City-Region Deal
Cùmhnant Baile-Roinne

Business Case

Project Name	Science Skills Academy
Themes	Digital Opportunity, Enhanced Growth Capacity
	Innovation, Young People, Up-skilling
Lead	Andrew Johnston
Date (version)	1.7 12 September 2016

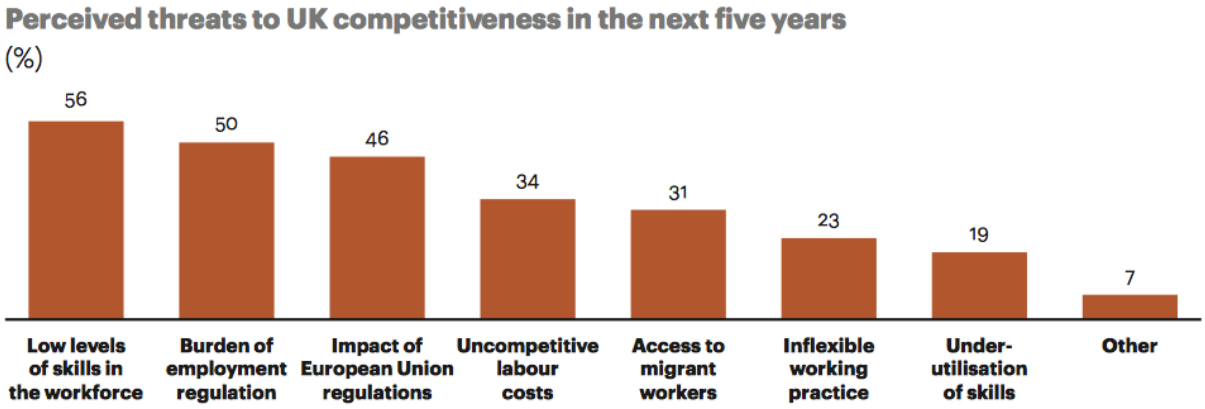
1. Strategic case

1. Introduction

The Inverness and Highland City-Region Deal Heads of Terms agreement was signed on 22 March and set out the projects that Government were prepared to invest in over the next 10 years. One of the projects included in the Heads of Terms agreement was to support the Council and its partners deliver the Science Skills Academy (SSA) project.

Globally there is a shortage of skills that are related to Science, Technology, Engineering, Mathematics and digital (STEMD) discipolines. Low skill levels are seen by the CBI as the single biggest threat to UK competitiveness.

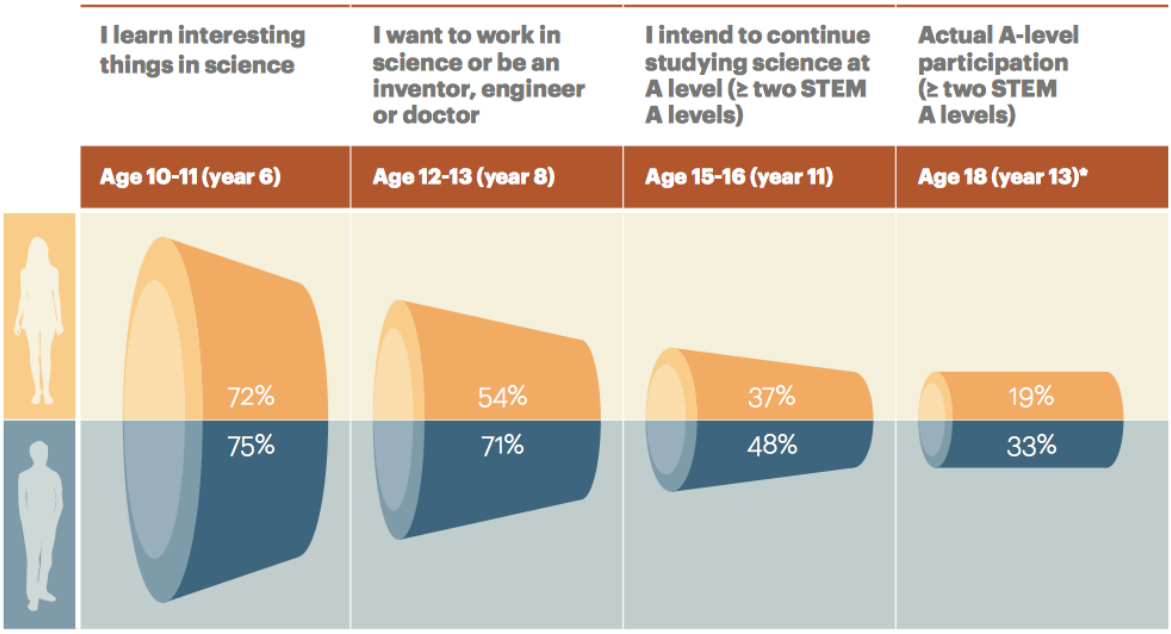
Low skills are the biggest threat to UK competitiveness



Source: *The Path Ahead: CBI/Accenture employment trends survey 2015*

Regrettably, engagement with STEM disciplines declines with age. A major study in England and Wales clearly depicts this as a decision making funnel. The attitudinal differences between boys and girls in regard to STEM become apparent early on.

STEM engagement declines dramatically for older students

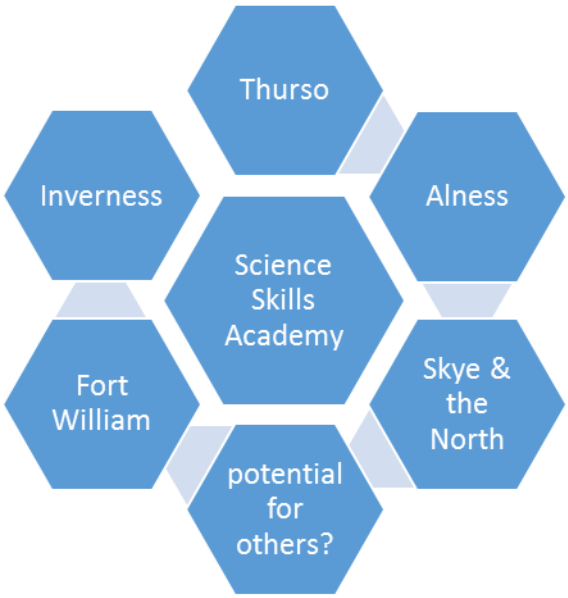


Notes: STEM is science, technology, engineering and mathematics.
*Percentage is based on pupils entered for at least one A level.
Sources: *ASPIRES1* and *2* studies, King's College London; *UPMAP* study, UCL Institute of Education

In parallel with the rest of Scotland and the UK, there is a growing skills shortage in STEMD across the Highlands and Islands. For example, within the next 5-8 years, there could be 1,000 high-quality jobs created in life sciences, and 2,000 created in the renewable energy sector. If the workforce is not equipped to take these jobs, employers will not grow in, or locate to the area.

The SSA is a long term, innovative and ambitious programme that will transform the uptake of STEMD subjects in schools. It will help to raise attainment in these disciplines, and increase the proportion of indigenous young people who are able to take advantage of the growing opportunities in life sciences, renewable energy and digital technologies.

The Science Skills Academy is designed as hub and spoke with the SSA dealing with overall strategy, development and maintaining an overview of quality and best practice. The spokes are the Newton Rooms where the delivery of high quality, hands on science based activities are delivered. At each Newton Room there will be local partnerships formed to ensure that community involvement and local requirements are prioritised within the framework of the SSA.



The project is part of a wider initiative that will address the STEMD provision across the whole of the Highlands & Islands.

1.2 Population and youth migration[1]

The Highlands and Islands has a "deficit" of young people (aged 15-30) when compared with Scotland as a whole (16% compared with 20%). This is largely caused by net out-migration - of those aged 17 to 20 years, although there is evidence that this is decreasing. Factors impacting upon the migration choices of young people include education, training and employment opportunities, housing availability, transport provision and digital and mobile connectivity. Strong community factors also affect decision-making, including affinity with and ties to local areas.

Many want to live and work in their local area, and would do so in greater numbers if more opportunities were created. Sustained efforts by public sector partners to broaden education and employment opportunities for young people will lead to an increase in the population of 15 to 30 year olds across the region.

[1] *http://www.hie.co.uk/regional-information/economic-reports-and-research/archive/young-people-and-the-highlands-and-islands--attitudes-and-aspirations-research.html*

1.3 A partnership approach to delivery

The SSA seeks approval to invest £3m from 2016/2017 through to 2021/2022 to establish the full SSA project at an earlier stage than otherwise would be possible. The project will work with partners including Highland Council, Highlands and Islands Enterprise (HIE), Skills Development Scotland (SDS) and the University of the Highlands and Islands (UHI) to establish sites for Newton Rooms in 5 locations, working with local education and businesses in each area:

- Highland Council wish to ensure that school pupils are given the opportunity to excel in STEMD subjects, tackle the shortage of STEMD teachers and increase attainment rates
- Skills Development Scotland wish to strengthen the link between classroom and career and tackle the potential skills shortages in STEMD driven sectors
- University of the Highlands and Islands wish to cultivate a flow of pupils that have qualifications that will enable them to undertake relevant STEMD courses on higher and further education
- Highlands and Islands Enterprise wish to support the businesses of the Highlands and Islands by ensuring the availability of STEMD skills are available locally to meet the demands of a modern, thriving economy.

