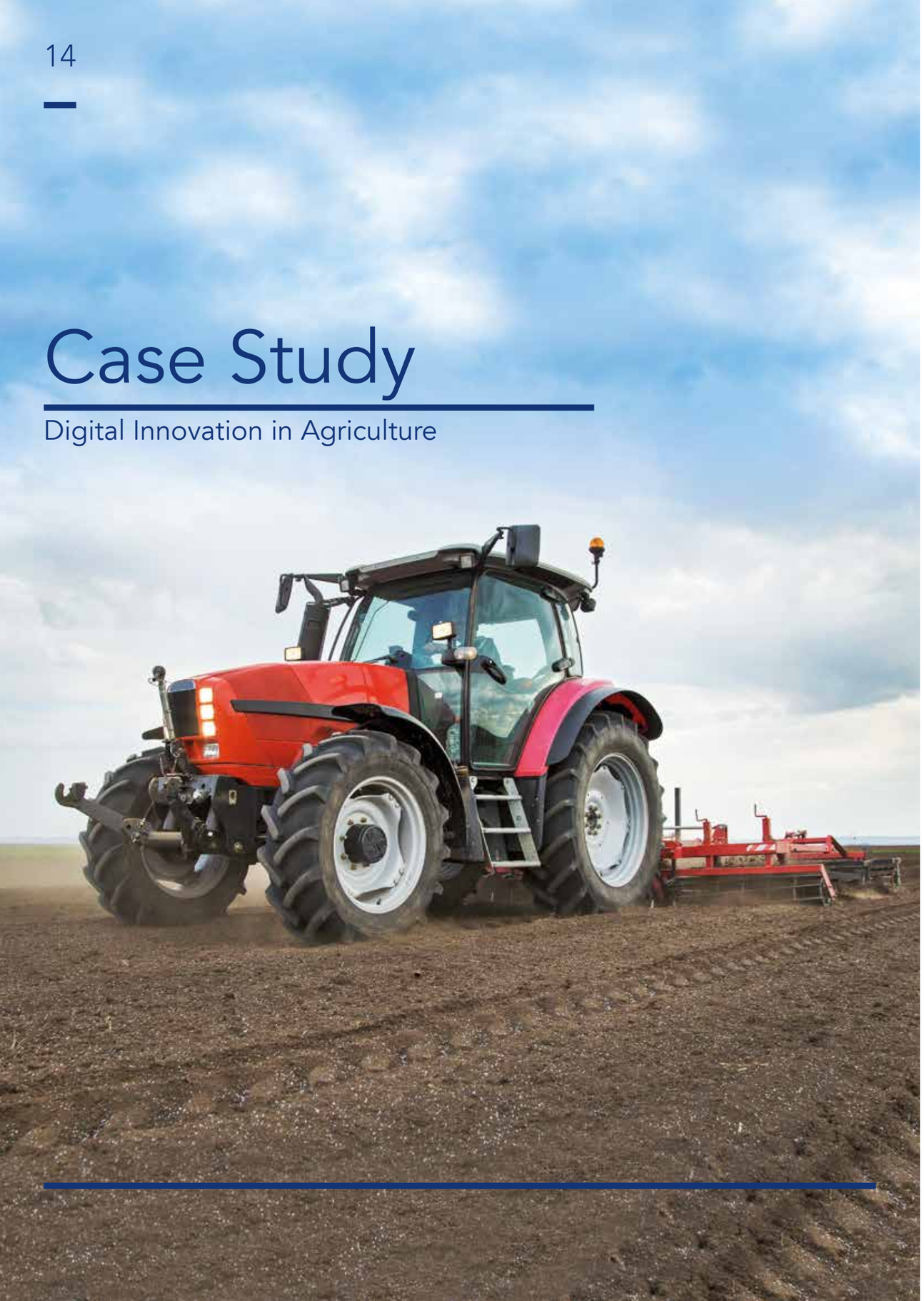
Related action by SCDI:

- SCDI, with the support of our private and public sectors partners, is aiming to involve every school in Scotland in our Young Engineers and Science Clubs (YESCs) network, with 100% of secondaries by 2018 and 100% of primaries by 2022, demonstrate their positive influence on subject and career choices and attainment, and continue to increase the diversity of the young people who participate in them
- Our YESCs network will expand its portfolio of STEM projects linked to key industry sectors, including Raspberry Pi coding projects which are being further developed to reach both primary and secondary schools
- SCDI will work with partners to stimulate thinking and galvanise action on how the utilisation of Scotland's new digital infrastructure and technologies could improve productivity across all sectors, to support Scotland's Digital Nation vision
- SCDI, working with its members, will demonstrate the leadership required for "engaging civic Scotland, driving economic growth", by showcasing brilliant examples of where productivity can be, and is being, improved

34. European Working Conditions Survey (2012)
35. Commission for Childcare Reform (2015), Final Report
36. Science and Engineering Education Advisory Group (2012), Supporting Scotland's STEM Education and Culture
37. Skills Development Scotland (2014), Skills Investment Plan: For Scotland's engineering and advanced manufacturing sector

Case Study

Digital Innovation in Agriculture



The Scottish Agricultural Organisation Society (SAOS) Ltd is a federal co-op providing services to Scotland's farmers' co-ops including the largest dairy, meat, grain and vegetable businesses in Scotland worth a total of £2.3 billion. Following the disastrous Foot and Mouth outbreak in 2001 which led to pyres of livestock due to slow, cumbersome and inaccurate traceability of animals, it set-up and now develops and operates the system which traces individual livestock from birth to slaughter.

The ScotEID web enabled data systems provide real time access for farmers, livestock markets and abattoirs to record, check and refine information on livestock movement. Any animal moving through the supply chain with a suspected ailment can be found along with its cohorts, allowing for efficient eradication of infectious diseases.

The system ensures farmers check the database for errors and keep it up-to-date with any changes in livestock

As Scottish livestock is traced from farm to farm, through markets and eventually to meat processors, this also validates its provenance. For example, ScotEID verifies 'Scotch Beef' as having been born, reared and butchered in Scotland, providing consumers and export markets with confidence that Scottish meat has the highest integrity and quality. The system is believed to be unique, giving Scotland a significant advantage concerning brand integrity, quality assurance, disease control and underlying research.

The system is a private/public partnership between the entire livestock supply chain and Scottish Government. This allows the core data to be consistently refined in real time to be as accurate as possible, providing for a wide range of purposes governed by 'data control in common' agreements, and flexibility and rapid response to industry needs and consumer concerns.

ScotEID is providing Scottish farmers with the data tools to eradicate diseases and a new scheme is currently being developed to provide farmers with data analysis and research to increase beef production efficiency, in particular to reduce greenhouse gas emissions.

The partnership, managed by SAOS, is providing accurate live data for a fraction of the cost of public data systems, whilst also reducing red tape for farmers (http://news.scotland.gov.uk/News/Reducing-red-tape-for-farmers-1fa9.aspx) e.g. by automatically recording livestock movements using electronic identification. Now the Scottish Government is using the system to allow farmers to submit statistical returns online and its data for other statutory purposes

Case Study

Productivity in North Sea Oil and Gas

North Sea oil and gas is associated with high-value jobs. Over 150,000 barrels were being produced per 'core' offshore worker less than a decade ago. Today, though, it is less than 50,000. Low oil prices have reduced nominal productivity further. While price volatility is a feature of oil and gas, many other factors have affected productivity and parallels can be drawn with other industries.

Much of the productivity decline is linked to the maturity of the North Sea. Many of the largest fields are well past peak production. Infrastructure is ageing, which necessitates increased maintenance activity. New fields tend to be smaller and more complex to develop, losing economies of scale. Age and complexity have also contributed to a rise in production outages: production efficiency fell from 80% to 60% between 2004 and 2012. However, most of the causes of low production efficiency can be controlled by the industry. It has also identified many other opportunities to improve productivity: new ways of working, simplifying processes and equipment, and deploying technology.

The North Sea is seeking to change from bespoke engineering to 'lean', standardised engineering that considers "how will we operate it?"

As a result of the focus on production efficiency, a Production Efficiency Task Force, led by the new Oil and Gas Authority (OGA), has been established. Amongst other areas, it is looking at offshore "wrench time", i.e. the actual productive hours an offshore worker has during a typical 12-hour shift. Improving wrench time is not simply a matter of ensuring a worker spends more of the day "on the tools". It requires the integration of planning, scheduling, materials and inventory management, logistics, and control of work. The taskforce has enabled companies to benchmark themselves and share best practice. There are a number of success stories. One operator has accelerated the completion of planned tasks by 12% over three months, by encouraging offshore teams to use visualisation techniques to plan operations and maintenance. A drilling contractor has, meanwhile, reduced the costs of plugging and abandoning old wells by 30% to 40%, by reviewing processes and adopting a batch approach.

Productivity is also being enhanced through comprehensive "renewal" programmes for individual assets, such as the ETAP cluster of fields. Additional workforce accommodation in the form of a "flotel" is brought in to enable integrity, reliability and production-adding work to be executed while continuing day-to-day production operations.

Looking further to the future, it is clear that productivity improvement will go hand in hand with the drive to transform the cost base and efficiency of the North Sea. This is essential given current high costs, increasing competition for investment globally, and the possibility of sustained lower oil prices.

The North Sea is seeking to change from bespoke engineering to 'lean', standardised engineering that considers "how will we operate it?" before "how will we be build it?". New technology will also make workers more efficient. BP began to develop the 'digital oil field' through its Field of the Future® technology programme, which began almost 15 years ago. Initially, this focussed on connectivity and collaboration between on and offshore operations. In more recent years, the focus has been on "big data": installing sensors across platforms, subsea equipment, and "downhole" in oil wells. Increasing automation is a logical next step.

Key priority 2
Innovation

Demystifying innovation… the diffusion challenge

The benefits of the introduction of any improved processes, services and products to increase value and better meet what customers want can be generally understood in the private, public and social economy sectors. Successful innovation can involve enhancements to existing services, more efficient ways of working and changes to business models which help to save time and money, better position businesses and organisations in a changing marketplace and create growth or public good. However, many businesses do not regard this as innovation. Increasing awareness and developing understanding of the full range of innovative activities and their benefits in the language of businesses and public services would be useful in encouraging more of them to seek to make and invest in continuous improvements.

The pace at which innovations spread throughout developed economies seems to be slowing. The most productive global firms can now "optimally combine technological, organisational and human capital in production processes throughout global value chains and harness the power of digitalisation to rapidly diffuse and replicate ideas", but many others are lagging behind, with a decreasing proportion implementing new or significantly improved products.[38]

If we are a high innovation society, the potential in all sources within our society to develop and apply creativity across all walks of life will be realised. We will be highly-networked, porous to new ideas and better at turning them into action. We will place a high-value on and make effective use of science and scientific advice, demonstrating a broader understanding of risk, encompassing the risks and potential opportunities of innovation and not innovating.

Our businesses and educational institutions will be at the forefront of the scientific or high-tech advances. Moreover, every business and public service will realise its potential to transform an aspect of the way they do business, from product and service design, marketing and distribution, use of customer data, to workforce engagement. We will innovate in how we use products as well as how they are invented and made. Innovation will be an in-built part of every business strategy, with a dynamic interaction between businesses, research, government and the market, and the capacities of everyone in work switched on to develop innovation.

