PROOF OF CONCEPT PROGRAMME
PHASE II

INTERIM EVALUATION – FINAL REPORT

April 2014

MC/Invest NI/Proof of Concept

INVEST NI

PROOF OF CONCEPT PROGRAMME PHASE II

INTERIM EVALUATION – FINAL REPORT

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INTERIM EVALUATION

GLOSSARY OF TERMS

AFBI	Agri-Food and Biosciences Institute
BERR	Business, Enterprise and Regulatory Reform
CF	Commercialisation Fund (ROI)
CFF	Commercialisation Feasibility Fund (ROI)
CO	Commercialisation Office
DEL	Department of Employment & Learning
DETI	Department of Enterprise, Trade & Investment
EI	Enterprise Ireland
GIAp	Global Innovation Advisors Programme
HEIF	Higher Education Innovation Fund
IP	Intellectual Property
IUL	Innovation Ulster Ltd
LOO	Letter of Offer
PfG	Programme for Government
PI	Principal Investigator
PoC	Proof of Concept
PoP	Proof of Principle
QUB	Queens University Belfast
REF	Research Excellence Framework
RIS	Regional Innovation Strategy
ROI	Republic of Ireland
SE	Scottish Enterprise
SFI	Science Foundation Ireland
TRL	Technology Readiness Level
Ulster	University of Ulster
VFM	Value for Money

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PROOF OF CONCEPT PROGRAMME PHASE II

INTERIM EVALUATION

DEFINITIONS

Direct Income	Turnover from a spin-out, licencing income and commercial income from an industrial partner for contract research
Follow on funds	Grants, other Research Funds awarded; Research Organisation funding; internal (QUBIS/IUL) and external investment.
Financial Outcomes	Direct Income plus Follow on Funds
Investment	Equity investment for the Research Organisation (QUBIS/IUL) and/or external investment from business angels and institutional funds

EXECUTIVE SUMMARY

1. Introduction

Invest NI commissioned BDO[1] to undertake an Interim Evaluation of the Phase II Proof of Concept (PoC) programme. The study comprises three elements, as per the Terms of Reference:

1. A longitudinal analysis of the impacts of the PoC programme since it was launched in 2003[2] to determine value for money to date;
2. An Interim evaluation of Phase II of the PoC programme covering the period September 2012 to May 2013; and
3. A review of the monitoring and evaluation (M&E) framework for the PoC programme.

The PoC programme was established by Invest NI to support the pre-commercialisation of leading edge technologies emerging from Northern Ireland's Research Organisations[3]. The financial assistance provided by the PoC programme helps researchers to export their ideas and inventions from the laboratory to the global market.

The first call for Phase II projects closed in September 2012. 67 awards have been made, with Phase II now considered to be complete, with funding allocated of £6.982 million. Phase II projects are generally at an early stage and have not yet achieved any commercial outcomes.

This Interim Evaluation of Phase II seeks to provide qualitative and quantitative information on current and projected performance that will help inform decisions on improvements to the current PoC programme and the future of the programme (i.e. a potential Phase III PoC Programme). The Interim Evaluation also focuses on assessing the outcomes, value for money and wider economic benefits gained from the delivery of the Pilot and Phase I PoC programme. The Phase II PoC programme is not yet at a stage to determine outcomes; as such this Interim Evaluation of Phase II is focused on processes rather than outcomes.

The Interim Evaluation was conducted in the context of it being recognised that there was a lengthy gestation period between the completion of a PoC project and the creation of a potential spin-out company or revenue stream (through licence income) for the Research Organisation. It was however noted that levels of revenue, if and when derived, would typically be significant.

[1] BDO is supported by partners Capaxo Ltd and Morrow Gilchrist Associates
[2] The Pilot PoC programme commenced in 2003 and Phase I commenced in 2008
[3] The Phase II PoC programme funds applications Queens University Belfast (QUB), the University of Ulster (Ulster), the Agri-Food and Biosciences Institute (AFBI) and the Department of Health and Social Services' sponsored HSC Innovations (HSC).

The review of commercial success to date in the Pilot and Phase I programmes indicates that the Research Organisations have still some distance to travel to demonstrate that their commercialisation activities are properly focused and that the potential for benefit for the NI economy is being maximised. Nonetheless, progress is being demonstrated.

In term of PoC's strategic fit to government policy, the importance of innovation and commercialisation of the public sector funded research base is recognised at a UK and international level as a means to increasing competitiveness, employment and business growth. The PoC programme is critical as a basis of funding such activity in NI, with there considered to be minimal duplication with/displacement of other programmes/activity operating in NI/UK.

Notwithstanding this, PoC is a high risk initiative, taking early stage research and seeking to identify its commercial potential. This risk is likely to have increased by the high number of Life & Health Science (L&HS) projects funded under all PoC funding rounds, typically requiring high levels of funding prior to commercialisation.

The assessment of the processes adopted for Phase II suggests that there is positive endorsement for the changes introduced in Phase II, including the additional funding (through PoC Plus and Sequential funding), and the introduction of commercialisation mentors. Recommendations on improvements to the PoC programme are set out in paragraph 3 below.

2. Benchmarking

Benchmarking was undertaken against the PoC programmes as delivered by Scottish Enterprise (SE) and Enterprise Ireland (EI).

Firstly, in terms of delivery, both SE and EI have delivered jobs and leveraged investment, against a backdrop of significant commercialisation support.

SE and EI have sought to set out their definition of a successful project, either a spin-out or a licence to a locally based company, or the progress on the commercialisation journey as evidenced by significant investment in the project. Their timescales for delivery against such targets differs – SE is seeking evidence of substantial progress some five years post the project completion, whilst EI is seeking an outcome some 2-5 years. It is noted that the SE current model is significantly different to Invest NI's, with a small number of projects being supported with substantial investment in finance and resources. Discussions with both SE and EI would indicate that these are indicative targets only, giving rise to significant variations, and have not yet been evaluated. Nonetheless, the expectation is that any project funded could lead to a significant economic impact. Moreover, EI note that the requirement for a licence to a ROI company is not enforced; equally EI (and

SE) would expect to have good oversight of project's progression and thus assessment for local licencing opportunities.

NI differs in that the opportunity for licencing to NI companies is very low. There may however be an opportunity for Invest NI to better define the impact that it is seeking.

Linked to this would be the ability of Invest NI to have more direct involvement in the commercialisation process, and indeed to have a monitoring process in place, whereby action can be taken by Invest NI in respect of projects which are not progressing in line with targets. This may require additional Invest NI resources.

Other points of learning from SE and EI are:

- For Invest NI to consider a two prong approach to the application stage with an application to conduct a Market Feasibility study prior to the full application to PoC. This could be incorporated into the Proof of Principle model which operates on an intermittent basis within QUB and Ulster. This should lead to more robust projects being prepared and selected rather than a reduction in the number of projects selected, recognizing that government should resist attempts to "pick winners" and should support a broad range of projects.
- For Invest NI to provide a wraparound service, with a fuller complement of services, including expertise and networks, to PoC projects, this to be provided on a uniform basis or to projects showing strong commercial potential;
- There should be more detailed monitoring of PoC projects, with data to be provided for up to 13 years post completion; and
- There should continue to be higher levels of funding available for worthy projects, where such spend is justified, including for the commercialisation process.

3. Value for Money Assessment

The Terms of Reference for the Interim Evaluation specify the requirement to consider the economic impact and Value for Money (VFM) per phase of PoC. This Interim Evaluation considers the quantifiable economic impacts arising from the Pilot and Phase I, as well as wider and regional benefits. A summary of the current success rate of the Pilot and Phase I PoC programmes is set out in Table 1:

Table 1: 'Current' Success Rate of Pilot and Phase I Funded PoC Projects in Achieving Positive Outcomes			
PoC Projects reporting success	**Pilot**	**Phase I**	**Number**
Period funding awarded	**2003-2005**	**2008-2010**	
Spin out	8	14	22
Licence – ongoing	3	3	6
Licence – abandoned	4	1	5
Option to licence	0	2	2
Commercial income	9	13	22
Follow on funding	10	29	39
Employment	26	16	42
Any Positive result	15	34	49
Total Pilot and Phase I Projects	**40**	**65**	**105**
% Achieving Positive Outcomes	**38%**	**52%**	**47%**

Table 2 sets out the monetary achievements from the Pilot and Phase I:

Table 2: Gross Monetary Impacts (Direct income) Arising from Pilot and PoC I (To Date)					
	Licencing Income (£)	**Turnover from Spin Out Companies (£)**	**Income From Commercial Partners (£)**	**Total (£)**	**Spend on PoC**
Pilot	£62,567	£1,820,982	£1,264,595	£3,148,144	£4,598,079
Phase I	£31,000	£688,067	£2,594,000	£3,313,067	£4,767,397

For reasons detailed more fully in the main report, a VFM assessment is only considered in relation to Phase I of PoC[4].

Phase I does not yet demonstrate a positive return on investment and therefore, at this point in time, does not demonstrate VFM. However the majority of projects are still very early in their commercialisation journey and the evidence captured within this Interim Evaluation suggests that a timeline to 2025 is required as the trajectory to assess all of the impacts from the overall portfolio of Phase I funded projects. The Russell Group has further indicated that the typical timeframe from research to a successful spin out is around 17 years.

It is not possible to robustly project future economic impacts from Phase I funded projects and therefore, at this point, to give a definitive view as to whether, in 2025, that VFM will be achieved. The analysis within this Interim Evaluation has indicated that the majority of Phase I projects remain 'live prospects' for commercialisation, and clearly a strong

[4] The Research Organisations have noted the poorer quality projects promoted in the Pilot PoC programme, the lack of resources in QUB and Ulster prior to the introduction of HEIF in 2004/5, and the lack of dedicated commerialisation funds in the Pilot phase. In considering the commercial success to date, the Evaluation Team would agree that the selection process for the Pilot PoC programme was not sufficiently robust. This is further evidenced by the fact that there is no evidence of a positive return of investment on the Pilot; specifically the current ratio of net GVA / cost of the Pilot phase is £1: £0.15. Considering that the Pilot phase started over ten years ago (in 2003) the investment cannot be viewed as value-for-money, and is highly unlikely to deliver a positive return on investment in future. For these reasons the Pilot phase is not a reliable evidence base on VFM of the PoC model and has not been considered further within the conclusion on VFM in this report.

performance by only one or two of these could skew the headline results into a positive return on investment. Therefore a straightforward linear projection of headline economic impact/ GVA now to a 2025 position is not appropriate. However, if there is the requisite focus on the commercialisation road maps/ action planning for all of the Phase I projects, (as per Recommendation 2 below), there remains reasonable prospects that VFM will be achieved.

At this stage, it is appropriate to conclude that there is sufficient evidence of market failure and potential for VFM to support the strategic rationale for a future PoC programme. A range of options have been developed on the scale of the PoC programme going forward, to be determined during the Economic Appraisal process.

4. Conclusion

The overall recommendation is that there is a rationale for the PoC programme continuing, but its operation needs to change so that government can be given a greater degree of comfort that PoC will deliver VFM over a shorter time- frame. This is all the more pressing given future public expenditure pressures, particularly for a scheme where the evaluation concludes that VFM has not been proven.

Changes to the operation of the scheme would involve Invest NI taking a more proactive role in the commercialisation process – (moving from monitoring to partnering, with rights) as is the case with Scotland and, to lesser extent, ROI.

5. Recommendations

Overall

Recommendation 1: Invest NI should continue with the PoC programme, at a scale based upon the findings of an Economic Appraisal. This should benchmark the trajectory for commercialisation at an international level. The Economic Appraisal should include a staff resourcing comparison with the benchmarked programmes at SE and EI. Invest NI should also ensure that there is a timely evaluation and appraisal/approval process between each Phase of the PoC programme.

Strategic

Recommendation 2: RoadMap to Commercialisation: The Research Organisations should conduct a review of all active[5] PoC projects (and consider if this should exclude "performing" spin-outs) and prepare a commercialisation road map for each. This should be reviewed by Invest NI.

[5] "Active projects" being projects with successfully completed technology phase and market opportunities not fully explored

Invest NI should be more directly involved in the commercialisation process and have a mechanism to introduce an arbitrator where disputes on the approach to commercialisation arise. These may require additional Invest NI resources.

Recommendation 3: Marketing: The Research Organisations and Invest NI should consider the mechanism by which a process can be introduced for the marketing of all technically successful PoC projects and their results. This should include the use of programmes such as VITAL to market PoC projects.

Recommendation 4: Revision of targets: The original targets for the Pilot and Phase I PoC need to be 'recast' to be consistent with assumptions applied in the Phase II Economic Appraisal on the percentage that will commercialise (i.e. licence or spin-out) and the timescale for the same, and as follows:

Table 3: Revised Targets	
Programme	**Revised target**
Pilot and Phase I	43% of funded projects to achieve either a spin-out or a licence, with the timeline to achieve outcomes being as per the Phase II PoC economic appraisal
Phase II	PoC Phase II targets should be redefined to include all aspects of direct income as well as follow on funding.

Recommendation 5: Assessment of Regional Benefits: There should be greater weighting given, in the Invest NI scoring mechanism, to the opportunity to generate regional impacts, with the requirement for the identification in the application form of potential NI licencing partners, and when a spin out is noted as a viable options, an assessment of the level of further testing, and associated future development costs and funding, plus an assessment of skill base, that would make the creation of a spin out company a viable and feasible option.

Recommendation 6: Monitoring: A Monitoring and Evaluation Framework has been developed and should be agreed and implemented. This will require a technology led data collection process.

Recommendation 7: Proof Of Principle: There should be a two stage approach to PoC, initially through a £10-£15,000 Proof of Principle (PoP) grant scheme, which would be awarded by Invest NI, with the funding criteria to include an independent endorsement of the market opportunity by the Research Organisations. The number of PoP awards made annually will need to be agreed with Invest NI and exceed the proposed number of PoC awards, to allow for a conversion rate of say 80% (to be determined in any subsequent Economic Appraisal.

Recommendation 8: DEL: Invest NI should engage more closely with DEL in relation to HEIF funding to ensure that the adequate support of PoC projects is a condition of HEIF funding and that HEIF targets are reviewed by DEL in light of the substantial PoC support provided by Invest NI.). Invest NI may wish to engage with DEL to determine the extent to which PoP does/should form part of HEIF funding.

Recommendation 9: Invest NI Wraparound support: Invest NI should consider the full range of support that it can provide to PoC projects achieving their technical objectives, including the opportunity to support projects at application stage and the opportunity to avail of the proposed Accelerator programme, Propel, sectoral support, networks etc. This wraparound support should commence immediately. It is further recommended that that the new NISPO programme proactively engages with PoC projects and sets out the roadmap required for each project to secure NISPO funding.

Recommendation 10: Separate L&HS programme: consideration should be given in the Economic Appraisal to having a separate L&HS strand to the PoC programme with different targets/timescales associated. Invest NI should also consider the commercialisation support offered to L&HS projects and to address any gaps arising since the GIAp ended.

Recommendation 11: Prioritisation of Projects by Research Organisations; Invest NI should ensure that the Research Organisations fully screen and prioritise good quality projects before submission of PoC projects to Invest NI.

Operational

Recommendation 12: Levels of Support: Consideration should be given in any future PoC programme to the overall level of funding for PoC projects, including for salaries and commercialisation activities, and in particular to ensure that Research Organisation have the funding available to offer salaries at competitive rates.

Recommendations 13: Targets for Drawdown: There should be targets for the drawdown of commercialisation funds written into LoOs (say 75% by month 18 – to be assessed during any Economic Appraisal process).

Recommendation 14: The Appraisal Process: The existing appraisal and communication arrangements should be augmented:

- The PoC Panel members should be reviewed and extended to maximise access to expertise, with ongoing engagement with MATRIX panel members, venture capitalists (particularly those delivering on Invest NI's Fund of Funds), business leaders and Invest NI sectoral teams, and consideration of off-line review by industry experts where niche areas are being considered.

- Invest NI should constantly monitor its marketing appraisal framework and ensure that all relevant areas are being covered.

Recommendation 15: Claims Process: Invest NI should ensure that sufficient guidance is issued to the Research Organisations/PIs on eligible commercialisation activities and that the Invest NI's claim process is as straightforward as possible, so as not be act as a barrier to PIs undertaking commercialisation activity.

1 INTRODUCTION AND BACKGROUND

1.1 Introduction

Invest NI commissioned BDO[6] to undertake an evaluation of the Proof of Concept (PoC) programme.

The study comprises three elements, as per the Terms of Reference:

1. A longitudinal analysis of the impacts of the PoC programme since it was launched in 2003 to determine value for money to date;
2. An Interim evaluation of Phase II of the PoC programme covering the period September 2012 to May 2013; and
3. A review of the monitoring and evaluation (M&E) framework for the PoC programme.

This report covers the first two elements. The Monitoring and Evaluation Framework is included in Appendix XV.

The Invest NI PoC programme funds applications from the Research Organisations in Northern Ireland (NI), namely Queens University Belfast (QUB), the University of Ulster (Ulster), the Agri-Food and Biosciences Institute (AFBI) and the Department of Health and Social Services' sponsored HSC Innovations (HSC). The latter two were invited to participate from 2009[7].

This Interim Evaluation of Phase II seeks to provide qualitative and quantitative information on current and projected performance that will help inform decisions on improvements to the current PoC programme and the future of the programme (i.e. a potential Phase III PoC Programme). The Interim Evaluation also focuses on assessing the outcomes, value for money and wider economic benefits gained from the delivery of the Pilot and Phase I PoC programme. The Phase II PoC programme is not yet at a stage to determine outcomes; as such this Interim Evaluation of Phase II is focused on processes rather than outcomes.

1.2 Background to the Proof of Concept Programme

1.2.1 Introduction to the Invest NI Proof of Concept Programme

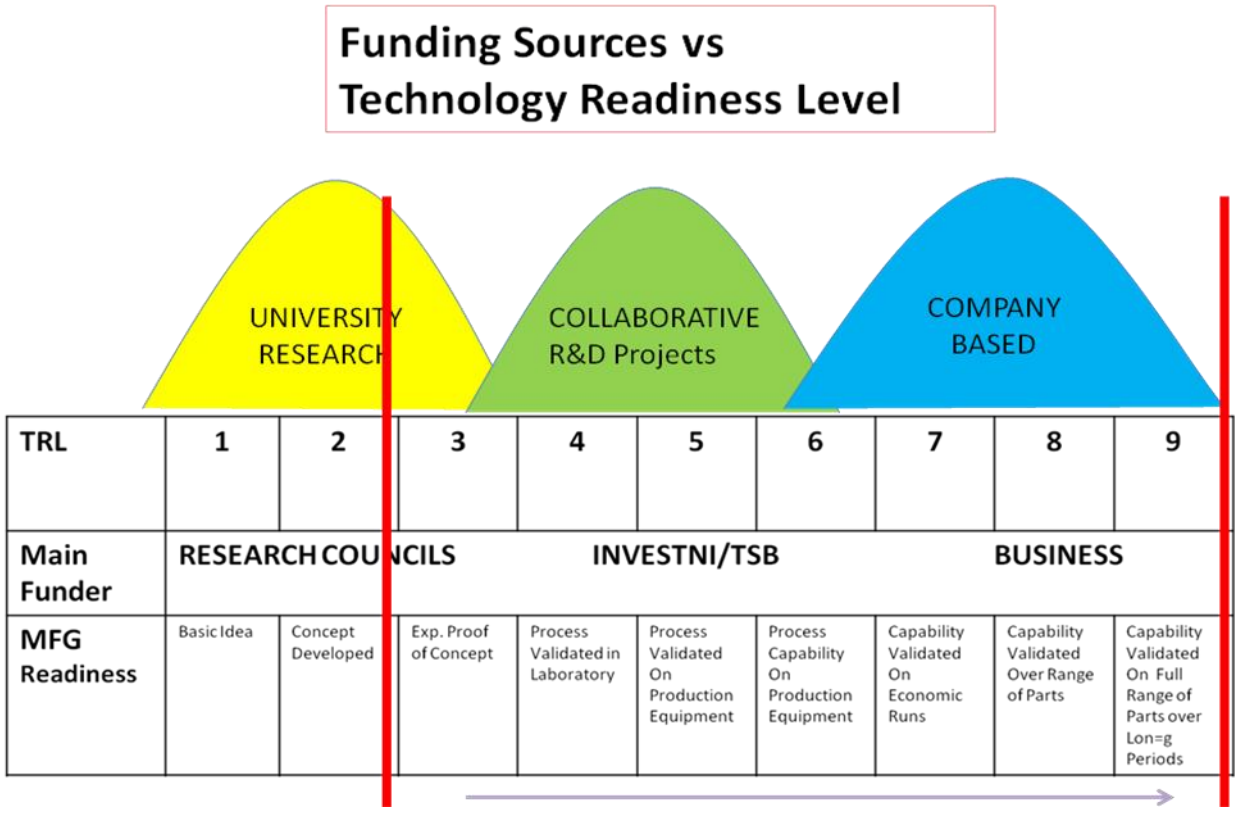
The PoC programme was established by Invest NI to support the pre-commercialisation of leading edge technologies emerging from Northern Ireland's Research Organisations[8]. The financial assistance provided by the

[6] BDO is supported by partners Capaxo Ltd and Morrow Gilchrist Associates
[7] Whilst AFBI and HSC were invited to submit applications in 2009, only AFBI has been successful to date in securing funding under PoC
[8] As noted, the pilot PoC programme and the 2008 call for applications were both restricted to the two Universities and excluded AFBI and HSC

PoC programme helps researchers to export their ideas and inventions from the laboratory to the global market.

The ultimate objective of the PoC programme is to improve the level and quality of commercialisation from within NI's Research Organisations i.e. the successful transfer of technology from academia to industry in the form of new spin-out companies or licence agreements. The programme focuses on a model whereby individuals or small groups work on applied projects to develop an idea through to a stage where a working prototype or demonstrator is produced, thereby proving the initial concept and clarifying a route to commercialisation.

Projects eligible for the PoC programme can therefore be typically defined as occurring after advances made during curiosity-driven or strategic research (i.e. Technology Readiness Levels[9] (TRL) 1 and 2), where the projects have not yet reached full laboratory-scale demonstration (TRL 4) i.e. the PoC programme will support the development of the technology concept to TRL 3/4 - 'Analytical and Experimental Critical Function and/or Characteristic Proof of Concept'. Invest NI has provided an overview of the focus of the PoC programme in the Technology Maturity Process, as per the diagram below. In this context, it should be noted that public sector support to collaborative R&D projects, post PoC, includes other NI (Invest NI), UK (TSB) plus EU (Horizon 2020) interventions.



[9] Technology Readiness Level (TRL) is a measure of the maturity of evolving technologies prior to incorporating that technology into a system or subsystem.

In addition, the focus for the Invest NI PoC programme is on projects with significant commercialisation potential. PoC funding is not to be another source of research funding and should support projects that are considered to be at too early a stage to attract private sector investment. Research Organisations have therefore to demonstrate that their ideas have originality and true commercial potential. Significant commercial potential means that the prospect of sales and profit are to be on a large enough scale to make all the risk generated by the proposed idea worth taking and to be achieved within an acceptable timescale. Overall, the aim is for a spin out company to be formed which will attract outside investors to continue development, or engagement with a third party with the view to signing a licence agreement / joint venture / etc. There is no requirement for a licence agreement to be with a NI company.

A pilot PoC programme was launched in 2003, with Phase I launched in 2008 and Phase II launched in 2012.

1.2.2 Overview of Programme Structure and Content

Key features of the PoC programme over the Pilot, Phase I and Phase II stages are provided in Appendix II.

Invest NI launched the PoC Pilot programme in December 2003, based on the Scottish Enterprise model. The Pilot programme ran from December 2003 to June 2005. Phase I programme commenced in 2008 with calls up to and including 2010.

There are two elements to the Phase II support, namely the technical strand and the commercialisation strand, with maximum funding[10] for each PoC project being:

- Technical strand – maximum funding of £80,000; and
- Commercialisation strand – maximum funding of £26,000.

As per the Economic Appraisal of Phase II, completed in October 2011, the Phase II PoC programme was to be a two year and seven month programme (to March 2014). The programme was approved at DETI Casework Committee in February 2012. Final approval for an estimated 69 PoC projects and £7.7m of spend was granted by DETI in April 2012.