A Heads of agreement is being developed to cement the partnership process that currently exists. Positive discussions have also started to support the 'mainstreaming' of Newton Room activities into the curriculum as early in the life of the Science Skills Academy as is practical.

1.4 Project Background

The economic importance of science, engineering and technology to Scotland

The Science and Engineering Education Advisory Group (SEEAG) has highlighted to the Scottish Government that the importance of young people continuing with science subjects cannot be overestimated. Science, engineering, technology and mathematics (STEM) underpin our economy. The Scottish Government has identified energy and life sciences as two of its 'priority sectors' in its overall economic strategy, where Scotland already has leading expertise and the potential for growth. The Scottish Government, and major employers in STEM-based industries in Scotland, have expressed widespread concern about the future supply of well-qualified, highly-skilled scientists and technicians to meet demand in the above sectors of industry and more widely across the economy.

1.5 Project Mission

The mission of the SSA is to ensure young people in the Highlands and Islands are aware of the opportunities, and have the skills to enter into employment in the areas of science, technology, engineering, maths and digital media. This will be through the introduction of a minimum 5 Newton Rooms over the next 3-4 years and if possible, more quickly than that.

1.6 Project Vision

The vision for the project is to build a sustainable pipeline of skills, that will bolster the competitiveness of the Highlands and Islands in sectors that are most important to a modern and successful economy. By enthusing young people about science the project will start the chain leading to skills that will support:

- the growth of hi-tech businesses based here in the Highlands and Islands;

- more high technology start-up companies;
- attraction of inward investing technology companies; and
- the potential to support increased GVA

The project will aim for sustainability from the outset by seeking private sector support in cash and kind. Any income generated will be ploughed back into the project and potentially support the introduction of an increased number of Newton Rooms.

1.7 Project Objectives

The project objectives are:

- to increase the proportion of young people engaged in science, technology, engineering and digital creativity, raise their levels of attainment in these disciplines and to allow them to pursue their interest into a fulfilling career;
- to raise the awareness of pupils, parents, carers and teachers about the current and expected availability and appeal of science, technology, engineering and digital media related careers;
- to develop new forms of delivery, integrating school, further education and higher education provision to meet the needs of employers, and to ensure equality of access that is irrespective of geographical location;
- to fully engage employers, communities, parents, carers and teachers in this task;
- to co-ordinate and extend the reach of current activities promoting young people's engagement with science, technology, engineering and digital media and to enhance the use, reach and impact of current support and resources;
- to transform the scale and nature of investment in the task through developing regional, Scottish, UK and international partnerships; and
- to identify and respond to barriers and gaps that may exist in support and resources to encourage young people's engagement

1.8 Outcomes

Outputs are relatively straightforward to measure, but great care will need to be taken to ensure that outcomes are captured, and that the contribution that the SSA makes to their achievement is calculated accurately. The outputs and outcomes that will be measured are:

- The creation of the SSA hub
- The creation of a minimum of 5 Newton Rooms in the Highland Region
- 9,500 school children attending a Newton Room one day per annum
- increased business investment in developing a pipeline of skills for the science, technology, engineering and digital sectors
- Numbers of 'rentals' of SSA facilities
- Numbers of school children taking/passing STEMD examinations
- School leaver destinations to STEMD FE/HE and employment
- Reduction in STEMD vacancies deemed 'hard to fill'
- Increase in STEMD jobs
- Increase in technology start-ups
- Increase in the numbers of inward investing (STEMD) companies attracted

To capture the level of information that will enable a clear view of the success and contribution made by the SSA, a comprehensive evaluation is already being built into the project. (See appendix 6)

1.9 Skills Investment Plans

The objectives of the SSA align with the themes of the Highlands and Islands Regional Skills Investment Plan (RSIP). The framework for action in the Highlands and Islands RSIP cites the establishment of the SSA as one of the regional actions to be taken in planning for the future. The table below is a summary of how meeting the SSA objectives supports the key themes of the RSIP.

Table 1 Meeting RSIP objectives

Key SIP theme	**Identified SIP key issue**	**Meeting the Science Skills Academy objectives will:**
Meeting the current skills needs of employers	Hard to recruit roles include engineering, technical IT and health professionals	Expand the pool of young people with STEMD interests, qualifications and aspirations to improve the skills pipeline for employers.
Planning for the future	Accessing an appropriately skilled workforce.	Improve the STEMD skills pipeline, helping to meet the projected increased demand for people with these skills.
	Half of investment/ jobs growth to occur outside Inverness/ Inner Moray Firth	Help provide a skilled workforce across the whole of the Highlands and Islands by using the outreach potential of the Science Skills Academy.
	Rebalancing the skills system towards future demand	Allow an evolving response to changing demands by providing a flexible and adaptive structure.
A region for young people	Continuing out migration	Reduce the outflow of young people by providing greater awareness of the employment and study opportunities within the Highlands and Islands
	Unrealistic/ unhelpful to halt the outflow to young people to study	Encourages the return of young people by ensuring they are aware of employment opportunities in the Highlands and Islands.
Attracting people to the region	An ambitious strategy to attract and retain working age people. Action beyond skills	Makes the region more attractive to parents from outside the Highlands and Islands, by supporting full curricular provision for the regions' schools, and implementing an innovative, internationally recognized, educational initiative
Strengthening the employer voice in the skills system	Developing clear mechanisms to develop employer informed curriculum development	Allow local employers to have the opportunity to shape SSA activities so that they reflect regional expertise.
	Engaging businesses with career promotion activity	Increasing the involvement of STEM ambassadors with young people, and allow the building of employer relationships with their future workforce.

In addition to the direct linkage to the RSIP as a specific recommended activity, the SSA will also be aligned to the individual national sector skills investment plans where STEMD has been highlighted as a key contributor to promoting entry to careers across a number of sectors. This will therefore contribute towards the SIP's intentions to attract and develop technically skilled young people into key sectors, with a facilitative and enabling learning and skills development system to support it.

2. THE ECONOMIC CASE

2.1. Market failure

The market failure that the Science Skills Academy seeks to address is the lack of a sufficiently skilled workforce for the SYEMD employers that are located or could locate itnhe Highlands and Islands. The Skills Investment Plan for the Highlands and Islands anticipates growth in employment, especially in engineering, life sciences and digital media. The sectors shown in the table below are not only expected to grow in the Highlands and Islands but elsewhere in Scotland and the UK as well as globally.

Sector	Current employment	Potential jobs growth	Location
Life sciences	1,800	Up to 1,000	Inverness; Moray; Outer Hebrides
Energy	13,000	3,000 – 5,000	Ardersier; Argyll; Arnish; Inverness; Kishorn; Nigg; Orkney; Shetland
Creative industries (including digital)	4,200	250	Across H&I

In addition to the jobs created directly, it is estimated that every new engineering job creates two more jobs and that every £1 Gross Value Added (GVA) generated in engineering sectors generates £1.45 elsewhere in the economy[2]. If the skilled workforce isn't present to meet this demand, economic growth in the Highlands and Islands will be constrained.
The market failure that the introduction of the SSA will address is to increase the number of people available to meet the STEMD skills needs. in the Highlands and Islands. The project will increase the number of pupils that have qualifications that allow entry to FE/HE and employment in STEMD related disciplines. It will engage at all levels of a young person's journey through education, working with partners to build capability and confidence of Primary School teachers to deliver effective STEMD education, inspiring P6-S2 learners in STEMD (before they make curricular options choices), helping to build the capacity of all schools to deliver high quality STEMD in the senior phase and raising family science capital.

[2] http://www.engineeringuk.com/_resources/documents/EngineeringUK-Report-2016-Full-Report_live.pdf

The STEMEC report and The Scottish Government STEM strategy consultation

The Scottish Government recognizes the importance of addressing the market failure outlined above. The final report of the Science, Technology, Engineering and Mathematics Education Committee was presented to the Scottish Government in September 2016[3]. It contains 43 recommendations based around Administration of Education, Women in STEM, Teacher Numbers, Initial Teacher Education, Primary Science, Career Long Professional Development and Professional Learning Communities, Interdisciplinary Learning and Additional Barriers to Success. While it is unlikely that all of these recommendations will be accepted by the Scottish Government, the STEMEC report provides a useful guide to issues facing STEMD education in Scotland and outlines possible solutions. The options for the Science Skills Academy were considered in the context of these recommendations and were also cognisant of the Scottish Government's SYEM strategy consultation, which opened in November 2016.[4]

[3] http://www.gov.scot/Topics/Education/Schools/curriculum/STEM/STEMEC/Report/FinalSTEMECReport
[4] https://consult.scotland.gov.uk/stem/a-stem-education-and-training-strategy

2.2 Options

For the Highlands and Islands, five options for addressing the STEMD skill shortage have been considered. These were:

Option 1 – Recruit skilled workforce externally. One option is to support direct recruitment of STEMD skills from outside the Highlands.

Option 2 – No action. Rely on existing activity and initiatives from Highland Council schools and agencies such as Skills Development Scotland, the University of the Highlands and Islands, Education Scotland and SSERC. This is the base case.

Option 3 – Intervention. Directly intervene in education to improve impact. Measures might include raising entry requirements to PGDE courses for STEMD teachers or changing General Teaching Council for Scotland (GTCS) registration requirements, providing incentives to STEMD teachers, directly supporting the resourcing of science equipment for schools, reversing the decrease in numbers of lab technicians and appointing STEMD development officers for schools.