Drivers of innovation… priorities for Scotland

In The Future of Productivity, the OECD has highlighted innovation as key to reviving productivity growth: pushing out the global innovation frontier through basic research; reviving the diffusion machine through a competitive market environment where firms have incentives to innovate and closer collaboration between universities and firms, especially smaller ones; and improving the allocation of scarce resources – labour and capital and skills - through the 'up or out' dynamic, reducing skill mismatch and improving the early stage risk capital market. Innovation policies, such as R&D fiscal incentives, collaboration between firms and universities and intellectual property rights protection, should follow international best practice and not favour incumbents over new firms, and public investments in education and life-long learning must enable workers to learn new skills and adapt to changing roles.[39]

Scotland ranks around the middle of European Union countries across a composite of innovation indicators.[40] There is a considerable amount of 'hidden innovation', particularly because surveys tend to focus on manufacturing at the expense of the resource and service industries which are large in the Scottish economy. However, the proportion of Scottish SMEs introducing new products or services declined between 2006/07 and 2014 from 52% to 43%.[41]

This is primarily through technology adoption rather than radical product development, meaning it cannot substitute for 'visible innovation' in its impact on productivity.[42] The dominant source of R&D spending in Scotland is derived from universities.

38. OECD (2015), The Future of Productivity
39. OECD (2015), The Future of Productivity
40. European Commission (2015), Regional Innovation Scoreboard 2014
41. University of Strathclyde (2015), Fraser of Allander Economic Commentary Vol 39 No 2, Scotland's Productivity Performance: Latest data and insights
42. Coad, A., and Reid, A. (2012), The Role of Technology and Technology-based Firms in Economic Development

Business Enterprise R&D (BERD) in Scotland in 2013 was 4.3% of the UK total (0.6% of Scottish GDP compared to 1.06% for the whole UK). Nearly two thirds (63.5%) of BERD expenditure was undertaken in just four areas: Edinburgh (23.1%), West Lothian (15.6%), Glasgow (14.6%) and Aberdeen (10.1%). It is concentrated in larger companies and inward investors.[43] The regional imbalance is also evident in patents - Aberdeen has the most applications per employee in the UK outside London,[44] with Edinburgh and Glasgow also strong performers.

SCDI members identified the following priorities for increasing innovation in Scotland:

- Increasing the appetite for risk, openness to new ideas and commitment to growth
- Increasing the scale of impact; improving the accessibility, particularly for SMEs; and joining-up the positive innovation initiatives currently available in Scotland
- Continuing to strengthen knowledge exchange between business and education
- Tackling the persistent challenges in the 'bridge to commercialisation'
- Delivering on procurement reforms which emphasise quality and innovative bids
- Enabling more sectoral collaboration to accelerate the market potential of innovation in safer areas where anti-competitive risks are lower and opportunities higher
- Realising the significant potential of digital technologies for businesses and public services by improving access across all communities and digital skills across society
- Ensuring longer-term consistency in legislation and regulation and its interpretation and application so that they form a positive framework for innovation, and that they do not stifle innovation or divert management time from other kinds of innovation

Innovation nation… leadership and switching on the capacities of everyone

Scotland is world-renowned for its history of scientific and technological inventions and excellence. The innovations developed in previous generations inevitably involved risks, but they led to revolutions in economic and social progress. However, with our crowded planet, complex societies and capacity for inventiveness, new issues constantly arise. Innovation itself almost always causes both benefit and harm. As a society, despite our relative safety, we have become more risk averse, yet the realities of modern life are that we cannot avoid risks. We need to manage them to realise the benefits while minimising the harms.[45]

Some recent decisions of the Scottish Government appear to have sidelined scientific evidence, imposing obstacles to the work of Scottish researchers and businesses, and diminishing Scotland's reputation as a world-leading scientific nation. Leadership and an evidence-based approach need to be demonstrated in engaging with the balance of opportunities and risks of innovation before high-level legislative and regulatory decisions. An immediate priority must be appointing a Chief Scientific Adviser for Scotland and reinforcing the memberships and profile of the Scottish Scientific Advisory Committee.

In recent years, Scotland has developed one of the strongest business angel communities in Europe and has been substantially closing the gap with other innovation-driven nations on entrepreneurship.[46] New technologies offer disruptive market opportunities and there is now a need to scale-up good ideas much more rapidly and exaggerate the 'up or out' dynamic in which it is better to fail fast (than plug away without success), take and discuss with others the learning and try again. The availability of sufficient risk capital for this is still a problem.

Long-term finance and service challenges for public services in the face of fiscal consolidation and demographic change necessitate a willingness to re-consider orthodoxies and the opportunities and risks of innovating and not innovating, and collaborating and not collaborating across the public, private and third sectors. Accountability and maintaining uniform provision are often central to public concerns around changes to services, which open and mature conversations and joint and transparent approaches could help to address.

A culture of innovation can be nurtured in the workplace by leadership and management giving workers time and space to think of, develop and test ideas, managing any risks and recognising and rewarding their successes. Diversity can encourage a range of new ideas, with young people often a positive source, potentially in combination with a more experienced colleague. Employees at the frontline can have the greatest understanding of changing customer needs, and digital technologies can facilitate sharing and commenting on ideas.

While global frontier innovation will have the greatest impact on productivity, there is a need to percolate national innovation and stimulate more local innovation. Norway has introduced regional innovation funds. In the UK, colleges have had a much smaller role in knowledge exchange of research, but changes which have enabled innovation vouchers to be used with them should help develop their potential, and ensuring that staff are continually refreshed in the latest industry developments recycles knowledge back into learning. The regionalisation of Scotland's colleges has increased their capacity to support national and regional innovation.

43. Scottish Government (2013), Business Enterprise Research and Development Scotland
44. Centre for Economics & Business Research for Johnston Press (2014), UK Local Innovation Index
45. UK Government, Annual Report of the Chief Scientific Advisor 2014, Innovation: Managing Risk, Not Avoiding It
46. http://www.heraldscotland.com/business/13716826.Growing_the_angels__share/

Horizon-scanning... bringing it all back home

The rapid rise of disruptive business models is a most significant area of transformative economic change. These are often agile and without legacy issues, utilise new technologies and respond to specific social, environmental and economic customer demand. In particular, the digital revolution is generating the fastest-growing companies in history and increasing the importance of the customer interface. Traditional businesses will have to choose between competing, adapting or collaborating with them to succeed in transforming markets.

This poses major opportunities and challenges. There is a need for a co-ordinated approach by government agencies, regulators, higher education and industry to horizon-scan, maintain an up-to-date view of trends and disseminate intelligence widely to Scottish businesses and organisations so that they are better positioned to lead on or adapt to these disruptions.

Opening up data sources to data mining, pattern recognition and other data management techniques will allow new and valuable information to be gleaned. There is a need for a more joined-up, industry-focussed approach to the generation and presentation of data and skills to produce, manage and analyse it in a meaningful way. A lead partner should rapidly consider access issues across a range of data streams, differentiating the issues for each (e.g. confidentiality or risks of anti-competitive practice) and the steps to address them, and develop an action plan to revolutionise the way we use data. The Data Lab Innovation Centre would be a natural home for this work. Based on this, the enterprise agencies and initiatives such as Resource Efficient Scotland should establish open innovation forums where anonymised data on barriers to business can be considered by stakeholders from industry to develop solutions.

The Scottish Government is one of the first to commit itself to the transition to a circular economy. The circular economy is the next phase for businesses in the business efficiency and sustainability agenda, and a growing number are interested in circular business models.

Work has been undertaken on the potential opportunities and barriers, and the focus must now be on aligning action in key sectors to drive progress, while continually disseminating the commercial and natural capital successes to the wider business community. Those who want to take steps will need easy identification of suitable partners and the availability of cost effective technology, making cluster formation, via the Innovation Centres and enterprise agencies, a fundamental driver. The Scottish Institute of Remanufacturing, the first such Centre of Expertise in Europe, should be elevated in status and funding to the same level as an Innovation Centre in order to demonstrate and drive the long-term commitment.

There will be a need to match potential waste streams with economic opportunities and to develop the necessary infrastructure for the circular economy to function successfully. A business-led Scottish Taskforce on the Circular Economy should be created and tasked with the ongoing identification of regulatory and fiscal barriers. In many cases, the supply chains and markets of Scottish businesses engaged in the circular economy will lie beyond Scotland and a whole country approach will be needed to achieve wider policy changes.

Disruptive Trends – Sharing Economy

Over the past 5 years, the sharing economy has developed from dealings between people who know each other to a market which includes the two start-ups with the highest market value in the world – Uber and Airbnb. With the growth of big data and smart phone technology, people have become able to share property, resources, time and skills in online marketplaces, allowing individuals to become retailers and reducing transaction costs for pioneering companies. Optimisation of resources through sharing, reuse and redistribution of goods and services can reduce demand for new resources and increase the sustainability of the economy.

The five main sharing economy sectors are currently estimated to generate $15bn in global revenues, which would increase to $335bn from these sectors alone by 2025.[47] The UK's share of the market in these sectors could grow to £9bn in 2025 and it accounts for 10% of the world's sharing economy companies. While the greatest disruptions so far have been in the transport and travel markets, there is potential for growth across a wide range of sectors.

A review of the UK sharing economy identified opportunities to support growth including an innovation lab to share best practice and research into sharing models, building consumers' trust in online transactions and increasing insurance coverage, and public procurement from the sharing economy and the sharing of government assets, such as space and vehicles.[48]

47. PwC, The sharing economy – sizing the revenue opportunity
48. UK Government, Unlocking the sharing economy: an independent review

Disruptive Trends – Circular Economy

The transition to a circular economy is essential if it is to live within environmental limits and businesses are to minimise the price and availability risks of resources - but for businesses the key driver is more than scarcity, it is opportunity.

Moving from a linear model of production, consumption and disposal to reusing items and recycling materials where their reuse is no longer possible keeps resources economically productive for as long as possible.

Globally, the circular economy could generate $4.5 trillion of additional economic output by 2030.[49] Companies which find innovative solutions and business models to turn waste into wealth gain a competitive advantage and market differentiation.

Key opportunities are maximisation of underused assets in the sharing economy, product life extension through remanufacturing and repairing, and circular supply chains to use recycled materials repeatedly - essential when the most optimistic forecasts of efficiency and technological innovation alone suggest a 40 billion ton overuse of the Earth's resource capacity by 2025.[50]

Significant opportunities have been identified[51] for key sectors of the Scottish economy[52] - oil and gas,[53] food and drink, finance, life and chemical sciences, construction, and renewables. Industry-leadership and innovative design are essential.

The value of the remanufacturing industry to the Scottish economy is £1.1bn and the Scottish Institute for Remanufacture, the first of its kind in Europe, has been developed to support its potential to grow rapidly.[54]

Regulation can motivate the top-down modernisation of whole swathes of industry. It can also prevent the bottom-up role out of innovative, unfamiliar technologies and processes. This places a strong onus on regulators to embrace the role of economic enablers. Regulators can act as critical partners in innovation, providing early expert advice on compliance and verifying new technologies and processes. Clusters rely on collaboration, such as the standardisation of simple parts and processes, accelerating the disruptive market potential of innovation. Regulators and industry should work together to identify areas where anti-competitive risks are lower and collaborative opportunities to maximise economic, social and/ or environmental value are higher. There is a need for a transparent and actively-managed balance.