There were 2 calls for applications in 2012 and three in 2013 by September 2013.

[10] Maximum funding subject to PoC Plus and sequential funding

The main changes introduced in Phase II are:

- **The funding period and eligible costs**: Under Phase II, the project's maximum duration has increased from 18 months to 24 months, with the technical strand to run for up to 18 months and the commercialisation strand to run for the full 24 months of the project. There was no separate commercialisation funding under the Pilot programme. Separate commercialisation funds were introduced in Phase I and were meant to be utilised concurrently with the technical strand as per Phase II. This highlighted the importance placed by Invest NI on "commercialisation" rather than pure technology development. In addition to this, a new concept of "commercialisation mentors" was introduced as part of Phase II. A minimum of £6,000 was set aside for payment to commercialisation mentors over the 24 month period, including travel and VAT as applicable. The commercialisation mentor should be in place circa 3 months from the commencement of the project[11]. Overall feedback from the Research Organisations is that the technical strand is more likely to be 12 months, mainly due to the fact that, with the funding for the technical strand restricted to £80k[12], there was rarely an opportunity to fund salary costs beyond one year after consumables and trials etc were taken into account. This is particularly the case given the high proportion of Life & Health Science (L&HS) projects funded, where clinical trials would be deemed to be a costly component of the spend profile. It is noted, however, that of the 67 projects supported under Phase II, the technical strand of 23 of these projects are scheduled to last between 15 to 18 months;

- **Total funding available** - for the majority of PoC Phase II projects, total available funding was £106,000, down from £150,000 in the Pilot PoC but an increase over the £100,000 in Phase I. For projects requiring some additional time and funding to 'prove the concept', PoC Plus was introduced to 'top up' live projects. This top up is restricted to no more than 50% of the original technical budget. Sequential PoC support is available to those projects that from the outset could not 'prove the concept' within the timeframes laid out in the programme. Effectively using a staged process, these 'long term' projects could apply for several funding rounds. This is similar to the Pilot where Invest NI had the right to introduce funding of £250k to a worthy project.

  The main changes introduced in Phase II (commercialisation mentor support, PoC Plus and sequential funding) recognise not only the importance of commercialisation but also that some projects, especially in L&HS, require both longer timescales to prove the concept and secure funding for clinical trials etc;

[11] The Research Organisations have flexibility as to when mentors commence
[12] Maximum funding under the Phase II commercialisation strand was £26k

- **Exclusion of indirect costs**: A further change introduced in Phase II is in relation to the eligibility of indirect costs. For the Pilot and Phase I programme, indirect costs could be funded as eligible costs. For Phase II, and in keeping with the approach adopted by Invest NI for Grant for R&D applications, and the similar PoC programmes run by benchmark regions (Scotland and Ireland), indirect costs are no longer eligible for funding support. Invest NI continues to support directly incurred costs and directly allocated costs within PoC Phase II.

Project target numbers identified for the Phase II PoC programme were determined through analysis of the 2011 PoC Evaluation and consultations by Cogent (the company who carried out the Economic Appraisal of Phase II) with the Research Organisations. Phase II PoC programme targets were set as follows, with the Economic Appraisal assuming that the programme would run from 1 November 2011 to 31st March 2014:

Table 1.1: Phase II Targets

	5 months to 31st March 2012 Awards	Year to 31st March 2013 Awards	Year to 31st March 2014 Awards	Overall Total
Target Applications	28	38	38	104
Target Awards	19	25	25	69

The key assumptions underpinning the Phase II programme, as per the Economic Appraisal, were as follows:

- The Phase II PoC programme would be open to applications from QUB, Ulster, AFBI and HSC;
- The above assumed a conversion rate of 66% (ie based on 104 applications and 69 awards) (comparable to the 67% conversion rate achieved during the Pilot and Phase I);
- It was assumed that there would be a backlog of projects in the first year, due to the gaps in PoC funding between Phase I and Phase II, hence 28 applications were budgeted for the first 5 months and 38 per annum thereafter;
- An Assessment Panel would be put in place for the approval of projects, represented by external and internal members with relevant expertise;
- Based on historical trends, it was assumed that 40% of projects would be L&HS projects. The commercial aspects of these L&HS projects were to be supported under the Invest NI funded Global Innovation Accelerator programme (GIAp)[13];
- The PoC programme would only support projects with commercial potential at TRL 3-4;
- There were to be no thematic or competitive calls for projects;
- It was anticipated that no more than 8-10% of PoC projects (5 or 6 projects) would receive additional PoC Plus support. Projects requiring

[13] Note that GIAp ceased in 2011. Further details are in para 4.3

PoC Plus funding were to brought to the attention of the Invest NI PoC team as soon as possible, with such additional funding to be approved by the Assessment Panel;
- Commercialisation mentors were to be appointed by the Research Organisations, such appointments to meet Invest NI's procurement guidelines;
- The above target of 69 awards under Phase II would include sequential funding awards. Projects requiring sequential funding were brought to Invest NI's attention at the initial application stage, with the expectation being that they were more likely to be L&HS projects; and
- Targets and monitoring requirements are set out in Letters of Offer issued, including the requirement to provide commercial information for post project evaluation purposes.

There were delays in the commencement of the Phase II programme and further delays in uptake and roll out:

- Phase II was to be launched in May 2012. The Research Organisations requested that the PoC Phase II programme was delayed, so as not to clash with examination timetables, with further delays due to extended discussions with regards to eligible expenditure and the removal of indirect costs. The first closing date for applications was therefore 28th September 2012; and
- QUB did not bid for the first funding call, due to its concerns over the removal of indirect costs.

In addition, there was a requirement for the procurement of commercialisation mentors in line with public procurement best practice procedures.[14] Whilst delays in project commencement are generally due to the recruitment process, this dimension did lead to some delays in project rollout. As at January 2014, the PoC procurement process for commercialisation mentors would appear to have been accepted by the Research Organisations.

With respect to the additional components introduced in Phase II, it is too early in the process to determine their effectiveness. It is noted that as at January 2014, there has only been one application for PoC Plus and one for sequential PoC funding.

At February 2014, 67 projects (including one sequential project) have been awarded funding. Subject to further PoC Plus funding being awarded, Phase II is effectively closed in terms of commitments to new projects.

[14] There is a requirement for 3 quotations

1.3 Terms of Reference

The Terms of Reference for the Interim Evaluation of the Phase II PoC programme are as per paragraph 1.1. The rest of this report is set out as follows:

Table 1.2: Programme Activity	
Section	
2	Performance & impact of the Pilot and Phase I PoC Programme (to date)
3	Benchmarking
4	Strategic context and rationale for the Phase II PoC Programme
5	Review of the Phase II PoC Programme activities and processes
6	Conclusions, Looking Forward and Recommendations

The Terms of Reference for the Interim Evaluation specify the requirement to consider the economic impact and VFM of PoC to date. This Interim Evaluation considers the quantifiable economic impacts arising from the Pilot and Phase I, as well as wider and regional benefits.

In the above context, it is important to highlight at the outset the timeline for assessment of the trajectory of monetary and non-monetary benefits arising from PoC funded projects and associated VFM.

The case for Phase II in the economic appraisal was made (and accepted) on the basis that monetary benefits would start to be derived by those projects that commercialise on the sixth year after the completion of the PoC project and that these monetary benefits for the NI economy would be derived over a maximum period of seven years thereafter as a direct result of PoC (after which time any benefits would no longer be attributable to the intervention). Thus, for those projects that do commercialise, a timeline of circa 15 years from commencement of the PoC project to the end point for attribution of monetary benefits is appropriate as a reference point for assessing VFM.

It was also confirmed through discussions with the Research Organisations who, as per their input to previous Interim evaluations, confirmed that there was a lengthy gestation period between completion of a PoC project and the creation of a potential spin-out company or revenue stream for the Research Organisation. It was however noted that levels of revenue, if and when derived, would typically be significant. This assessment is further supported by a paper produced by The Russell Group indicating that the typical timeframe from research to a successful spin out is around 17 years[15]. Only a proportion of the outcomes and impacts from the PoC programme can reasonably be expected to be evident at this point, including benefits from projects supported in the Pilot Phase.

[15] The Economic Impact of Research conducted in Russell Group Universities- Analysis of the Russell Group case studies showed that it took on average a further 8.5 years **after** a licence was granted for revenue generation or in the case of spin-out companies a buy-out or exit. For these case studies, the timescale from research to first realising a commercial return averaged over 17 years.

Details of consultations are included as Appendix I. As part of this Interim Evaluation, BDO also issued electronic surveys to the PIs involved in the Pilot and Phase I PoC programme and the PIs participating in the Phase II PoC programme.

2 PERFORMANCE & IMPACT OF THE PILOT & PHASE I POC PROGRAMME (TO DATE)

2.1 Introduction

This section considers the progress towards the achievement of the commercialisation and related outcome targets for approved PoC projects. Essentially this involved updating the outcomes for Pilot and Phase I projects, and draws on the material included in Appendix VI and X and additional excel spreadsheets supplied to Invest NI in Appendix XII.[16]

The Evaluation Team made every effort to progress the evidence base (relative to that which was available at the time of the primary research for the Interim Evaluation substantially completed in November 2010). Whilst the E-Survey implemented for the evaluation captured a proportion of Pilot and Phase I projects (39 out of a potential 105) the Evaluation Team conducted a series of additional face-to-face meetings with staff from the Commercialisation Offices to ensure that for every PoC project funded through the Pilot and Phase I, that there was an up-to-date position on the status, in respect of commercialisation and related outcomes. As such, there has been 100% coverage of all funded Pilot and Phase I projects in this regard.

2.2 Overview of the Pilot PoC Programme

Set out below is the overview of the performance and impact of the Pilot PoC programme. Of relevance, is the fact that funding for the Commercialisation Offices of QUB and Ulster, under the Higher Education Innovation Fund (HEIF), commenced in Academic Year 2004/5, after the Pilot PoC programme had commenced. Details on HEIF are as per para 4.3, but essentially, HEIF funds the resources within the two Universities to manage the PoC process. QUB and Ulster would therefore contend that the infrastructure to manage the PoC programme was not in place when the Pilot started. This would have hindered the Universities' initial ability to support the commercialisation of projects (with HEIF funding introduced from August 2004).

2.2.1 Activity levels for the Pilot PoC Programme

Overall, there were 40 projects funded in the Pilot stage:

[16] Consideration has been given solely to the actual results to date rather than forecasts of future performance, given the high degree of uncertainty of the latter. A sample of projects with high growth potential have however been highlighted

Table 2.1: Pilot PoC awards (Dec 2003 to June 2005)			
	QUB Awards	Ulster Awards	Overall Total
PoC Applications	28	25	53
PoC Awards	24	16	40
% total	86%	64%	75%

A total of 53 applications were made by the Research Organisations to the PoC Pilot programme, with a conversion rate of 75%. Actual spend was £4.6m approximately against funding awarded of £5.2m, with an underspend of 12%:

Table 2.2: Actual Spend				
Spend	Budget	Actual	Variance	% variance
Pilot	£5,209,691	£4,598,079	£611,612	12%

Sectoral focus of projects

The sectoral profile of the projects receiving funding under the Pilot PoC programme was as follows:

Table 2.3: Pilot: Sectoral analysis of projects funded				
	QUB	Ulster	Total £	%
Advanced Engineering	2	-	2	5%
Advanced Materials	5	7	12	30%
Agri Food	3	1	4	10%
ICT	3	2	5	13%
Life & Health Sciences	7	6	13	33%
Sustainable Energy	1	-	1	3%
Telecommunications	3	-	3	8%
Total	**24**	**16**	**40**	**100%**

Of the total number of Pilot projects funded, 33% were L&HS projects.

2.2.2 Overview of the Outcomes from the Pilot PoC Programme

The outcomes from the 40 awards from the Pilot PoC programme are summarised below, covering the period from PoC funding being awarded to the end of 2013:

- There were 8 spin-outs, of which 6 are directly attributed to the PoC project and 2 projects (PoC 1 and BE1) are attributed to subsequent research emulating from the PoC project. Of the 8 spin-outs, only 3 have generated direct income[17] in excess of £250,000 (the target for an Invest NI client company);
- 26 jobs have been created across 3 spin-outs, with 21 of these jobs being in NI;

[17] Direct income is defined as turnover from a spin-out, licence income and/or commercial income from an industrial partner

- Within the Pilot, there are 3 current licences, with one generating licence income of £62k to date (and no income being generated from the other two licences);
- None of the current licences are to NI companies;
- 4 PoC projects have had licences that have been abandoned; and
- 15 projects are considered to have had a positive outcome with 5 considered to have some future potential and 2 considered to have contributed to knowledge within the relevant department.

Both QUB and Ulster reported that at least 18 of the Pilot PoC projects (45%) will not realise commercial outcomes. Three main reasons were cited:

- The PoC process was not well enough developed when the Pilot was launched, with some projects being at too early a stage;
- The mechanism was not in place within the Research Organisations (pre HEIF) to support commercialisation; and
- The PI was not fully aware or committed to the commercialisation process.

Overall, this highlights that while some Pilot PoC projects should not have been funded under PoC, for others, more could/should have been done to support the commercialisation of these Pilot projects.

The impacts of the Pilot PoC programme are summarised in Table 2.4 below.

Table 2.4: Pilot PoC -outcomes

	QUB	Ulster	Total	%
Spin-outs	4[18]	4[19]	8	20%
Other financial outcome arising - direct and indirect (ie licences, commercial income through contract research, grant support, other research income, investment secured)	7[20]	0	7	18%
No outcome but Knowledge arising	0	2	2	5%
Some potential	4	1	5	13%
No impact	9	9	18	45%
Total PoC projects	**24**	**16**	**40**	**100%**
Total financial outcomes	**£4,502,248**	**£4,849,543**	**£9,351,791**	
Average financial outcome	**£187,594**	**£303,096**	**£233,795**	

The feedback on the Pilot PoC projects is that these have generated total financial income of £9.3 million[21], analysed between spin-outs and non spin-outs:

[18] Includes 1 spin-out with an abandoned licence
[19] Included 1 spin-out with a current licence
[20] Includes two licences and two abandoned licences
[21] the total financial outcomes is defined in terms of the **Direct Income** generated to date (turnover from a spin-out, licencing income or commercial income through contract research from an industrial partner); Invest NI/other grant awards; other research funds awarded; other Research Organisation funding (ie from Enterprise

Table 2.5: Analysis of Financial Outcomes			
	Spin-out outcomes	Non Spin-outs	Total
Direct income	£1,965,896	£1,182,248	£3,148,144
Follow on income:			
Other Non NI research income	£434,147	£102,853	£537,000
Other NI grants	£84,000	£350,147	£434,147
Research Organisation grant	£60,000	£53,000	£113,000
Investment[22]	£5,119,500	0	£5,119,500
Total income/grants/investment	**£7,663,543**	**£1,688,248**	**£9,351,791**
% split - spin-out/non spin-outs	**82%**	**18%**	**100%**
Current employment	26	0	26

Financial outcomes can be further split by sector:

Table 2.6: Phase I PoC: analysis of financial impact by sector				
	QUB	Ulster	Total	%
Advanced Materials	£544,895	£429,000	£973,895	10%
Advanced Engineering	0	0	£0	0%
Agri food	£960,000		£960,000	10%
ICT	0	£3,674,003	£3,674,003	39%
Life and Health Sciences	£301,353	£746,540	£1,047,893	11%
Sustainable Energy	£1,195,000		£1,195,000	13%
Telecommunications	£1,501,000		£1,501,000	16%
Total income/grants/investment	**£4,502,248**	**£4,849,543**	**£9,351,791**	100%

Table 2.6 illustrates that whilst L&HS projects accounted for 33% of awards, they accounted for 11% of financial outcomes. For these 13 L&HS projects, 5 are still considered to have potential, or have realised some financial outcomes. Further outcomes are anticipated from these 5 projects and it is still too early to determine their full VFM.

2.2.3 Spin-outs from the Pilot PoC Programme

There were 4 QUB and 4 Ulster spin-outs generated from the Pilot PoC programme, including PoC projects where the Intellectual property (IP) has been licenced to a spin-out:

Table 2.7: Sectoral analysis of spin-outs from Pilot PoC			
Sector	QUB	Ulster	Total
Advanced materials	1	2	3
ICT/telecommunications	2	1	3
L&HS	0	1	1
Sustainable energy	1	0	1
Total	**4**	**4**	**8**

Fellowship, etc); internal (QUBIS/IUL) and external investment. Note that only "direct income" will be included in the economic impact and value for Money assessment

[22] Equity investment from the Research Organisation (QUBIS/IUL) and/or external investment from business angels and institutional funds

Comments on a number of these spin-outs are set out below. Particular successes include PoC Numbers 66, 72, CM1 and 1:

PoC number 66 resulted in a telecoms spin out company (TitanIC) in 2008. The firm has secured development capital, generated commercial income and created employment for 10 employees, with significant forecast sales within the next 3 year horizon. The PI, who was a recipient of an Enterprise Fellowship award, has made a further successful application to the PoC programme, stated to be for a non-related application. Furthermore, a further 2 Phase I PoCs awards, to PIs in the same department, are stated to have prospects to licence their technology to the spin-out company.

PoC number 72 resulted in a telecoms spin out (Lamhroe). In addition, the same PI has had a second spin out (Microsense) linked to a 2nd PoC (PoC number 33a). Commercial income has been generated from PoC 72, with QUBIS noting that the spin-out is likely to be subsumed by a commercial partner;

PoC number CM1 led to an ICT company (Sophia Search) being established in 2007. The company has secured a number of funding awards, (including overall winner of the £25k award and the InterTradeIreland Seedcorn Competition) and significant development capital. Employment totals 15, of whom 10 are based in NI, with the Company having operations in Belfast (Headquarters), St Petersburg (Software Development) and San Jose (Sales). The Company has attracted an impressive management team, including Irish Entrepreneur, Chris Horn, and UK Business Angel 2013, Stephen Houston. The press release in 2013, at the time of the $3.7m fund raising, states:

> Sophia Search, the innovation leader in semantic content analysis, chaired by industry veteran Chris Horn, today announced that it has closed a $3.7 million Series A funding round. The investment was led by Atlantic Bridge and will be used to increase marketing and sales efforts in North America and to accelerate product roll-out.
>
> Sophia's products are unique in providing understanding and context within large sets of unstructured content. According to International Data Corporation (IDC), the global analytics market will continue to grow at a 9.8% compound annual growth rate (CAGR) through 2016 to reach $50.7 billion. Sophia is well positioned to capitalize on the burgeoning market opportunity with a next-generation semantic analysis solution that leapfrogs traditional text analytics tools.
>
> "Sophia's unique solution has shown it can greatly increase customers' ability to work with large data sets, giving insight and understanding into content that previously was unavailable".

PoC number 1 is an example which illustrates the potential length of the commercialisation journey. The markets targeted by the PoC 01 project,

undertaken in 2004, turned out to be highly competitive therefore making them difficult to penetrate with the technology in its state of maturity at that time. However, the direct experience gained by undertaking the PoC project provided the direction needed to refocus the technological offering and to then advance the associated IP so as to address commercial opportunities in more niche areas.

Based on the outcomes of the PoC1 project (2004-2006), it was possible to reconsider the requirements for commercialisation. At that time there was no formal IP in place and so it was possible to reassess the benefits that needed to be achieved in specific areas to create an effective value proposition for its application. This led to inclusion of the technology in a successful application for research funding (Cross Border Research and Development Funding Programme for Functional Biomaterials). The specific emphasis for this work was to extend the PoC data originally generated and to focus on the commercial exploitation of the technology. As a direct result of these studies, two patent applications have subsequently been made. These patents have been licenced to **Advanced Materials company, Surf-Spec Ltd,** a new spin-out company from Ulster which has attached initial funding from the Ulster Innovation Fund (NISPO) and Innovation Ulster Ltd (IUL). The Company participated on the Invest NI Propel programme in 2013.

Equally, a number of spin-outs have been less successful:

For one Pilot PoC project, the IP was licenced to a spin out formed in 2001, which has secured development capital, but has yet to generate commercial income. The Research Organisation has stated that the chance of a return on investment looks slim.

It is noted that in the five examples given above, there are a further 4 PoC awards where the projects are stated not to be related but where the PI has made multiple PoC applications, or where other PoC projects could result in licence opportunities.

In a number of cases, the outcome has not been positive because the PIs has retired or left the Research Organisation and the project has not progressed. The outcomes would therefore suggest the need for a more robust approach to the commercialisation of PoC projects.

Overall, the 8 spin-outs have secured a range of outcomes, including direct income generated to date (turnover from a spin-out, licencing income or commercial income from an industrial partner); Invest NI/other grant awards; other research funds awarded; other Research Organisation funding (ie from Enterprise Fellowship, etc); internal (QUBIS/IUL) and external investment; and employment. The breakdown of outcomes is set out in Table 2.8.

Table 2.8: Pilot PoC: Financial outcomes from spin-outs							
Pilot PoC - Numbers- actuals to date	Direct income (£)	Invest NI /grant support (£)	Other research funds (£)	Other RO funding (£)	Investment (£)	Total (£)	Employment
Spin-outs Achieving:	5	1	7	1	7	8	8
Total value	£1,965,896	£84,000	£434,147	£60,000	£5,119,500	£7,663,543	26
Highest	£744,914	£84,000	£202,021	£60,000	£3,329,500	£3,674,003	15 of whom 10 in UK
Lowest	£3,500	n/a	500	n/a	£30,000	£118,000	1

Details have been given of anticipated investment and/or future sales for 4 of these 8 spin-outs. The 8 spin-outs accounted for "total financial outcomes" of £7.6m against a total of £9.3m for the overall Pilot PoC programme, or 82%.

What is unclear is the extent to which these spin-outs could have engaged with Invest NI at an earlier stage in order to progress more speedily along their commercialisation journey. In the event that there was a lack of engagement, by or with Invest NI, this was a missed opportunity to accelerate the commercialisation process.

2.2.4 Financial outcomes arising from the Pilot PoC Programme

Direct Income

There are 9 Pilot PoC projects reporting direct income to date, of which:

- Five are in respect of spin outs (as reported above);
- Four represented direct income where spin outs were not created. Of these, one has links to a current Phase II PoC, and two are considered to have prospects for future licences. A further PoC has a licence and is linked to the strategic partnership with Almac.

The sectoral split of the 9 pilot PoC projects reporting direct income is set out below for the 5 spin-out companies and 4 non spin-outs:

Table 2.9: Pilot PoC: Sectoral Analysis of Projects reporting Direct income			
Sector	No of spin-outs	Non spin-outs	Total No of Pilot PoCs
Advanced materials	1	2	3
Agri food	0	1	1
ICT	1	0	1
L&HS	1	1	2
Telecommunications	2	0	2
Total	**5**	**4**	**9**

Licences

There are three current licences from the Pilot PoC (30, 32 and 49) of which only one (PoC 30) is generating licence income (of £62,000 to date).

Follow on Research Income

There have been three PoC projects (Numbers 48, 56 and 69) where follow on external research income has been secured and two projects (Numbers 52 and 66) where income from the Research Organisation has been secured. For one of these, the patent has been sold to a Spanish Pharma company (with no subsequent licencing income).

Projects considered to have potential for success

There are 5 Pilot PoC projects[23] where there have been no financial outcomes to date but where the respective Research Organisations still consider there to be prospects for a commercial outcome. The Research Organisations are reluctant to commit to labelling Pilot PoC projects as "potentials" unless there is current industrial interest in them. Equally, whilst each Pilot PoC has had a member of the Commercialisation Office management team assigned to them for the purpose of providing feedback for the Evaluation, there was an initial lack of clarity, in a number of instances, as to where responsibility lay.

The challenge for the PoC programme is that there are projects which have achieved their technical objectives but have not maximised their commercial potential or impact. Some projects could still be of interest to industry but are not being marketed or taken forward in a coherent fashion.

One such example would be PoC number 34, where a joint marketing exercise was undertaken with an FE college to highlight the outcome of the technical research, As a result of this marketing exercise, the project has attracted the interest of one of NI's largest agri-food companies. In discussions, the Research Organisations acknowledge the challenge they face in marketing their research to industrial partners, citing this to be an issue not just for PoC but also for all research conducted.