Option 4 – **Science Skills Academy hub only** – coordinating and catalysing activity. As option 2 but bringing more STEMD educational activity and investment to the region and extending its reach beyond its current range.

Option 5- Deliver Science Skills Academy. Option 4 + Newton Room network

The 5 options have been assessed against a set of objectives designed to address the Highland skills shortage:

- to increase the proportion of young people engaged in science, technology, engineering and digital creativity, raise their levels of attainment in these disciplines and to allow them to pursue their interest into a fulfilling career;
- to raise the awareness of pupils, parents, carers and teachers about the current and expected availability and appeal of science, technology, engineering and digital media related careers;
- to develop new forms of delivery, integrating school, further education and higher education provision to meet the needs of employers, and to ensure equality of access that is irrespective of geographical location;
- to fully engage employers, communities, parents, carers and teachers in this task;
- to co-ordinate and extend the reach of current activities promoting young people's engagement with science, technology, engineering and digital media and to enhance the use, reach and impact of current support and resources;
- to transform the scale and nature of investment in the task through developing regional, Scottish, UK and international partnerships; and
- to identify and respond to barriers and gaps that may exist in support and resources to encourage young people's engagement

An analysis of the impact of the five different options in achieving these objectives was carried out and summarised in the table overleaf.

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The advantages, disadvantages, risks, deliverability implications, and costs were further considered for each option and the results summarised in tabular form.

OBJECTIVES	Option 1 – recruit externally	Option 2 – Do nothing	Option 3 – intervention	Option 4 – Science Skills Academy hub only	Option 5-Deliver Science Skills Academy (Option 4 + Newton Room network)
	Comment	**Comment**	**Comment**	**Comment**	**Comment**
increase the proportion of young people engaged in STEMD, raise levels of attainment and allow them to pursue a fulfilling career;	No increase	Limited increase. There may be progress but it is likely to be too slow to have a measurable impact.	Low impact in wider Highlands and Islands, more impact possible in Inner Moray Firth and Inverness where there is currently more activity	Significant impact in Inner Moray Firth and Inverness, less so in wider H and I.	Most effective approach for entire region
raise the awareness of pupils, parents, carers and teachers about the current and expected availability and appeal of STEM related careers;	No impact – possibly negative, where residents see jobs in these industries as not for them	Some increase from current initiatives, but limited.	Investing in working with SDS careers advisers and STEM ambassador network could work well.	Working with SDS careers advisers and STEM ambassador network could work well.	Opportunity to work alongside industry representatives in Newton Rooms would be highly effective.

develop new forms of delivery, integrating school, FE and HE provision to meet the needs of employers, and to ensure equality of access irrespective of geographical location;	No effect	Proposals for e schools in Highland and Western Isles will help, but progress in other areas is sporadic.	Invest in e schools in Moray, Orkney, Shetland, Argyll and Bute	The Hub would accelerate current initiatives and ensure equality of access.	Newton Rooms would provide a local presence that could act to drive new forms of delivery, with an emphasis on equity.

fully engage employers, communities, parents, carers and teachers in this task;	No effect	Science festivals have some positive impact.	Greater investment in science festivals etc required.	Hub could effectively coordinate and promote public engagement events in addition to the Science festivals and work closely with STEM ambassador network to increase their impact.	Newton Rooms provide a local presence that would be highly effective in engaging the wider community in STEMD activity and increasing family science capital
co-ordinate & extend the reach of activities promoting young people's engagement with STEMD to enhance the use, reach & impact of current support & resources	No impact and increasing duplication of activity	No impact and increasing duplication of activity.	No impact	Some impact, but constrained by lack of local presence.	Newton Rooms provide highly effective delivery of inspirational activity that reflects local research and industry. They give a way of coordinating and enhancing current resources.
transform the scale and nature of investment in the task through developing regional, Scottish, UK and international partnerships	Possibility of developing international partnerships to fill vacancies	No effect	No new investment generated.	Effective at developing these partnerships and drawing in additional investment in STEMD education in H and I	As for the hub, plus Newton Rooms concept is an attractive sponsorship project for local businesses and is international in nature.

identify and respond to barriers and gaps that may exist in support and resources to encourage young people's engagement	No effect			No effect			Moderate impact possible through reacting to regional barriers.			Moderate impact and able to focus on particular areas of concern, such as gender imbalance.	Tackles issues of geographical exclusion and travel difficulties head on.	
Key		no/ low impact			Some impact			High impact				

Option 1 – Recruit skilled workforce externally. One option is to support direct recruitment of STEMD skills from outside the Highlands.

Advantages: **(including summary of the tables above)**	Requires no intervention or investment in education.
Disadvantages(including summary of the tables above)	Does not address the root of the market / educational failure. Would have no impact on achieving the objectives of the Science Skills Academy
Risks/ deliverability	The STEMD skills shortage is international and it is unlikely to be able to attract sufficient numbers of skilled employees to fill the skills gap, especially to the more remote parts of the Highlands . Here, the availability of housing and jobs for partners is a key issue. The local populace may continue to see skilled STEMD jobs as not for them and this approach might entrench the low skill/ low wage economy in the Highlands. BASF and Marine Harvest have tried this approach and now accept that it is unsustainable. They now wish to focus on developing their own skill base locally. Other employers (Denchi Power, Cavendish Nuclear) have expressed the same opinion
Costs	Given the numbers of employees required for potential growth (up to 5500 in renewable energy over the next 5 years, alone), it is unlikely that the costs of relocation and incentivisation would be sustainable for companies and/or the Government.
Conclusion	Rejected on grounds of cost, high risk of failure and unacceptability to employers

Option 2 – No action. Rely on existing activity and initiatives from Highland Council schools and agencies such as Skills Development Scotland, the University of the Highlands and Islands, Education Scotland and SSERC. This is the base case.

Advantages: **(including summary of the tables above)**	Requires no extra investment in education. There is an increasing number of STEMD initiatives, mainly focused on Inverness and the Inner Moray Firth.
Disadvantages(including summary of the tables above)	These initiatives and activities are uncoordinated. There is little evidence of impact in the wider Highlands.
Risks/ deliverability	Unlikely to be focused enough on the Highlands to provide a workable solution to the difficulties faced by remote communities. Would lack a coordinating core, meaning activity will continue to be delivered ad hoc and piece meal. Schools and businesses are confused by the plethora of initiatives. There is a sense of initiative fatigue' and a clearly expressed desire from employers and schools for a coherent approach. Likely to be 'more of the same' - there may not be a sufficiently powerful impact to make a significant difference to to STEMD engagement and performance.
Costs	The duplication of activity and the lack of a joined up approach is wasting resources.
Conclusion	Rejected on grounds of ineffectiveness and wastefulness.

Option 3 – Intervention. Directly intervene in education to improve impact. Measures might include raising entry requirements to PGDE courses for STEMD teachers or changing General Teaching Council for Scotland (GTCS) registration requirements, providing incentives to STEMD teachers, directly supporting the resourcing of science equipment for schools, reversing the decrease in numbers of lab technicians and appointing STEMD development officers for schools.

Advantages: **(includeing summary of the tables above)**	Targeted intervention could have a significant impact.
Disadvantages(including summary of the tables above)	Tends to be reactive rather than proactive. Can only address some aspects of a complex and multi faceted problem. Has only low - moderate impact on Science Skills Academy objectives. Will not provide the innovative, coherent and far sighted solution required.
Risks/ deliverability	Will not work without wholesale buy in from unions, GTCS, Local Authorities, schools and teachers which will take considerable time to achieve. Would require to be a national programme and might then not address challenges specifically faced by the Highlands. Does not address the issue of improving STEMD employer engagement with young people.
Costs	Very expensive. Bursaries awarded to physics and maths graduates in England to train as teachers may be up to £30 000 per person. This is just one measure that would be required and that level of spend is unsustainable in the current climate. To appoint five Primary Science Development Officers across Scotland for 3 years is costing £800 000 +.The total cost of this option could run into 7 figures.
Conclusion	Rejected due to potential costs, difficulty of implementation and poor impact.

Option 4 – **Science Skills Academy hub only** – coordinating and catalysing activity. As option 2 but bringing more STEMD educational activity and investment to the region and extending its reach beyond its current range.

Advantages: **(including summary of the tables above)**	Would select and promote the most effective activities and would maximise impact and minimise waste through careful coordination. The concept has been successful so far in attracting additional investment into Highland Schools from SSERC and other agencies.
Disadvantages(including summary of the tables above)	A lack of physical facilities in the wider Highlands might impair effectiveness. Does not directly deliver inspirational activity.
Risks/ deliverability	Highly deliverable. There is a widely expressed desire for a coordinating hub. External agencies see the attraction of a single point of contact for STEMD activity in the Highlands and Islands. Considered against the STEMEC report, the Hub could contribute to 18 of the 44 recommendations.
Costs	Between £200 000 and £250 000 pa - see section 4.3 for costing
Conclusion	Cost-effective partial solution; see impact analysis

Option 5- Deliver Science Skills Academy. Option 4 + Newton Room network

Advantages:(summary of the tables above)	As for option 4 but it is also an attractive proposition for business sponsorship. Several have already indicated preparedness to back Newton Rooms. High likelihood of achieving the objectives set out above. Tackles issues around rural exclusion head on. Allows other programmes, such as My World Of Work live or Hello Digital to extend their reach. This option comes closest to the Finnish Luma centres concept, identified as a successful model by the Scottish Government.
Disadvantages(summary of the tables above)	Complex initial implementation involving several partners and stakeholders.
Risks/ deliverability	As for option 4 - highly deliverable. There is a widely expressed desire for a coordinating hub and an appetite for Newton Rooms. External agencies see the attraction of a single point of contact for STEMD activity in the Highlands and Islands. Relies on continuing collaboration between HIE, UHI, SDS and HC. Requires a long term approach.
Costs	in addition to the cost of the hub, establishing, outfitting and running five Newton Rooms up to March 2022 is estimated at £1 669 000 - see section 4.4.
Conclusion	The most cost effective option; see economic impact analysis below.