In some cases, proving compliance can be burdensome and can divert management time from other kinds of innovation. The success of SEPA's new, more risk-based and flexible approach to regulation should be monitored, with lessons and best practice rolled out. Systematic, easy-to-engage mechanisms for reporting, reviewing and repealing out-of-date regulations from all sources, especially those which dampen innovation, would be useful. Voluntary regulation can be a more agile, industry-led form of regulation, but the same principles of evidence-base, outcome-focus, proportionality and regular review should apply.

Exchanging knowledge… brief contacts to long-term relationships

Universities and other research institutions are essential partners in any highly-functioning innovative economy. Scotland's research impact, relative to its GDP, has been rated as world-leading[55] and higher education institutions supply graduates for highly skilled workforces. Sustained funding is needed to ensure that Scotland remains at the frontier of basic research, and to strengthen applied research and the ability of firms to adopt innovation.

Scotland's universities offer consultancy and licensing services for businesses, provide access to specialist equipment, and offer external research grants and contracts. They are keystone partners in the Innovation Centres, which bring together cross-sectoral networks around specific opportunities and are an important advance on the key sector strategy.

There is a continuing need to develop the knowledge base. The certainty, pace and impact of long-term investment programmes can be improved by aligning the potential of universities, colleges and city region deals. There is a need to address the restrictions on the ability of colleges to reinvest income by their recent reclassification as public sector bodies subject to accountancy rules, and the university sector needs to be protected from the same potential reclassification.

For a small country such as Scotland, a collaborative, laser-like focus on developing industrial 'clusters' in areas of potential comparative advantage in the global economy is essential. These clusters facilitate an ecosystem of organic knowledge exchange and provide the critical mass which is needed to sustain support services and attract and develop skills.

49. Accenture, Waste to Wealth: Creating advantage in a circular economy
50. Accenture (2014), Circular Advantage.
51. The Green Alliance in partnership with SCDI, Circular Economy Scotland
52. Ellen MacArthur Foundation in collaboration with Zero Waste Scotland and Scottish Enterprise, Scotland and the Circular Economy: A preliminary examination of the opportunities for a circular economy in Scotland
53. The RSA Great Recovery & Zero Waste Scotland Programme, North Sea Oil & Gas Rig Decommissioning and Re-use Opportunity Report
54. Zero Waste Scotland etc, Circular Economy Evidence Building Programme: Remanufacturing Study
55. Scottish Government (2010), International Comparative Performance of Scotland's Research Base

More now needs to be done to bed the work of innovation centres into mainstream business practice by improving their visibility and making them as simple as possible to engage with. They must become lead partners in developing an Innovation Cluster Strategy, with gaps in support and bridging solutions, clear goals and milestones, identified for each cluster.

Knowledge exchange between research institutions and business is continuing to improve, with Scottish universities as a group outperforming the rest of the UK. However, a gap is still perceived between the best and worst performing institutions, and as well as making the support available for knowledge exchange more visible to business, there is also a need for more academics to be concerned with and engage on real world applicability. The greater emphasis on impact in the Research Evaluation Framework is therefore welcome.

A standardised guide on negotiations for the ownership of and responsibilities for intellectual property would streamline the process and encourage collaboration, especially by SMEs.

Scotland's reputation as an attractive location for innovation-rich businesses would benefit from the designation of the Court of Session as part of the new Unified Patent Court system to protect intellectual property rights across the EU and from best practice across sectors.

Greater opportunity for co-location and secondments between academia and industry, and for combining studies with entrepreneurship or work placements, and digitally networked innovative communities could help to establish deeper relationships and understanding.

Scottish universities have been very successful in generating spinout businesses, which often develop 'disruptive' technologies and foster emerging clusters. Scaling these up remains a challenge and options include embedding them into existing value chains or merging competing spinouts into larger firms, which the Scottish Investment Bank could facilitate.

Large companies could do more to share business planning and data with their supply chains to help SMEs identify their changing needs and signpost how to approach them with new innovations and opportunities to co-develop products or services with potential. They would also benefit from increasing their support by hosting or providing co-location opportunities for start-ups and potential supply chain partners, offering staff secondments and mentoring growth businesses. The upscaling of the Seek and Solve initiative, in which large companies identify a problem and Scottish Enterprise facilitates contacts with SMEs, supports these links.

Building bridges to commercialisation…

The nature and scale of funding available from sources including The City and international finance does not always suit the needs of innovative Scottish businesses. However, in some cases, higher ambition and confidence, stronger business plan development and improved salesmanship would unlock these opportunities.

Government agencies can do more to draw on the expertise available in the Scottish financial community, and play a co-ordinating role in attracting venture capital funding.

This could include working in collaboration with other parts of the UK e.g. leverage London's position as the Fintech capital by working with industry bodies such as Innovate Finance to establish a strong regional hub in Scotland.

With the funding for grants squeezed, a 'buying culture' must be encouraged in government to support early-stage Scottish products and services and validate them to potential customers and investors at home and abroad. These can offer better value for money than business-as-usual, especially in the longer-term.

Too often innovative products and services developed by Scottish businesses, such as in tech or life sciences, are far more readily accepted and adopted overseas than in Scotland. The system needs to be geared up to consider bids against quality criteria over price, or consider merits of innovative bids, and public sector buyers need to be supported to upskill in the consideration of innovative bids.

The introduction of Innovation Partnerships in Scotland will allow contracting authorities to work with single or multiple partners to research and develop substantially new solutions to market problems. They must stimulate a widespread change in practice and culture and avoid the loss of initial ideas or developing solutions. An opportunity exists for buyers to work with Innovation Centres to develop specific opportunities to procure innovative products.

Substantial EU funding is available to support innovation and knowledge exchange, however awareness among business is low and the applications are regarded as complex and time-consuming. Scotland's universities enjoy a great deal of success, partnering with European institutions, but the benefits accrue in more engaged overseas business bases. Dedicated centres of expertise from which businesses could seek support could address this, and Innovations Centres facilitate and act as lead partners in developing proposals for clusters.

Key Innovation Challenge

To achieve the Scottish Government's target for Scotland to be in the 1st quartile of OECD countries for innovation, which is estimated to require around 5000 more businesses to innovate actively as part of their long-term business strategy. To increase business expenditure on research and development to at least the UK average (currently, from 0.60% to 1.06%), while maintaining Scotland's rank as one of the top five OECD countries for higher education research and development as a percentage of GDP.

Recommendations on Innovation

Agile partnerships between regulators and industry, including:

- All regulators should produce dynamic strategies on how they will respond to and shape positively disruptive business models, including approved areas for more sectoral and cross-sectoral collaboration on innovation

First movers in identifying and capturing disruptive opportunities, including:

- Government, industry and education should review public support for innovation (particularly by the enterprise agencies) including roles, resources and returns, to enhance strategic investments in risk and to expand rapidly by at least 5000, and broaden the range of businesses innovating actively
- Leadership should be identified for horizon-scanning, and informing and advising Scottish businesses and organisations on emerging trends
- A Circular Economy Industry Leadership Group should be created, advice should be mainstreamed in business support services, and the new Scottish Institute of Remanufacturing should gain Innovation Centre status

Broaden and deepen industry-education knowledge exchange, including:

- Outcomes should be agreed by the Scottish Funding Council and universities for turning more one-off contacts with businesses into strategic partnerships, and a 'no wrong door' policy for businesses seeking to access support
- Innovation Centres should be lead partners in cluster strategy development and centres of expertise and application support with EU innovation funding
- Government, education and industry should develop mechanisms which unlock joint investment in Scotland in critical mass in key applied research
- More risk capital should be unlocked by improving the attractiveness of investing and co-investing and partnering with other parts of the UK

Expert Utilisation of Data, including:

- Government, following widespread consultation, should develop a long-term framework which allays public concerns about data sharing and encourages an open, joined-up and industry-friendly approach by public bodies
- A lead partner should be appointed to make recommendations on access and utilisation across data streams to drive productivity and innovation
- More open innovation forums should be established where anonymised data on challenges can be analysed by industry and solutions developed

Related action by SCDI:

- SCDI will highlight and develop conversations with members and partners on 'The Emerging Economy', including digital innovation and low carbon infrastructure
- SCDI will continue to champion the circular economy in Scotland, building on our previous work to engage our members and highlight specific sectoral opportunities
- SCDI will continue to embed interdisciplinary learning in our YESC projects

Case Study

Circular Economy Innovation in the Scotch Whisky Industry

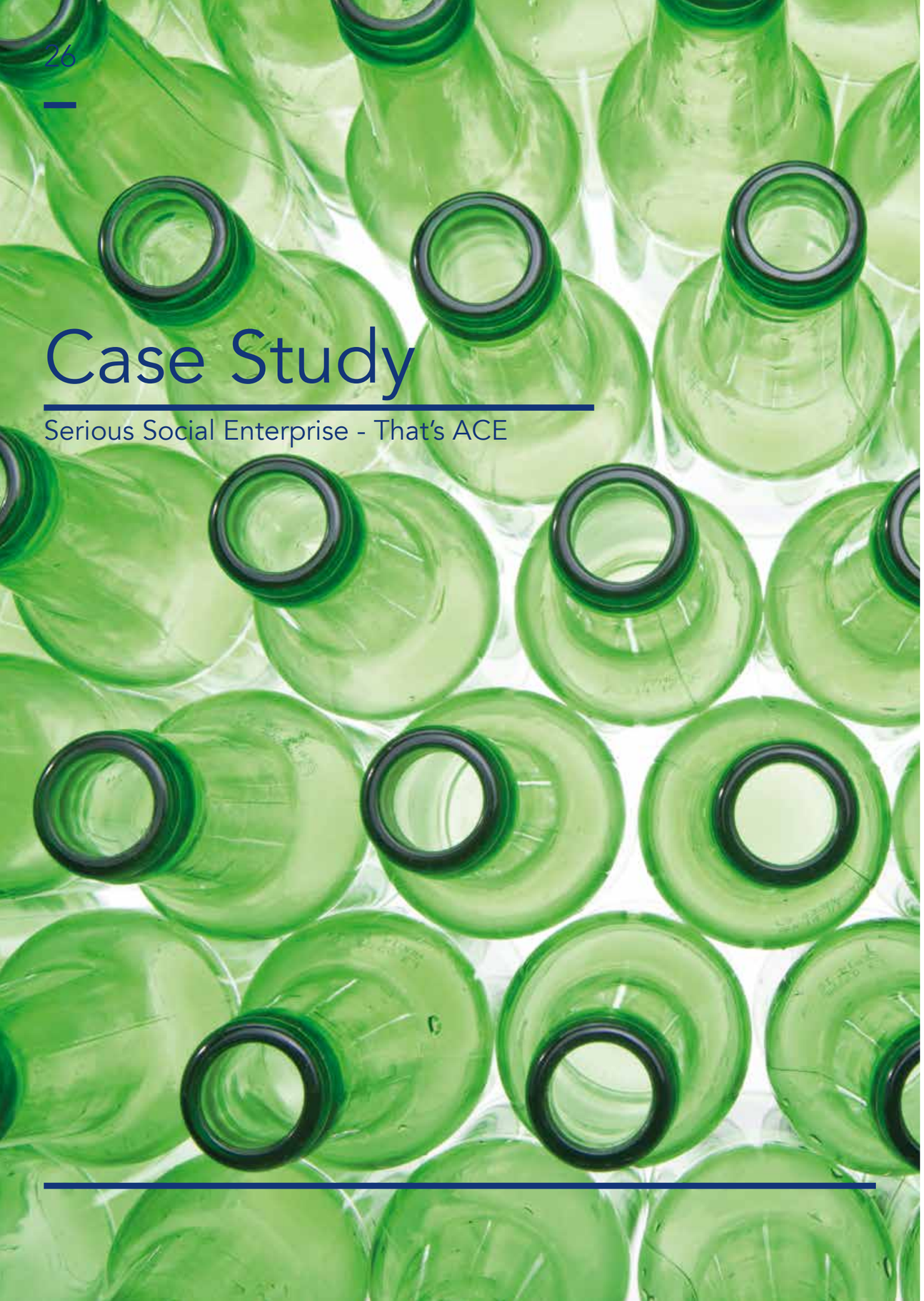
A circular approach to production is in Scotch whisky's DNA, but the industry is developing innovative, higher-value technologies. For example, Diageo has invested over £100million in renewable energy projects at its distilleries to create circular economies.