Projects with no impact

The feedback from Invest NI and the Research Organisations, as well as a number of PIs, was that the Pilot supported a number of projects which would not be eligible under Phase II, i.e. projects were either at too early a stage of development or where the potential for commercialisation outcomes was not sufficiently demonstrated. This led to a higher number of projects which did not meet their objectives, and is further shown in the

[23] 3, 34, 38, 39, 40

level of spend, at 88% of that committed. The electronic survey of PIs at Appendix X, (relating to the Pilot and Phase I combined) inquired as to the barriers to commercialisation. Feedback suggested that barriers were:

- Lack of funding;
- Challenges in identifying commercial partners; and
- The protracted timescales to negotiate commercialization.

Moreover, of the 18 Pilot projects stated to deliver no impact, 8 or 44% were in the L&HS sector, which compares to the 33% of L&HS projects awarded.

2.3 Overview of the Phase I PoC Programme

2.3.1 Activity levels for the Phase I PoC Programme

Invest NI launched the Phase I programme in 2008 with one call for applications in 2008, 2009 and 2010.

A total of 104 applications were made by the Research Organisations to the Phase I PoC programme, with AFBI and HSC, as well as QUB and Ulster, eligible to apply:

Table 2.10: Overview of activity support by the Phase I PoC

	QUB			Ulster			AFBI			HSC Innovations			All Institutions		
	Applications	Awards	% Successful	Applications	Awards	% Successful	Applications	Awards	% Successful	Applications	Awards	% Successful	Applications	Awards	% Successful
2008	34	28	82%	11	7	64%	0	0	0	-	-	-	45	35	78%
2009	29	13	45%	16	10	63%	3	2	67%	3	0	0%	51	25	49%
2010	3	2	67%	4	2	50%	1	1	100%	0	0	0%	8	5	63%
Total	**66**	**43**	**65%**	**31**	**19**	**61%**	**4**	**3**	**75%**	**3**	**0**	**0%**	**104**	**65**	**63%**

Overall, there were 65 projects funded in the Phase I PoC programme which represents a conversion rate of 63% (down from 75% in the Pilot PoC). QUB received the largest number of awards (43), Ulster had 19 projects funded and AFBI had 3 projects funded. HSC was not successful with any of its applications submitted as part of Phase I. HSC is further discussed in para 5.2.2.

Actual spend was £4.7m against funding awarded of £6.3m:

Table 2.11: Phase I: Budget and Actual spend

Spend	Budget	Actual	Variance	% variance
Phase I	£6,360,152	£4,767,397	£1,592,755	25%

The underspend mainly relates to commercialisation budgets not being utilised and drawn down, with some underspend also in the technical budgets due to projects not completing.

Sectoral focus of projects

The sectoral profile of the projects receiving funding under Phase I was as follows:

Table 2.12: Phase I: Sectoral analysis of projects funded					
	QUB	Ulster	AFBI	Total	%
Advanced Engineering	5	1	-	6	9%
Advanced Materials	7	4	-	11	17%
Agri Food	-	-	3	3	5%
ICT	6	1	-	7	11%
Life & Health Sciences	20	11	-	31	48%
Sustainable Energy	2	2	-	4	6%
Telecommunications	3	-	-	3	5%
Total	**43**	**19**	**3**	**65**	**100%**

Of the total number of Phase I projects funded, 31 or 48% were L&HS projects (up from 33% in the Pilot).

2.3.2 Overview of the Outcomes from the Phase I PoC Programme

The outcomes from the 65 projects funded under the Phase I PoC programme are summarised below and cover the period from PoC funding being awarded to end 2013:

- There have been 14 spin-outs, generating 16 jobs within 6 spin-outs. Of the latter, only 1 has generated total sales in excess of £250,000 (the target for an Invest NI client company);
- Within Phase I, there are 3 current licences, with only 1 generating licence income (of £15,000 to date).
- None of the current licences are to NI companies;
- There was 1 PoC project with a licence that had been abandoned, with 2 having options for licences;
- Follow on research income of £5.3m had been earned by 13 PoCs, including 2 spin –outs (£1.2m).

In assessing the potential for commercial success, QUB is of the view that the majority of its Phase I projects may still have the potential for success, although for some projects, they are dependent on securing unsolicited interest from an industrial partner, rather than a proactive marketing campaign or current interest. Ulster has been more forthright in declaring a number of its Phase I projects to be unsuccessful, where there is no active industrial engagement.

Overall impacts of the Phase I PoC programme (at January 2014) are noted:

Table 2.13: Phase I PoC: Overall impact					
Phase 1 PoC	**QUB**	**Ulster**	**AFBI**	**Total**	**%**
Spin-outs	9	5	0	14	22%
Other financial outcome arising – direct and indirect (ie licences, commercial income through contract research, grant support, other research income, investment secured)	14	5	1	20	31%
No outcome but Knowledge arising	1	0	0	1	2%
Some potential	10	0	2	12	18%
Follow on PoC	1	2	0	3	5%
No impact	8	7	0	15	23%
Total	**43**	**19**	**3**	**65**	100%
Total financial outcomes	**£9,353,981**	**£1,795,408**	**£10,000**	**£11,159,389**	
Average financial outcome	**£217,534**	**£94,495**	**£3,333**	**£171,683**	

The above QUB spin-outs include one that is based in London (to where the PI has moved) and one where the IP from the PoC is licenced to a spin-out, with the background IP being from the PoC project. The above Ulster spin-outs include one where the PI moved from QUB to Ulster. The feedback on the Phase I PoC projects is that these have generated total financial income of £11.1 million, broken down by income type and sector:

Table 2.14: Phase I PoC: analysis of financial impact			
	Spin out outcomes	**Non Spin-outs**	**Total**
Direct income	£878,067	£2,435,000	£3,313,067
Follow on income:			
Other Non NI research income	£1,237,591	£4,113,633	£5,351,224
Other NI grants	£540,198	£82,000	£622,198
Research Organisation grant	£130,000	£215,400	£345,400
Investment	£1,527,500	0	£1,527,500
Total income/grants/investment	**£4,313,356**	**£6,846,033**	**£11,159,389**
% split – spin-out/non spin-outs	**39%**	**61%**	**100%**
Current employment	15	0	15

Table 2.15: Phase I PoC: analysis of financial impact					
	QUB	**Ulster**	**AFBI**	**Total**	
Advanced Materials	£293,000	£466,007		£759,007	7%
Advanced Engineering	£755,500	£152,500		£908,000	8%
Agri food			£10,000	£10,000	<1%
ICT	£1,063,758	£277,500		£1,341,258	12%
Life and Health Sciences	£5,353,132	£680,500		£6,033,632	54%
Sustainable Energy	£397,591	£218,901		£616,492	6%
Telecommunications	£1,491,000			£1,491,000	13%
Total income/grants/investment	**£9,353,981**	**£1,795,408**	**£10,000**	**£11,159,389**	**100%**

The L&HS sector accounted for 48% of projects and 54% of financial outcomes (as compared to 11% in the Pilot phase). This evidence suggests that Phase I L&HS projects are therefore more appropriate for the PoC programme than the Pilot L&HS projects, i.e. closer to commercialisation.

2.3.3 Spin-outs from the Phase 1 PoC Programme

There have been 14 Phase I spin-outs (22% of all Phase I projects) with details as follows:

Table 2.16: Sectoral analysis of spin-outs Phase I PoC

Sector	QUB	Ulster	AFBI	Total
Advanced materials	1	1	0	2
Advanced engineering	2	1	0	3
ICT/Telecommunications	3	1	0	4
L&HS	2	1	0	3
Sustainable energy	1	1	0	2
Total	**9**	**5**	**0**	**14**

There has therefore been almost double the number of spin outs when compared to the Pilot PoC programme in a much shorter timeframe, reflecting the fact that Phase I projects are of a better quality than the Pilot projects.

A number of case studies highlight the progress made to date. It is important to note that these PoC projects were only awarded funding between 2008 and 2010, with spin-outs mainly being incorporated in 2013. As a consequence, the full impact of these projects will only be evident in the longer term.

PoC number 44a ultimately resulted in an ICT spin out company (ACT Wireless) in 2013. The company has secured a cocktail of funding including £557,000 from the Royal Academy of Engineering, £162,000 from ESPRIT (EPSRC) grant, £54,000 of TSB funding, £70,000 Philip Leverhulm Prize, as well as Invest NI and QUBIS funding. There have been initial sales generated and 2 jobs created. QUB has stated that without the PoC funding, this spin out would not have happened.

PoC number 11a resulted in an Advanced Materials spin out company (Axis Composites) being created in 2010. The firm has received support from the Invest NI Propel programme and Invest NI /IUL funding. It currently has 4 employees and is fund raising, with international interest.

PoC number 33a resulted in an Telecommunications spin out company (Microsense) in 2013. The company is linked to an existing spin-out, Lamhroe Ltd. It has secured Enterprise Fellowship funding from QUB, development capital including from QUBIS, Invest NI grants. To date, the company has 5 employees and has significant forecast sales within the next 3 year horizon.

PoC number 35a resulted in a L&HS spin out company in 2013 (ProAxis), with the PIs (founders of the company) having had 3 PoC awards between them (not all of these being related). ProAxis recently secured its first investment, won the 2013 £25k awards[24] and the Company's forecast for the future is highly positive.

PoC number 23a resulted in an Advanced Engineering spin out company in 2013 (Catagen). The company won the 2012 £25,000 awards, the InterTradeIreland Seedcorn competition, and has secured interest amongst multi-nationals in the automotive sector. The forecast for the future is positive.

A number of spin-outs are still under consideration for investment and hence are at an early stage of securing follow on funds. Equally, these spin-outs are at an early stage in their commercialisation process. For example, Catagen announced a major $1m deal with a global automotive player in February 2014, with £374,000 support from Invest NI.

For one project (PoC 38a) the PI moved from QUB to Ulster. In addition, QUB has one PoC (PoC 13a) where the PI moved to London and has setup a company "London Technology Academy Ltd" as the vehicle to commercialise the work. Equally, there have been instances e.g. PoC Number 12a where another PI has assumed responsibility for a PoC project where the PI has retired.

Two spin-outs have recently secured Invest NI NISPO funding, whilst four are in the process of closing investment rounds or are under consideration (these not being reported in the figures above).

For the PoC 101 project, NISPO/private investor funding and IUL funding has been secured and the project is in trials with two potential partners. The Research Organisation has noted that the project had been delayed due to a requirement for additional funds beyond PoC that did not exist at the time, and that the project would have benefitted from PoC Plus and PoC sequential funding, had they been available for Phase I.

The commercialisation process has not been successful in all cases. For one project with two PoC awards, a spin-out was established with the IP from the PoC. However, final agreement was not reached on the terms and conditions of a commercial licence and the IP is now back in the Research Organisation. New efforts to commercialise this IP are stated to be underway by the Research Organisation.

Overall, the 14 spin-outs accounted for a commercial value of £4.3m against a total of £11.1m, or 38%.

[24] Recent financial successes, including the Investments, were secured post the PoC Evaluation analysis

The outcomes from Phase I spin out performance are summarised in Table 2.17 below.

Table 2.17: Phase 1 PoC - Financial outcomes from spin-outs							
	Direct income (£)	Invest NI /grant support (£)	Other research funds (£)	Other RO funding (£)	Investment (£)	Total (£)	Employment
Spin-outs Achieving:	5	2	9	3	10	12[25]	4
Total	**£878,067**	**£1,237,591**	**£540,198**	**£130,000**	**£1,527,500**	**£4,313,356**	**11**
Highest	£355,067	£843,000	£224,000	£60,000	£650,000	£981,258	
Lowest	£25,000	£394,591	£3,000	£10,000	£10,000	£15,000	

Overall, whilst 14 or 21% of Phase I PoC awards led to a spin-out, of these, one is based outside of NI. This leaves potentially 13 spin-outs where there may be economic benefits to NI.

Only 3 of the 31 L&HS projects supported under Phase I (9.6%) resulted in a spin-out (as compared to 32%+ for the ICT and engineering sectors). Moreover, of the 15 Phase I projects stated to deliver no impact, 9 or 60% were in the L&HS sector, which is proportionate to the number of L&HS projects supported. However, non-spin-out L&HS projects accounted for £2.452m of income from industrial partners and £3.485m of follow on non NI research income, highlighting the potential commercialisation impact. Equally, the majority of L&HS projects are in discussions regarding licensing opportunities outside of NI. **There is therefore evidence that there are a number of good L&HS projects within Phase I, but that the outcome is likely to be licensing income into NI rather than spin-outs.**

2.3.4 Financial outcomes arising from the Phase I PoC Programme

Direct Income

There are 16 Phase 1 PoC projects reporting direct income to date (£3.313m), of which:

- Six are in respect of spin outs (accounting for £878k or 26%);
- Direct income was generated for 10 PoC projects where spin-outs were not created (accounting for income of £2.435m). Of this, only £13,000 was generated through licence income, with the remainder being commercial income from industrial partners.

The sectoral split of the 16 Phase I PoC projects reporting direct income is set out in Table 2.18.

[25] There are two recent spin-outs which are yet to show financial outcomes – both are in negotiation for investment or this has been received post the receipt of the Evaluation data

Table 2.18: Sectoral split of Phase I Direct income				
Sector	**No of spin - outs**	**Non spin-outs**	**No of Phase I PoCs**	**Number of non spin-outs with direct income >£250k**
Advanced materials	0	1	1	0
Advanced engineering	2	0	2	0
ICT	2	0	2	0
L&HS	0	6	6	3
Total	**4**	**7**	**11**	**3**

There are 3 PoC Phase I projects (all in the L&HS sector), which have generated direct income in excess of £250,000, outside of a spin out or licence agreement.

- **PoC number 21a** has secured income from commercial partners of £1m plus follow on research income of £2 million. This includes the largest BBRSC[26] funding awarded of £798,000, with the PI being named as the BBSRC Inventor of the year. There have been recent discussions with a German multi-national as a manufacturing option.

- **PoC number 42a** has secured income from two commercial partners of £350,000 plus Grant for R&D from Invest NI of £50,000.

- **PoC number 118**, generated income from commercial partner of £320,000. A non NI multinational company has acquired the technology and the associated IP. The agreement resulted in the Research Organisation securing £190,000, including £50,000 for the assignment of the patent and patent costs, and an additional £130,000 for a 12 month collaborative research project.

Further Research Income

There is follow on research income of £5.3m generated from 13 PoC projects, of which 2 are spin-outs. A further 3 projects have generated direct income, whilst 8 projects have not yet generated direct income. The breakdown between Research Organisations is set out in Table 2.19.

Table 2.19: Further Research Income from Phase I				
	QUB	**Ulster**	**AFBI**	**Total**
Follow on research	10	3	0	13
Of which:				
Spin outs	2	0	0	2
PoCs with other direct income	2	1	0	3
PoCs with no direct income	6	2	0	8

[26] Biotechnology and Biological Sciences Research Council

Of the PoCs with no spin-outs or direct income, four have attracted further research income in excess of £250k. These include:

- **PoC number 135**, in the telecommunications sector, secured follow on research income of £700k and is in discussion with a multinational regarding a collaborative agreement; and
- **PoC number 40a**, in the L&HS sector, has secured £400k of follow on research funding. This research did not proceed, however, due to the cost of clinical trials.

Projects considered to have potential for success

There are 13 PoC Phase I projects where there have been no commercial outcomes to date but where there are still considered by the Research Organisations to be prospects for a commercial outcome. These include 2 PoC projects that could be of interest to spin-out, TitanIC Ltd, and a number where discussions have been ongoing with large NI businesses.

There are a number of L&HS projects where a licencing opportunity is being pursued with an overseas multi-national, the rationale being that neither the skill base nor funding exists in NI to fully exploit the opportunity.

It should be noted that for the L&HS projects, these would originally have been assisted under the GIAp[27] in terms of seeking industrial partners, assessing market opportunity etc. Since this programme ceased, as noted further in para 4.3, no further "specific" support has been afforded to the Commercialisation Offices in terms of maximising the commercial potential of the L&HS sector. The exceptions are those projects which have already resulted in spin-outs which automatically become Invest NI clients.

It is the view of the Evaluation Team that the removal of this programme since 2011 has potentially hampered the commercialisation of Pilot and Phase I L&HS projects and contributed to the low GVA.

2.4 Emerging Economic Impact Pilot and Phase I PoC Programme

2.4.1 Introduction

The Terms of Reference for assessing the economic impact of the Pilot and Phase I PoC programme are set out in paragraph 1.3, which, based on the Phase II Economic Appraisal, suggest that a timeline of circa 15 years from commencement of the PoC project to the end point for attribution of monetary benefits is appropriate as a reference point for assessing VFM.

It is the view of the Evaluation Team that the timelines used in the Phase II Economic Appraisal are a useful reference framework / 'broad average', but that considerable variation will apply within this range. This is further

[27] Global Innovator Accelerator Programme – see para 4.3

supported by a paper produced by The Russell Group indicating that the typical timeframe from research to a successful spin out is around 17 years.

This assessment is best illustrated by examples from the longitudinal evidence base captured with respect to the Pilot and Phase I spin-outs:

- Sophia Search (PoC CM1) was a pilot funded project (2003-5) in the ICT sector, that took until 2007 to spin-out, has since secured considerable investment but which only started to generate income/ sales in 2012;

- Surfspec (PoC1 – the very first project funded in the Pilot 2003-5) in the Advanced Materials sector, following further research, took until 2013 to spin-out and as result has not yet generated income/ turnover. It is projecting £1m of income over the next three years which has been subject to independent appraisal, and therefore has been objectively tested as reasonable; and

- ProaXis – in the Life and Health Science sector has just spun out (i.e. in 2013, some 5 years post first PoC support). While it is in the process of securing private investment to progress development/ commercialisation activities, it is likely to be another 5 years before it is generating product or licence revenue.

These examples suggest that the trajectory for ICT projects will be shorter, but even then they can take several years, post PoC, to generate a revenue stream (e.g. 7 in the case of Sophia Search). For Life and Health Science projects, the timeline to spin-out can be significant (5 years from first PoC support for ProaXis) and then there can be a lengthy period of clinical testing (typically funded by private investment) to get to a stage where it is revenue generating. The Advanced Materials example above indicates 8 years post PoC to spin-out, but a shorter timeline thereafter to having an income stream (1 year). These examples serve to illustrate that the timescale to assess benefits can vary significantly, and a 'one size fits all' assumption is not applicable.

In general terms it does suggest that the timescale applied in the Phase II economic appraisal, as above, is useful as a very broad reference framework and therefore the Evaluation Team is content that it is reasonable to apply within this analysis.

Allied to the above, in respect of the Pilot and Phase I, it is relevant to reflect again on the timeline of the funded projects as per Table 2.20 below:

Table 2.20: Timeline of Funded Projects Pilot and Phase I				
	QUB Awards	Ulster Awards	AFBI Awards	Overall Total
Pilot (Dec 2003 to June 2005)	**24**	**16**	**0**	**40**
2008	28	7	0	35
2009	13	10	2	25
2010	2	2	1	5
Phase I	**43**	**19**	**3**	**65**
Total Pilot and Phase I	**67**	**35**	**3**	**105**

Applying the broad timeline assumptions used in the Phase II Economic Appraisal and assuming an 18-24 months duration of each PoC project (within the Pilot and Phase I), then projects funded at the start of the Pilot (starting 2003 and completed in 2005), that were successful in commercialising would only start to derive monetary benefits six years later, i.e. in 2011 and would run and be attributable to PoC until 2018.

Similarly, projects funded at the end of Phase I (starting in 2010 and completing 2012) would only start to derive monetary benefits in 2018, and would run and be attributable to PoC until 2025. Therefore, there is still much of the 'journey' to go in terms of the timeline for a complete assessment of impacts and VFM.

The Evaluation Team made every effort to progress the evidence base (relative to that which was available at the time of the Interim Evaluation completed in November 2010) to enable 'movement' on the quantifiable benefits and VFM position at that point (which essentially was that it was 'too early to tell').

Whilst the E-Survey implemented for the evaluation captured a proportion of Pilot and Phase I projects (39 out of a potential 105), the Evaluation Team conducted a series of additional face-to-face meetings with staff from the Commercialisation Offices to ensure that for every PoC project funded through the Pilot and Phase I, that there was an up-to-date position on the status of it in respect of commercialisation and related monetary impacts. As such, there has been 100% coverage of all funded Pilot and Phase I projects in this regard.

Table 2.21 below presents a summary of the current success rate of the Pilot and Phase 1 PoC programmes. **Only when the commercialisation timelines are complete will a final assessment on the level of success be able to be presented.** This 'run-rate' of 47% of projects achieving a positive impact, at face value, compares favourably with the benchmarking data (e.g. from Scottish Enterprise included at 3.1.3), in terms of numbers – however, the Invest NI POC projects still have some way to go in terms of demonstrating economic impact.

Table 2.21: 'Current' Success Rate of Pilot and Phase I Funded PoC Projects in Achieving Positive Outcomes			
POC Projects reporting:	**Pilot**	**Phase I**	**Number**
Spin out	8	14	22
Licence – ongoing	3	3	6
Licence - abandoned	4	1	5
Option to licence	0	2	2
Commercial income	9	13	22
Follow on funding	10	29	39
Employment	26	16	42
Any Positive result	15	34	49
Total Pilot and Phase I Projects	**40**	**65**	**105**
% Achieving Positive Outcomes	**38%**	**52%**	**47%**

2.4.2 Gross Economic Impacts – Pilot and Phase I

In respect of the Pilot and PoC I, Appendix XII sets out a consolidated spreadsheet of the monetary impacts arising to date categorised as follows:-

a) Income from licencing;
b) Turnover associated with spin-out companies;
c) Income from commercial partners;
d) Follow-on funding[28]

It was agreed with the Evaluation Project Steering Group that the first three categories above i.e. (a) to (c) were deemed to be direct income and the main focus in terms of the quantifiable impacts associated with the investment in individual PoC projects It should be noted that these figures reflect income generated to date.

Table 2.22: Gross Monetary Impacts (Direct income) Arising from Pilot and POC I (To Date)				
	Licencing Income	**Turnover from Spin Out Companies**	**Income From Commercial Partners**	**Total**
Pilot – Table 2.5	£62,567	£1,820,982	£1,264,595	£3,148,144
Phase I – Table 2.14	£31,000	£688,067	£2,594,000	£3,313,067

2.4.3 Analysis of Deadweight – Pilot and Phase I

The conversion of gross to net economic impacts entails the consideration of deadweight/additionality. This considers the extent to which Northern Ireland's Research Organisations would engage in activities to support the pre-commercialisation of leading-edge technologies independently of support provided by the PoC programme. Allied to this is the extent to which there would have been successful transfer of technology from

[28] Categorised into four 'bands' – 1. UK and EU research income; 2. Other NI research income i.e. from the Research Organisations; 3. NI Grants i.e. other Invest NI and Intertradelreland programme support; and 4. Equity investment.

academia to industry in the form of new spin-out companies or licence agreements, without the support provided by the PoC programme.

The extent to which the Research Organisations would have engaged in these activities (and achieved the related impacts) or as appropriate have undertaken them to a similar scale and/or within a similar timescale, can only be measured after making allowances for what would have happened in the absence of the support from PoC. 'Deadweight' is the term that refers to activity and impacts that would have occurred without PoC.

Levels of deadweight were calculated using a 'participant self-assessment' methodology, and with respect to the Pilot and Phase I, a series of questions were incorporated within the Principal Investigator (PI) survey, to assess impact deadweight/ additionality. Specifically PIs were asked to identify which ONE of the qualitative statements, featured in Table 2.23 below, best described their view on the extent to which any monetary impacts achieved would have occurred in the absence of support from PoC. This followed the same methodology as the previous Interim Evaluation and the Phase II Economic Appraisal to facilitate like-for-like comparisons.