2.3 Future economic impact to be derived from SSA

A key part of the project will be to capture outputs and outcomes in order to measure the impact that the SSA will have. An evaluation model is in the process of being developed and there is no misunderstanding regarding the difficulty in measuring the impact a project of this kind might have.

This section presents indicative figures and potential conclusions that an economic impact assessment of the impact that the SSA might have. The figures are purely for demonstration purposes as it is nigh on impossible to forecast what economic impact an education project will have far into the future. The purpose of this exercise is to quantify the level of net direct, indirect and induced added value that the SSA could contribute to the Highlands and Islands economy over the course of a 12-month period in the future (and this could be extrapolated further). The assessment would follow the principals of HM Treasury's Green Book appraisal guidance.

he impact model might be designed around the assumption that the SSA will contribute to the economy in the following five distinct ways:

1. Through the additional salaries that SSA participants (and then additional UHI STEMD graduates) earn as a result of having their qualification
2. Through the additional profits Highland businesses make as a result of the improved productivity and performance of those staff members educated and/or trained by SSA and 'additional' UHI STEMD graduates
3. Through the additional income tax and national insurance payments the Government receives from SSA and additional UHI STEMD graduates, either as a result of them finding work for the first time, or as a result of them experiencing an increase in earnings
4. Through the reduction in the amount of public money that goes towards Job Seekers Allowance, as a result of SSA helping people to find work
5. Through the SSA buying goods and services from other businesses. This will also support inclusive growth through the more even distribution of growth across the Highlands and Islands economy.

1. Additional salary payments to STEMD graduates/diplomates

This figure describes the difference between the total salaries that STEMD graduates are expected to earn with an HE or FE qualification and what they would have earned without it.

In the case of the HE qualifications, we can estimate this by converting the estimated present value lifetime earnings differentials quoted in Walker and Zhu to an average annual impact.

In the case of the FE qualifications, we can apply the average percentage increase in salaries attributable to an FE degree quoted in Beaven et al ; to the average earnings for the area as a whole, as published in the most recent Annual Survey of Hours and Earnings.

The figure of 600 graduates at an average salary differential of £13,666 was used. The opportunity to drive up the number of females graduating in STEMD and the significant differ-

ence in salary differential should be noted.**Direct impact – £8.2 million (estimate only at this stage)**

2. Additional employer profitability

As part of the analysis an estimate was made of the level of additional profits Highlands employers of STEMD graduates make as a result of having them on their payroll.

The first thing is to estimate the average profit companies make from every member of staff on their payroll. This can be done by taking the total turnover figure for the Scottish economy as a whole (sourced from the Scottish Annual Business Statistics), and deducting total company expenditure on goods, services and employment costs. The figure that is left over after this calculation is the total combined profit, depreciation and amortisation for the Scottish economy. It could be assumed that 33% of the figure was depreciation and amortisation and the rest was profit. The total profit can then be divided by the number of employees in Scotland to get a national estimate of profit per employee, and multiplied this figure by the number of STEMD graduates in a specific year in the future who are now employed in the Highlands and Islands.

What has not been taken into account as yet is the expectation of increased profitability through the wider benefits of a more highly trained workforce. The benefits would include:

- Increased expertise in digital marketing and selling
- Increased technical product knowledge
- Reduced reliance on external technical repairs and maintenance
- Reduced recruitment and relocation costs

Direct impact – £5.1 million (estimate only at this stage)

3. Additional income tax and NI receipts

An estimate can be made of the additional Income Tax and National Insurance HMRC will be able to take in as a result of the increased earnings of STEMD graduates.

An online Income Tax and National Insurance calculator can be used to estimate this, based on the post and pre graduation income levels that was calculated as part of the calculation in section 1.2, the difference in the level of tax income the government currently receives, and the amount it would have received had STEMD qualifications never been obtained.

Direct impact – £2.3 million (estimate only at this stage)

4. Government JSA savings

This figure will describe the money that DWP will have saved as a result of those STEMD graduates that would otherwise have been unemployed. This is a difficult one to measure but based on work done in the Forth Valley area an assumption can be made that the STEMD graduate population shared the same age profile as the Forth Valley population as a whole. If this were the case, the Forth Valley College graduate unemployment rate would be 12.3% lower, or 1.3 percentage points lower than that of the population as a whole (for the sake of this calculation assumed to be 8.9% v 10.2%).

Based on this figure, it has been estimated that 12.3% of 2,500 STEMD graduates would have been unemployed had it not been for their college qualification. If you take a break down of this by their ages, and multiplied them by the JSA payment they would have been entitled to (£57.90 a week if they were under 25, 73.10 a week if they were older than that) to derive a total benefit savings estimate.

Direct impact – £1.1 million (estimate only at this stage)

5. SSA procurement

Given the absence of any detailed information on procurement, the simple assumption could be made that 75% of all goods and services will be sourced in the Highlands and Islands, and that the rest will be brought in from elsewhere.

Direct impact – £0.5 million (estimate only at this stage)

Impact table

	Direct impact (£m)	Multiplier	Direct, indirect & induced impact (£m)	GVA ratio	GVA impact (£m)
Additional salary payments to STEMD graduates	8.2	1.2	9.8	39%	3.8
Additional employer profitability	5.1	1.8	9.2	39%	3.6
Additional income tax and NI receipts	2.3	1.0	2.3	100%	2.3
Government JSA saving	1.1	1.0	1.1	100%	1.1
SSA procurement	.5	1.8	0.9	39%	0.4
Total impact	**17.2**		**23.3**		**11.2**

These figures are only for guidance and are probably high, based on the fact that the SSA will have created the opportunity for these figures to be delivered – and rely on follow on activity from:

- Highland schools in supporting pupils to STEMD qualifications - Highers etc
- SDS in demonstrating the value of a STEMD career path

- UHI in particular by supporting students to STEMD diplomas and degrees

Therefore, a weighting figure relating to the additionality that SSA provides would have to be agreed to get to an impact figure that the SSA will deliver in the future - for example 50% - which would give an annual GVA impact of £5.6m per annum to the Highland economy.

Application of multipliers and GVA ratios

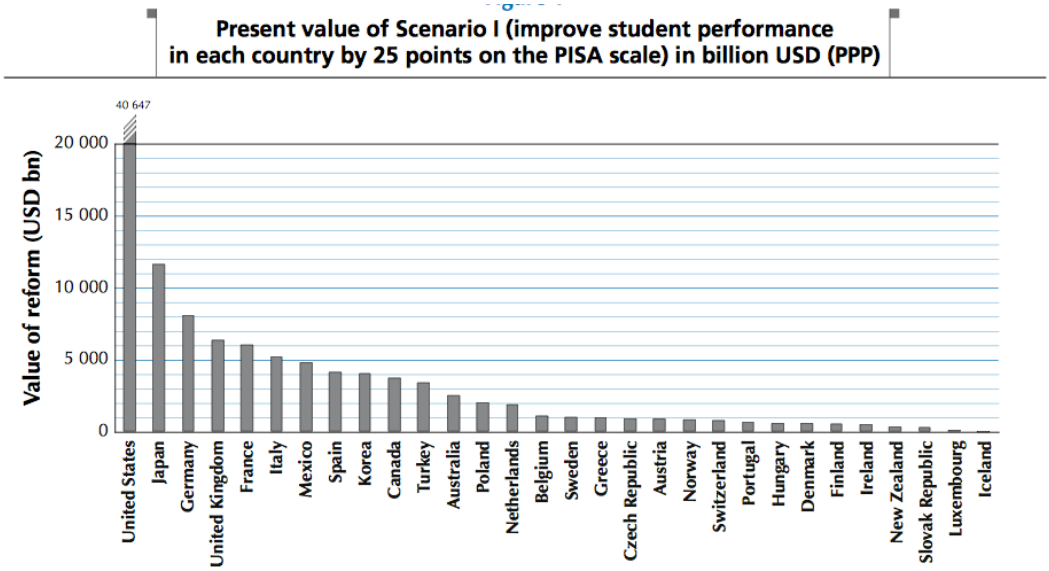
In the majority of cases, it was estimated the indirect and induced impacts of the SSA on the Highlands and Islands economy by applying the mean average Type II multiplier for the 90 industry groups listed in the most recent (2011) Scottish Input Output Tables). The only exceptions to this were:

- **Taxes and benefit savings**: as this money goes straight out of circulation, into the government reserves, so we haven't applied any multipliers to these savings
- **Graduate salaries**: as this is money going to individuals, rather than companies, there is no knock-on industry supply chain impacts here, so we have just included an induced impact (calculated as the Type II impact divided by the Type I impact). In the case of graduates we applied a multiplier for the whole economy and applied the multiplier for the education sector.