The company's new Roseisle Distillery in Speyside was the first to be built with an onsite renewable energy plant, including bio-mass and anaerobic digestion, which provides 50% of the power needed to run the distillery. The ash from the renewable energy plant is returned to local farmers who use it to feed the soil in the barley fields surrounding the distillery.

Celtic Renewables has developed a process to use whisky co-products for bio-butanol – a next generation biofuel which has 25% more energy per unit volume than bioethanol, can run in unmodified engines at any blend with petrol and may also be blended with diesel and biodiesel, and can be transported using existing infrastructures.

With UK Government support, it is opening its first UK production plant which will employ 50 people with plans to open 3 commercial plants located in Scotland's whisky producing areas and to export the technology to other major whisky markets such as Ireland, India, US, Canada, and Japan.

Celtic Renewables has developed a process to use whisky co-products for bio-butanol – a next generation biofuel



Case Study

Serious Social Enterprise - That's ACE

Alloa Community Enterprises (ACE) was started by a group of individuals who had one very simple objective - to save the planet. At a time before people in general knew about the ozone layer, let alone carbon emissions, ACE saw an opportunity to spread the word about recycling. ACE were sure they could help people transform their lives in many ways by involving them in recycling and environmental management, including training and employability for long term unemployed residents of Alloa and making recycled furniture and other household items available to low income and homeless families.

It started with a man and a van and no legacy nor public funding and has grown to 19 trucks with 59 staff that will achieve a turnover in excess of £2 million in the next financial year.

It started with a man and a van and no legacy nor public funding and has grown to 19 trucks with 59 staff

Over the last 31 years ACE has supported over 10,000 households with furniture donations and other assistance, has led the way in Scotland on source separated recycling and is the largest independent glass recycler in Scotland, and is developing a chain of re-use outlets.

ACE is an exemplar of the social enterprise model, earning its own income and contributing to a truly viable, socially responsible Scottish economy. ACE has taken the circular economy message out on the road and won over the hearts and minds of local authorities, other charities, businesses and large manufacturers, saving money, creating new jobs and helping to grow Scotland's recycling and reprocessing industry.

Key priority 3
Internationalisation

The world around us…

Internationalisation drives business growth by opening opportunities to access new customers and potential investors. Businesses which export tend to be more productive and have greater opportunities to capitalise on the competitive advantages unleashed by innovation.[56] Exposure to new markets stimulates further innovation. Businesses are brought into contact with new environments and perspectives, creating self-reinforcing feedback loops. Countries which attract a higher and diverse mix of talented people to study and work tend to be more innovative and entrepreneurial, attracting further talented and ambitious people.

World trade has grown by over 700% since the mid-1970s, far higher than GDP growth in the same period even with the Global Financial Crisis and Great Recession in 2007-09.[57] Emerging markets have recently been accounting for 80% of global growth and are 70% of the world's population, with 2013 the first year that emerging and developing markets were bigger than the advanced economies. It has been forecast that developing countries are likely to outpace developed countries in both export and GDP growth by a factor of two to three in future decades.[58]

International production, trade and investments have been increasingly organised within global value chains where different stages of the production process – design, production, marketing, distribution etc. – are dispersed in optimal locations across different countries.[59] Productivity growth at the global frontier has remained relatively robust in the 21st century.[60] For small economies identifying, specialising in and exploiting comparative advantages where there is, or is expected to be, sustained market demand can be of greater importance.

If we are a highly internationalised society, we will be more outward-looking and culturally aware, respectful and adaptable. People and businesses will be more open, confident and entrepreneurial, and opportunities will be less constrained by national, cultural or linguistic barriers. Scotland's premium products will continue to thrive in existing and new markets and produce a halo effect for all Scottish exports, leading the way and offering a helping hand to them in markets. More businesses, especially our SMEs, will benefit from opportunities with clients, customers and businesses in other parts of the world and more will be 'born global', export-enabled and innovative. Trade-related infrastructure will be competitive, mutual benefits will be realised from trading and business-government trade partnerships will be stronger. More young people will be encouraged to broaden their horizons with challenges and opportunities overseas, and the economy will benefit from the knowledge, skills and contacts they have acquired when they return. Scotland will attract talented students and skilled people to study, work and live, as well as visit, and they will financially and culturally enrich our society.

Drivers of internationalisation… key priorities for Scotland

In the Future of Productivity, the OECD has highlighted as key to more effective innovation diffusion and, thus, productivity, the need to extend global connections via trade, Foreign Direct Investment, participation in global value chains and the international mobility of labour. Despite the advantages of the global business language, a global financial and business centre, and historical relationships with and similar legal systems to many countries, the UK has run consistent trade deficits since 1998, due to demand for overseas consumer goods, decline in UK manufacturing, the rising value of sterling and falling oil and gas production.

Scotland is a small country with an open economy which has always needed to trade to prosper, from its early exports around Northern Europe to its role in a global trade empire. However, while Scotland hosts some world class exporters, activity is concentrated, with 100 companies accounting for 60% of total exports.[61] The number of Scottish companies which export fell from 20% in 2006/07 to 12% in 2014.[62] There was a reduction of £135 million in the value of exports from small companies between 2012 and 2013, representing a 3% decrease.[63] Trade volumes per capita would need to increase by 40% or 63% if oil and gas exports were excluded to match the average for small advanced economies.[64] If Scotland had an SME export rate similar to the UK, there would be over 2,500 additional exporters[65]

56. UK Trade & Investment, 2020 Export Drive
57. Scotland Office (2014), Wilson Review of Support for Scottish Exporting
58. World Trade Organisation (2013), World Trade Report
59. OECD (2015), Global Value Chains
60. OECD (2015), The Future of Productivity
61. Scottish Government (2015), Scotland's Economic Strategy
62. University of Strathclyde (2015), Fraser of Allander Economic Commentary Vol 39 No 2, Scotland's international export performance: some recent evidence
63. Scottish Government (2015), Scotland's Economic Strategy
64. N56 (2015), Export Based Growth: Global Competitive Advantage from the Scottish Brand
65. University of Strathclyde (2015), Fraser of Allander Economic Commentary Vol 39 No 2, Scotland's international export performance: some recent evidence

Export markets are also geographically concentrated in developed economies. The top five international export markets for Scotland (USA, Netherlands, Germany, France, and Denmark) accounted for £11.2bn (40%) of international exports while exports to Asia are valued at £2.8bn, the Middle East £1.5bn, Africa £1.3bn and Central and South America £1.2bn.[66] The nations in Scotland's top four export markets have not changed at all since 2008 and, indeed 19 countries out of those top 20 feature in every single year since 2008.[67]

SCDI members identified the following priorities for increasing internationalisation:

- Increasing awareness of specific business opportunities and routes to market
- Increasing business confidence and ambition
- Increasing support from government agencies and banks across the business base
- Improving global business and language skills
- Tackling distance from markets through ecommerce and air routes
- Closely involving financial services and business networks with potential exporters
- Sorting out unwieldy and unreasonable temporary visa application processes which reduce global business meetings in the UK, the UK business profile, and tourism

Our place in the world…Europe

In 2012, the EU was the most important international trading partner for Scotland with around 45% of Scotland's international exports going to the European continent. Despite the crisis in the Eurozone, the EU is the world's most important trading area with a GDP of around €12,900bn and a population of more than 500 million people. If Scotland's jobs market benefits to a similar extent to the UK, 13.3% of the workforce, over 336,000 jobs in Scotland, are estimated to be directly or indirectly dependent on trade with EU countries.[68]

There is near unanimous support from SCDI members for continued UK membership of the EU. The EU is seen as an essential foundation of the international trade and collaboration undertaken by many Scottish businesses and institutions, which benefit from the single market, trade and investment, free movement of people to work and study, common standards, and regional and social development. The EU is now the main proponent of trade agreements and a successful defender of trade interests at the World Trade Organisation.

As well as losing out on these benefits, a withdrawal of the UK from the EU could result in a hiatus in investment; relocation of inward investors and loss of attractiveness for future inward investments; a loss of any influence of European Union policy and developments such as pan-European energy networks; reduced funding for research and regional and social development; and reduced knowledge exchange in business and education. Whether these would have a long-term or a more temporary impact was questioned by some.

There are some areas where reform would be welcome by business. For some sectors, a deepening of the single market and reduction in national regulatory barriers is a priority. In others, legislative and regulatory over-reach by the EU is a concern. Both issues would benefit from EU institutions being more visible, responsive and flexible to business needs.

Refreshing market priorities… deepening trading partnerships

Scottish exporters already engage with a wide variety of markets and many different parts of the world are of interest to Scottish businesses over the next five to ten years. Reduced or no growth in the BRICS countries has recently increased interest in a broader range of markets, although they are still priorities. One third of the world's people live in Commonwealth states and its young, diverse and dynamic population is expected to grow by 29.4% between 2015 and 2050. Trade among them is expected to rise from $680 billion a year to £1 trillion by 2020.

Due to the English language and the similarity of legal systems and ways of doing business, the costs of doing trade are estimated at 19% less than would otherwise be the case.[69] The expatriate communities in some Commonwealth countries can be a successful way to enter and expand in those markets, before using them as a launch-pad into neighbouring markets. This suggests the potential for an increased priority from business and government agencies.

Free trade agreements and reduced trade barriers extend global connections via trade, Foreign Direct Investment and participation in global value chains, promoting innovation diffusion, investment, competition and enterprise, all of which drive higher productivity. It is estimated that the EU-USA Transatlantic Trade and Investment Partnership in negotiation will generate economic benefits to the UK of £4-10bn/ year[70] and will increase both Scotland's GDP and international exports.[71] This should be seized, although the specific sectoral concerns need to be addressed, especially those on public services. There is a need to reinforce the importance of emerging markets for EU trade priorities because, while the challenges might be greater, the economic returns from removing barriers are higher.