Table 2.23: Extent to Which Reported Monetary Impacts Would Have Occurred in The Absence of Receiving PoC Support

	Pilot		Phase I	
Would not have been achieved	2	50%	4	44%
Achieved but on a reduced scale	2	50%	1	11%
Achieved but at a later date	0	0%	1	11%
Achieved but on a reduced scale and later date	0	0%	3	33%
Would have been achieved anyway	0	0%	0	0
N=	4	100%	9	100%

It should be noted that whilst there were responses to the E-Survey from PIs corresponding to 40 Pilot and POC I projects, some of these were partially completed and the questions on deadweight were not always answered robustly. That said, the levels of deadweight/additionality arising from this analysis detailed below are comparable with what has been captured previously (i.e. in the 2010 Interim Evaluation and applied in 2011 Phase II Economic Appraisal, where the input on these questions was more extensive) and therefore the Evaluation Team is content that they are reasonable[29]. The additional face-to-face meetings with staff from the Commercialisation Offices[30] also confirmed that there was limited deadweight/high additionality associated with the monetary impacts achieved to date – as per the analysis below.

Based on each of the responses set out in Table 2.23 above, a range of deadweight 'levels' or weightings[31] are assigned to each – the outcome of which is provided in Table 2.24 below. At one extreme, the level of

[29] The Interim Evaluation reported an average level of deadweight of 40% for Pilot and 30% for Phase [1]
[30] to ensure that for every POC project funded through the Pilot and Phase I, that there was an up-to-date position on the status of it in respect of commercialisation and related monetary impacts
[31] in line with

deadweight associated with the "Would not have been achieved" is zero, where all of the impacts achieved are retained within the analysis (i.e. no netting off). The other extreme "Would have been achieved anyway" is full/100% deadweight, where none of the impacts achieved are retained within the analysis (i.e. all of the same are netted off). Responses falling between these two extremes exhibit varying degrees of partial deadweight, reflected in the weightings assigned.

Table 2.24: Calculating Average Deadweight/ Additionality - Pilot and Phase I						
	Pilot			Phase I		
Response	% of Projects	Deadweight Factor	Average Programme Deadweight	% of Projects	Deadweight Factor	Average Programme Deadweight
Would not have been achieved	50%	0	0%	44%	0	0%
Achieved but on a reduced scale	50%	0.5	25%	11%	0.5	6%
Achieved but at a later date	0%	0.5	0%	11%	0.5	6%
Achieved but on a reduced scale and later date	0%	0.75	0%	33%	0.75	25%
Would have been achieved anyway	0%	1	0%	0	1	0%
Average Deadweight			25%			36%
Average Additionality			75%			64%[32]

It is evident from the high levels of additionality detailed above that the support provided through PoC has played a vital role in enabling the monetary impacts achieved to date. The high levels of [33]'impact additionality' are also likely to reflect the high quality of support that has been delivered through the PoC (through both Invest NI and the Commercialisation Offices), evident through the high levels of satisfaction with the same, expressed in the PI Survey. Finally, it should be noted that it is [34]accepted that additionality is generally high for R&D programmes as outlined above.

2.4.4 Analysis of Complementarity and Duplication – Pilot and Phase I

Table 4.3 (later in this report) provides an overview of the potential sources of funding available to NI's Research Organisations to undertake innovation activities. This illustrates (as confirmed through consultation for this evaluation) that PoC is a key support mechanism to enable NI's Research Organisations to undertake pre-commercial technology development work to a stage where they can attract pre-seed, seed and commercial investment – and as such it is an important precursor intervention that complements

[32] Compares to range of 67-73% in 2010 Interim Evaluation
[33] Impact additionality refers to the additionality of impacts achieved (i.e. spin outs, commercial income etc) as opposed to activity additionality i.e. whether the individual would have undertaken the activity to test and commercialise the R&D in the absence of a POC programme.
[34] Independent Review of Economic Policy, 2009

rather than displaces the other sources of funding to undertake Research Organisation-led innovation activities.

It is also relevant in this context to comment on the HEIF III and IV support from DEL and Invest NI to exploit the IP base which exists within the Research Organisations. As demonstrated in the economic appraisal for Phase II of PoC, it is viewed that there is a clear distinction between HEIF and PoC. Essentially, HEIF is a strategic programme to encourage the higher education sector to increase their capability to respond to the needs of business (including companies of all sizes) and the wider community, with a clear focus on the promotion of wealth creation. By contrast, the PoC programme is a tactical programme aimed at providing targeted support for specific projects to enable individual researchers or groups of researchers to export their ideas and inventions from the laboratory to the global market place. As such, PoC is one of the mechanisms used by the universities to attain their strategic objectives.

Therefore, it is the view of the Evaluation Team that there is no material displacement issues associated with the PoC programme, and no adjustments are made for the same in converting the gross impacts to net impacts.

2.4.5 Net Monetary Impacts – Pilot and Phase I

The Evaluation Team applied the additionality levels detailed above to calculate the net monetary impacts to date from the Pilot and Phase I to date.

Table 2.25: Net Monetary Impacts to Date (following the application of Programme Additionality)

	Gross Monetary Impacts to Date (£)	Additionality Adjustment	Net Monetary Impacts to Date (£)
Pilot	£3,148,144	75%	£2,361,108.00
Phase I	£3,313,067	64%	£2,120,362.88

2.4.6 Calculation of Net Gross Value-Added (GVA)

GVA is a measure of the value of economic activity generated by businesses, after expenditure on goods and services is accounted for. In the context of PoC, the turnover generated by spin-out businesses and the income from licencing and commercial partners[35] all contribute to GVA – i.e. the latter two support economic activity within the Research Organisations. The Evaluation Team applied the NI average sectoral level of GVA, calculated to be 30%[36]. This is consistent with the methodology used to forecast GVA impacts in the Phase II Economic Appraisal for PoC and therefore will

[35] e.g. Income from commercial partners is typically used to employ additional research staff to progress the PoC project.
[36] DETI NI Annual Business Inquiry (GVA 2012)

facilitate the ongoing measurement of GVA for the Pilot and Phase I of PoC on a 'like-for-like' basis with Phase II outcomes in due course. The results of this analysis are provided below.

Table 2.26: Net GVA (to Date on Pilot and Phase I)		
	Net Monetary Impacts (£)	Net GVA (£)
Pilot	£2,361,108.00	£708,332
Phase I	£2,120,362.88	£657,312

2.4.7 Wider and Regional Benefits – Pilot and Phase I

The PI Survey for Pilot and Phase I incorporated a series of questions aligned to the R&D spillover test used by Invest NI in the appraisal of R&D projects, adapted as appropriate for a self-completion questionnaire. Responses are as follows:

Table 2.27: PI Views on Wider and Regional Benefits – Pilot and Phase I						
	Very Significant benefit	Significant benefit	Marginal benefit	No benefit	Don't know	Response Count
Overseas company's investment opportunity into NI	3	4	7	13	5	32
Reduction of NI 'brain drain'	6	7	9	9	1	32
Technology transfer/ linkages with local companies/SMEs	5	11	8	8	0	32
Impact on skills development in NI	6	17	5	4	0	32
Impact on encouraging entrepreneurship in NI	10	11	6	4	1	32
Impact on NI supply chain	1	3	12	11	5	32
Impact on creating high quality jobs	5	10	9	5	3	32
Impact on the environment/ environmental improvements	1	5	4	15	7	32
Impact on Areas of Disadvantage	1	2	7	14	8	32
Other	2	1	3	2	24	32

It is evident from the table above that there has been a greater level of perceived impact with respect to entrepreneurship, skill development and an expectation that these will result in the creation of high quality jobs. By contrast there is little perceived impact, with respect to NI supply chain, reflecting the stage of development of the projects.

Based on the above responses and additional consultations with staff from the Commercialisation Offices within the Research Organisations, Table 2.28

below provides an overview of the main contribution of PoC in delivering wider and regional benefits. Again this relates only to the Pilot and Phase I, given that Phase II is still early in the implementation phase with impacts and benefits yet to arise.

Table 2.28: Contribution of PoC to Delivering Wider and Regional Benefits	
Wider benefits	
Skills development	The Pilot and Phase I have contributed strongly to the development of academics'/PIs' business and commercial skills as well as their understanding of IP and commercial aspects of research projects. In the context of PoC, PIs commented on the extent to which PoC has also improved their communication and project management skills.
Entrepreneurship	The Pilot and Phase I have made good progress in developing a culture of entrepreneurship amongst academics, through the creation of private sector spin-out companies. There has been a positive progression in the number of spin-outs since the time of the Interim Evaluation in 2010 (4 spin-outs) to the 22 current spin-outs, of which all but 4 are still on the path towards commercial success. As such it is clear that POC has helped to make the Research Organisations more entrepreneurial.
Knowledge transfers and creation of university linkages with industry	The Pilot and Phase I of PoC has successfully transferred knowledge between the private sector and research organisations mainly through the creation of spin-out companies and licencing of technology, and there has been good progression on these since the time of the Interim Evaluation in 2010. In addition, whilst it is still 'early days' on the inclusion of commercialisation mentoring in Phase II, the expectations amongst PIs are that they will contribute to enhanced outcomes and greater levels of knowledge transfer between the private sector and research organisations.
Regional benefits	
Impact on the creation of high quality jobs and reduction of 'brain drain'.	The Pilot and Phase I of PoC have supported the creation /maintenance of high-quality jobs by in the first instance, supporting the full-time salary of a Research Associate during the course of the project and secondly in terms of the additional employment through the creation of spin-out companies and/or the integration of the technology by a licencee. This additional employment linked to spin-out commercialisation activity post PoC is currently 42 gross jobs The jobs created are in the main in high-value added sectors (and as such in excess of the NI median salary). As detailed previously, there is further potential for additional job creation in this context, given that the Research Organisations are reporting that some of the 21 PoC projects across the Pilot and Phase I that are dormant may still progress to a commercial outcome. Allied to the above, the provision/maintenance of high quality jobs offers the potential for the region to retain its most skilled/educated workforce (thus reducing the potential for 'brain-drain') – which was deemed as a moderately ranked benefit by the PIs.

Table 2.28: Contribution of PoC to Delivering Wider and Regional Benefits	
Degree of R&D being injected	The Pilot and Phase I of PoC have helped to develop the NI research base in sectors with high growth potential, strengthening the research base of the Research Organisations in the same. They have stimulated R&D through financial assistance for technology development activities to a point where a working prototype or demonstrator is produced, to prove the initial concept and clarify a route to commercialisation. Essentially, the intervention from PoC de-risks the technology to the extent whereby it becomes a more attractive proposition for other sources of seed/start-up capital to be committed to enable the continuation of development activities in order to potentially bring the technology to market. Pilot and Phase I funded projects to date have secured £14.05m of follow-up funds to enable these innovative activities to continue, in order to potentially bring the technologies involved to market. This level of funding equates to a leverage factor of 1.5 against the initial investment of £9.36m in the Pilot and Phase I.

Value for Money and related recommendations are considered in more detail in Section 6.

3 BENCHMARKING

3.1 Introduction to Benchmarking

3.1.1 Regions for benchmarking

Benchmarking was undertaken of the Invest NI PoC programme against similar initiatives offered Scottish Enterprise (SE) under its Proof of Concept Fund and Enterprise Ireland (EI)/Science Foundation Ireland (SFI) under its Commercialisation Fund (CF) and TIDA[37] programme. Consultation was also undertaken with the Technology Strategy Board.

Benchmarking has been undertaken across a number of metrics including the assessment criteria, number of annual awards, level of spend per project, eligible spend and impact. The analysis draws largely on published data and information, supported by consultations. Comparisons are also made across key programme characteristics including the number of annual awards, average funding per award, definition of success and general support towards commercialisation.

An analysis is set out in Table 3.1, comparing SE, EI and Invest NI. Details of the feedback from the benchmarking consultations are included in Appendix VII. Key areas of interest to the Invest NI PoC programme are considered below.

3.1.2 Overview of benchmark programmes

Up until 2010, both SE and EI had a similar approach to the Invest NI PoC programme.

Both SE and EI have revised their respective programmes (in 2010 and 2011 respectively). In terms of the numbers of projects to be supported annually, these now differ to the approach taken by Invest NI.

SE has adopted an approach of selecting a small number of PoC projects (it has funded 24 in total since 2010), with significant levels of support, averaging £451,000 per project, and within a range of £316,000 to £794,000. All high growth sectors are eligible; the key differential is that the project must be capable of spinning out into a company of scale (defined as £5m revenue) or having leveraged significant investment (£10m) all within a 5 year period post PoC funding. PoC projects can result in a licensing opportunity, but this must be to a Scottish company. There is significant involvement by SE in the commercialisation journey of each selected PoC, the ability to stop a project or clawback funding[38] if projects are not progressing or in line with economic objectives. Significant funding is

[37] SFI has a Technology Innovation Development Award initiative that supports projects in technology development phase

[38] Clawback is written into LoO but has not been exercised

provided for the commercialisation phase, with projects having both a Commercialisation Contractor appointed by SE. This typically involves 1 day per month with Commercialisation Champions appointed by the PoC team- the cost has no upper limit and can be significant.

EI has maintained its approach of funding a larger number of projects (254 projects since 2011), with technical development support also supplied by SFI under the TIDA programme.

Following the €100,000 SFI TIDA support (or equivalent), funding from EI can extend to €350,000 under a staged approach. As with SE, there is an expectation of an economic benefit to the region, ie projects should be exploitable in Ireland ideally in 2-5 years, post completion, either as part of a technology-based start-up company or through licencing to a company in Ireland. EI acknowledge that timescale can be longer, particularly in the L&HS sector. Again, as with SE, there is an emphasis on providing substantial commercial support, with EI's 20 commercialisation specialists working closely at all stages of the project, including at application stage and throughout the project implementation.

Both SE and EI also adopt a two stage application process which commences with an initial feasibility study. Worthy projects then progress to apply to the main programme.

Both regions operate internal and external panel members for assessment, drawing upon mainly regional expertise.

3.1.3 Summary of Benchmarking

A summary of the findings from the benchmark analysis is as follows:

Table 3.1: Findings from the benchmarking exercise				
Category	**Scottish Enterprise**	**Enterprise Ireland**	**Invest NI – Phase II**	**Commentary**
Impact Target	Company of scale - £5 million revenue / £10 million investment in 5 years) – can be licencing to Scottish company.	The innovation should be exploitable in Ireland ideally in 2-5 years either as part of a technology-based start-up company or through licencing to a company in Ireland. Timescale can be longer.	Phase II target of 18% spin outs (average 10 employees each) and 25% licences within 5 years	There needs to be explicit regional impact targets and evidence of best endeavours to achieve these, whilst recognising NI's small industry base and hence limitations in scope.
Regional Impact	SE is involved in deciding the best route to maximise benefit to Scottish economy. Must be a Scottish Licence. LoOs have a clawback provision included, for example where the project has no regional economic impact (licence to non Scottish partner) although this has not been exercised. Can stop a project not showing commercial progress.	EI expects all ROI licence opportunities to be considered. EI can exploit the project if the university makes no effort within one year of completion, but **EI have yet to exercise this option.**	At the commencement of Phase II, Invest NI had discussed with the ROs the ability to "step in" where commercialisation opportunities are not being pursued. This was resisted by the ROs.	Invest NI should address this issue with the ROs, with clarification on the scope of its involvement.
No of projects supported	24 since 2010	254 projects from 2011; including 105 in 2012 and 65 in 2013	2010- 5 Sept 2012 to May 2013 - 41 Target 69 from April 2012 to April 2015 – 25 per year in latter years	Invest NI targets are comparable to that of EI
Flow of funds	Continuous	Continuous	5 in 2010, gap to Sept 2012	Invest NI has had a gap in PoC funding from 2010 to 2012
Application process	2 stages – Stage 1 assessed by panel Market Feasibility study £5-£15k post stage 1 Considering a 6 month £50k proof of technology stage Then move to stage 2 following technical and commercial due diligence	2 stage - Commercial Feasibility Fund (CFF) (€10-15k) (not compulsory but 30% apply) prior to Commercialisation Fund (CF)	1 stage – some POCs have had Proof of Principle support at RO's discretion	The NI PoCs are not uniformly awarded Proof of Principle funding.
No of calls	3 stage 1, and 4 stage 2 deadlines per	CFF – continuous	There were 5 calls between	Invest NI has been

Table 3.1: Findings from the benchmarking exercise				
Category	**Scottish Enterprise**	**Enterprise Ireland**	**Invest NI – Phase II**	**Commentary**
	annum	CF – 2 published calls pa plus invitations	August 12 and July 13	playing catch up in 2013 from the 5 PoC awards in 2010
Conversion rate of applications	2013: Stage 1 appl – 11 Assessment – 9 Stage 2 appl – 2 Stage 2 success – 2	Circa 35%-40%	Call 1 – 63% Call 2- 70% Call 3- 80% Call 4 -55% Call 5 – 50% Average Circa 63%	Invest NI's conversion rate has been falling over the last number of calls.
Period of funding	Typically 24 months	One stage 12-18 months 3 stage project – 36 months	Up to 24 months for standard PoC projects PoC Plus can add a further 6 months to a standard project – limited to 5 projects Allows for sequential PoCs	Project based: 12-24 months with exceptions
Average spend pre corporate structure	Range from £316,000 - £794,000, with an average new award level of £451,000.	Following €100,000 SFI TIDA or equivalent. CF Minimum €80,000, and each stage €100,000. Average single stage €125,000, multiple stage €350,000 each	Maximum £106,000 per PoC. 5 projects to secure +£40k under PoC Plus Opportunity for multiple/sequential PoCs – to be identified in application	A number of Phase II PoCs have already had awards under Pilot and/or Phase I. Under Phase II, there can be several wards, plus additional technology development support
Maximum funding level in existence	No	No	Yes – currently limited to £212,000[39]	Invest NI has indicated that it will consider multiple sequential projects
Sectors	No thematic calls	No thematic calls – but areas relevant to Technology Directorate – Life sciences and	No thematic calls	No thematic calls appropriate but PoC should be marketed to

[39] Strictly speaking, Invest NI has no limit but in reality it is unlikely that Invest NI would give a project more than 3 awards due to the risk and assessment of the potential return to the NI economy

Table 3.1: Findings from the benchmarking exercise				
Category	**Scottish Enterprise**	**Enterprise Ireland**	**Invest NI – Phase II**	**Commentary**
		food, ICT, Manufacturing, engineering and energy		all Matrix areas
Dependency on Life & Health Science (L&HS)	13 of 24 project L&HS (54%)	72 of 254 projects Life Sciences and food (28%)	Over 40% of projects L&HS	Invest NI should consider a greater spread across sectors, given the greater timescale for commercialisation with L&HS
Upper Spend limit to date	£794,000 – 5 projects funded over £500,000	€350,000	Could be up to £212,000 – multiple POCs	Invest NI could provide further sequential funding
Achievements to date per Evaluation[40]	10 year period to 2011: • Over 970 applications submitted over the past 10 years; • 235 projects funded; • Over £47 million awarded; • > 90 % of funding goes into personnel; • Average projects run 18 months to 2 years; • Over 500 knowledge-intensive jobs created in universities; • Over 300 jobs created in new Scottish companies; • 50 new high-tech companies formed; • 57 licence deals signed; and • Over £243 million post-PoC investment leveraged.	7 year period to 2009: Three strands of funding: 543 POC at cost of Euro 45.3m 302 Tech Development at cost of Euro 93.3m 50 Commercialisation Plus at cost of Euro 5.5m Total funding Euro 144m • 280 net additional jobs • Turnover of Euro 41.6m (33.8m NPV) • EVA Euro 34.0m (Euro 27.7m NPV)	10 year period 2003 to 2013: • 105 projects funded; • Over £11.5 million awarded and £9.3m spent; • 42 gross jobs created in new NI companies; • 22 new high-tech companies formed; • 6 licence deals signed; and • Over £7 million post-PoC investment leveraged.	Invest NI is at an early stage with Pilot and Phase I
Support by Economic Development Agency pre application stage	SE PoC Programme Manager and a High Growth Start-Up Advisor/Commercialisation contractor (4 days) working closely with RI.	EI Commercialisation Specialist appointed	PoC team did attend several enterprise events organised by QUB to give advice to potential applicants. No formal requests were made by	Invest NI should consider the involvement at the application stage of its sectoral teams/growth teams

[40] Note that there are no evaluations of the schemes that are currently in operation.

Table 3.1: Findings from the benchmarking exercise				
Category	**Scottish Enterprise**	**Enterprise Ireland**	**Invest NI – Phase II**	**Commentary**
			any Research Organisations or PIs for Invest NI to review applications before they were submitted.	
Mentors appointed to PoC	Commercialisation Contractor – 1 day a month (£660 per day) – on call off Framework run by SE. Commercialisation Champions within 3 months – no upper limit but cost must be justified and can be significant	No formal mentors appointed - but EI recognises the need for earlier industry involvement and can signpost to other EI programmes	Each project must appoint a commercialisation mentor at a minimum cost of £6k.	Invest NI should consider higher limits for commercial mentors
Costs supported	Technical and Commercial costs • Personnel • Consumables • Patents • Market Assessment • Equipment • Other (includes Commercialisation Champion – no upper limit but needs rationale)	Detailed for each stage: • Pay • Materials • Travel – domestic and overseas • Subcontract • Other • Capital	Technical costs: • Staff costs • Consumables • Patent costs • Subcontracting • Equipment • Other (i.e. Trials and testing) • Research Facilities allocated costs Commercialisation costs: • Staff costs – up to £5,000 • Market Assessment Consultancy • Travel and Subsistence • Commercialisation Mentor (£6,000 minimum)	Invest NI disallowed indirect costs at the start of Phase II and this is in line with the benchmark regions. Categories appear to be appropriate
Panel Assessment composition	The panel members are drawn from a combination of VCs and business angels and sector industry people (usually from the GlobalScot network). Internal experts are from a combination of specialist sector teams within SE and from High Growth Start Up advisors. Panel members	The approval Panel comprises relevant industry experts, both technical and business experts (multi-national, Irish Indigenous sector, entrepreneurs, and business consultants), often a VC	Panel in place from external and internal sources. Typically sectoral expertise per Matrix area.	Invest NI to consider means of increasing specialist knowledge.

Table 3.1: Findings from the benchmarking exercise				
Category	**Scottish Enterprise**	**Enterprise Ireland**	**Invest NI – Phase II**	**Commentary**
	are not paid.	expert is included and there may be some relevant academic experts on the panel. Panel members are paid. Usually members are based in Ireland but can also be based in Europe.		
Monitoring Framework	LOO requires PIs to provide data for 10 years post project		The LOO has a requirement to provide commercial information for post project evaluation purposes	New Monitoring Framework to be proposed

3.2 Lessons to be Learnt from the Benchmarking exercise

Firstly, in terms of delivery, both SE and EI have delivered jobs and leveraged investment, against a backdrop of significant commercialisation support.

SE and EI have sought to set out their definition of a successful project, either a spin-out or a licence to a locally based company, or the progress on the commercialisation journey as evidenced by significant investment in the project. Their timescales for delivery against such targets differs – SE is seeking evidence of substantial progress some five years post the project completion, whilst EI is seeking an outcome some 2-5 years. It is noted that the SE current model is significantly different to Invest NI's, with a small number of projects being supported with substantial investment in finance and resources. Discussions with both SE and EI would indicate that these are indicative targets only, giving rise to significant variations, and have not yet been evaluated. Nonetheless, the expectation is that any project funded could lead to a significant economic impact. Moreover, EI note that the requirement for a licence to a ROI company is not enforced; equally EI (and SE) would expect to have good oversight of project's progression and thus assessment for local licencing opportunities.

Invest NI has included the demonstration of regional impact in its criteria (see para 5.2.2), however, NI differs in that the opportunity for licencing to NI companies is very low. Notwithstanding that currently, of the Pilot and Phase I PoC projects, discussions are ongoing on at least 4 projects with NI companies, the opportunity for NI licences is limited.

There may however be an opportunity for Invest NI to better define the impact that it is seeking, ie a spin-out within a defined period, level of investment and period by which a licensing deal should be negotiated.

The emphasis should be on projects with:

(1) a potential strong regional economic impact, which should mean that the skill base (or infrastructure) exists to establish a start-up company; or
(2) that potential NI licence opportunities exist.

Linked to this would be the ability of Invest NI to have more direct involvement in the commercialisation process, and indeed to have a monitoring process in place, whereby action can be taken by Invest NI in respect of projects which are not progressing in line with targets. This may require additional Invest NI resources.