In most cases, it was assumed a GVA ratio of 39%, equivalent to total Scottish GVA divided by total turnover in the Scottish economy. Again, the two exceptions were taxes and benefits, as this money all goes to the UK government, and therefore all counts as value added to the national economy.

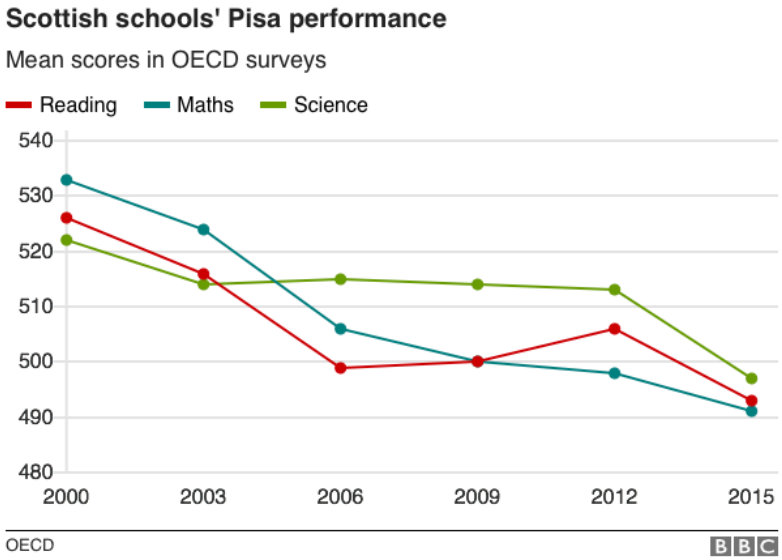
The economic value of improved educational performance

A commitment to improving educational quality through radical reform is the current goal of many Governments. It is estimated by the organisation for Economic Cooperation and Development (OECD) that a modest increase in STEM attainment by secondary school students - about as much as has been achieved by Poland in six years - could increase the UK's GDP by over $6 trillion over the lifetime of a child born in 2010 [5].



[5] http:/

Given Scotland's contribution to UK tax revenues, it is reasonable to assume that approximately 9%, or $540 billion, of this could accrue to Scotland.
The $6 trillion dollar figure given above is based on an average improvement of 25 points per student in the PISA international tests of science, maths and English. Unfortunately, this is the level by which Scottish students' performance in science has declined since the first PISA tests on 15 year olds were conducted in 2000:



The declining performance of Scotland relative to other developed nations adds weight to the argument for taking an innovative approach to improving STEMD education. The Science Skills Academy provides this.

3. COMMERCIAL CASE

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3.1 Market Appetite.

Both private and public sectors have shown significant interest in the project and in becoming involved. A list of potential project sponsors has been drawn up, and initial discussions have shown a willingness to contribute over both the short and long term. The Science Skills Academy is geared to tackling the problem of skills shortages in STEMD disciplines in a holistic manner. To meet the business requirements of tomorrow – for example the ones that are set out in 2.6 above - this means that the main markets for the Academy at this stage are:

Learners

By increasing the proportion of young people engaged in STEMD, young people will be the key beneficiaries of the Science Skills Academy. STEMD skills, qualifications and careers are reliable pathways to well paid and fulfilling careers that are resilient in times of economic slowdown. The Science Skills Academy programme is holistic and addresses issues around STEMD engagement at all stages of a young person's life. However, the focus of the Newton modules will be on learners from P6 - S2. It is acknowledged that this is a key period when interest in STEM subjects declines and that this influences later academic and career choices[6].

The target is to enable every learner in this age range to have at least one full school day per annum in a Newton Room. Education leaders are positive about making Newton Room provision part of mainstream school activity. A key objective is to locate Newton Rooms in locations that will make them accessible within one hours travelling distance to every school pupil in the Highland Region. The physical size of the region has meant that rurality has often been a major issue for 'outlying' schools and this is a direct attempt to drive up an inclusive approach. The figures shown in the table contained in Appendix 3 outline the initial target market of around 9,500 school children across the Highland Region in the age groups between P6 and S2 together with approximate travel times from potential Newton Room sites. The travel times are important as this makes the Science Skills Academy genuinely accessible for pupils in more remote locations.

Families

Parents are the single most significant influencer of young people's career choice. However, research has suggested that when parents' awareness of the range and nature of career opportunities around STEMD creativity is limited – and their unfamiliarity breeds wariness – that this can lead to the discouragement of young people when seeking to pursue an interest in science, technology, engineering and digital creativity through to a career.

A key factor affecting the likelihood of a student aspiring to a science-related career by the age of 14 is the amount of 'science capital'[7] a family has. Science capital refers to science-related qualifications, understanding, knowledge (about science and 'how it works'), interest and social contacts (e.g. knowing someone who works in a science-related job).

Students from families with medium or high science capital are more likely to aspire to science and STEMD related careers and are more likely to plan to study science post-16. A major role of the Science Skills Academy will be to build science capital - using the network of Newton Rooms to engage learners' families in STEMD activities and informing them about career opportunities

Teachers

Because of the importance of building confidence and capability among Primary teachers around STEMD, the Science Skills Academy will work to support and extend initiatives such as the SSERC Primary Cluster programme in Science and Technology. The Science Skills Academy will provide a focus for professional learning for teachers, helping them to stay abreast of latest developments in their helping them stay informed about the most effective ways of engaging young people in STEMD.

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[6] (*https://www.imeche.org/policy-and-press/reports/detail/when-stem-a-question-of-age*

[7] (*http://www.kcl.ac.uk/sspp/departments/education/research/aspires/aspires-final-report-december-2013.pdf).*

Employers

The active involvement, investment and leadership by employers is central to an effective model for the Academy. Their involvement is needed to:

- Contribute to the accurate portrayal of current and emerging opportunities
- Develop a range of mutually beneficial relationships with local schools – in terms of helping young people gain insights into the world of work and the appeal and practical application of science, technology, engineering and digital creativity, and enhancing their likelihood of finding the recruits they need
- Co-design career pathways that will meet the needs of employers
- Develop co-investment packages that will enhance the flow of young people into local opportunities.

Head Teachers

The leadership role of Head Teachers will be critical to the success of the Academy. They have a significant role to play in driving the adoption of initiatives in their school, tackling perceived barriers and engaging with other schools, local employers, parents and communities to create a strong local partnership around the agenda. The Science Skills Academy programme aligns with the quality indicators identified in the fourth edition of Education Scotland's 'How good is our school' document.

Young people at College and University

Newton Rooms will be a marketing tool for Students in FE/HE will also be able to appreciate the opportunities available and the skills that can be transferred to the work of science, technology, engineering and digital creativity. Access to Newton Rooms will be made available under separate agreements to students as per FE and HE requirements. In addition to this it is envisaged that FE/HE students being involved in mentoring or teaching in Newton rooms alongside staff.

FE/HE providers

FE/HE providers are critical partners in designing and delivering career pathways to many opportunities in the science, technology, engineering and digital creativity areas of the labour market. They are also in a position to work with partners to develop appropriate resources for use by teachers working with pupils. FE/HE providers also see the Science Skills Academy as an opportunity to showcase their institutions to prospective students.

To date there has been nothing but positive feedback with great interest particularly from education to drive up attainment and opportunity, and from employers to support long term growth plans.

3.3 Venues

Whilst no decisions or commitments have been made, discussions are ongoing in the following areas as potential 'early adopters' of hosting Newton Rooms:

- Inverness
- Thurso/Wick
- Fort William
- Alness
- Skye and the North West

Discussions with stakeholders have revealed several options for the sites of Newton Rooms. These include conversion of underused facilities in schools and colleges and potential for sharing facilities with other local organisations such as museums, colleges or schools. The possibility if using temporary 'pop up' facilities and mobile delivery is being investigated. This is particularly appropriate for the the more remote and sparsely populated areas in the North West.

3.4 Procurement Strategy and Contracts.

The development of the SSA will be through a process of creating services with partners and obtaining best value for money in the process. The Newton Rooms will all be led by local strategic partnerships that will be invited to bring together the best science 'fit' for their area within tight budget constraints. They will be supported by the SSA Core Directorate to achieve best value for money through strategic and effective procurement. Where applicable the HIE procurement processes will be followed in 2016-17.

3.5 Management of Risk

A standard risk management approach has been developed and the initial risks are shown below in section 5.4. The Risk Register will be used for the entirety of the programme and risks categorised by type.

4. THE FINANCIAL CASE

4.1 Overview

The Science Skills Academy has been earmarked for support of £3m under a city deal agreement. This is a fantastic opportunity to deliver a significant project that can make a major difference to education, careers and the economy in the Highlands and Islands it is also important to ensure that the project is sustainable and the financial approach reflects the desire to achieve this. Therefore, in addition to the Government funding through city deal, the project is committed to identify additional funding through private sector sponsorship – principally to ensure that the project is valued and sustainable in the long term. Further applications will also be made to relevant funding bodies with a relevance to STEMD and the projects objectives. The creation of the SSA requires significant investment. In building the business plan there are two key factors:

- sharing the financial strain; and
- sustainability.