Inspiring internationalisation… stories and supply chains

In comparison to other countries, Scottish businesses are less likely to think globally when considering potential markets.[72] Sometimes this might be because the specific opportunities are less visible and routes to market are physically greater, or they cannot access support from government agencies (e.g. if they are a non-account managed business) or banks.

In some markets, a lack of global business and language skills can also frustrate opportunities. In too many instances, however, exports are not being considered due to modest ambitions and exaggerated perceptions of the risks and barriers exporting might entail. This is, of course, not the case in every sector – companies in the emerging tech sector, for example, are often 'born global', and ecommerce offers opportunities for export sales by many more micro and small businesses, which advice, training and ongoing support could encourage them to realise.

Businesses are often most encouraged by stories from other exporters who have carved out successes. Mentoring and other opportunities to seek advice from successful

66. Scottish Government (2015), Scotland's Global Connections Survey
67. Scotland Office (2014), Wilson Review of Support for Scottish Exporting
68. CEBR (2014), British Jobs and the Single Market
69. Commonwealth Secretariat (2015), A Rising Tide: Emerging Dynamics of Intra-Commonwealth Trade and Investment
70. Centre for Economic Policy Research (2013), Reducing Transatlantic Barriers to Trade and Investment
71. Scottish Government (2015), http://www.scottish.parliament.uk/S4_EuropeanandExternalRelationsCommittee/Inquiries/DFM_response_to_EERC_report.pdf
72. University of Strathclyde (2015), Fraser of Allander Economic Commentary Vol 39 No 2, Scotland's international export performance: some recent evidence

exporters are valuable tools. The GlobalScot network has a great deal of potential, but it is lacking profile in Scotland and is under-utilised. The small base of large companies and expert exporters limits the potential for peer-to-peer and mentoring approaches to reach the scale and number of businesses it must in order to generate a step-change in Scottish export volumes. There is a need to target mentoring to where it can have the greatest value. There is a role for a network of Scottish Export Ambassadors, including experienced individuals who have recently stepped back from full-time positions.

Larger businesses can also support smaller businesses enter into international markets and global supply chains by supporting access to their established sales and distribution networks, lowering trade barriers and providing a sense of security to new exporters, while also expanding their offer to existing customers. While this should be led by business, in some emerging markets government could assist by establishing framework agreements.

The international presence of Scottish Government offices and 29 SDI international offices could be more effectively utilised if aligned with private sector operations in the same locations. This would facilitate a global network of Scottish business support centres which offer advice and in-market expertise, delivering a greater return on investment and playing a key part in achieving the collective ambition to grow the value of Scottish exports. This must be the model for how the new Innovation and Investment Hubs in Brussels, Dublin and London operate.

Falling between cracks… to best of both worlds

While the extensive reach and influence around the world of UK Trade & Investment (UKTI) and the insights into distinctive Scottish sectors of Scottish Development International (SDI) should be complementary, in practice, there are some gaps and some duplication. UKTI programmes should be more visible and accessible for Scottish businesses and UKTI should reflect distinctive Scottish sectors better. The working links between UKTI and SDI need to be clarified and reviewed regularly by both governments. The risk that the suggested incorporation of parts of UKTI into UK government departments will make its engagement with SDI harder, and for Scottish businesses to access key contacts, needs to be addressed.

SCDI believes that a business led approach to export strategy should be established across multiple sectors (as is being established for food and drink) and geographies, with this then tasking UKTI and SDI with various reinforcing activities. These should also galvanise opportunities to share services, market intelligence and facilities within their own networks, and make links with the extensive network of UK embassies and High Commission offices. The greater commercial focus of this network in recent years is welcome, but it needs to aim to represent world-leading potential in its pro-active support for exports and inward investment.

Inward investment… staying ahead

Scotland has had great success in attracting inward investment, ranking top in the UK (outside London) for foreign direct investment in 2014, with significant proportions focused on manufacturing and R&D activity.[73] We cannot rest on our laurels and there are some concerns that inward investment is no longer as great a priority for the Scottish Government. This should be addressed. There will be a need for new, diversified sources of investment and to reinvigorate Scotland's offer in the face of stiffening competition across the UK.

To support this, SDI should play a key role in growing collaboration with other bodies, such as the Scottish Cities Alliance, to promote the distinctive offer of Scotland's regions - without leading to confusion or duplication in overseas messaging - and make links to the places and environments which contribute to Scotland's offer as an attractive place to live and work.

There is also continuing need to embed inward investors, encouraging participation by SMEs in their global value chains and developing a regional reputation for innovation ecosystems.

International talent… embracing opportunities with open arms

International students make a very valuable contribution to growing and internationalising the economy. However, the current UK immigration policy and perceptions of unwelcoming attitudes are damaging the attractiveness of Scotland and its institutions as a place to study. There is strong support in Scotland for the reinstatement of a post study work scheme.[74] Post study work schemes are key features of many developed economies' immigration systems. They allow international students to remain for a period of time after graduating to gain work experience, and contribute to economic development by providing businesses with access to skills, as well as international perspectives. These can be key tools in university recruitment activities and contribute to their strength as a successful economic sector.

The introduction of the Scottish Rate of Income Tax will for the first time provide a mechanism to differentiate between people employed in Scotland and the rest of the UK. This could potentially be used to ensure highly skilled/ post study migrants stay in Scotland rather than move to other parts of the UK, and that they are working in higher skill/ wage employment.

Improving connections between international students and Scottish schoolchildren, students and businesses, and developing, maintaining and utilising networks of highly qualified and connected alumni as ambassadors for Scotland and Scottish products would further maximise value. With less than half (42%) of businesses agreeing that they are able to recruit young people in Scotland with the global skills they require, and almost half (47%) thinking that this may be a constraint on their international business plans over the next five years, it is vital to encourage a more outward looking culture within our own population, particularly through the ability to work well with clients, customers and businesses in other parts of the world.[75]

Estimates that the number of tertiary students being educated outside their home country will nearly double between 2011 and 2025, attracting their families and friends, who generally spend more than the average visitor, present a key opportunity to increase productivity.[76]

73. Ernst and Young (2015), Global Investment Monitor
74. The Smith Commission (2014), The Smith Commission Report for Further Devolution of Powers to the Scottish Parliament
75. SCDI (2014), Scotland's Future Workforce – Keeping Pace in the Global Skills Race Survey
76. Tourism 2025 New Zealand, Target for value

Key Internationalisation Challenge

To achieve the Scottish Government's target to increase the value of Scottish exports by 50% by 2017. To grow exports by a further 20% by 2020. To increase the contribution from across the Scottish economy towards this target and reduce the reliance on a narrow range of companies and sectors, by increasing the number of SMEs which are internationally active from around 12% to 30% or more by 2020.

Recommendations on Internationalisation

Unleash the potential of genuine trade and investment partnerships, including:

- Government should enable and actively support, aligning national agencies, business/sectoral-led resources and relationships, such as peer-to-peer learning, market intelligence and access to office facilities, and light up and capitalise on civic, educational and cultural resources and relationships
- The UK should remain in the EU, leading a growth agenda including the single services and digital markets, energy and trade agreements
- Potential Scottish exporters should have a clear front-door - a Single Portal – developed co-operatively by all the organisations, public and private, Scottish and UK, which support exports, to guide businesses to the most appropriate source of advice and support
- A network of Scottish Export Ambassadors, including individuals who have recently stepped back from full-time positions, should be developed for peer-to-peer mentoring

Deepen links with Commonwealth countries, including:

- Business and the Scottish Government should develop a 'Commonwealth Plan' to promote and support businesses with trade and investment growth
- Greater use should be made of business networks and commercial diplomacy in market as well as Commonwealth representation in Scotland

Strengthen and sharpen Scotland's inward investment offer, including:

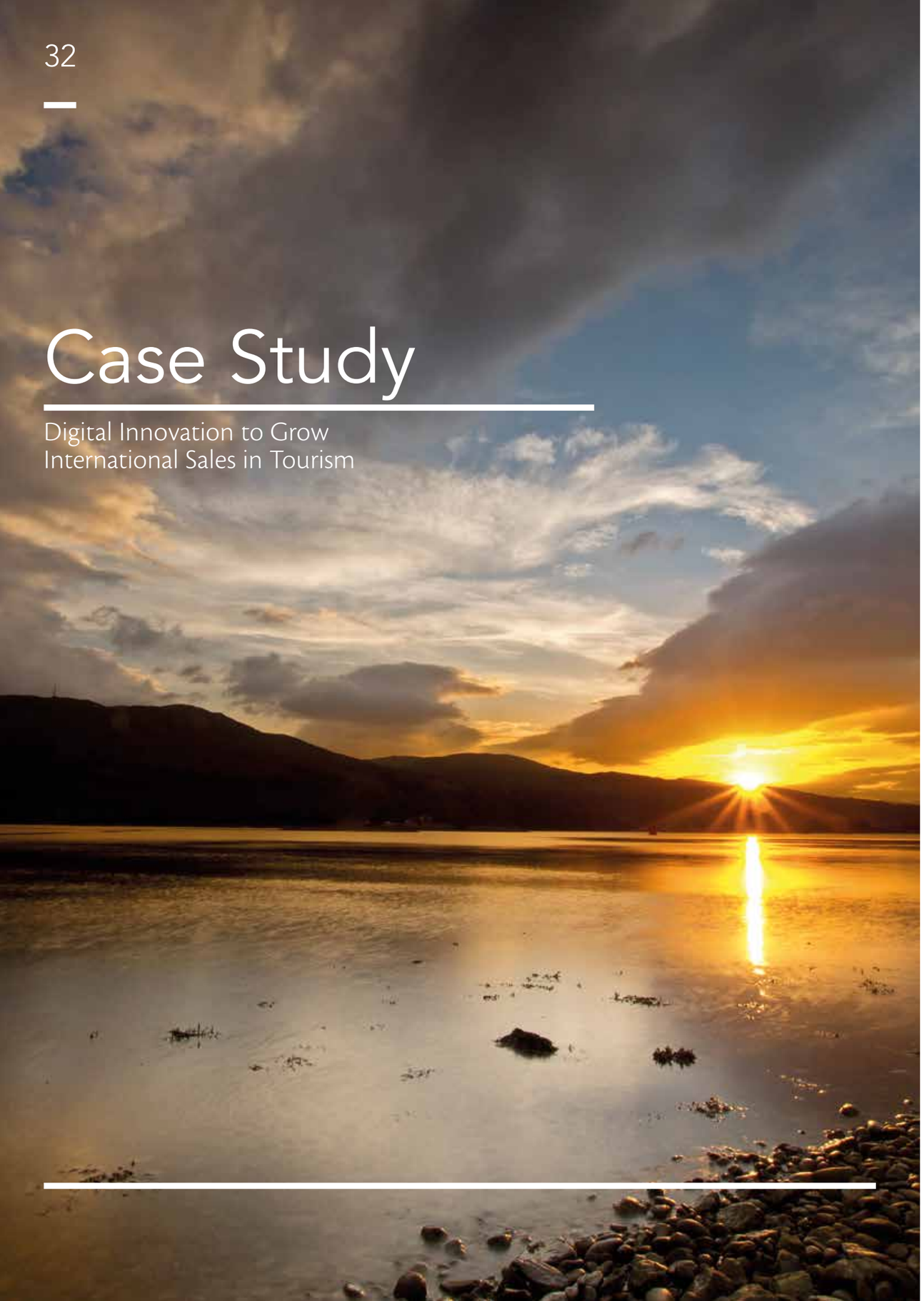
- Reinvigorate Scotland's approach in the face of stiffening competition in the UK, with specific objectives to diversify sources and for investment complementary to innovation clusters, to maintain Scotland's status as the most attractive part of the UK outwith London for inward investment
- Scotland should make the most of opportunities from our EU membership, attracting more projects in key EU innovation and investment workstreams