Discussions with the Research Organisations indicate that there would be concerns as to where responsibility for Intellectual Property would lie if Invest NI assumed control over the commercial direction of PoC projects.

Feedback from SE in particular indicates that similar discussions in Scotland led to a delay in the new programme's commencement, although there is now a greater degree of trust amongst Universities that SE will become involved only as a last resort.

Other points of learning from SE and EI are:

- For Invest NI to consider a two prong approach to the application stage with an application to conduct a Market Feasibility study prior to the full application to PoC. This could be incorporated into the Proof of Principle model which operates on an intermittent basis within QUB and Ulster. This should lead to more robust projects being prepared and selected rather than a reduction in the number of projects selected, recognizing that government should resist attempts to "pick winners" (see paragraph 4.2.2) and should support a broad range of projects.
- For Invest NI to provide a wraparound service, with a fuller complement of services, including expertise and networks, to PoC projects, this to be provided on a uniform basis or to projects showing strong commercial potential;
- There should be more detailed monitoring of PoC projects, with data to be provided for up to 13 years post completion; and
- There should continue to be higher levels of funding available for worthy projects, where such spend is justified, including for the commercialisation process.

3.3 Conclusion

Overall, the key issues that Invest NI should take account of going forward are:

- The two stage approach to project application and selection, initially through a Feasibility Study/Proof of Principle process, and then, for successful applicants, a full application to the PoC programme. This should ensure a more robust selection process.
- The wraparound service provided by the economic development agencies for PoC projects, thus ensuring that the skill base and financial support within the agency is fully provided to accelerate the commercialisation of the PoC project.
- The increased level of support for project showing potential and were such support is needed in order to progress along the commercialisation journey.
- There is merit in continuing to support a range of projects, similar to EI, on the basis that government is not well placed to pick winners, whilst ensuring a broad range of sectors to be supported.
- There should be adequate support available for worthy projects with strong commercial potential.

4 STRATEGIC CONTEXT AND RATIONALE FOR THE PHASE II POC PROGRAMME

4.1 Review of Strategic Context for Phase II

4.1.1 Summary of Policy and Economic Context for the Phase II PoC Programme

The policy and economic context for the Phase II PoC programme is set out in Appendix III. This is summarised below.

The NI Executive Economic Strategy 2012 notes the significant structural weaknesses in the NI economy. In particular, this strategy document noted:

Table 4.1: Weaknesses in the NI economy
Skills profile remains weak vis-à-vis leading economies
Low living standards, productivity and wages
Lack of large firms
Under-represented in high value sectors
Small private sector with over-reliance on public sector / fiscal subvention
Much of the job growth has been in low wage services
Large amount of FDI in low value sectors
Low export-intensity internationally
Historically low BERD
Over-reliance on a small number of firms for R&D
Relatively low levels of innovation, patents and absorptive capacity
Low levels of entrepreneurship
High proportion of workforce with no qualifications
'Brain drain' of skilled people who leave to work elsewhere
Low labour market participation rates

The overarching goal of the Economic Strategy is to improve the economic competitiveness of the Northern Ireland economy, identifying that the key drivers in rebalancing the NI economy will be innovation, R&D and a skilled workforce. This will lead then to increased labour productivity and employment rates.

Given the importance in supporting investment in innovation and R&D, a number of complementary actions have been identified in the Strategy which will be pursued over the medium to longer term in order to build a more knowledge based NI economy. These include:

- Progressing the alignment of publically funded research with economic priorities in order to increase the potential for greater knowledge transfer between business and academia; and
- Examining ways to increase the rate of commercialisation of publically funded research and public sector Intellectual Property.

A key support to NI Government, in its drive for innovation, has been the formation of MATRIX in 2006 to advise DETI on how Northern Ireland's R&D and science and technology strengths could be used to better commercial success. Key priority areas identified were health and life sciences;

advanced engineering (transport); advanced materials, agri-food technologies and ICT.

Following on from this, DETI launched its draft innovation Strategy in 2013. The vision set out in the draft Innovation Strategy is that Northern Ireland, by 2025, will be recognised as an innovation hub and will be one of the UK's leading high-growth, knowledge-based regions which embraces creativity and innovation at all levels of society. In support of this, the strategy notes that DETI will prioritise funding and support for research and innovation in both education and company base in seven priority areas: Advanced Engineering (Transport); Advanced Materials; Agri-food; Life and Health Sciences; ICT; Telecommunications; and Sustainable Energy.

These Economic and Innovation strategies support the Programme for Government (PFG) 2011-2015, where a key priority includes 'Growing a sustainable economy and investing in the future'. Overall, innovation and creativity, by their juxtapositioning, are acknowledged as key drivers to achieve long term economic growth, improve competitiveness and build a larger and more export-driven private sector.

In working to rebalance the NI economy during the current budget period, and to stimulate Innovation, R&D and Creativity, DETI (in its Corporate Plan 2011-2015) has undertaken to:

- Support £300m investment in R&D, with at least 20% from SMEs;
- Provide £54m funding for University research and investing in collaborative HE/FE engagement with business in 2011/12; and
- Support our Universities to establish 8 spin-out companies by 2013[41].

In its Corporate Plan 2011-2015, Invest NI notes that it will build on those sectors where our research is truly world class and where we have exploitable intellectual property such as IT security and health technology by promoting technology licencing and Northern Ireland as a location for undertaking research activity. Key targets, relevant to the PoC programme, are:

Table 4.2: Key Targets

Theme	Indicator	Target
Stimulating innovation, R&D and creativity	• Investment in R&D • First time R&D • Commercialise outcomes from knowledge transfer • develop capability through technology & process development	• Secure £300m investment in R&D (with at least 20% from SMEs) • Support 500 businesses to undertake R&D for the first time and secure 120 Collaborative Projects in R&D • *Support 40 Proof of Concept projects (University based)*
Encouraging	• Support wages, salaries and	• Promote £400m of investment

[41] There is no consideration of the quality of these spin-outs

Table 4.2: Key Targets		
Theme	**Indicator**	**Target**
business growth	job creation in locally owned businesses • Encourage entrepreneurship and new business development and growth	and 6,300 jobs in locally owned businesses, with 50% paying salaries above the NI PSM • £120m in additional wages and salaries p.a. • Promote 6,500 new jobs in new start-up businesses

The PoC programme is specifically referred to in the Invest NI Corporate Plan, although the target of 40 Proof of Concept projects in the period 2011-2015 appears to be understated.

The importance of innovation and commercialisation of the NI Research business is recognised as a means to increasing competitiveness, employment and business growth.

4.1.2 The Rationale for Funding a PoC Programme in NI

The PoC programme is an important tool to meet the strategic goals set by NI Government. The strategic rationale is underpinned by the following:

- The UK's Government's policy which notes, through publications including "Insights from International benchmarking of the UK Science and innovation System" (2014), that the most promising strategy for the UK is to continue both to produce world-beating science and innovation and to seek to commercialise ever more consistently the best of what is produced in the rest of the world.

- The House of Commons Science and Technology Committee, "Bridging the valley of death: improving the commercialisation of research" (2013) which notes that the future success of the UK economy is linked to the success of translating a world class science base to generate new businesses with the consequent generation of UK jobs and wealth. It adds that while academic research is the "jewel in the crown of UK innovation activity", the Committee notes that total funding for proof of concept (in the UK) is insufficient, with a recommendation being:

  "{that} the Technology Strategy Board examine the current provision of proof of concept funding to universities and small companies and report to Government a coherent view of the amounts of funding available along with a recommendation on whether there exists a shortfall of provision of these funds and whether a consolidation of provision into a single programme[42] would be helpful".

[42] Note – UK companies can assess the SMART awards

- DETI's draft Innovation Strategy, which underpins the economic impact that can be achieved through the commercialisation of the Universities' research and notes the support for the PoC programme;

- The continued investment in HEIF in NI (similar to the rest of the UK), with HEIF funding both confirmed to 2015/16 but also increased by circa 30%, with targets set including for spin-outs and licences (see para 4.3);

- The continued investment in similar initiatives in benchmark regions including Scotland and Ireland;

- The assessment of NI's economic performance against other UK regions, (as per the Economic Strategy (2013)), which notes that NI continues to lag behind, at 80% of the UK's GDP.

Many UK studies have looked at the reasons for delays or failure in commercialising PoC stage projects and NI is certainly not alone in this regard.

The House of Commons Science and Technology Committee, "Bridging the valley of death: improving the commercialisation of research" (2013) makes a number of observations including:

- Consideration to be given as to how well changes to the Higher Education Innovation Fund improve commercialisation activity;
- Consideration to be given to the need to provide greater amounts of proof of concept funding;
- It is crucial that the Government has a coherent plan on how to engage the research base (people, facilities and intellectual property) with the innovation agenda;
- The Government's objective should be to create a commercial demand for university engagement to which they are already primed to respond;
- It is also important to ensure that the incentives from Government tend towards greater growth and retention of jobs and wealth creation in the UK; and
- Public science and engineering research programmes typically focus on building one technology artefact to demonstrate innovation/technology; but lack resources to address risks in maturing manufacturing processes. Access to large scale facilities is therefore critical.

The report also cautions against narrowing the number of projects supported, stating that it is widely accepted that Government is unable to "pick winners". This is a view shared in other reports including "Insights from International benchmarking of the UK Science and innovation System".

All of the above would suggest that there is a rationale for financially supporting the commercialisation of the research base in NI.

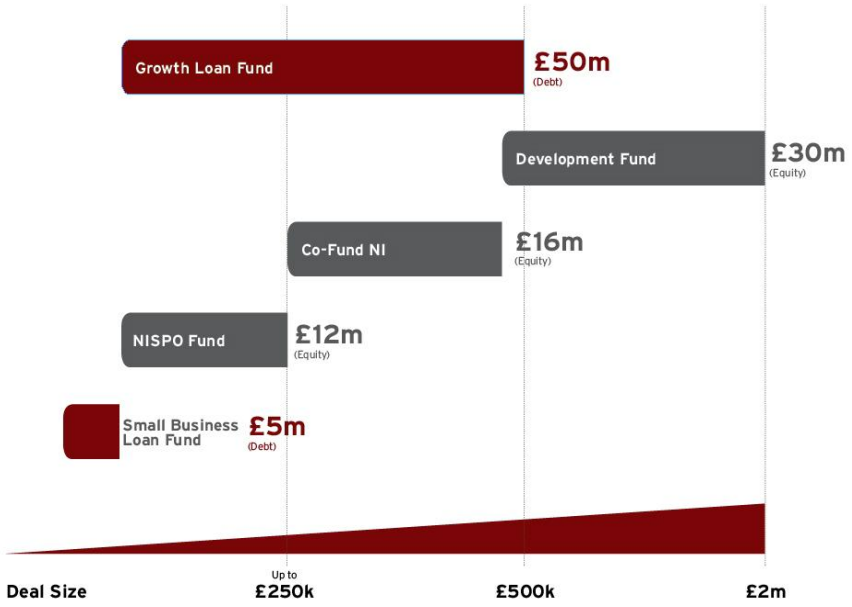
4.2 Fit with other relevant programmes

One of DETI's conditions of Phase II PoC funding was that Invest NI and DEL would continue to monitor the potential for duplication with other programmes.

Of direct relevance are the following:

Table 4.3: Relevant programmes and Initiatives
Higher Education Innovation Fund (HEIF) – QUB and Ulster
The Higher Education Innovation Fund (HEIF) is administered by the Department of Employment and Learning (DEL). Its aim is to provide third stream funding to support technology transfer and the interface between the Universities and industry. The HEIF III funding round finished in July 2012. HEIF IV commenced in August 2013 and runs for the three years to 2015/16. Details of HEIF funding are set out in Appendix III. HEIF provides funding for the commercialisation offices at QUB and Ulster, and associated activity with targets set in relation to spin out companies and licences. Overall funding has increased by 30% in HEIF IV, now totalling £6.4m over 3 years for QUB, £5.2m over 3 years for Ulster and £11.6m in total. HEIF IV currently supports Proof of Principle funding in QUB (£100k pa) and part fund the Impact Development Grant scheme. HEIF IV also currently supports £50k only in year 2013/14 of Proof of Principle in Ulster, with Ulster seeking additional support from Invest NI. HEIF does not extend to AFBI or HSC Innovations. Funding for AFBI and HSC for commercialisation activities has come from a mix of sources including Invest NI.
Invest NI Access to Capital Initiative
Invest NI has put in place a £100m Access to Finance Initiative to ensure that companies with high growth potential are not held back because they cannot access finance. Through the suite of funds, Invest NI offers a continuum of funding for businesses seeking between £1k and £2m. The Access to Finance initiative has five separate funds totalling more than £100m. This suite of support seeks to ensure that SMEs at all stages of the development cycle have access to financial support through a range of equity investment and debt financed models. The continuum of funding is shown below:

Table 4.3: Relevant programmes and Initiatives



Of relevance to PoC are the NISPO fund, the Co-Investment Fund and the Development Fund, with a number of PoC projects having availed of NISPO funding.

Invest NI support to Business Start ups

Invest NI provides support to **companies** under its suite of programmes, including:

- R&D: Grant for R&D, Innovation Vouchers,
- Business start-up: GAP, Propel, (proposed Accelerator Programme)

Innovation Vouchers and Propel are open to non INI clients.

Grant for R&D and GAP are available for INI clients where the company must demonstrate that it has, or has the potential to, achieve total sales of over £150,000 per year; and sales outside Northern Ireland greater than 25% of turnover, or greater than £250,000 a year.

Global Innovation Advisors Programme

Global Innovation Advisors Programme (GIAp) was an Invest NI programme which ran to 2011 and sought to support the commercialisation of L&HS assets/IP within the Research Organisations. This was discontinued in 2011.

Other R&D support

Other R&D support is provided by the Technology Strategy Board, under its SBRI programme, although this is focused solely on **companies** and not university research, and thus can only support spinouts from PoC.

The UK Research Councils:

Both initial and follow on funding is provided by the UK Research Councils. There are seven research councils funded by the Department for Business, Innovation and Skills, namely AHRC, BBSRC, EPSRC, ESRC, NERC, MRC and STFC. Other research support is from European Funds (Framework 7 and now Horizon 2020), as well as Philanthropic funds. The focus is on research and not commercialisation activities, ie before TRL level 3.

Halo Private Equity

The Halo Private Equity Initiative was set up in NI in March 2004 and, since 2007, is delivered by the NI Science Park. This provides a mechanism to access business angel funding and is only available to companies.

NISP CONNECT

Based at the NI Science Park, the NISP CONNECT programme offers business and mentoring support to tenants and non tenants with a knowledge based focus, linking young businesses to the experienced business community. The Research Organisations also avail of the NISP managed £25k Award, managed by NISP CONNECT.

Table 4.3: Relevant programmes and Initiatives
Science Foundation Ireland
Science Foundation Ireland (SFI), in the Republic of Ireland, offers funding under a range of programmes including €100,000 under TIDA (Technology Innovation Development Award) and SFI's Investigators Programme. The Industrial Development (Science Foundation Ireland) Bill 2012 introduced changes allowing closer research collaboration between the Republic of Ireland and Northern Ireland. This also allows SFI to fund joint research projects of excellence with Northern Ireland for the first time.

The following is noted in terms of the PoC Programme:

HEIF - The level of HEIF funding has been increased under HEIF IV, totalling £11.6 million across the two Universities for the three years to July 2016 (and thus straddling PoC Phase II). The House of Commons Science and Technology Committee report[43] raised as an action point in 2013 that consideration to be given as to how well changes to the Higher Education Innovation Fund have improved commercialisation activity. The two Universities have targets for commercialisation within their HEIF approvals as follows:

- QUB has a target of 6 spin-outs over 3 years and £1.8m of licence income (although it is assumed that the latter includes income from existing licences). Even with the 32 PoC awards to September 2013, this would only represent a spin out rate of 18%. Targeted licence income at £1.8m compares to licence income under the Pilot and Phase I of £31,000 (and is clearly wider than PoC);
- Ulster has a target of 7 spin-outs over 3 years and 6 new licence agreements; and
- Overall, the HEIF targets for 13 spin-outs over 3 years are comparable to Phase I (where there were 14 spin-outs), but would appear to be low, given that Phase II is likely to be condensed into a 2 year period. The QUB HEIF target lack details on the number of new licences. It is unclear as to the extent that Ulster's targets for licences relate to previous or current PoC funding rounds.

It would therefore seem to be appropriate that HEIF targets are reviewed by DEL in light of the substantial PoC support provided by Invest NI.

A number of the QUB and Ulster PoC projects will have availed of the Proof of Principle funding available intermittently within the two Universities, as funded by HEIF (typically £10k for a feasibility study). It is noted that Ulster has not applied for Proof of Principle funding after 2013/14 and is seeking this support from Invest NI.

As noted, AFBI and HSC do not have access to HEIF funding. Both have noted the challenges in accessing funding for patent costs etc.

[43] "Bridging the valley of death: improving the commercialisation of research"

Access to Finance - Those PIs responding to the Pilot and Phase I electronic survey noted the reasons contributing to the delay or failure to commercialise, with lack of funding as being a key contributor. Invest NI's Access to Capital initiative, and specifically the Universities' NISPO Fund, was introduced to address the challenges of University spin-outs' accessing seedcorn funding.

It is generally accepted that the NISPO funding process has been slower than anticipated; however it is recommended that more effort is made in the new NISPO programme to engage with PoC projects and expedite the funding process. For example, for one PoC project awarded PoC funding in the period 2008-2009, a start up company was formed and NISPO funding secured in 2013, with there being protracted negotiations around the terms of the NISPO funding.

Invest NI introduced PoC Plus and sequential PoC in Phase II to address issues of funding for projects not yet ready for Venture Capital funding, especially L&HS projects requiring substantial support. The level of uptake has been low to date. For sequential funding in particular, the expectation had been that applications would give notice if sequential funding was likely to be required. Such lack of notice, particularly amongst L&HS projects, could indicate the absence of a robust roadmap for projects. Equally, for some, funding may be required more for the commercialisation and development stage rather than technical development.

Invest NI support to Business Start ups – Section 2.2 sets out the level of support for the Pilot and Phase 1, with Invest NI follow on funding support across the Pilot and Phase I PoC programme totalling £734,000. Invest NI support is mainly to spin-outs although non trading entities can access the Innovation Voucher scheme and the Propel programme, with evidence of both being accessed for PoC projects. Feedback from the PIs engaged in spin-outs is that they are generally satisfied with the level of Invest NI support. What is unclear is the extent to which these spin-outs, and indeed other PoC projects, could have engaged with Invest NI at an earlier stage in order to progress, more speedily, along their commercialisation journey. In the benchmarking section, it is noted that Enterprise Ireland and Scottish Enterprise adopt a more holistic approach to supporting PoC projects. This support can also take a variety of forms, including management development support and support in the development of the management team.

GIAp – as noted, the GIAp was discontinued in 2011. This will have had implications for the L&HS projects both already supported by Invest NI and those awarded funding under Phase II. There would not appear to be a strategy adopted for meeting this gap in the L&HS infrastructure; rather, the scheme has been acknowledged as being costly but largely effective. As noted in paragraph 2.3.4, removal of the programme has potentially hampered the commercialisation of Pilot and Phase I L&HS projects.

The UK Research Councils - A further related issue is whether or not similar UK schemes exist for the NI research base to avail of and thus the need for NI Government intervention. In the UK, commercialisation funding is provided by the Research Councils[44], with these being accessible to the NI academic base. However, these are invariably follow on funds from initial research awards from each Research Council, thus limiting the number of PIs who could apply for such funding. No data is available on the extent to which the 105 pilot and Phase I PoC projects had already secured Research Council funding (prior to PoC) (or applied for funding). It is noted that 16 Pilot and Phase I PoC projects had subsequently received Research Council and other non NI follow on funding. The general feedback is that Research Council funding is difficult to secure and increasingly awarded on the basis of collaborative bids by the larger Universities. Therefore, whilst it would be unwise for NI Government to rely solely on successful applications to such funding streams to commercialise its research base, applications should be encouraged and monitored. It is noted that Scottish Enterprise has its own commercialisation/PoC fund, despite having the same opportunities as other UK regions to apply to Research Council funding. The Evaluation Team suggests that a similar dual approach is adopted within Northern Ireland.

Halo/NISP CONNECT – the Spin-outs and other PoC projects would appear to be fairly well connected to Halo/NISP CONNECT, with a number being located at the NI Science Park (or at QUB's ECIT) and using the NISP services.

Science Foundation Ireland – SFI will now fund joint areas of research. This is a new funding source that should be pursued and marketed by DEL and the Universities.

The feedback from the PIs is that PoC is a critical funding source. There is considered to be minimal duplication with/displacement of other programmes/activity operating in NI/UK, with the opportunities for funding from the Research Councils considered to be extremely limited and SFI, as yet, untested and not expected to be substantial. These funding sources should continue to be monitored by Invest NI and the Research Organisations.

4.3 Rationale, Market Failure, Need and Demand for the Programme in the Future

PoC was introduced to fill a vital gap in the R&D funding chain, that is pre-seed funding, aiming to produce a number of technologies which could be exploited commercially, either in the form of new spin-out companies, or licence agreements with companies from NI or overseas. Projects typically occur after curiosity-driven research; the programme will support the development of the technology to Technology Readiness Levels (TRL) 3-4.

[44] TSB have provided details of seven Research Councils

The market failure which existed in 2011[45] was attributed to:

- The productivity gap that existed in NI vis-a-vis the rest of the UK;
- The view that the NI research and technology base in NI had not been fully realized and exploited in the commercial marketplace; and
- A lack of availability of pre-seed funding.

In terms of the commercialisation of NI's research and technology base, and on the basis of the findings of the HE-BCI survey 2011/12 and NI Knowledge Economy Index[46], NI continues to be one of the poorest performing regions in NI, ranked 11th out of the 12 regions in terms of overall innovation:

Table 4.4: Innovation in NI				
Metrics on R&D (per KEI)	**2011 KEI**	**2012 KEI**	**2013 KEI**	**Ranking**
R&D as % of workplace based GVA	1.8%	1.7%	1.7%	7
R&D (BERD) as % of workplace GVA	1.2%	1.1%	1.2%	7
R&D personnel as % of total employment	1.5%	1.0%	1.0%	6
Number of PhDs per million inhabitant*	253	263	284	8
HEI Research grants and contracts per 1,000 population*	£50	£45	£45	9
Number of science and technology graduates (NVQ Level 4+) as % of workforce	7.0%	9.4%	10.5%	11
% of firms stating that they are innovation active [47]	31%	27%	27.0%	11
Number of patent applications filed per million inhabitant (to UK IPO)[48]	133	138	139	11

It is the Evaluation Team's view that the Market Failure, Need and Demand still exists for the PoC programme:

- The PoC programme fills a recognisable gap between the availability of funding to support pure research and the stage when other seedcorn funding, including NISPO, and start-up capital can be attracted to commercialise the technology by bringing a product to market. A number of market failures (e.g. asymmetric information, externalities/spillovers) combine to deliver a proposition which is too high risk to attract private sector investment;
- In view of the analysis on deadweight/ additionality (included previously in Section 2.4.3) the Evaluation Team is content that the POC programme continues to address a failure in the market for commercially focused funding and support to academics to transfer new technology to industry in the form of licences or new spin out companies;
- A significant proportion of PIs would not have undertaken the technology development and commercialisation activities in the absence of the programme (i.e. a high level of programme additionality exists); and

[45] The dates of the Cogent Economic Appraisal in 2011 (which supported the Phase II PoC programme)
[46] Details are as per Appendix III
[47] BIS, 2011
[48] UK IPO, 2011

- PoC activity has enhanced the skill-sets and knowledge of PIs in a range of areas including their understanding of commercial aspect of research projects and IP issues.

In terms of the continued need for intervention, it is clear, from the number of PoC projects stated to have potential, vis-à-vis the lack of direct income currently being generated, that the Research Organisations have still some distance to travel to demonstrate that their commercialisation activities are properly focused and that the potential for benefit for the NI economy is being maximised. Nonetheless, progress is being demonstrated.