4.2 Sharing the financial strain

The way that SSA will seek to finance its development is through:

- initial pump prime funding from the partner organisations, including City Deal;
- negotiating private sector investments by geographic area;
- bidding for central funds and resources that support science and technology initiatives; and
- commercial use of the Newton Rooms by 3rd party organisations, businesses etc.

The willingness of stakeholders in both the public and private sectors to consider how best they can support the SSA has been encouraging, and a business model is being developed which will build on the discussions that have been had to date. Additional funding/sponsorship/income that is generated will be ploughed back into the SSA core to support additional Newton Rooms that meet the criteria.
The first consideration is to the cost of establishing and maintaining the central function of the Science Skills Academy and the cost of establishing and delivering five individual Newton Rooms across the Highland Region.

4.3 The Science Skills Academy core function

Table 4 Finance for SSA hub

	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Staffing	60,000	93,000	95,000	97,000	100,000	103,000
Travel and subsistence	15,000	12,000	12,000	12,000	12,000	12,000

Communication	3,000	1,000	2,000	1,000	2,000	2,000
Administration	7,000	7,000	8,000	8,000	9,000	9,000
Marketing	7,000	20,000	20,000	15,000	15,000	15,000
Professional fees	7,000	10,000	10,000	10,000	10,000	10,000
Rental accommodation						
Preliminary activities	47,000	50,000				
Consultancy		13,000	13,000	13,000	8,000	5,000
Evaluation	25,000	25,000	25,000	25,000		
Programmes		15,000	30,000	40,000	40,000	30,000
Contingency		16,000	20,000	20,000	20,000	20,000
Total	**171,000**	**262,000**	**235,000**	**241,000**	**216,000**	**206,000**

Total 5-year cost of delivering SSA hub £1,331,000

Notes to core cost figures

Staffing: Project Director/CEO of Science Skills Academy plus a project executive
Travel and subsistence: Setting up and supporting Newton Rooms throughout the Region, there is potential for international travel to ensure best practice
Communication: Laptop, phone and tablet
Administration: there will be a requirement for administration as the project builds, potentially through part time and temporary support and additional administrative items such as headed paper etc.
Marketing: The project will need to ensure that the right message is getting to a wide audience across the Region and some of the messages will need to be tailored to fit with the area
Professional fees: legal and accountancy
Rental accommodation: It is envisaged that space will be offered from one of the partner organisations. If this is not the case then additional services will need to be put in place support stand-alone office.
Preliminary activities: as documented in the application for 16/17 support
Consultancy: support from First Scandinavia. Expertise in setting up similar ventures can be built upon
Evaluation: Evaluation will be key to ensuring that desired results are being achieved and what best practice means in a Highlands and Islands setting
Programmes: Programmes will be purchased centrally for delivery in the Newton Rooms. This will provide greater purchasing power and central expertise in a wide range of programmes to meet differing needs across the Region
Contingency: A number of assumptions have been made at this development stage if the project and the contingency figure is to support tackling any unforeseen situations that may arise.

If the contingency figures for the SSA core and/or the individual Newton Rooms are not used then these funds will be allocated towards the potential for further Newton Rooms as appli-

cations to host come forward, along with any unused allocations towards previous years projects.

4.4 Establishing 5 individual Newton Rooms

Table 5 Finance for 5 Newton Rooms

	2016/17	2017/18	2018/19	2019/20	2020/21	2021/22
Initial fit out		100,000	200,000	200,000		
Management fee		5,000	15,000	25,000	28,000	30,000
Staffing		20,000	60,000	100,000	105,000	110,000
Staff recruitment		5,000	5,000	5,000	5,000	5,000
Staff training		5,000	12,000	25,000	10,000	10,000
Rent		6,000	18,000	30,000	33,000	35,000
Consumables		5,000	15,000	25,000	27,000	30,000
Replacement/depreciation on equipment		5,000	15,000	25,000	30,000	30,000
Transport		10,000	20,000	30,000	30,000	30,000
Contingency		25,000	25,000	30,000	30,000	25,000
Total		**186,000**	**385,000**	**495,000**	**298000**	**305000**

Total cost of delivering 5 Newton Rooms £1,669,000

Notes to Newton Room figures

Initial fit out: Estimated at £100k per Newton Room but this will vary depending on location. This figure includes capital equipment for education. Sponsorship will always be sought. Branding by sponsors is strong option
Management fee: Local time spent in booking in events, classes etc. and preparing room
Staffing: Secondments, post-docs and 'teacher in training' will be sought to reduce costs
Staff recruitment: recruitment is a key factor as there is currently a dearth of science teachers in the Highlands and islands and the SSA is one of the approaches that will start to change this through offering something different and attractive
Staff training: One of the differentials that SSA will have is that it is very hands-on and teachers/trainers will be trained in techniques that will bring science to life for students/pupils
Rent: including contribution to HLP, cleaning and internet access, again sponsorship and rent holiday agreements will be sought
Consumables: Everyday items for experiments etc. that need constant replacement
Replacement/depreciation on equipment: Capital costs need to be maintained and replaced to keep Newton Rooms 'fresh'
T**ransport**: Bussing learners to Newton Rooms. This will be negotiated with schools to use their own transport/drivers/supervisor-teachers
Contingency: As the actual sites have not yet been confirmed, a figure has been included for contingency to ensure that strong projects have leeway to go forward if financial barriers are slowing them down.

4.5 Sustainability

The Education Department at Highland Council have agreed the importance of mainstreaming the activity of Newton Rooms into the curriculum. Ways of ensuring that the Science Skills Academy and its developmental role continue post-project are already being considered by the partner stakeholders to ensure that the quality of the Newton Room experience continues to grow.

5. THE MANAGEMENT CASE

5.1 Governance

Leadership Board

The SSA will have an invited board, and a constitution will be created. The partner organisations will all have a seat on the board. It is hoped that an independent chairperson can be approached and appointed – potentially a representative of the private sector. In addition to bringing strategic prowess, the chairperson should be able to support the SSA in building a strong reputation quickly, and make introductions at senior levels across the political, public and business communities.

As each Newton Room is launched, a local group should be formed to support start up and report back to the central SSA board on progress and local requirements. The Academy itself will be managed as the hub with a Director in charge of:

- Maintaining a close watch on developments in science education and considering developments for the SSA;
- marketing the SSA;
- liaison with stakeholders;
- identification of 'next Newton Rooms', making approval cases to the board then development and project management of delivery of new Newton Rooms; and
- budget control and reporting to the board

Staff levels will be reviewed as the project develops. For the purpose of this paper it is anticipated that the SSA will be able to draw on the management experience of a stakeholder organisation(s) to reduce overheads (space, admin, payroll, accounting, legal etc.).

It is envisaged that the SSA will be, and promoted as, a stand-alone entity with acknowledgement given to the stakeholders for its existence.

Programme Board

An overall Programme Board has been established for all of the City-Region Deal projects which reports to the Highland Council's Planning, Development and Infrastructure Committee, and to the Highland Community Planning Partnership.

5.2 Key Project Dates and Milestones

Appendix 5 contains the current project plan.

5.3 Project Methodology

Tailored Prince2 will be used in the management of the initiative and support provided by the City Region Deal Programme Manager.

5.4 Risks - Analysis, Prevention, Management and Monitoring

A Risk Register will be held for the entirety of the SSA, and categories for reporting and other purposes are as below:

Table 6 Risk analysis

Risk description	Category	Impact	Probability	Mitigation
Academy activities seen as providing duplicating or competing activities rather than complementary to those of other stakeholders	Technical	High	Medium	Close liaison between major partners, especially UHI STEM team and SDS. Project board and Leadership Board contain representatives from all stakeholders.
Academy seen as centred on Inverness.	Stakeholder	Medium	Medium	Activity is evenly spread across the region with equality of access a fundamental principle.
Lack of engagement with schools	Stakeholder	Medium	Medium	Continuous efforts are made to ensure activities help schools in the delivery of the curriculum and augment their resources & capacity
Lack of engagement with employers	Stakeholder	Medium	Medium	Contact with employers is through regional DYW groups in the first instance
Lack of engagement with young people	Stakeholder	High	Low	The delivery of activities is designed to be relevant and exciting. The issue of gender balance will be a particular focus.
Inability to attract industrial sponsorship (for post City Deal delivery	Financial	High	Medium	Prioritise prospectus. Engage early with DYW groups. Promote benefits. Provide strong evidence of success. Target key sectors.
Partners disengage	Stakeholder	High	Medium	Ensure SSA is fully representative of regional partners interests, and maintain buy in from Scottish/UK partners

A detailed risk analysis will be presented to the project delivery group, and a Risk Register maintained during the life of the project.

5.5 Sustainability

The business plan is based on a model that ensures income and expenditure are both at sustainable levels beyond the life of project funding through mainstreaming activity into the curriculum and long term support from employers.

APPENDIX 1

Newton Rooms

NEWTON ROOMS

The Newton Room concept has been developed over many years by an organisation in Norway called FIRST Scandinavia in collaboration with people from schools and businesses. The concept is also based on the experience gained over several years through the development and operation of the FIRST LEGO League in Scandinavia. There are now 29 Newton Rooms in Norway and more are in the planning stage.

Through building some local initiatives and building networks they have created new education locations for natural sciences and technology. Newton Rooms are a common resource centre for schools in each region through teachers, space and equipment.