Welcome and retain international talent, including:

- Post Study Work Visas for international graduates in Scotland should be reinstated, with eligibility to stay for 2 years for those completing at minimum a degree, equivalent level of qualification or an HND qualification
- The potential for the Scottish Rate of Income Tax to support a differentiated Scottish system for highly skilled/ post study migrants should be examined
- A plan to maximise the benefits of international students across the economy should be developed, with programmes to link them with businesses on a project/ internship basis and school/ undergraduate students for cross-cultural exchange, attracting friends and families to visit Scotland, and develop stronger alumni links as ambassadors for Scotland and its products

Related action by SCDI:

- SCDI will continue to develop its role facilitating business to business export support, connecting experienced exporters with those at earlier stages in their journey to new markets, and expanding opportunities for mentoring across our network
- SCDI will work with private, public and education sector partners to develop and scale-up successful programmes for young people in Scotland who are interested in developing communication and cultural skills for the global economy
- SCDI will continue to support the Scottish Cities Alliance as it develops its responsibilities for attracting inward investment into the £10bn pipeline of projects in the City Investment Plans and the agreed and proposed City Deals in Scotland



Case Study

Digital Innovation to Grow International Sales in Tourism

The international travel industry was an early adopter of online sales and marketing over 20 years ago, but in the last five years digital has become even more key to potential visitors. However, of the 8000 accommodation businesses listed on visitscotland.com, only one third can transact online, while only two-thirds have what Visitscotland term an optimised listing.[77]

The growth in smartphones and social media is increasing opportunities such as to build a rapport with customers wherever they are in the world, collect data on their preferences and sell higher value products; while also increasing the attraction of local authenticity, the need to manage online reputations and the expectation of digital connectivity at all points of travel.

Digital is now the primary source of travel inspiration - 65% of people are generally beginning to research online before deciding where or how they want to travel, most notably through social/video sites and search engines[78]- and the strong growth of online research and purchases is expected to continue. Chinese tourists, forecast to be the world's top outbound travel market by 2020, have a very high level of engagement with technology and brands.

Digital connectivity, platforms and skills are key to the success of the Scottish tourism industry, however, of the 9000 businesses listed on visitscotland.com, 70% do not offer online bookings. Improving connectivity and use is needed, following examples of innovation and collaboration by SMEs to increase their profile and better meet the needs of customers, wherever they are.

Craigatin House (www.craigatinhouse.co.uk) is an extensive user of a variety of marketing channels including social media and direct mail, actively managing its business reputation online to rank No.1 on TripAdvisor under UK B&B's for several years. It collaborates digitally, contributing to and leading the local Pitlochry partnership website (www.pitlochry.org), which is rich in content and a significant driver of traffic to individual businesses on the website.

65% of people are generally beginning to research online before deciding where or how they want to travel

The Fort William Accommodation Marketing Group, led by the Torlinnhe Guest House (www.torlinnhe.com), has brought local availability together in one location (www.fortwilliam-guesthouse.com) allowing potential guests to research accommodation, check availability and book online, and members to share potential guest enquiries if they cannot accommodate them. Many members no longer use international online booking services and they have seen no decline in occupancy while improving profitability as they no longer have to pay commission for bookings, retaining an extra 10 to 20% of each booking in the local economy.

A search "widget" is being incorporated into other local attraction websites allowing their customers to search and book accommodation without leaving the attraction website. The Group's approach supports joint local marketing, take-up of online book-up by SMEs and higher conversion rates as bookings generally stay among group members. (www.freetobook.com/case_studies/fortwilliam.php)

77. Malcolm Roughhead, Chief Executive, Visitscotland, Speech to SCDI Highlands and Islands, October 2015
78. Google, The 2014 Traveler's Road to Decision

Underpinning the key priorities

Competitive Places, Competitive Infrastructure

Devolution and the decentralisation drive…

The need to rebalance the UK economy has been a key theme following the financial crash. Growth became over-dependent on household consumption and government consumption, rather than increasing business investment and net exports. The decline of manufacturing and the growth of services also change the regional distribution of economic growth and prosperity.

London makes up over a quarter of UK GDP and the gap in labour productivity between the UK's two largest city economies, London and Manchester, is larger than in any other G7 country and more than double that in both Germany and Japan.[79] Scotland's GDP per capita is around the UK average, but, in contrast to other economies, most 'second-tier' UK cities have consistently performed below the national average rather than above it.[80]

Following the referendum on Scottish independence, further powers are being devolved to the Scottish Parliament based on the recommendations of the Smith Commission. Following decades in which the UK was one of the world's most centralised countries, devolution to Scotland is at the leading edge of a drive for greater decentralisation across the UK, although behind the curve with second stage decentralisation to city regions and regions.

In response, the UK Government has introduced City Deals for UK cities, supported in Scotland by the Scottish Government, and the concept of the Northern Powerhouse in northern England. Scotland's 7 cities have created a Shared Vision for Scotland's Success[81] and are designing and utilising a range of growth models, such as the Growth Accelerator Model and Tax Incremental Financing, the development of which SCDI is supporting.

Increasing competition… utilising further powers for sustainable economic growth

As well as global competition, the competitiveness of Scotland within the UK is a key concern. Other regions, particularly the Northern Powerhouse, are strengthening their leadership and governance to increase investment and Scotland must ensure that it continues to enhance the attractiveness of its offer in the UK and internationally as a place to live, work and do business.

The distribution of political powers is clearly of great significance. The effective utilisation of these powers, at whatever level they reside to increase economic and social prosperity and meet the priorities of people in Scotland and across the UK, should be the key ambition.

The risk is that further uncertainty and increased competition in the UK damages Scotland's economy. While there are clear opportunities to meet the needs of the Scottish economy and scope to be creative, this should be within a strong and stable fiscal framework, with a priority of maintaining and enhancing Scotland's competitiveness for capital, talent and infrastructure investment to drive productivity, innovation and internationalisation. This will require more comprehensive, up-to-date information on the performance of the Scottish economy than is available at present, and a range of independent expert analysis.

There is also a need to ensure competitiveness using existing powers. There has been continued upward pressure on business rates revenues as a result of the long-term freeze in council tax. The time is right for a structural review which aims to increase responsiveness to economic conditions, incentivise investment and maintain Scotland's competitiveness.

Ensuring competitiveness will allow a focus on the complementarities of a stronger relationship with the north of England, such as improving productivity, growing risk capital and innovation diffusion between clusters, through stronger connectivity. These links would promote, develop and maximise the benefits of high speed rail between central Scotland and the north of England; and improvements to the road links, the Edinburgh City Bypass, A1 and A66, between Scotland's city regions and Newcastle and north east England's ports.

Scotland has clearly started on a decentralisation journey, with a range of options and opportunities for city regions, regions and islands. It will be essential that this complements and adds value to national approaches and does not lead to increased inefficiency.

Competitive places… national priorities and starting on a decentralisation journey

Cities attract global and national frontier firms, highly-skilled people and finance which enables the rapid diffusion of innovation through enterprise and competition and higher productivity.[82] Digital technologies are making the density of cities more important rather than less. Globally, governments and investors see cities as key drivers of both regional and national economies and as offering solutions to many of the major social and environmental challenges.[83]

In a country of Scotland's population size and dispersion, there are clear benefits to a national approach in key economic areas, such as sectoral strategies and international trade, and risks in a more regional approach of fragmentation, duplication and complexity. However, a city region or regional approach offers opportunities to strengthen competitiveness, focusing partners and policies on improving productivity, creating direct funding incentives, meeting specific needs and raising service delivery to the levels of the better regional performers.

It needs to have the confidence of businesses and communities, and, as with the Manchester city region, stronger economic leadership and combined governance structures will need to be developed and demonstrated before further decentralisation, such as fiscal, can be supported.

While there are risks around upheaval, costs and a diversion of focus from economic improvements and service change, there are also opportunities to meet long-term budget challenges through growth and to raise productivity. OECD research has shown that cities around the world with fragmented governance structures have up to 6% lower levels of productivity than those that do not.[84] City region and regional growth deals and powers for the islands may provide a mechanism to stimulate stronger community planning and shared services, collaborations between the public, private and social economy sectors, and community activity such as maximising the utilisation of local assets and services.

Competitive places… the enabling infrastructure

Investment in transformational infrastructure has generated many of the most significant productivity improvements before and, in particular, following the Industrial Revolution. Transport, energy, business, water and sewerage, flooding, waste, housing and digital infrastructure developments are essential underpinnings to a modern economy. They have integrated and enlarged domestic and global markets, reduced monetary and time costs of logistics and information, enabled diffusion of innovation, promoted greater competition, specialisation, and economies of scale, and facilitated industrial and urban growth.

As economies develop, productivity gains from more incremental improvements to existing infrastructure become less significant on a national scale, but, especially when infrastructure is constrained, may still be substantial. For example, in this hyper-connected world of trade, supply chains, finance, information, knowledge exchange, skills; the costs to the UK economy of not addressing airport capacity constraints are estimated at £30-45 billion.[85]

The productivity gains from newer forms of infrastructure are more transformational, especially when it enables development and diffusion of disruptive technologies and models.

79. OECD (2015), Metropolitan Areas Database
80. IPPR North (2014), Decentralisation decade: A plan for economic prosperity public service transformation and economic renewal in England
81. Scottish Cities Alliance (2015), Scotland's Seven Cities: A Shared Vision for Scotland's Success
82. HM Treasury (2015), Fixing the foundations: Creating a more prosperous nation
83. Scottish Cities Alliance (2015), Scotland's Seven Cities: A Shared Vision for Scotland's Success
84. OECD (2015), What makes cities more productive? Evidence on the role of urban governance from five OECD countries
85. Airports Commission (2013), Interim Report

Infrastructure…issues for the UK and Scotland

The UK's population is forecast to grow from around 65 million today to 77 million in 2050 and, potentially, 85 million in 2080. This would give the UK the highest population in the EU.[86] Scotland's population is expected to grow by 9% between 2012 and 2037 to 5.78 million, and carry on growing, with very high growth in the east and decline in some other areas. This will continue to place strain on infrastructure for which there seems to be little planning.