The importance being placed by the UK Government and relevant committees, on the commercialisation of innovative research and the availability of proof of concept funding, is also noted.

On the basis of these points, it is the view of the Evaluation Team that there continues to be a strategic need for Invest NI to support the pre-commercialisation development activities emerging from Northern Ireland's Research Organisations. Specific discussions on HSC, and its participation, are included in paragraph 5.2.2.

At this stage, it is appropriate to conclude that there is sufficient evidence of market failure to support the strategic rationale for a future PoC programme.

5 REVIEW OF PHASE II POC ACTIVITY AND PROCESSES

5.1 Introduction

As part of this Interim Evaluation, BDO issued electronic surveys to the PIs participating in the Phase II PoC programme. There were 38 responses to the Phase II PoC survey. PIs were questions on various aspects of the Phase II programme including marketing, notice periods for applications, the Invest NI processes, support from the Research Organisations and further support required from Invest NI. Full details are included in Appendix X.

5.2 Review of the current Phase II Activity and Processes

5.2.1 Phase II PoC Programme Activity

The activity targets for Phase II comprised 104 applications to be received and 69 projects to be funded. Invest NI had five calls for applications prior to September 2013, with 102 applications received. 67 awards had been made, including one PoC sequential award, with Phase II now considered to be complete, subject to any further PoC Plus awards being made[49]:

Table 5.1: Phase II: Closing dates for applications							
Phase II calls	**12/01**	**12/02**	**13/01**	**13/02**	**13/03**	**Overall actual**	**Target for Phase II**
Closing dates	**28 Sept 12**	**30 Nov 13**	**31 Jan 13**	**29 Mar 13**	**26 July 13**		
Applications by call							
QUB	0	15	12	18	15	60	
Ulster	14	12	2	4	5	37	
AFBI	1	0	0	0	2	3	
HSC	1	0	1	0	0	2	
Total	**16**	**27**	**15**	**22**	**22**	**102**	**104**
Awards	**10**	**19**	**12**	**14**	**12**[50]	**67**	**69**
Success rate	**63%**	**70%**	**80%**	**64%**	**54.5%**	**65.7%**	**66%**

QUB did not submit any applications in the first call for applications, due to its concerns on the removal of indirect costs from eligible costs.

Table 5.2: Phase II: Successful awards by Research Organisation					
Phase II	**QUB**	**Ulster**	**AFBI**	**HSC**	**Overall Total**
Total Applications	60	37	3	2	102
Awards	43	22	2	0	67
% total conversion	**71.67%**	**59.46%**	**66.66%**	**0.00%**	**65.7%**

[49] For the 5th call, the closing date for applications was 26th July 2013, with awards made in January 2014. The delay is attributed to the number of applications in the last two calls (22 in each) and difficulties in organising the Panel Assessment meeting, due to holidays and diary commitments

[50] These were awarded after 30 September 2013

Conversion rates in Phase II averaged 65.7% which compares to 75% conversion rates in the Pilot and 63% in Phase I. For comparison, the conversion rate for the comparable EI programme is 35-40%.

The conversion rates of applications peaked at 80% in call three, falling to 64% in call four and 54.5% in call five. The higher conversion rates at the start of the programme are attributed by Invest NI to the build up in "good" projects between Phase I and Phase II, although it is noted that conversion rates were lower in calls one and two than in call three. The former reflects the fact that QUB did not participate in the first call of Phase II call. Their conversion rates are generally higher, hence this pulled down the overall PoC performance. In terms of conversion rates in the latter calls, Invest NI stated that a small number of projects are being submitted by the Research Organisations which are at an earlier stage than TRL stage 3 and where the Research Organisation focus should be on the Research Councils for funding rather than the PoC programme. This is likely to account for a small number of projects.

There have been delays in the commencement of projects, partially due to Research Organisation's recruitment processes and timescales, which was an issue faced by the PIs in the Pilot and Phase I programmes. There have also been delays in the agreement of the procurement processes for the commercialisation mentors.

The timescale from application closing date to awards has varied from 6 weeks to 5 months for the first 5 calls. Feedback from the Research Organisations/PIs was that the process has been longer than anticipated, with a request for improved communication from Invest NI on potential award dates.

The sectoral analysis of projects supported is set out in Table 5.3 below. It is evident that the emphasis (from both QUB and Ulster) has been on L&HS projects, which accounted for 43% of all Phase II projects. This is comparable to the Pilot and Phase I PoC programme where 33% and 48% of projects were L&HS projects. The benchmarking exercise indicates that SE also had a majority of L&HS projects (54%) as compared to EI where 28% of projects were L&HS:

Table 5.3: Phase II - Sectors supported

	QUB	Ulster	AFBI	Total	Total
Advanced Engineering	5	1	0	6	9%
Advanced materials	6	5	0	11	16%
Advanced materials/L&HS	1	1	0	2	4%
Agri-food	3	0	2	5	7%
ICT	7	4	0	11	16%
Life and Health Sciences	20	9	0	29	43%
Sustainable energy	0	2	0	2	4%
Telecommunications	1	0	0	1	1%
Total	**43**	**22**	**2**	**67**	100%

There has been some follow on of projects from the Pilot and Phase I stage, or new applications (in new areas) from serial PI applicants:

- There were 8 QUB PIs and 5 Ulster PIs, successful at Phase II, and who have already been awarded Pilot and Phase I funding; and
- There was also 1 Ulster PI who has 2 Phase II PoC awards.

As at February 2014, Invest NI had committed funding totalling £6.982 million under Phase II, with total funds now committed[51]:

Table 5.4: Phase II - Funding approved						
Phase II calls	**12/01**	**12/02**	**13/01**	**13/02**	**13/03**	**Overall Total**
QUB	£0	£1,368,590	£1,052,277	£1,156,706	£939,870	£4,517,443
Ulster	£927,332	£597,866	£211,247	£310,868	£209,331	£2,256,644
AFBI	£105,403				£103,83	£105,403
Total	**£1,032,735**	**£1,966,456**	**£1,263,524**	**£1,467,244**	**£1,253,037**	**£6,982,996**

5.2.2 The Processes for the Phase II PoC Programme

The current Phase II PoC programme was to be a two year and seven month programme, although, in fact, funding has been largely committed in less than 2 years.

Guidance and Marketing: Invest NI has worked with the Research Organisations to market the PoC programme, with presentations by Invest NI to all of the Research Organisations. Guidance on the PoC programme has been issued to the Research Organisations for dissemination amongst the relevant schools. The Phase II launch was supported though detailed guidance issued by Invest NI to the Research Organisations, including clarification on the definition of Prior Art, and the new features of the programme, including the role and skill set for the commercialisation mentors, as well as on PoC Plus and sequential PoC funding. Research Organisations have been critical of the timeliness of responses from Invest NI but all matters appear to have been resolved satisfactorily.

Selection Criteria: Invest NI has based its selection criteria for the PoC programme on the Research Council Follow on Fund model. Namely each successful applicant must demonstrate scientific quality, commercial potential, regional impact, quality of the development plan, including clear objectives and milestones (both technical and commercial) and added value, how PoC funding will enhance the prospect of commercialisation and/or increase the value of the technology.

[51] As per para 5.9, the total to be spent directly on Phase II PoC projects was £6.786m. There was an underspend on the market appraisals, hence monies have been diverted to a further PoC. As noted in para 5.9, funding from GIAp was no longer available, hence, contrary to the assumption in the Economic Appraisal of Phase II, PoC has allocated commercialisation monies to L&HS projects. Further funding is likely to be available for PoC Plus funding

Regional benefit is defined, ie the commercial potential of the project output in terms of a) providing the basis for setting up a new commercial enterprise in Northern Ireland and/or b) licencing the technology to improve the competitiveness of industry in Northern Ireland must be clearly elucidated. If the project is not expected to result in the creation of a NI company or licence to an existing NI company, the applicant must demonstrate how the project will result in an economic impact for NI by other means.

In addition, it was a condition of funding, as set down by DETI, that Invest NI should identify an arbitration process in the event that commercialisation options, with regional impact, were not being pursued.

Sectors supported: All DETI priority sectors are represented within the 67 projects, with a continued predominance on L&HS projects. Feedback from MATRIX is that there should be an opportunity for MATRIX champions and representatives to engage with the relevant schools within the Research Organisations on an ongoing basis, to encourage applications and ensure a two way communication process between academia and industry.

Market and Panel Appraisal: Applications successful at the initial sift are selected for patent and market appraisal assessment. The feedback from Invest NI and the external panel assessors was that the quality of the market validation reports and patent reports was reasonable. The Research Organisations have however voiced concerns citing that the marketing appraisers have limited ability to assess niche areas. The difficulty in establishing a framework of appraisers to cover all niche areas is however acknowledged.

Panel Assessment: The initial sifting of applications is conducted internally by Invest NI. The assessment panel includes representatives external to Invest NI, Invest NI sectoral staff and the PoC Invest NI programme management. Given the number of applications, PIs are not invited to present their projects to the panel assessment team. The Research Organisations have queried the experience of those conducting the panel assessments, and whether or not an element of peer review should be introduced given the niche areas that are being submitted, and the challenges that Invest NI face in identifying relevant expertise amongst those on its framework for market assessment. External panel members noted that they were rely heavily on panel members with subject matter expertise. It is noted that the benchmark regions draw upon a wider pool for the panel assessments, including venture capital representatives and experts from outside the region (by remote assessment).

Monitoring: Invest NI monitors the progress of PoC projects through the attendance at selected project management meetings, review of progress reports submitted with grants claims and attendance at Quarterly Programme Management meetings with the relevant Research Organisations.

The LoO issued indicates that monitoring data on commercial outcomes should be provided to Invest NI as it requires the same (with no specified period defined). It is unclear as to the extent to which spin-outs from PoC may agree to such monitoring conditions, or are aware of the same. It also notes that Invest NI can appoint a consultant to assess the commercial potential up to three years post project completion. Current monitoring focus, through the progress reports, is on the technology development inputs and activities rather than the impact of commercialisation activities or action required to maximise commercialisation outcomes with regional impact. This is an area where Invest NI is seeking to address through the introduction of a longitudinal Monitoring Framework. As part of the Terms of Reference for the Interim Evaluation of Phase II, there was a requirement to develop a monitoring and evaluation (M&E) framework for the PoC programme. This is included as Appendix XV.

Resubmissions: Unsuccessful projects have an opportunity to resubmit to Invest NI. Formal feedback is provided to the Research Organisation and they can also avail of a face to face meeting with a PoC representative. Invest NI could however be more proactive in working with the Research Organisation/PIs to ensure that all good projects are well placed to proceed through the rigours of the selection process.

Commercialisation Mentors: As at January 2014, only a small number of commercialisation mentors have been appointed, although recruitment was starting to accelerate. Initial concerns raised by the Research Organisations included the need to identify three relevant candidates for procurement purposes[52] and the level of funding available over a 24 month period (whilst £6k is stated to be the minimum, there is stated to be little scope in the overall budget to increase the allowance above this)[53]. The concern was that there was a reliance on recruiting experienced mentors working on a pro bono basis with a view to securing a potential interest in a start up company. Notwithstanding this, it is noted that the Research Organisations can request monies in the commercialisation pot to be vired to the commercialisation mentor.

With many mentors appointed only recently, or in the process of being appointed, the value added of the commercialisation mentors has yet to be assessed. The expectation is however positive: 61% of the PIs were of the view that commercialisation mentors would add value to the PoC project, whilst 34% did not yet know as they were too early in the process. Additional funds for commercialisation mentors should however be considered where commercialisation budgets are fully utilised.

[52] University procurement procedures were out of line with Government procurement requirements. This was highlighted during European Article 13 and 16 checks. It is also acknowledged that mentors would have to "gel" with the PIs.

[53] Historic evidence suggests that commercialisation monies are not fully drawn down and does not support this argument. Invest NI can vire commercialisation monies into the mentor pot.

Eligible costs and Maximum funding: Phase II increased the technical development phase from 12 to 18 months, and kept the maximum funding available at £80,000, despite removing indirect costs as an eligible cost. Feedback from Research Organisations is that the level of funding is still only sufficient to employ a Research Assistant for a 12 month period, with the remaining funding required for technical consumables, patent costs, technical sub contract costs etc.[54] Generally, however, there is a concern that salaries provided for under PoC are not competitive[55] and that this impacts upon recruitment.

The Research Organisations have also queried the level of annual funding available for Research Assistants and the ability to meet competitive salary expectations. Further queries were in relation to the opportunity to transfer monies between the two strands (technical development and commercialisation strand).

It is understood that there is no limit in PoC on salary costs, subject to the overall maximum funding within each strand. The Evaluation team would be concerned that with any potential merging of the technical and commercialisation budgets, that the PIs' focus continued to be on the research aspects, hence the separate commercialisation budget should be maintained. Consideration could however be given to assessing the adequacy of the overall ceiling for PoC (at £80,000 for the technical development stage), given the concerns raised, and recognising that projects will have different requirements, depending on the need to develop prototypes, clinical trials etc.

PoC Plus and PoC Sequential Funding: Due to the early stage of projects, there has been only 1 application for PoC Plus, which has been provisionally recommended for support (but not formally approved). One application has also been received for PoC sequential funding.

Feedback from PIs is that these additional funding sources should be sufficient to bring their projects to a commercial outcome, although, for many PIs, it is too early for them to make an assessment. Given the high number of L&HS projects, it is unclear as to why further notification has not been given for sequential projects. It is noted however that for 13 PIs, Phase II awards follow on from previous PoC funding[56]. The Research Organisations have raised concerns that PoC Plus and sequential funding requires further panel assessment, rather than being determined solely at the initial application stage. The Evaluation Team's view is that there is considerable merit in reviewing key milestones and the proposed practice should be maintained.

[54] Note, however, that one third of all Phase II funded projects will last longer than 12 months
[55] The feedback from Invest NI is that the same applies to other Invest NI programmes such as Competence Centres and KTP.
[56] The Research Organisations would claim that the majority of PoC from Multiple applicants are not related

HSC Participation: There have been two applications from HSC (with neither successful). Feedback from HSC is that the PoC programme does not fit well with its strategic objectives (where funding constraints have led it to focus on developing IP on a collaborative basis with industrial partners, whereby the partners incur patent and further development costs). Moreover, they further cite difficulties in doctors engaging with PoC through back-filling posts (or proportions of them) as well as the fact that their projects are more likely to be focused on developing innovative processes, rather than products, with resultant improvements in local healthcare outcomes, and these do not fit well with the strategic objectives of PoC. The PoC criteria, with its focus on commercialising publicly funded R&D, does not therefore, accommodate standalone HSC projects. HSC notes, however, that they are engaged with QUB and Ulster through the provision of clinical trials. It has asked that its role in the PoC programme is more prominently acknowledged, for example, through an opportunity for joint applications[57] or acknowledging of secondary partners. It also notes the opportunity to further promote its role in clinical trials to the PIs in the two Universities.

5.2.3 Conclusion on the Processes for the Phase II PoC Programme

The above indicates that the processes adopted for PoC are largely appropriate. Areas for improvement are set out in para 6.4 and include recommendations on the opportunity to improve marketing, regional impact; the arbitration process, the composition of the panel assessment team, the sectoral mix of projects, the turnaround times for approvals, the opportunity for increased participation/acknowledgement of HSC, the level of funding for technical and commercialisation activities (including the commercialisation mentor) and monitoring.

5.3 Assessment of progress towards activity targets

The activity targets for Phase II are set out in Appendix IX. There are 64 standard PoC projects, (to include projects with sequential funding) and 5 projects awarded PoC Plus funding. Table 5.5 sets out the progress towards targets.

[57] Note that the application process allows for joint applicants to be named; thereafter, however, in its documentation, Invest NI name only the lead applicant

Table 5.5: Phase II: Summary of monetary costs – Budget		
Category	**Target for Phase II**	**Actual to mid-February 2014**
Timescale	**2 years & 7 months**	**1 year & 4.5 months[58]**
Marketing & Patent Appraisals	104 applications	102 applications
Technology Development Support (Non-PoC Plus projects)	64 projects	67 projects
Technology Development Support (PoC Plus projects)	5 projects	0 projects
Commercialisation Support	41 projects[59]	67
Commercialisation Mentoring Support	41 projects[52]	66
Success rate	66%	65.7%

- At mid February 2014, there had been 67 awards against 102 applications, including one sequential PoC project;
- To date, only one PoC Plus application has been provisionally recommended for support (it has yet to receive formal approval); and
- Actual draw down and claims received at 21st March 2014 was £523,960 as against a target in the Economic Appraisal of £5.4 million[60] at March 2014. The substantially lower level of drawdown reflects the delays in the commencement of the programme and the projects, including delays in recruitment, and thus that PoC projects are at an earlier stage than originally envisaged.

The Research Organisations have indicated that, as PoC is a competitive call, there is no prioritisation of projects submitted, nor the submission of only the "best" projects. This can have negative repercussions for the Research Organisations, who have referred to quality projects[61] being rejected in a particular funding round whilst lower quality projects were accepted in other rounds.

Of the 67 awards, 8 from QUB and 7 from Ulster were applications from previous award holders of which only one is stated to be a follow-on project.

Feedback from the electronic survey of the Phase II PIs indicates that:

- 29% of PIs responding to the survey had not yet started the technical strand, with the majority (87%) being less than 25% complete;
- 50% of respondents have not yet commenced the commercialisation strand with 40% reporting less than 10% completed; and

[58] Based on period for date of first closing date for applications
[59] This lower figure is due to the fact LHS projects' commercialisation activity was to be supported by GIAp
[60] The £5.4m drawdown figure was an appraisal projection based on the programme starting in November 2011 and projects not experiencing delays (which have subsequently come from challenges over indirect costs being excluded from project costs, challenges over the procurement of commercialisation mentors and recruitment of Research Assistants)
[61] It is acknowledged that the definition of "quality" may differ between Invest NI and the Research Organisations. The emphasis for PoC must be on technically sound projects with strong commercial potential

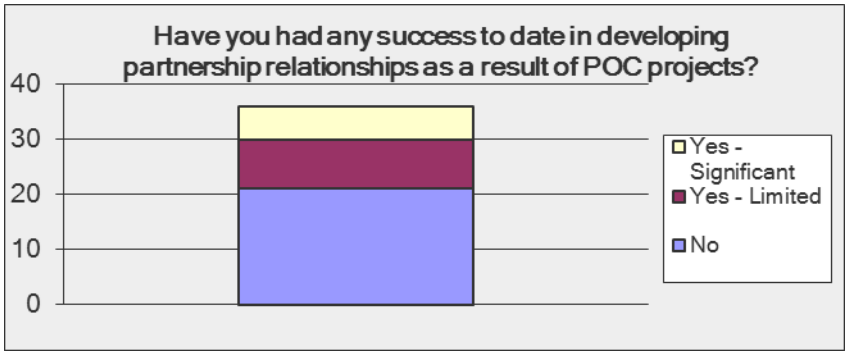
- The majority of PIs (28) expect to spend their full funding allocation with 6 anticipating that they would spend between 75% and 99%.

PIs were asked the extent to which they envisaged the technical objectives would be achieved, with only 16% anticipating that the technical objectives would not be fully achieved:

Table 5.6: Stage in technical strand		
	Number of responses	**% response**
Technical objectives not likely to be achieved	0	0%
Technical objectives likely to be 25% achieved	0	0%
Technical objectives likely to be 50% achieved	2	5%
Technical objectives likely to be 75% achieved	4	11%
Technical objectives likely to be 100% achieved	21	55%
Too early to say	11	29%
Total	**38**	**100%**

The electronic survey of Pilot and Phase I PIs indicated that only 5 out of 39 (circa 13%) had not achieved their technical objectives, with the main challenge being the achievement of commercialisation objectives.

Phase II projects have not yet achieved any commercial outcomes. However, 15 PIs of the 36 PIs completing the survey and responding to this question have already been successful in developing partnerships, with a number being with local companies or previous PoC spin-outs:



In terms of the progress towards outcome targets, (set out in Appendix IX), it is too early to report on how well Phase II projects are able to meet the objectives set out for the PoC programme.

Other changes in relation to the exclusion of indirect costs from eligible costs have caused challenges for the Research Organisations, particularly when other research funding bodies do contribute to indirect costs. For example, QUB state that a fully costed PoC project would cost £155,000, as compared to the £106,000 currently available. If applied to all 67 PoC projects in Phase II, this means the Research Organisations are committing £3.4m which is a significant motivation for them to commercialise these

projects, over one third of what is committed from HEIF IV funding to the Universities, ie £11.6m over 3 years.

The Research Organisations do however acknowledge the role of the Invest NI PoC programme in the commercialisation of research and the lack of alternative funding.

5.4 Assessment of Management and Operating structures for POC Phase II

5.4.1 Invest NI Management and Operating Structures

The management teams for the PoC programme (within Invest NI and the Research Organisations) are set out in Appendix III.

Invest NI has a small management team of three people who are responsible for the PoC programme. The volume of applications and projects supported (207 since the start of the PoC programme), has impacted upon the time available by the Invest NI PoC team to dedicate to each project, although there is regular formal and informal contact with the Research Organisations' Commercialisation Offices. Feedback from the Research Organisations indicates that the PoC Programme management team are extremely well regarded.

The feedback from the PIs to the Phase II survey included feedback on the Invest NI processes:

- Of the 38 Phase II respondents, all considered the notice period for the PoC programme to be more than sufficient or "about right"; and
- The majority of PIs were satisfied/very satisfied with the Invest NI processes and support.

The survey findings are summarised in Table 5.7 below

Table 5.7: Satisfaction with Invest NI's processes and support[62]:

	Satisfied/ very satisfied %	Dissatisfied/ very dissatisfied %
The timing of the Invest NI call for applications	95%	5%
The ease of completing the Application form	97%	3%
The market validation process	89%	3%
The patent appraisal process	71%	5%
The total level of funding allocated[63]	76%	24%
The mix of funding (technical and commercial) allocated	76%	16%
The period over which funding is provided	71%	29%
The process of funding the Technical and Commercial strands concurrently	79%	18%
The availability of PoC Plus Funding	47%	3%

[62] The above table excludes the "don't knows"

[63] Whilst it is noted that 76% considered funding to be satisfactory/very satisfactory, other feedback is that salary levels may not be competitive and this may impact upon recruitment

Table 5.7: Satisfaction with Invest NI's processes and support[62]:		
	Satisfied/ very satisfied %	Dissatisfied/ very dissatisfied %
The quantum of PoC Plus Funding	32%	8%
The availability of Sequential Funding	45%	3%
The quantum of Sequential Funding	32%	5%
The time taken to issue the Letter of Offer	79%	21%
The targets set within the Letter of Offer	95%	3%
The Invest NI monitoring process	76%	5%
The Invest NI payment process	59%	11%
Change management process (in the project, timing, cost etc)	61%	3%
Any information and support provided by Invest NI during the PoC programme	76%	3%
Invest NI communication channels with the Research Institute re the POC project	74%	8%

Areas of dissatisfaction were mainly in relation to:

- The period over which funding is provided (11 – 29%);
- The total funding allocated (9 – 24%);
- The time taken to issue the Letter of Offer (8 – 21%);
- Procurement of Commercialisation mentors (7 – 18%);
- The process of funding the Technical and Commercial strands concurrently (7 – 18%);
- The mix of funding (technical and commercial) allocated (6 – 16%);
- The identification of Commercialisation mentors (4 – 11%);
- The Invest NI payment process (4 – 11%);
- The quantum of PoC Plus funding (3 – 8%); and
- Invest NI communication channels with the Research Organisation regarding the PoC project (3 – 8%).

There was a high degree of "don't knows" around the adequacy of the availability and quantum of the PoC Plus and Sequential funding.

50% of PIs were satisfied/very satisfied with the process of identifying commercialisation mentors and 38% were satisfied/very satisfied with the process of procuring mentors[64].

Table 5.8: Satisfaction with Commercialisation mentors:		
	Satisfied/very satisfied %	Dissatisfied/very dissatisfied %
Identifying of Commercialisation Mentors	50%	11%
Procurement of Commercialisation Mentors	35%	18%

There were various levels of frustration in the delays in appointing mentors, and a lack of clarity if selected mentors had yet been appointed, but positive feedback once the process had commenced.