The purpose of the Newton-Rooms, is to give children and young people good learning experiences with science, mathematics and technology. This happens through the teaching which focuses on learning through practical activities in a stimulating and hands-on approach within a "researcher environment".

What is a Newton-Room?

A Newton-Room is a convenient, excitingly decorated, and technologically well-equipped teaching space, with a focus on Science, math and technology. Each Room has one or more Newton-teacher affiliated with the venue. With a range of equipment, from simple to advanced, the Newton-teacher teaches visiting classes, in a given Newton-module that lasts from three hours to two school days.

The design and function will vary from place to place but it is recommended that a Newton-Room is at least 150 m2, with the facility as a single laboratory, with a small amphitheatre as well as areas to undertake practical and exploratory tasks – hands-on. A Newton-Room is likely to be in a school or in centrally located premises in a municipality. In some cases, Newton-rooms are established with others who want to promote the science. Newton-Rooms can also be used to great advantage in science related activities in the evenings, on weekends and holidays.

Teaching in Newton-Rooms

A Newton-teacher leads the class through theory and practical activities. All teaching is curriculum-based, and should be a part of the Norwegian school, not an addition to. Educational design that is used are called the Newton-modules.

A Newton-module is documented and described in its entirety, and is made up of research performed at the school, practical activities and lessons in Newton-Rooms, and ends with after-work at the school.

It is a goal that the implementation of a Newton-module requires equipment and methodology that challenges students to work hands-on in an exploratory manner, and that the method adds weight to get students engaged and to explore, explain and elaborate on the subjects. An Important point is that practical activities should have a theoretical/oral introduction, and that practical activities should have a summary (what we have learned?).

Each visiting class will be accompanied by their usual class teacher who will act as support during the visit. In the course of the day(s) they will help pupils and students with practical activities and get a "hands on" experience that might otherwise be difficult to achieve in an ordinary classroom.

Newton-Room-a common resource centre

A Newton-Room will function as a common resource centre in the field of real professional teaching for schools in a region. Newton-Rooms will be able to help focus on experience-based learning in science and the importance of high quality teaching.

Through delivering activities that are beyond the schools current capability, Newton-Rooms help to raise the public's interest and understanding of science. Last but not least; It can be a venue for continuing education and inspiration, both for established teachers and teaching students.

Ownership and operation of Newton-Rooms

Newton-Rooms are owned and operated locally by municipalities, county councils and business. This ensures continuity in the operation and use of the room. There is no standard operating model, rather several examples of good practice, which reflect local industry and research interests.

http://firstscandinavia.datasenter.no/index.php?option=com_content&view=article&id=16&Itemid=14&lang=en

An example of a week in the life of a Newton Room

This is a worked up example of what might be delivered in a Newton Room based on discussions that have been held in Thurso.

	Morning	Afternoon	After/school/evening
Monday	**Newton module** - renewable energy engineering. S2, Wick High School		**CREST club**
Tuesday	**My World of Work live** - Facilitated by SDS	**Webcast:** "Plastics in the marine environment" for Higher Chemistry students. Delivered by PhD student, ERI	**Movie making on your mobile phone** - for local businesses, delivered remotely by #hellodigital
Wednesday	**Newton module** - Salmon life cycle. P7 Halkirk Primary students.		**SSERC Primary teacher mentor scheme** - mentor support session
Thursday	**Advanced Higher Biology practical workshop** - Fish proteomics - for AH students from Thurso, Wick, Dornoch and Farr		**Codeclub/ Coderdojo - for Primary students**. Delivery by Thurso S5/6 students for D of E award, supervised by Codeclub volunteer

Friday	**“Cookalong science”** for UHI PGDE Primary students	**Development/ Maintenance/Preparation time**	**Bloodhound rocket car challenge** - for S1 -3.
Saturday	**Girl Guides scientist badge**		

APPENDIX 2

Travel times to potential SSA venues for school students

Secondary school	P6	P7	S1	S2	Total	Travel time to potential Newton Room site (minutes)
Easter Ross schools						Travel time from Alness
Alness	96	83	66	77	322	0
Dingwall	166	168	182	186	702	16
Invergordon	55	44	58	76	233	8
Tain	94	81	93	84	352	19
Dornoch	33	31	37	27	128	28
Golspie	45	44	34	50	173	40
Fortrose	101	109	100	115	425	33
Total					2335	
Caithness/ Sutherland schools						Travel time from Thurso
Farr	7	19	10	16	52	46
Thurso	133	135	130	130	528	0
Wick	130	116	139	114	499	29
Total					1079	
Lochaber schools						Travel time from Fort William
Ardnamurchan	31	31	31	31	124	58
Kinlochleven	23	27	27	25	102	37
Kilchuimen	12	9	5	5	31	48
Lochaber	149	173	156	122	600	5
Mallaig	18	20	22	19	79	60
Total					936	
Skye/ Wester Ross schools						Travel time from Gairloch
Gairloch	21	22	25	24	92	3
Kinlochbervie	6	12	11	11	40	167
Plockton	45	41	44	42	172	95
Portree	89	123	92	89	393	151
Ullapool	30	38	31	42	141	81

Total					838	
Inverness and South schools						Travel time from Inverness
Charleston	136	113	119	120	488	15
Culloden	176	167	201	174	718	10
Glenurquhart	25	37	38	40	140	34
Inverness High	132	154	96	94	476	12
Inverness Royal	179	189	178	170	716	9
Kingussie	75	85	67	63	290	52
Millburn	203	205	195	200	803	8
Grantown	36	40	63	65	204	48
Nairn	126	134	122	125	507	23
Total					4342	

The figures in the table above outline the initial target market of around 9,500 school children across the Highland Region in the age groups between P6 and S2. The travel times are important as this makes the Science Skills Academy genuinely accessible for pupils in more remote locations.

APPENDIX 3

Project plan

Science Skills Academy Project Plan as at July 2016

Topic	Objective	Lead	Progress summary	
Leadership and Governance				
LG1 Establish a Leadership Group to lead the creation of the Academy	The LG should include: : University of the Highlands and Islands : The Highland Council · Highlands and Islands Enterprise · Skills Development Scotland · NHS Highland · 3 Employers from the private sector · Scottish Funding Council · Scottish Council Development and Industry The LG should consist of both women & men.	**THC**	The Leadership Board is in place. and includes private sector and local authority representation.	
LG2 Ensure clarity of purpose	Review and confirm the vision, purpose, objectives and roles of the Academy as proposed in the Rocket Science report of April 2014. When confirmed, these should form the heart of the business planning process for 2015-2018.	**L** **B**	The vision statement has been agreed and the Mission and objectives of the Science Skills Academy are being used in the preparation of the Business Case.	
LG3 Create name for initiative	Agree name for programme which reflects its nature and aim	**L** **B**	The agreed name for the programme is the Science Skills Academy.	

LG4 Ensuring a Highlands and Islands wide effort	Invite each of the local authorities in the Highlands and Islands to join the LB.	**LB**	Highland Council, Orkney Isles Council and Moray Council are represented on Leadership Board. Western Isles Council has elected to await developments.	Repr Shetl Argyl follow
LG5 Appointment of Chair of LG	The members of the LB should appoint one of their number, or an independent person, to chair the Group	**LB**	Cllr Audrey Sinclair agreed as Chair of the LB at meeting in December.	
LG6 Support for short term implementation	Recruit an Interim Project Management Team, accountable to the LB, to take forward the work to create the Academy until executive leadership can be appointed	**LB**	Project Board has been established and meets bimonthly to review progress and discuss developments and discuss the direction of the Science Skills Academy	
Finance and Investment				

FI1 Creating a Business Plan	Commission the development of a 3-year Business Plan to enable 3-year funding investments to be secured from April 2015.	**PB**	Frontline Consulting were appointed in May 2016.	An ou for th cial y prepa July 2 case gion plete and i the fu the e comp
FI2 Initial Prospectus for the Academy	Commission the creation of a compelling story / prospectus about the significance of the Academy to the future of the economy of the Highlands and Islands and to the young people and workforce of the region; publish it online and hard-copy to create engagement tools with young people, schools, colleges, parents, ambassadors, (employers and future partners.	**PB**	Presentations for employers, partners and supporters are being prepared. A suite of preliminary activities is planned that will illustrate the Science Skills Academy's approach to fulfilling its objectives.	An in tion c activi deve ence will p the p ness will ta ketin Scier

FI3 Attracting investment	Create a Development Budget for the Academy; seek initial investment from member organisations of the Leadership Board and from other public, private and philanthropic sources; seek secondees from founders and partners to build interim capability.	**PB**	• City deal funding application is progressing • Sources of European funding are being investigated. • Third sector funding is being investigated. • A co-ordinated approach to individual private enterprises is being developed.	
Partnership building and engagement				
P1 Create accessible database of available resources for teachers and parents	Build a data-base of the STEMD resources, activities, facilities, investments and partners currently available in the Highlands and Islands, and across Scotland, building on Rocket Science	**PB**	Mapping of STEMD activity in the region against Science Skills Academy objectives has been completed. Contact has been made with most activity providers and key individuals identified.	ing