Scotland has world-leading climate change targets requiring an 80% decrease in greenhouse gas emissions by 2050. This is even more ambitious than it seems as there are areas which it will not be possible to decarbonise significantly, necessitating larger reductions in others. Infrastructure development and utilisation can clearly generate substantial carbon emissions. It has been estimated that just over half of Scotland's planned infrastructure investment is low carbon, but if it is to align with the scenario of the Commission on the Economy and Climate to limit global warming to 2°C, it should be aiming to increase this percentage by at least 20%.[87]

Digital infrastructure also provides opportunities to maximise the productivity of infrastructure via 'smart' technologies. Smart meters, sensors, advanced modelling, apps and other technologies can provide real-time information and optimisation, enabling, for example, balancing of energy demand in buildings, increasing capacity of railways and managing peak loads on utility and transport networks, increasing efficiency, reducing system stress, enhancing resilience and creating new markets and collaborative consumption models.[88]

The UK has historically invested less in infrastructure than many other developed countries. As a share of GDP, investment in the UK has ranked in the lowest 10% of OECD countries for 16 of the last 21 years.[89] In 2012, the World Economic Forum ranked the UK 24th for the overall quality of its infrastructure in its global competitiveness report,[90] highlighting the legacy of underinvestment, especially in the transport and energy networks, and housing.

An independent review of UK infrastructure identified the following problems:[91]

- Lack of long term strategic planning
- Policy uncertainty
- Lack of transparency around funding
- Length of the planning process
- Limitations of regulation

The OECD's recommendations for the UK are upgrading roads, railways and connections to the outside world, especially airports and seaports, greening the infrastructure, improving long-term planning and improving infrastructure financing. Among its proposals are the further development of the use of public-private partnerships, public guarantees for privately financed infrastructure projects and the introduction of user-paid tolls for roads.[92]

The Scottish Government has placed a higher priority on public infrastructure investment than the UK Government, however, investment is still lower than in many other countries.

Key priorities for infrastructure… and place-making

There is a need for a long-term, transformational investment plan for infrastructure. The creation of an independent national infrastructure commission for Scotland, modelled on and working with the new National Infrastructure Commission for the UK to undertake evidence-based assessments of infrastructure needs over a 25-30 year horizon, would establish clear objectives, promote consensus and long-term certainty and reduce barriers to investment.[93] There is a need to resolve 'disconnects' between long-term spatial planning and infrastructure investment and local planning processes and infrastructure development.

There has never been a better time to invest in infrastructure with interest rates on borrowing at historically low levels and not forecast to rise significantly in the immediate term.

With new borrowing powers, Scotland has the opportunity to develop a clear, long-term pipeline of investment, which utilises a flexible range of sources depending on government finances, market conditions and the project. Increased use of government borrowing should allow for the reduction in size of some projects in procurement which would help businesses of all sizes.

More could be done to attract private investment in infrastructure from a range of international sources where this is most advantageous, by developing clear and simple propositions and models which assure reasonable returns for investors without risks, such as the Scottish Cities Alliance's work to aggregate projects. There is a need for a fairer long-term model of cost-allocation between all the users who would benefit, both immediately and in the future, from infrastructure improvements to unlock investment by industry in improvement projects.

Infrastructure investment has too often been developed in isolation of service redesign which reduces its benefits. Outcomes should be defined first, before the opportunity is taken to determine the services and associated infrastructure which are needed to best deliver them.

The relationship between people and place lies at the heart of Scotland's economic effort. It is fundamental to our proposition for investment in both financial and human capital. The quality of place and our relationship with it underpins our quality of life, a key determinant in the choice of investors and individuals in where to place their finance and their family.

This necessitates a strong link between economic and social policy aims, and the implementation of the Scotland Act provides a potential framework for a partnership between fiscal, regulatory and public policies. Nowhere is this need for alignment better demonstrated than in the creation of places where the capital investment in infrastructure must be seen alongside the social investment in potential uses. Stronger strategic alignment between infrastructure spend, service (re)design and population trends is required if Scotland is to re-establish itself as a world leader in the creation of top quality places to live, work and play.

86. Eurostat (2015), Population and population change statistics
87. Scotland's Way Ahead (2015), The Case for Low Carbon Infrastructure in Scotland
88. Green Investment Bank (2015), Smarter Greener Cities
89. OECD (2015), Stats Database: Quarterly National Accounts
90. Armit, J. (2014), Independent Armitt Review of Infrastructure
91. Armit, J. (2014), Independent Armitt Review of Infrastructure
92. OECD (2015), Economic Surveys: UNITED KINGDOM 2015
93. Armit, J. (2014), Independent Armitt Review of Infrastructure

For example, the national Housing Land Supply must be flexible enough to react to, if not actually anticipate, market trends, utilising the flexibility of the 2006 Planning (Scotland) Act to deliver faster decisions on settlement proposals, ensuring that enabling infrastructure, from local roads to schools to water supply, is put in place when and where it is needed.

Given that the economic geography of Scotland simply does not match the political/administrative map, the ability of regulatory authorities to co-operate at the regional travel to work level is crucial. It is therefore heartening to see examples of where key players across city regions are now coming together with common cause to deliver the economic infrastructure required to support and in time drive faster economic growth.

Housing

Housing supply is at historically low levels while the population is at record levels and forecast to continue to grow. With the economy specialising more in ideas and information, higher density of people and businesses is increasingly key to a successful city region knowledge economy and more young people are being attracted to living and working in city centres. There are particular challenges in meeting the demand for housing supply in the Edinburgh and Aberdeen city regions which need more homes for rapidly growing populations.

Increasing housing supply, especially in and around employment centres, can boost productivity by helping firms to locate where they can be most efficient and create jobs, and enabling more people to live and own homes close to where they work.[94] Reuse of vacant city centre properties, including commercial properties into accommodation, should be a priority.

There is a continuing need to increase confidence in the private house-building industry, unlocking large and small developments through the competitiveness of market support with the rest of the UK and increasing access to finance for SMEs.

The significant expansion of social housing across the country will be needed to meet demand, and developing a pipeline of investment in social housing would enable the construction industry to align capacity. New housing should be increased towards 25,000 per year to meet projected demand and curb price inflation, including around 9000 socially rented homes per year over the next 5 years.

More extensive use of public guarantees can overcome the impasse on infrastructure associated with housing which house-builders and local authorities are unable to fund upfront.

Opportunities for innovation, such as offsite manufacturing[95] and zero carbon homes, are not being developed due to perceptions of risk and costs, and more collaboration is needed to develop the methods, standards, skills, funding, and infrastructure in Scotland.

Digital

World-class digital infrastructure and exploitation is essential for a competitive economy in the 21st century. The Digital Scotland Superfast Broadband programme will ensure that at least 95% of premises across Scotland will be able to access superfast fibre broadband by the end of 2017.[96] There is currently a need for improvements across a range of locations around Scotland, including inter-city transport networks, city centres, business parks, and rural and remote areas. Cost-effective solutions should be identified for those hard-to-reach areas which will not be connected by the current programme. Public service innovation hubs with the latest digital technologies could transform provision and utilisation in these areas.

The proposed minimum service obligation of 10 megabits per second (Mbit/s) to ensure digital inclusion and facilitate business growth in all communities is welcome. Future-proofing broadband infrastructure with rollout of ultrafast speeds would stimulate further creativity and innovation, positioning Scotland to capitalise on transformational technologies and models.

Mobile phone signal coverage also needs to be upgraded nationally, including in city centre business premises, transport corridors and rural communities, to comprehensive 4G coverage and then 5G. Investment could be unlocked by national changes to planning laws, reductions in business rates and access to public sector digital networks, including on the rail network.

Transport

Transport connectivity is of fundamental importance to the success of the Scottish economy, not least, as a relatively small, open economy on the edge of Europe with global markets. While technologies create opportunities for videoconferencing and flexible working, increased connectivity has created a complementary demand for person-to-person contact.

There is substantial long-term investment in Scotland, however there is a perception that the networks are falling further behind internationally, risking loss of economic competitiveness. Scotland is trying to play catch-up – for instance with the major investment planned for the North East – but there is a need for infrastructure developments to become transformational.

With the growing importance of city regions to the economy, intercity and intra-city connectivity, including active travel, can support higher productivity and innovation. The growth of Mobility as a Service (MaaS) and the potential for autonomous cars in urban areas by 2025 could radically reduce private car ownership, congestion and air pollution, meeting the lifestyle needs of people and creating the potential to release road capacity to re-engineer city centres to be economically vibrant and release land for large-scale redevelopment.

The impact of MaaS on transport infrastructure is immense, changing the legacy operationally-based model into a service-based model. Seamless connectivity between modes with integrated timetabling, ticketing and information would be transformational.[97]

94. HM Treasury (2015), Fixing the foundations: Creating a more prosperous nation
95. Homes for Scotland (2015), Research into Mainstreaming Offsite Modern Methods of Construction (MMC) into Housebuilding
96. The Scottish Government (2015), Scotland's Economic Strategy
97. Atkins (2015), Journeys of the Future: Introducing Mobility as a Service

It also potentially generates significant new revenue streams that will help to fund future infrastructure needs .

There is a need for a joined-up strategy for rolling stock, track, station capacity, electrification and digitisation investment which allows for the earlier introduction of improved services and adoption of innovative technologies, maximising efficiency and economic benefits. There is a need to transform the intercity rail networks in Scotland to cut down travel time and increase opportunities for productive work, especially the lines to, from and between Aberdeen and Inverness. The varying quality and reliability of Wi-Fi connectivity must be improved.

A journey time of less than three hours between both Glasgow and Edinburgh and London is key to delivering the full economic and environmental benefits of high speed rail. Faster connections between central Scotland, the Northern Powerhouse, the Midlands and London, integrated into an improved conventional rail network, can promote knowledge exchange, investment and growth. Options for routes and the mix of new and upgraded track need to be considered, but it should be possible to start work on improvements by 2020. Scotland can maximise the economic benefits with the opportunity to develop skills and the supply chain, stimulate investment in advance, and develop a world-class innovation centre in rail.

Scotland's airports are successfully growing their international direct routes and passenger numbers, capitalising on strong demand for long haul in sectors such as education, energy and tech. A 'big bang' approach of fulfilling the 50% reduction in Air Passenger Duty when it is devolved would capture the attention of global airline boardrooms and create further opportunities with new or more frequent European routes and, with the introduction of new aircraft models (long-range, mid-size aircraft) long haul routes. An early announcement is needed to allow airlines to identify and market routes, and airports to plan for extra capacity.

Scotland needs a mix of direct services and strong connections with global hubs. Connectivity with London provides essential point-to-point and onward connections for many Scottish businesses. Aviation hubs, such as Heathrow, are national assets and additional capacity should be approved, with guaranteed access which meets the needs of the Scottish economy.

The planned upgrade to the intercity road network in the north to full expressway standard is welcome. However, the design, development and delivery of dualling of key sections of the A96 should be accelerated and other key routes for transporting products to market and for tourism, such as the A82, A9 in the Far North and A95 are also in need of further development.

There is a need for strategic long-term planning for freight transport, including investment in improvements to rail terminals and network, roads, and ports and harbours. Increased rail freight capacity offers opportunities to better link Scotland with the rest of the UK – including key ports – and European and global markets. Capacity on the key East Coast and West Coast main lines, between central and northern Scotland, and capacity, access and capability at key central Scotland rail freight terminals must be developed, to increase productivity and the opportunities for modal shift and international services. Double-tracking and freight loops between Perth and Inverness for longer freight trains would increase their productivity by 40%.

Investment is required in ports and harbours, and in new ferries, to improve the capacity, reliability and quality of services for freight and passengers, and to support greater commercialisation of these assets. Consideration should also be given to instances where there may be advantage in replacing short ferry routes with fixed links. Short-sea shipping has considerable potential for distributing goods throughout the UK and connecting with deep sea ports in England and Europe. There is a particularly urgent need for a national investment plan and for onshore and offshore infrastructure for oil and gas decommissioning and remanufacturing.