[64] Circa 40-45% were too early in the process with commercialisation mentors to comment

PIs noted areas where the processes could be improved, with the views of the Evaluation team also shown:

Table 5.9: Processes for Improvement	
PIs suggestions for Improvement	**Evaluation Team's response**
Less segmentation between funding of technical and commercial	There is a rationale for retaining this distinction
Timescale for starting projects to be more than 6 months to accommodate Research Organisation's recruitment timescales	This represents a reasonable target for commencement; Invest NI allow for extensions as applied for
Extending programme to 2 years	The technical development stage is 18 months. PIs can apply to PoC Plus where a further 6 months is required
Speedier application/approval process and better communication	This is an area that Invest NI can address
Consideration as to when recruitment could be better facilitated, ie start date of May in each year to facilitate recruitment and to ensure staff are not on holidays	In the event of a further PoC programme, this is likely to have a number of call dates, hence PIs can apply at an appropriate time
A broader pool of external market assessors, with greater expertise	As per para 5.2, this is an area that Invest NI may seek to address in any further programme

13 PIs of the 38 who completed the survey noted that further support was required from Invest NI. This included support in:

- Help with identification of industrial partners and collaborators;
- More funding to support prototype manufacture;
- Further funding;
- Consideration of multiple PoCs (note, this is available through sequential funding); and
- Assistance with marketing the PoC results.

In terms of the current service provision, the PIs noted:

- Additional support would be beneficial from Invest NI, in terms of commercialising the project, identifying partners and generally marketing the PoC outcomes. The feedback from Invest NI is that this responsibility lies better with the Research Organisations, however, the Evaluation Team would note the apparent "wraparound" support offered by SE and EI where the economic development agency is more intensively involved in the commercialisation process. Moreover, it is noted that Invest NI does not publish any case studies of PoC projects and this should be encouraged;

- There should be a two stage approach in the application stage, with support in the preparation of a Feasibility Study/Proof of Principle in

order to ensure quality PoC submissions[65]. This would appear to mirror the approach taken by benchmark regions in Scotland and Ireland; and

- The Market assessment reports (or parts of them) should be provided to the PI on a timely basis – at present, these are provided on request.

Other consultation feedback was:

Table 5.10: Other Consultation feedback
• There needs to be continuity of funding and not a stop-start process. This should apply to the full range of support including the University Seed Capital fund and the NISPO fund. For the University Seedcorn fund, terms and conditions must be reasonable. • There should be open rather than thematic calls. • PoC should support all MATRIX sectors and market growth areas including digital media as the impact on the economy could be significant. The EU has given guidelines for what constitutes innovation, and this is being updated. There is a need to demonstrate the scientific quality of projects in ICT and digital media. • The mentor process is well regarding although procurement has been challenging. The rate allowed (£6,000) assumes that mentor will not charge a commercial rate but will work largely pro bono. Additional monies should be considered. • There should be a databank of Invest NI investment in innovation, made available to businesses and strategic decision makers. • The length of time for commercialisation must be recognised for Life and Health Science projects. • There should be a focus on Technology push rather than Market Pull. The focus should be on Impact and the NI multiplier. A commercial filter should be applied to all PoCs – to identify unmet demand or identification of anchor customers (or definition of similar). There is a lack of knowledge in the business community on what is being offered through the PoC Programme.

5.4.2 Research Organisations' Management and Operating Structures

DEL's HEIF funding funds the management teams at QUB and Ulster responsible for the PoC programme. Details of the Management and Operating Structures within the Research Organisations are included in Appendix III.

As part of the electronic survey of Phase II participants, PIs reported that they became aware of the PoC programme mainly through the Research Organisations' Commercialisation Office, followed by the Research Offices and academic colleagues. The latter are therefore an important source of referral.

The majority of PIs were satisfied/very satisfied with the processes and support provided by the Research Organisation's Commercialisation Offices:

[65] It was envisaged that this would be carried out by the Research Organisations as supported by HEIF for QUB and Ulster

Table 5.11: Phase II: Satisfaction with the Commercialisation Office's processes and support[66]:		
	Satisfied/ very satisfied %	Dissatisfied/ very dissatisfied %
The marketing of the Programme	82%	13%
The guidance that was provided by the RI at Application stage	86%	11%
The support from the RI Commercialisation Office at the Application stage	89%	8%
Support provided in setting targets	81%	3%
Support provided during the PoC project	61%	5%
Support provided towards commercialisation	53%	11%
Support provided when preparing commercialisation plan	62%	5%
RO's communication channels with Invest NI in relation to your project	73%	8%
Overall project management	65%	5%

PIs were generally satisfied or very satisfied. For some, it was too early in the process to comment on the support during the PoC project duration.

The main areas of dissatisfaction related to:

- The marketing of the programme (5 – 13%);
- The guidance given during the application stage (4 – 11%);
- Support towards commercialisation (4 – 11%);
- The support from the Commercialisation Office at application stage (3 – 8%); and
- Research Organisation communication channels with Invest NI regarding the PI's project (3 – 8%).

As many PIs were at an early stage in their project, or had not yet commenced the PoC project, many were unable to comment on areas such as support during the PoC project, support towards commercialisation and in preparing the commercialisation plan and overall project management.

PIs considered that the PoC programme could be better marketed, including within the various schools. Details on websites could be enhanced or updated for all Research Organisations with the exception of QUB. There was a recognition that the PoC programme could dovetail more strategically with the Proof of Principle scheme. PIs welcomed detailed guidance from the Commercialisation Offices.

21 of the 38 PIs (55%) who completed the survey noted that further support was required from the Research Organisations in respect of achieving commercialisation outcomes. This included the following:-

[66] The above table excludes the "don't knows"

- General guidance on the Commercialisation plan and strategy, patent, branding, marketing, etc;
- Support in accessing commercial mentors;
- Support on accessing commercial partners;
- Guidance on steps to register a company;
- Guidance regarding IP and licencing; and
- Clarification on what does or does not constitute commercialisation activity, what activity is or is not supported, IP protection before talking to organisations, etc.

In terms of the current service provision, the Evaluation Team would note:

Resources within the Commercialisation Offices: Both QUB and Ulster have recently increased the resources in their Commercialisation Offices. Notwithstanding this, there are increasing pressures on the Commercialisation teams to manage a larger number of PoC projects, including the Pilot and Phase I projects.

It is noted that for QUB, responsibility for PoC projects transfers outside of the core PoC team on the creation of a spin-out or securement of a licence, ie to QUBIS and the manager responsible for IP management and licencing, respectively. For Ulster, the Head of Investment and Enterprise takes responsibility for spin out companies although the core PoC team retains responsibility for PoC projects with licences or options to licence.

For those PoC projects that are deemed to have the potential to be successful, and where licences/spin-outs have yet to be achieved, responsibility for the ongoing assessment of commercialisation opportunities rests with the core PoC teams. One particular challenge is that many of the core PoC teams were not in place during the Pilot PoC funding period.

In terms of workloads, there are 111 "active" PoCs, these deemed to be projects which have successfully completed the technology phase and with market opportunities not fully explored but where some commercial outcome is still envisaged:

Table 5.12: "Active" PoC projects per Research Organisations

	Pilot	Phase I	Phase II	Total
QUB	11	24	43	78
Ulster	1	5	22	28
AFBI	0	3	2	5
Total	**12**	**32**	**67**	**111**

"Active" PoC projects above include PoC projects where licences have been granted or there is an option to licence. A number of these are related, ie there are four PoC projects where there has been follow on PoCs within the same IP/application.

From the discussions with the Research Organisations, the Evaluation Team is not in a position to determine whether or not licences are being, or are likely to be, exploited to their full potential. We note instances where options for licences have been revoked because of a lack of progress.

Hence, even when licences have been granted, there is an onus on the Commercialisation Offices to continue to monitor closely.

There is no doubt that the Commercialisation Managers within each Research Organisation are more closely focused on the current Phase II rather than earlier Pilot or Phase I projects. The Commercialisation Managers also note the pressures on their workloads, stated to extend beyond PoC.

For those Pilot and Phase I projects in particular, there does not appear to be any road map as to how these projects might be progressed or commercialisation accelerated. Nor have there been detailed PPEs of each PoC project to determine why the commercial objectives were not achieved and what more could be done. As part of the electronic survey of Pilot and Phase I PIs, this Evaluation did seek details on further support needed, with over 50% of Pilot and Phase I "active and spin out "projects, that had fully or partially achieved their commercial outcomes, stating that further support was needed. This detail would need to be followed up on an individual basis by the Commercialisation Offices[67] and Invest NI. There would however be considerable merit in conducting a detailed review of the "active" PoC projects, working with Invest NI, to determine an action plan for each PoC active project. **These should be tied into the HEIF strategic plan.**

Given the often elongated timescale for the commercialisation journey for PoC projects, this action plan would need to be updated on an annual basis, until commercialisation or where the project is considered to be no longer active.

As noted, for both QUB and Ulster, responsibility for monitoring progress of the spin out companies falls outside of the PoC team. **It will be important that data on commercial outcomes continues to be captured by a single point of contact within the Research Organisation for reporting to Invest NI.**

As a final point, there are no guidelines within the PoC programme for succession planning; PIs have left or retired in the past and the PoC lost to NI or in its entirety.

Other points raised were as follows:

[67] Detailed responses have not yet been provided to the Commercialisation Offices

Support to PIs: The PIs appear to require support at every step of the PoC process. All of the Commercialisation teams consider themselves to be heavily involved in the PoC process, particularly in preparing the commercialisation aspects of the PoC application, and the Evaluation Team have been impressed by the commitment demonstrated.

There are, however, some areas to be addressed. Not all members of the Commercialisation team consider there to be a need to attend the market assessment visits alongside, and in support of, the PI. One successful PI of Phase I noted that there was no direct contact from the Commercialisation Office during his PoC project. The Evaluation Team's view is that the PIs need support at all stages in the initial application and assessment process, during the implementation stage and during the commercialisation journey. It is too early in the process of introducing the commercialisation mentors to know if the mentors can provide some of this support in lieu of the Commercialisation teams. Further, feedback from Invest NI and the external panel members is that applications have been received from PIs where the technical and market sections have been difficult to decipher, or where the project is not yet ready for PoC support (ie not yet at TRL level 3). It is however the responsibility of the Commercialisation Offices to ensure that applications submitted are "fit for purpose" and represent the best chance of approval for all worthy projects.

Given that the Commercialisation Offices at QUB and Ulster are funded through HEIF IV, there should be closer workings between DEL and Invest NI to ensure that PoC projects are being adequately supported.

Marketing of PoC research: The Research Organisations acknowledge that there is currently no system/database to market the PoC technical outcomes to potentially interested industrial partners. This becomes more important as PoC projects complete without having secured a commercial outcome[68], but still have market potential. They note the opportunity to market Pilot and Phase I PoC projects through the cross border R&D VITAL project which has recently been launched. They also note that this is a universal problem across all research schemes and not solely the PoC programme.

5.4.3 Conclusion on the Management and Operating Structures

The above indicates that the processes adopted for the PoC programme, in relation to management and operating structures are largely appropriate.

Areas for improvement are set out in para 6.4 and (excluding those already referred to) include recommendations on: improved timescales for approval and communication during the approval process; the introduction of a

[68] Responses to the Pilot and Phase I POC survey noted that commercial outcomes were delayed due to the fact that markets were difficult to penetrate, or the timescale to achieve commercial objectives was significant

uniform Proof of Principle scheme; increased sequential funding (where warranted); increased Invest NI support for projects including promotion through case studies; a process for marketing of all PoC projects and their results; a review of all active PoC projects and preparation of road map for each; closer working with DEL and linkages between HEIF funding and the PoC programme; a process for succession planning within PoC applications; more feedback through sharing of market assessment reports to PIs[69]; and consideration of all MATRIX sectors.

5.5 Review progress on implementation of agreed Action Plan from 2011 evaluation

Consideration has been given to the progress on the implementation of the agreed Action Plan relating to the recommendations arising from the 2011 evaluation. This is set out in detail in Appendix XI and includes:

- Recommendation in the Action Plan;
- Invest NI management response;
- Implementation date;
- Monitoring update (September 2012); and
- Evaluation Team's commentary.

It is noted that the recommendations from the 2011 evaluation were effectively modified by the follow-on Economic Appraisal. Overall, the recommendations in the Action Plan and commentary by the Evaluation Team are summarised as follows:

Table 5.13: Recommendations in 2011 Action Plan and Status

Rec. No.	Action Plan Recommendation	Update on Status as per Evaluation Team
1	Invest NI should continue to support the PoC programme on a competitive basis. There should be three calls per year for the PoC programme, with no more than 5 or 6 projects funded under each call. Calls should be organised around predetermined "themes", linked to Invest NI and MATRIX priority areas, and likely to include ICT, Health and Life Sciences and engineering. Invest NI should support a spread of projects across those where research can be completed within 12-24 months and those where the timescale is up to 5 years, with criteria being communicated to the Universities/Institutes.	PoC has operated in line with EA. There were 2 calls in 2012 and 3 in 2013. There has been an average of 13 approvals per call in the 5 calls. The higher number of calls would support the House of Commons advice (paragraph 4.2.2) that Government should not limit the number of PoC projects it funds as it cannot "pick winners". No thematic calls as per EA and stated sectors supported although predominance of L&HS.

[69] Invest NI do share market assessment reports with the Research Organisations – these in turn, need to share these with the PIs

Table 5.13: Recommendations in 2011 Action Plan and Status		
Rec. No.	**Action Plan Recommendation**	**Update on Status as per Evaluation Team**
2	Invest NI should retain the amount of funding available to projects selected for support at a cap of £100,000, maintaining the split between the Technology Phase (£80,000) and the Commercialisation Phase (£20,000). The period of funding should be 12 months for the Technology Phase and 24 months for the Commercialisation phase, subject to 75% of Commercialisation funding incurred by month 18. Invest NI should introduce a follow on fund, available on a competitive basis, to priority projects.	Funding approved at a maximum of £106000, split £80,000 technical and £26,000 commercial. The additional commercial funding was introduced to accommodate the commercial mentor at £6,000. Period of funding a maximum of 18 months for technical stage and 24 months for commercial stage. Follow up funding (PoC Plus and Sequential funding) introduced, the former for a targeted 8% of projects. No targets on drawdown of Commercialisation funds at 75% within 18 months.
3	The Universities/Institutes should ensure that the PoC programme is widely marketed throughout the Organisations. Planning for PoCs should include sufficient allowance for the timescale for recruitment. Individual applications to Invest NI for PoC funding, from the Universities/Institutes should include independent endorsement of the market opportunity and patent opinion.	Feedback indicates that more could be done to market PoC. QUB in particular has increased its team to include a focus on engineering etc. INI has presented to the Research Organisations. The feedback is that the recruitment processes have improved, although allowances are made for delays. Not clear as to the extent to which there is independent endorsement of the market opportunity. This area will still need to be addressed. All applications are subject to independent market appraisal and patent appraisal by INI.
4	The composition of the assessment panel to be extended to include sectoral experts, for example, linked to MATRIX, NISP CONNECT, and ITLG. These newly constituted panels should also take the decision in relation to follow on funding, as well as the merits of supporting PoC projects which are far from market, with this dictated by its appropriateness to the sector. All PIs should be interviewed by the Assessment Panel.	INI has sought to engage with sectoral experts, including from MATRIX, but operates with a limited pool and heavy reliance on 1 or 2 individuals at each panel. There are no venture capital representatives. L&HS is represented although all niche areas will not be represented The panel does include Invest NI internal sectoral experts - within the R&D division there is significant expertise in a range of sectors qualified at Phd and MSc level, including former research scientists.

Table 5.13: Recommendations in 2011 Action Plan and Status		
Rec. No.	**Action Plan Recommendation**	**Update on Status as per Evaluation Team**
		All PIs are interviewed by the market and patent appraiser but do not present to the panels. The PIs have requested updates on progress after the application is submitted. PoC Plus requests are to be reassessed by the panel, based on an update to the original application.
5	There should be a structured monitoring programme in place. The Universities/Research Organisations should present summary monitoring reports for each project to Invest NI on a six monthly basis, to include (as appropriate) details of patents filed and secured, commercial partners identified and secured, follow-up research income, spin out established, licence agreements, spin out income and employment, licence income. All PIs to present their progress against milestones to a Monitoring Committee on an annual basis, this committee to comprise Invest NI and members of the expert panel. Universities/Research Organisations to continue to submit monitoring reports to Invest NI for 10 years post funding. Invest NI to establish realistic targets for project success.	Monitoring is focused on the technical aspects. There are quarterly meetings, where Invest NI records the verbal update on the commercialisation progress. The intention is to introduce formal post project monitoring for a 13 year period post completion. This would require a substantial IT led data gathering process, eg a secure portal with log-in.
6	There should be clearer communication from the Universities on the progress being made in respect of each PoC project. Progress reports to be submitted 1 month after each quarter end and to include details on the partners engaged, quarterly progress with partners and proposed programme for the next three months. Case studies of successful PoCs should be published on the websites of the Universities/Institutes and Invest NI.	Progress reports are submitted but focused on technical progression. Case studies have not yet been published. There could be better communication of PoC projects and marketing to encourage commercial interest.
7	The Universities/Institutes and Invest NI to agree a structured mentoring programme for each PoC project within 1 month of the LOO, to include Invest NI global start/sectoral teams, NISP CONNECT and other industrial experts as agreed.	There was initially reluctance by the Research Organisations to accept the commercialisation mentors due to concerns over procurement. These issues appear to have been addressed internally within the Research Organisations although the majority of PoC projects have yet to appoint mentors.
8	Funding for Commercialisation Offices, post 2011, should be clarified as soon as possible, thus ensuring the retention of staff for the management of the PoC programme.	HEIF IV funding in place to 2015/16. This needs to link in better to the PoC targets.
9	Invest NI should seek meetings with Scottish	Meetings were held with SE and EI in

Table 5.13: Recommendations in 2011 Action Plan and Status		
Rec. No.	**Action Plan Recommendation**	**Update on Status as per Evaluation Team**
	Enterprise and Enterprise Ireland, in late 2010, and assess the relevance of the findings from their Evaluations to Invest NI.	2011. Discussions with both as part of the evaluation indicate a willingness to engage with Invest NI on a more regular basis.
10	Value for money should be considered in the context of the Scottish achievement, feedback from the NI Commercialisation Offices on successes to date (spin outs, licences and follow on funds), potential for income from spin outs and licence deals (where estimated) and the timescales to such realisation (up to 10 years). Further investment in PoC should be considered on the basis of an Economic Appraisal, with this to include an update on success to date.	Value for money is being considered as part of the Evaluation (section 6).

The areas for further action[70] are in relation to: Independent endorsement of market opportunity by the Research Organisations (possibly through a Proof of Principle scheme); targets for drawdown of commercialisation funds as written into LoOs; inclusion of venture capitalists on the Assessment Panels; and regular meetings by Invest NI with SE and EI.

The need for PIs to present at the panel assessment meetings was considered. It is understood that this did not progress because of perceived impacts on the length and number of panel meetings. Industrial applicants to other Invest NI R&D schemes do not present to decision-makers. The current process, which is focused on the marketing appraisal and patent assessment, is therefore considered to be appropriate.

5.6 Identification of Risks in PoC Phase II and actions taken to reduce risks

The risks identified at the outset for the PoC Phase II programme were:

1. Lack of programme demand;
2. Duplication of support being provided as part of the GIAp or HEIF;
3. Projects/programme fails to realise commercial benefits;
4. Accrual of economic benefits outside of NI; and
5. Limited drawdown of commercialisation funding leads to programme underspend.

[70] Those not discussed earlier in the report

Lack of programme demand

At the time of this Interim Evaluation[71], there have been 102 applications to the PoC programme against a target of 69 over the life of the programme. Hence, there is no evidence of a lack of programme demand, albeit it is too early to assess the quality of projects awarded funding.

Duplication of support being provided as part of the GIAp or HEIF

The following is noted:

- Whilst the risk of duplication of support was raised at the Economic Appraisal stage, the Evaluation Team is confident that this has not materialised;
- GIAp was discontinued in 2011, before the Phase II programme was launched;
- DEL's HEIF IV funding was approved in mid 2013. This supports the staff resource in the two Universities' Commercialisation Offices, and Proof of Principle funding for three years for QUB and one year for Ulster. HEIF does not support PoC activity. The Evaluation Team recommends that there continues to be dialogue between DEL and Invest NI to ensure that collective funds are best targeted and that PoC funding (and supporting activities) is maximised; and
- Reference is also made to the findings of Invest NI's Commercialisation Study.

Projects/programme fails to realise commercial benefits/ Accrual of economic benefits outside of NI

At the date of this Interim Evaluation, projects have not progressed sufficiently in order to determine the extent to which these risks are likely to materialise. **Notwithstanding this, PoC is a high risk initiative, taking early stage research and seeking to identify its commercial potential.**

Invest NI acknowledges that as the PoC programme seeks to provide support for unproven early stage technology development, coupled with the significant gestation period that may be required in order to derive a positive commercial income, the PoC projects, are, by their very nature, high risk investment projects. Hence, there is a high likelihood that a significant proportion of projects may not derive any, or any significant, monetary outcome.

Notwithstanding this, Invest NI has introduced a number of new measures in Phase II to maximise the potential for success; namely, the introduction of additional funding (PoC Plus and Sequential funding), the introduction of commercialisation mentors and a more robust selection process (with

[71] September 2013

market and patent assessments available in advance of the panel assessment meetings).

Moreover, Invest NI notes in the planning for Phase II that it will encourage the Research Organisations to place greater emphasis on identifying the market potential of the technology, including potential sectors and customers, as well as ensuring that commercialisation activities are conducted in a timely manner.

The Evaluation Team's view is that there is a robust application and selection process in place.

Challenges in agreeing the procurement processes for commercialisation mentors has meant that the majority of Phase II PoC projects are lagging behind the proposed timescale for their commercialisation activities. This procurement issue appears to have been resolved.

The Evaluation Team is of the view that a number of other mitigating actions should be introduced in order to maximise the potential for success. These are included in Table 5.13.

Accrual of economic benefits outside of NI

There is a challenge in securing economic benefits for NI, particularly where licences were granted to overseas companies. As noted in paragraph 5.2.2, the application process does seek information on how regional benefits could be accrued, including spin outs and the licencing of technology to NI companies. At present, Invest NI has no opportunity to influence the decision-making process within the Research Organisations. Discussions were held at the commencement of Phase II on an arbitration process being introduced (see paragraph 5.2.2) but this was rejected by the Research Organisations. This should be further reviewed by Invest NI.

Limited drawdown of commercialisation funding leads to Programme underspend

The experience of the Pilot and Phase I was that only 80% of technology development and circa 40% of commercialisation funds were drawn down. The latter has been partially attributed by Invest NI to concerns by the PIs that inappropriate spend may result in clawback by Invest NI.

The current mechanism allows for sequential funding awards to be given to worthy projects. To date, there has only been one application for sequential funding and one application for PoC Plus. It is noted that a number of PIs in Phase II have already had PoC projects funded under the Pilot and Phase I

programmes, hence there is already an element of follow on funding in place[72].

5.7 Timescale for assessing benefits

A key issue for the PoC programme is the timescale for assessing benefits. It is worth noting that both Scottish Enterprise and Enterprise Ireland define success within timescales of circa 5 years (timescales generally being from the end of the PoC funding):

Table 5.14: Timescales for impact per benchmark areas	
Benchmark region	**Definition of success for PoC**
Scottish Enterprise	Post project completion, the project must have the potential to generate an annual turnover of £5m within 5 years, or which has the potential to secure £10m of investment within 5 years.
Enterprise Ireland	The innovation should be exploitable in Ireland ideally in 2-5 years either as part of a technology-based start-up company or through licencing to a company in Ireland. Enterprise Ireland does recognise that some innovations take longer to get to market than others

The timescale to realisation of commercialisation benefits will vary by sector, being shorter for ICT projects and longer (10-15+ years) for L&HS projects. It is noted that Scottish Enterprise stipulates in its Letters of Offer that projects should return monitoring data to SE for a 10 year period, post funding. EI have stated that monitoring timescales differ on a project by project basis. It is noted that the funding resources are higher for both of the new SE and EI schemes, which would help to accelerate the commercialisation process.