P3 Engaging with young people to gain their insights and experience	Ensuring that the voice of young people can be drawn on in developing actions and the Business Plan. Commissioning a collaborative research project about young people's attitudes, hopes, fears, aspirations and awareness of jobs and possible futures. Designed to create clear comparisons with HIE's major study from 2008.On line and workshops in schools and colleges across the Highlands and Islands region.	**THC/UHI/HIE**	HIE's report "Young People and the Highlands and Islands: Attitudes and Aspirations Research" was published in 2015 and used to inform the development of the Science Skills Academy	Youn tion a Scien preli be us evolu Their will b forma Acad - for i sign layou
P4 Building relationships and widening involvement with employers	Build relationships and potential partnerships with businesses and other employers in the STEMD sectors to seek their engagement, and that of their employees, in the work of the Academy	**PB/ HIE**	Constructive discussions with several businesses have taken place and there is a realistic prospect of financial backing. A coordinated approach is being developed.	PD busi ness via i grou strea
P5 Building relationships with schools	With the support of each of the local authorities, build relationships and potential partnerships with primary and secondary schools to gain insights into their current resources and challenges, and their ideas about how the work of the Academy could help them deepen and enrich their STEMD offer	**THC and other LAs**	Activities involving several schools are planned or taking place. These are designed to engage & bring schools on board at an early stage of the SSA. LA contacts have been established and developed.	Ong

Identifying key delivery part-nerships	Build relationships with organisations beyond Highland that may become partners in the work of the SSA eg Glasgow and Dundee Science Centres, Office of the Chief Science Adviser in Scottish Gov, the STEM Ed Committee for Scotland, and Education Scotland. Also, resources at UK level relevant to the work of SSA, such as STEM Am-bassadors, the OU ('My Digital Life' teaching resource pack for schools), e-Skills UK, and the investment pro-grammes of the TSB	PD	Key delivery partnerships have been identified and developed. Of particular significance are the UHI STEM team, SSERC, Education Scotland, Barefoot CAS, My World of Work live and the Energy SkillsPartnership.	Ong
A4 City Centre Hub	Development of a city Centre base that acted as an exhibition/My WoW facility which was seen as an generic introduc-tion centre to science and other skills and was complementary to the SSA	**SDS**	from August 2016.	Clos with plen cont
Evaluation				
E1 Preliminary ac-tivity evaluation	Independently evaluate impact of pre-liminary activities to inform the devel-opment of the Science Skills Academy programme	PB		Com dep tion

E2 Science Skills Academy evaluation	Make the Science Skills Academy the subject of a formal academic evaluation to inform its future development and identify best practice in achieving objectives.	PB	Iden aca tions have taken place.

APPENDIX 4

Measuring objectives

The following table sets out potential measures that will provide evidence of the success or otherwise of the Science Skills Academy project, and suggests sources of information.

Objective	**Suggested quantitative measure**	**Data sources**
1. to increase the proportion of young people engaged in science, technology, engineering and digital creativity, raise their levels of attainment in these disciplines and to allow them to pursue their interest into a fulfilling career;	Long term study measuring: • proportion of young people studying STEMD disciplines • Numbers of STEMD awards • analysis of SCQF levels of study • using 'insight' data to analyse attainment; • also PISA scores of attainment in maths and science (if these can be narrowed down to H and I) • Numbers of unfilled STEMD vacancies	• Education Scotland 'insight' • Local authorities/ • HIE • SDS • OECD (PISA)
2. to raise the awareness of pupils, parents, carers and teachers about the current and expected availability and appeal of science, technology, engineering and digital media related careers	• Uptake of SDS My World of Work website • Questionnaires to school students, pupil support teachers and parents	• SDS • Science Skills Academy study
3. to develop new forms of delivery, integrating school, further education and higher education provision to meet the needs of employers, and to ensure equality of access that is irrespective of geographical location;	Maintenance or enhancement of curricular provision in remote and rural locations. • Assess breadth of STEMD curriculum in remote and rural schools. • Assessment of growth of STEMD related curriculum in UHI	Local authorities
4. to fully engage employers, communities, parents, carers and teachers in this task;		DYW groups
5. to co-ordinate and extend the reach of current activities promoting young people's engagement with science, technology, engineering and digital media and to enhance the use, reach and impact of current support and resources;	Monitor STEM ambassador activity: • Assess numbers of active ambassadors • Assess numbers of engagements and weight according to quality and impact. • Monitor all areas to ensure full coverage (via GIS map?)	UHI STEM team

6. to transform the scale and nature of investment in the task through developing regional, Scottish, UK and international partnerships;	Report on the partnerships that are developed and, quantify financial and in kind support:	Science Skills Academy study
7. to identify and respond to barriers and gaps that may exist in support and resources to encourage young people's engagement	Construct Geographical Information System to map engagement of young people with Science Skills Academy programme across the region.	Science Skills Academy study

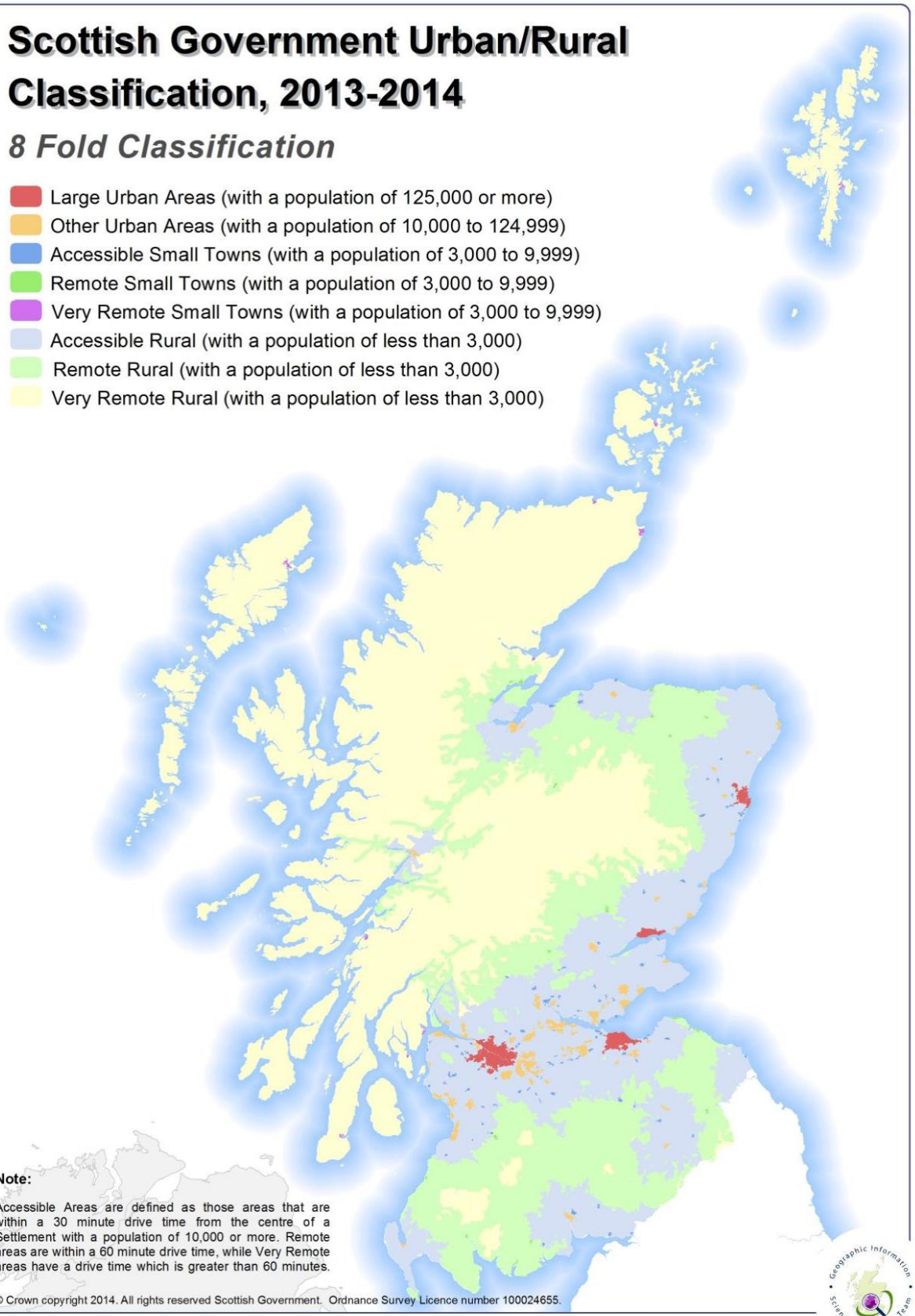
Appendix 5

Scottish Government Rural Classification, 2013-2014

Scottish Government Urban/Rural Classification, 2013-2014

8 Fold Classification

- Large Urban Areas (with a population of 125,000 or more)
- Other Urban Areas (with a population of 10,000 to 124,999)
- Accessible Small Towns (with a population of 3,000 to 9,999)
- Remote Small Towns (with a population of 3,000 to 9,999)
- Very Remote Small Towns (with a population of 3,000 to 9,999)
- Accessible Rural (with a population of less than 3,000)
- Remote Rural (with a population of less than 3,000)
- Very Remote Rural (with a population of less than 3,000)



Note:

Accessible Areas are defined as those areas that are within a 30 minute drive time from the centre of a Settlement with a population of 10,000 or more. Remote areas are within a 60 minute drive time, while Very Remote areas have a drive time which is greater than 60 minutes.

Scottish Government GI Science & Analysis Team, October 2014, Job 5547aj