The industry, worth around a billion pounds this year, is set to almost double in value by 2018[98] and there is a concern that the Scottish economy is going to 'miss the boat'.

Energy

Changes to UK energy policy are making it harder to attract investment to address the energy trilemma of security, decarbonisation and affordability. There is a significant loss of generation capacity, including Longannet, and increasing reliance on interconnection with Europe, which has its own supply risks and offshores the economic benefits from energy generation. There is an urgent need for a new long-term strategy for power generation and utilisation.[99]

Delivery of the three planned offshore wind projects in Scottish waters is key to the prospects of the industry and the supply chain in Scotland. Onshore, the first windfarms were constructed around 1995 and turbines have a 20-25 year lifespan. A strategic overview for opportunities to re-power existing UK sites with more efficient turbines could increase output and identify a pipeline of opportunities which attracts investment from turbine manufacturers.

A strategy is needed to support the investment case for energy storage (pumped storage and batteries). The Scottish Funding Council should focus significant resources on the development of energy storage and grid systems, given their central role in decarbonisation and projected global demand for utilisation of the technologies. Proposed lower transmission costs for renewables need to be delivered and the renewables resources on the Northern and Western Isles need to be unlocked through grid development. There should be a greater role for smaller scale generation, demand response technologies and energy efficiency.

A National Infrastructure Project to improve the energy efficiency of at least 127,000 homes every year to Energy Performance Certificate Band C or above by 2025 has been estimated to provide a net increase in jobs of 8,000-9,000 per year spread across Scotland.[100]

Carbon Capture and Storage (CCS) could secure a future for thermal generation, put Scotland at the forefront of the technology and develop a European hub for carbon storage, enabling heavy industry to transition to a low carbon economy. Following the cancellation of the £1billion UK Government CCS competition, which deeply disappointed SCDI, there is an urgent need for a strategy and the identification of an alternative source of investment for demonstration projects in the UK which would form the basis of this major new industry.

North Sea oil and gas still has significant long-term potential, but it is at a critical juncture with high costs by international standards, lower production and negative cash flow. The new Oil and Gas Authority has a critical role in brokering collaboration between the industry and in promoting innovation diffusion. Improvements in productivity will require investment in the maintenance and utilisation of existing assets and higher rates of exploration, Enhanced Oil Recovery, use of new technologies and lean production techniques, closer collaboration with suppliers and changes to working practices. Options for further fiscal changes should be developed to support exploration, decommissioning and critical infrastructure.

Water

Scotland's water infrastructure is good, but new technologies and techniques could improve its sustainability which would become potential exports via the Hydro Nation agenda.

98. Deirdre Michie, Chief Executive, Oil & Gas UK, Speech to SCDI Highlands and Islands, October 2015
99. The Royal Academy of Engineering (2015), A critical time for UK energy policy: what must be done now to deliver the UK's future energy system, A report for the Council of Science and Technology
100. The Existing Homes Alliance Scotland, Joint statement of organisations – October 2015

Key Infrastructure and Place Challenges

To maintain and enhance Scotland's competitiveness, globally and with the rest of the UK, particularly to maintain its competitiveness and develop economic complementarities with the Northern Powerhouse. To increase the percentage of total infrastructure investment which is low carbon by 20% to 75%, to be consistent with Scotland's commitment to climate change targets for 2050.[101]

- The evolving city region and regional agendas in Scotland should be supported, with strengthened leadership and governance and public service standards and efficiency raised to the levels of the best, followed by a further devolution of powers
- Beyond the current programme, an independent Scottish Infrastructure Commission should be created to recommend long-term priorities which develop the planned investment programme from catch-up to transformational of Scotland's competitiveness, and which integrates national and city region pipelines with a focus on smart and low carbon, supported by new legislation to fast-track their delivery

Productivity, supported by infrastructure

- Everyone should have access to a minimum broadband speed of 10Mbit/s and 4G mobile coverage, and after the current programmes, ultrafast broadband at 500Mbit/s and 5G mobile should be rolled-out by 2025. Should there be market demand, this ambition should be raised to 1Gbit/s for key economic locations
- Scotland should be a global location of choice for investment in Mobility as a Service projects that provide digitally-integrated, low carbon transport services for people and goods including access to door-to-door services. A single body should be resourced to bring together a cluster of informatics, transport and energy businesses to lead the development and implementation of a strategy to accelerate projects.
- The Scottish Cities Alliance, Northern Powerhouse, Scottish and UK governments should develop an investment programme to improve cross-border rail and road connectivity, including significantly accelerated journey times between Scotland and northern English cities as part of a developing UK high speed rail network and journey times between Edinburgh/ Glasgow and London of 3 hours or less by 2032[102]
- Journey times, frequency and capacity should be increased on Scotland's intercity rail network, with journey times of 2 hours or less between Aberdeen and Edinburgh/ Glasgow, 3 hours or less between Inverness and Edinburgh/ Glasgow and a minimum hourly frequency between Perth and Inverness, 2 hours or less between Aberdeen and Inverness, and a higher-speed Edinburgh-Glasgow shuttle service[103]
- Scotland's city regions should be connected by motorways or dual carriageway roads by 2030, with charging infrastructure for electric and hybrid vehicles
- New housing supply should be increased towards 25,000 per year to meet projected demand and curb house price inflation, including around 9,000 socially rented homes per year over the next 5 years,[104] with a specific focus on employment centres, and support should be increased for reuse of vacant city centre properties as homes
- A long-term strategy for secure, low carbon and affordable energy supply in Scotland and exports as part of the GB and EU markets should be developed by the Scottish Energy Advisory Board in consultation with UK and EU partners, with the aim of proposing a stable framework for attracting investment, such as in onshore wind re-powering, offshore wind, energy storage, Carbon Capture and Storage, transmission and distribution networks, smart technologies and demand reduction
- No-one in Scotland should live in a hard-to-heat, draughty home by 2025[105]
- Economic recovery of North Sea oil and gas resources should be maximised, with urgent action by industry, regulator and government to protect critical infrastructure, return production efficiency to 80% from 60% and revitalise exploration activity[106]

Innovation, supported by infrastructure

- A network of TechHubs should be developed to bring together innovators, entrepreneurs and creatives with professional support in flexible, affordable and high-tech spaces in cities, towns and smaller communities - with opportunities for revitalising private and public sector property assets as economic changes and financial pressures drive "capacity exit" an immediate priority for policy and partnership support
- Long-term capital investment in education and city region deals should be aligned and institutions should continue to be able to reinvest income in their facilities
- Scottish-based businesses should be able to access and enforce in Scotland protection of intellectual property rights across the EU through the designation of the Court of Session as a local division of the new EU Unified Patent Court
- Scotland should develop the low carbon energy and resource efficiency infrastructure which supports economic leadership in the circular economy
- Scottish port capacity should expand in the next 5 years to capture a large share of offshore and onshore oil and gas decommissioning activity, along with industrial capacity for circular economy opportunities in recycling, reconditioning and re-use
- Investment in water infrastructure should realise the Hydro Nation vision of a lower carbon, higher efficiency system which supports sustainable economic development, stimulates more innovative and exportable solutions, and includes development of a pilot energy from wastewater co-digestion plant in the next 5-10 years[107]

Internationalisation, supported by infrastructure

- Air Passenger Duty should be reduced by 50% from 2018 to support route development including direct flights to China, Houston and the US West Coast
- Airports should be better integrated with city and national transport networks, and the development of city region deals offers an opportunity to improve or develop rail or light rail links with Edinburgh, Glasgow, Aberdeen, Inverness and Dundee airports
- Scotland's major airports, Edinburgh, Glasgow, Aberdeen and Inverness, should have guaranteed levels of access to expanded UK hub airport capacity by 2025[108]
- An investment plan for freight should be implemented by government and industry, particularly to improve capacity and capabilities on key routes, last-mile infrastructure and gateways to accommodate industry trends, like larger container feeder vessels, growth in Eurotunnel traffic and new long-haul, midsized aircraft

Related action by SCDI:

- Establish a Connectivity Commission to report on recommendations for substantial improvements to road and rail connectivity between Scotland's city-regions and with the Northern Powerhouse, including the development of smart mobility
- Continue to facilitate discussion between the public, private and social economy sectors to develop city region and regional growth deals, including co-ordinated and comprehensive approaches to improve productivity, innovation, internationalisation and infrastructure in regions with a long-term need for economic regeneration

101. Low Carbon Infrastructure Task Force (2015), Scotland's Way Ahead, The Case For Low Carbon Infrastructure in Scotland
102. High Speed Rail Scotland Group (2011), Fast Track Scotland – Making the Case for High Speed Rail Connections with Scotland
103. Transport Scotland (2008), Strategic Transport Projects Review
104. Commission for Housing and Wellbeing (2015), A blueprint for Scotland's future
105. The Existing Homes Alliance Scotland, Joint statement of organisations – October 2015
106. Oil & Gas Authority (2015), Call to Action: The Oil and Gas Authority Commission 2015
107. Low Carbon Infrastructure Task Force (2015), Forging Scotland's Way Ahead: Ten projects for a low carbon future
108. Airports Commission (2015), Final Report

SCDI Timeline - Highlights

1937

Scotland's first Industrial Estate, Hillington.

1938

Great Empire Exhibition, Glasgow. Displays Scotland's achievements in science, engineering, arts and film in modernist buildings. Attracts 12 million visitors.

1942-5

Scottish Council on Industry attracts 700 businesses and 90,000 jobs to Scotland. Proposals for Forth Road Bridge. Creation of Scottish Tourism Board.

1948

Establishment of Scotland's Electronics Industry. Attracts over 70% of all US investment in the UK and more than the rest of Europe combined by the mid-1950s.

1952

Cairncross Report introduces the concept of Regional Policy to accelerate the growth of new industrial communities in the most promising locations.

1960

First Export Mission, to the then USSR.

1961

Toothill Report introduces Comprehensive Growth Strategy, the science-based diversification of industry with improved investment in infrastructure and skills.

1965

Creation of Highlands and Islands Development Board.

1968-9

Proposals for the Ballachulish, Skye and 'Three Firths' (Beauly, Cromarty and Dornoch) bridges to improve connectivity. Work completed 1975-1995.

1971

First Export Mission to People's Republic of China.

1972

'Oil & Gas and Scotland's Future' Forum. Highlights scale of development. Catalyses action on enabling infrastructure and opportunities for Scottish industry.

1984

Financial Services Forum leads to creation of Scottish Financial Enterprise.

1986

Network of Young Engineers and Science Clubs created. Grown to over 1,300 school clubs. Engages over 26,000 primary and secondary pupils annually.

2010

50 years of trade visits. 370 visits to over 50 markets with 6000 participants.

2011

Foundation of Scottish Cities Alliance. Renewed city region agenda and collaboration in Scotland. By 2015, Investment Prospectus developed of £10 billion.

scdi Scottish Council for Development and Industry

enquiries@scdi.org.uk | @scdinews | @scdiglobal | www.yecscotland.co.uk

A company registered in Scotland no.24724

#SCDIblueprint

scdi.org.uk

Design by Fourtwentysseven 0427.co.uk