The Evaluation Team notes that the above are targeted timetables and progress against the same has not been evaluated (with these targets being introduced in 2010 and 2011 respectively).

The feedback from the Pilot and Phase I questionnaire indicated that, where a project has had not yet realised commercial success, that a positive outcome was anticipated in 2-5 years[73] for 56% of projects (n=9).[74]

The case for Phase II in the Economic Appraisal was made and accepted on the basis that monetary benefits would start to be derived by those projects that commercialise in the sixth year after the completion of the PoC project and that these monetary benefits for the NI economy would be derived over a maximum period of seven years thereafter as a direct result of PoC (after which time any benefits would no longer be attributable to the intervention). Thus, for those projects that do commercialise, a timeline of circa 15 years from commencement of the PoC project to the end point for

[72] Note that the Research Organisations have stated that PoC projects from multiple award holders are generally not directly related
[73] From the date the question was asked i.e. currently
[74] 22% said 1-24 months, 11% said 6-10 years and 11% didn't know

attribution of monetary benefits is appropriate as a reference point for assessing Value for Money (VFM).

This Evaluation review (as discussed in Section 2.4) suggests that the trajectory for ICT projects will be shorter, but even these types of projects can take several years post PoC to generate a revenue stream. In general terms, it does suggest that the timescale applied in the Phase II economic appraisal, is appropriate as a very broad reference framework.

5.8 Consideration of prioritisation of PoC support

The Evaluation Team's view is that the MATRIX themes and all other projects offering strong regional economic impact should be supported. There should be further spread amongst the sectors supported.

5.9 Comparison of actual and estimated costs for Phase II

Consideration is given to the comparison of the costs actually incurred on the Phase II PoC programme with those estimated at the outset. The estimated costs for Phase II were as follows:

Table 5.15: Summary of Phase II monetary costs - Budget

Cost Category	Unit Cost	Yr 0	Yr 1	Yr 2	Yr 3	Yr 4	Total
Programme Delivery Costs							
Marketing & Patent Appraisals	£5,400	£151,200	£205,200	£205,200	-	-	£5.4k x 104 applications = **£561,600**
Technology Development Support (Non-PoC+ projects)	£80,000	£432,000	£1,568,000	£1,840,000	£1,136,000	£144,000	£80k x 64 projects = **£5,120,000**
Technology Development Support (PoC+ projects)	£120,000	£34,286	£137,143	£222,857	£154,286	£51,429	£120k x 5 projects = **£600,000**
Commercialisation Support	£20,000	£48,571	£180,000	£291,429	£214,286	£85,714	£20k x 41 projects = **£820,000**
Commercialisation Mentoring Support	£6,000	£10,200	£41,400	£86,400	£72,000	£36,000	£6k x 41 projects = **£246,000**
Total Direct PoC funding		£525,057	£1,926,543	£2,440,686	£1,576,572	£317,143	£6,786,001
Sub-total		**£676,257**	**£2,131,743**	**£2,645,886**	**£1,576,572**	**£317,143**	**£7,347,601**
Programme Administration Costs							
Salary Costs		£55,611	£111,222	£111,222	£27,805	£13,903	**£319,763**
Marketing		£3,600	£3,600	£3,600	-	-	**£10,800**
External Evaluation Costs		-	£18,000	-	£18,000	-	**£36,000**
Sub-total		**£59,211**	**£132,822**	**£114,822**	**£45,805**	**£13,903**	**£366,563**
Total		**£735,468**	**£2,264,565**	**£2,760,708**	**£1,622,377**	**£331,046**	**£7,714,164**

The budget profile above assumed 69 projects with the following noted:

- Average projects costs were circa £98,300; the reduction in the maximum budget of £106,000 reflected the then view that commercial costs of the L&HS projects would be funded through the GIAp, with this then subsequently ceasing before Phase II was launched; and
- The assumption was that 5 projects would be funded under PoC Plus.

The amount committed to 67 PoC projects awarded funding at February 2014 was £6.982m[75]:

Table 5.16: Phase II – Funding approved						
Phase II calls	**12/01**	**12/02**	**13/01**	**13/02**	**13/03**	**Overall Total**
QUB	£0	£1,368,590	£1,052,277	£1,156,706	£939,870	£4,517,443
Ulster	£927,332	£597,866	£211,247	£310,868	£209,331	£2,256,644
AFBI	£105,403				£103,83	£105,403
Total	**£1,032,735**	**£1,966,456**	**£1,263,524**	**£1,467,244**	**£1,253,037**	**£6,982,996**
Phase II total budget						**£6,786,001**

The spend profile above is before PoC Plus funding awards. The average committed spend per project is £104,224. As at January 2014, £188,912, including Vat, has been paid for 53 marketing and patent appraisals.

Actual draw down and claims received at 21st March 2014 was £523,960 as against a target in the Economic Appraisal of £5.4 million[76] at March reflecting the early stage of the majority of projects.

Committed spend is higher than budgeted due to the budget excluding commercialisation support for L&HS projects (with these to be supported under GIAp) and a higher number of projects being funded[77]. Invest NI has indicated that the experience of the Pilot and Phase I was that actual spend was 19% less than that committed and the same could be expected for Phase II. Accordingly, Invest NI has profiled a spend profile lower than that committed within its cash flow forecasts.

5.10 Equality

This section of the report provides an Equality assessment of the Phase II PoC programme.

[75] This was based on a start date in 2011 – for reasons set out earlier, the programme has been delayed
[76] The £5.4m drawdown figure was an appraisal projection based on the programme starting in November 2011 and projects not experiencing delays (which have subsequently come from challenges over indirect costs being excluded from project costs, challenges over the procurement of commercialisation mentors and recruitment of Research Assistants)
[77] Higher costs are partially offset by lower market and patent appraisal spend

As a recognised public authority, Invest NI has an obligation, under Section 75 of the Northern Ireland Act 1998 to provide equal opportunities for all in relation to nine categories: religious belief, political opinion, racial group, gender, marital status, age, persons with a disability and those without, persons with dependents and those without and sexual orientation. On recognition of the obligation to provide equality of opportunity, Invest NI's website (www.investni.com) outlines the following equality statement:

"Invest NI is committed to achieving a successful economy in Northern Ireland which provides equal opportunities for all citizens. The organisation works to fulfill its responsibilities across the spectrum of Government policy relating to Equality, the Lifetime Opportunities - Anti-Poverty and Social Inclusion Strategy and Human Rights."

Invest NI details in its Equality Scheme how it continues to meet its Section 75 responsibilities through its arrangements for monitoring any adverse impact of policies on the promotion or equality of opportunity.

The Evaluation Team's review of the programme's activities indicates that the programme is available to all academics.

The programme has undergone equality screening as part of the Equality Impact Assessment, carried out for all Business Development Services programmes by the Invest NI Equality Team. As a result any adverse impact relating to PoC programme has been mitigated against.

6 CONCLUSIONS, LOOKING FORWARD AND RECOMMENDATIONS

6.1 Conclusions

A key focus of this Interim Evaluation of the PoC Phase II programme is the assessment of the outcomes, value for money and wider economic benefits gained from the delivery of the Pilot and Phase I PoC programme. The Phase II PoC programme is not yet at a stage to determine outcomes; and, as such, this Interim Evaluation of Phase II is focused on processes rather than outcomes, and seeks to provide qualitative and quantitative information on current and projected performance that will help inform decisions on improvements to the current PoC programme and the future of the programme (i.e. a potential Phase III PoC programme).

In terms of its strategic fit, the importance of innovation and commercialisation of the public sector funded research base is recognised at a UK and international level as a means to increasing competitiveness, employment and business growth. The PoC programme is critical as a basis of funding such activity in NI, with there is considered to be minimal duplication with/displacement of other programmes/activity operating in NI/UK.

The UK Government has also provided recent endorsement of the need to fund PoC projects, cautioning also against narrowing the range? of projects supported.

Notwithstanding this, PoC is a high risk initiative, taking early stage research and seeking to identify its commercial potential. This risk is likely to have increased by the high number of L&HS projects funded under all PoC funding rounds, typically requiring longer timescales and high levels of funding prior to commercialisation.

This Interim Evaluation presents a summary of the current success rate of the Pilot and Phase I PoC programmes, set out in Table 6.1:

Table 6.1: 'Current' Success Rate of Pilot and Phase I Funded PoC Projects in Achieving Positive Outcomes

PoC Projects reporting success	Pilot	Phase I	Number
Period funding awarded	**2003-2005**	**2008-2010**	
Spin out	8	14	22
Licence - ongoing	3	3	6
Licence - abandoned	4	1	5
Option to licence	0	2	2
Commercial income	9	13	22
Follow on funding	10	29	39
Employment	26	16	42
Any Positive result	15	34	49
Total Pilot and Phase I Projects	**40**	**65**	**105**
% Achieving Positive Outcomes	38%	52%	47%

Table 6.2 sets out the monetary achievements:

Table 6.2: Gross Monetary Impacts (Direct income) Arising from Pilot and PoC I (To Date)					
	Licencing Income (£)	Turnover from Spin Out Companies (£)	Income From Commercial Partners (£)	Total (£)	Spend on PoC
Pilot	£62,567	£1,820,982	£1,264,595	£3,148,144	£4,598,079
Phase I	£31,000	£688,067	£2,594,000	£3,313,067	£4,767,397

The interim Evaluation was conducted in the context of it being recognised that there was a lengthy gestation period between completion of a PoC project and the creation of a potential spin-out company or revenue stream (through licence income) for the Research Organisation. It was however noted that levels of revenue, if and when derived, would typically be significant. The Russell Group has further indicated that the typical timeframe from research to a successful spin out is around 17 years.

Table 6.1 indicates that there has therefore been almost double the number of spin outs when compared to the Pilot PoC programme in a much shorter timeframe, reflecting the fact that the quality of Phase I projects are of a better quality than the Pilot projects. The review of the PoC programme indicates that a less rigorous selection process was applied to the pilot programme and its results to date are not be an appropriate benchmark in order to assess the need and potential benefits of a future PoC programme.

Moreover, it terms of the commercial potential from Phase I projects, there is evidence that there are a number of good L&HS projects within Phase I, but that the outcome is likely to be licensing income into NI rather than spin-outs. It is also the view of the Evaluation Team that the removal of the GIAp programme since 2011 has potentially hampered the commercialisation of Pilot and Phase I L&HS projects and contributed to the low GVA impact to date.

Overall, in relation to the Pilot and Phase I programme, the outcomes and value for money assessment compares poorly against SE and EI, this being particularly obvious in respect of the comparison to SE. It should be noted, however, that SE/EI have a more holistic approach to PoC. In effect, the SE PoC includes the equivalent of Invest NI's GAP, Propel and NISPO type mechanisms built into the programme. Whilst Invest NI offers these programmes, they are not being accessed fully. Therefore this is not a strictly like with like comparison:

Table 6.3: Comparison with SE

	Scottish Enterprise	Invest NI - Pilot and Phase I
Achievements to date	10 year period 2001 to 2011: • 235 projects funded; • Over £47 million awarded; • Over 300 jobs created in new Scottish companies; • 50 new high-tech companies formed; • 57 licence deals signed; and • Over £243 million post-PoC investment leveraged.	10 year period 2003 to 2013: • 105 projects funded; • Over £11.5 million awarded and £9.3m spent; • 42 jobs created in new NI companies • 22 new high-tech companies formed; • 6 licence deals signed; and • Over £7 million post-PoC programme investment leveraged.

In their defense also, the Research Organisations have noted the poorer quality projects promoted in the Pilot PoC programme, the lack of resources in QUB and Ulster prior to the introduction of HEIF in 2004/5, the lack of dedicated commerialisation funds in the Pilot phase, the smaller business base within NI for licensing opportunities, the challenges in attracting ongoing funding, market impacts during the recession and their expectations of significant timescales for successful commercialisation of projects. Notwithstanding this, the Commercialisation Offices should ensure that sufficient guidance on PoC is issued to the PIs, as well as support throughout the application, appraisal, project implementation and commercialisation stage, and this could further aid commercialisation.

Equally, the Evaluation team notes that for some of the most successful of the Pilot and Phase I PoC projects (with spin-out companies formed, such as Sophia Search), management teams are in place, ongoing funding has been secured, yet the spin-outs are still at an early stage in their commercialisation journey, with minimal commercial income achieved to date.

With many of the Phase I projects still only a number of years post project completion, it is suggested that only when the commercialisation timelines are complete will a final assessment on the level of success be able to be presented. Whilst the Terms of Reference for this Interim Evaluation states that this should include a longitudinal study of the PoC from inception and over a 10 year period, at best, the earliest of the Phase I projects (accounting for 34 of the 49 positive outcomes) are no more than 3 years post completion.

Tables 6.1 and 6.2 therefore indicate that the Research Organisations have still some distance to travel to demonstrate that their commercialisation activities are properly focused and that the potential for benefit for the NI economy is being maximised. Nonetheless, progress is being demonstrated.

The challenge for the PoC programme is that there are projects which have achieved their technical objectives but have not maximised their commercial potential or impact. Some projects could still be of interest to

industry but are not being marketed or taken forward in a coherent fashion. Overall, there is a concern that the Research Organisations are focused primarily on the current Phase II programme and there is no clear strategy as to how the previous PoC projects, demonstrating potential, can be exploited to ensure full commercialisation.

It is noted, moreover, that there is no direct linkage between the PoC programme and the HEIF targets as set by DEL. Given that the Commercialisation Offices at QUB and Ulster are funded through HEIF IV, there should be closer workings between DEL and Invest NI to ensure that PoC projects are being adequately supported. It would also seem to be appropriate that HEIF targets are reviewed by DEL in light of the substantial PoC support provided by Invest NI.

What is further unclear is the extent to which spin-outs from PoC could have engaged with Invest NI at an earlier stage in order to progress, more speedily, along their commercialisation journey. Where there was a lack of engagement, by or with Invest NI, this was a missed opportunity to accelerate the commercialisation process. Invest NI should provide a wraparound service for PoC projects, thus ensuring that the skill base and financial support within Invest NI is fully provided to accelerate the commercialisation of the PoC project.

Linked to maximizing commercial outcomes would be the ability of Invest NI to have more direct involvement in the commercialisation process, and indeed to have a monitoring process in place, whereby action can be taken by Invest NI in respect of projects which are not progressing in line with targets. This may require additional Invest NI resources. It is noted that SE has introduced a clawback provision within its PoC programme, albeit this has not yet been exercised. The Evaluation Team is of the view that in such high risk R&D projects, clawback is not a realistic option unless there are material variances from plans or grants are improperly claimed/paid.

There is however considerable merit in conducting a detailed review of the "active" PoC projects, working with Invest NI, to determine an action plan for each PoC active project. These should be tied into the HEIF strategic plan. This should link into the proposed new 10 year Monitoring and Evaluation Framework for PoC[78], this monitoring to require an IT led data gathering process and adequately resourced within Invest NI. It will also be important that data on commercial outcomes continues to be captured by a single point of contact within the Research Organisation for reporting to Invest NI.

A key finding from the Interim Evaluation is the level of support given to the L&HS sector, where the levels of funding required are potentially higher, and over a longer period, and where the potential for spinouts may be limited. The sector is strategically important for the NI Government, with a

[78] 10 year post PoC project completion

Life Sciences Strategy to be launched in 2015. Accordingly, L&HS should feature within any PoC funding mechanism. There is merit both in continuing to support a range of projects, on the basis that government is not well placed to pick winners, whilst recognizing that the L&HS sector has particular attributes that may lend it to being funded separately from any future mainstream PoC programme.

The commercial outcomes generated to date from PoC, and particularly from Phase I, and feedback from the PIs and the Research Organisations on the future potential, suggest that there is a rationale for financially supporting the commercialisation of the research base in NI. It is the Evaluation Team's view that the Market Failure, Need and Demand still exists for the PoC programme. At this stage, it is appropriate to conclude that there is sufficient evidence of market failure to support the strategic rationale for a future PoC programme. While the selection process has been more robust in Phase I and II, it is also suggested that a two stage approach could be introduced to project application and selection, initially through a Feasibility Study/Proof of Principle process, and then, for successful applicants, a full application to the PoC programme. This should further enhance the selection process.

6.2 Assessment of Economic Impact and Value for Money

This section considers the VFM to date of the PoC programme. This is focused on Phase I only, given the previous comments about the quality of the Pilot projects, which in effect means that [79]VFM has not and is highly unlikely to be achieved, suggesting that it is not a reliable evidence base to assess the efficacy of the POC model.

With respect to Phase 1 while continued progress is evident, it does not yet demonstrate a positive return on investment and therefore at this point in time does not demonstrate VFM (evident by the fact it does not presently pass the quantified element of the EET). However, the majority of projects are still very early in their commercialisation journey and the evidence captured within this evaluation suggests that a timeline to 2025 is required as the trajectory to assess all of the impacts from the overall portfolio of Phase I funded projects.

It is not possible to robustly project future economic impacts from Phase I funded projects and therefore at this point to give a definitive view as to whether in 2025 VFM will be achieved. The analysis within this evaluation

[79] The Research Organisations have noted the poorer quality projects promoted in the Pilot PoC programme, the lack of resources in QUB and Ulster prior to the introduction of HEIF in 2004/5, and the lack of dedicated commerialisation funds in the Pilot phase. In considering the commercial success to date, the Evaluation Team would agree that the selection process for the Pilot PoC programme was not sufficiently robust. This is further evidenced by the fact that there is no evidence of a positive return of investment on the Pilot; specifically the current ratio of net GVA / cost of the Pilot phase is £1: £0.15. Considering that the Pilot phase started over ten years ago (in 2003) the investment cannot be viewed as value-for-money, and is highly unlikely to deliver a positive investment in future. For these reasons the Pilot phase is not a reliable evidence base on VFM of the POC model and has not been considered within the conclusion of VFM in this report.

has indicated that the majority of Phase I projects remain 'live prospects' for commercialisation, and clearly a strong performance by only one or two of these could skew the headline results into a positive return on investment. Therefore a straightforward 'linear' projection of headline economic impacts/ GVA now to a 2025 position is not appropriate. However, if there is the requisite focus on the commercialisation road maps/ action planning for all of the Phase I projects, (as recommended later in this section), there remains reasonable prospects that VFM will be achieved.

Table 6.4 below sets out the views of the Evaluation Team against each of the prescribed VFM indicators. Appendix XIV also sets out a summary of the PoC programme's contribution to objectives, targets and actions of PfG, DETI and Invest NI.

Table 6.4: Summary of Value to Money (to Date)	
VFM Indicator	
Strategic Fit	The focus for the NI Executive is on strengthening the economy, with investment in innovation key to driving productivity and economic growth. Allied to this, POC is clearly aligned to the focus of the NI Economic Strategy and recent NI Innovation Strategy.
Need & Market Failure	The PoC programme continues to address a failure in the market for commercially focused funding and support to academics to transfer new technology to industry in the form of licences or new spin-out companies.
Additionality	The support provided through PoC has played a vital role in enabling the monetary impacts achieved to date as evidenced by the high levels of 'impact additionality' (64% for Phase I). Similarly PIs captured through the Phase II survey, were asked about their ability to prove the concept of their technology in absence of PoC – the results of which are included in Appendix VII. Again this indicates the high levels of projected additionality – 68%. These findings reinforce the evidence collected in the previous Interim Evaluation of Phase I in 2010 and the assumptions developed for the economic appraisal for Phase II.
Displacement and complementarity	PoC is a key support mechanism to enable NI's Research Organisations to undertake pre-commercial technology development work to a stage where they can attract pre-seed, seed and commercial investment – and as such it is an important precursor intervention that complements rather than displaces the other sources of funding to undertake Research Organisation-led activities to commercialise innovation. It is relevant in this context to note (as detailed in Appendix XII) that Phase I funded projects have to date secured £7.8m in follow-on funds. This illustrates the important role that PoC plays as a precursor intervention, leveraging other sources of pre-seed, seed and commercial investment, to allow downstream development activities on the commercialisation journey to take place.
Economy Efficiency and Effectiveness	Invest NI has implemented a robust appraisal process to assess, amongst other things, the need for support and the reasonableness of support being requested. This process has ensured that only the minimum level of support has been provided to date to enable various phases of the programme to proceed. As such, it is the

Table 6.4: Summary of Value to Money (to Date)	
VFM Indicator	
	Evaluation Team's view that Invest NI has made appropriate efforts to ensure that PoC were obtained at least cost to NI. However, looking forward, the Evaluation Team are of the view that in respect of any future potential phase of PoC that consideration should be given to assessing an option, within a future economic appraisal, based on a smaller number of projects being awarded a higher level of funding – i.e. moving in the direction of SE but not so narrowly defined. In terms of efficiency, individual projects funded through the various phases of PoC have been subject to a robust application and appraisal process. These processes have ensured that individual projects were obtained at least cost but also with potential maximum benefit, to NI. Indeed, Invest NI has made PoC more efficient in Phase II by taking out the indirect costs allocation for Research Organisations in Phase II. The feedback on the claims process is that it is onerous with perceived ambiguity around eligible expenditure, with associated clawback risks, which has also served to reduce the inputs and has resulted in underspend. It should also be noted that the level of inputs per PoC project is less in NI than the benchmark regions. All of this suggests that Invest NI has endeavoured to ensure the maximum output from a given set of inputs, for Phase II, however some level of redress may be required going forward to optimise this. In addition, as highlighted above, consideration should be given to assessing an option within the economic appraisal for a future phase, based on a smaller number of projects being awarded a higher level of funding. With regard to effectiveness, the Phase I targets set out in the original economic appraisal have not yet been achieved. That said, there has been positive progress since the time of the Interim Evaluation in 2010 with respect to the number of spin-outs and licences reported, and further potential ahead in that regard. Therefore it is the view of the Evaluation Team that there is further potential to progress towards the original targets. It is also the view of the Evaluation Team that the commercialisation rate (80%) and target timelines to achieve commercial success (e.g. Year 3) were unrealistic and not achievable. The forward assumptions made in Phase II economic appraisal (that 43% of funded projects would achieve either a spin-out or a licence) and associated timelines are more realistic as a reference framework. Thus as it stands the effectiveness measure of VFM has not been achieved, but it is the view of the Evaluation Team that any future assessment of Phase I needs to be 'recast' within a more realistic target framework as above. Allied to this there is still some way to go on the 'journey' to assess the complete picture of economic benefits and VFM, for Phase I (up to 2025).
Cost effectiveness	Appendix XII, sets out the full economic cost of delivering PoC against the net GVA generated to date, linked only to the monetary impacts (i.e. income from licencing, turnover from spin-outs and commercial income). The current GVA return on investment is modest at £0.14:£1 for Phase I. Therefore this phase of PoC has not yet delivered a positive return on investment and could not therefore be viewed as cost-effective at this point in time. However it should be noted that the outcomes to date are broadly

Table 6.4: Summary of Value to Money (to Date)	
VFM Indicator	
	commensurate with the current point on the commercialisation timeline for Phase II. At most, these projects are 3 years post completion of the programme and the full time period to 2025 is required to evidence the impact for all of the Phase I projects. It is also important to note however that Phase I funded projects have leveraged £7.8m in follow-on funds, all of which continues to allow downstream development activities on the commercialisation journey to take place and support related employment. The vast majority of this funding is UK and EU Research Income and Equity Investment, rather than grants from Invest NI or InterTradeIreland. This is a leverage factor of 1.65 against the initial investment of £4.767m in Phase I.
EET	The Evaluation Team's analysis suggests that the PoC programme continues to make a contribution to support academics to transfer new technology to industry in the form of licences or new spin out companies. More specifically, the analysis suggests that at this point Phase I has delivered a net additional GVA of £657,312 to the NI economy, thus far. In addition to this, PoC has delivered a range of other wider (e.g. skills development, entrepreneurship and knowledge transfer) and regional benefits (e.g. degree of R&D being injected, creation of high quality jobs and associated reduction in the brain drain) to the NI economy. However it has not yet generated a positive return on investment to the NI economy (i.e. is a Net Present Cost) and, as such, does not presently pass the quantified element of the EET. Whilst there is still some way to go on the 'journey' to assess the complete picture of economic benefits and VFM, for Phase I (potentially up to 2025), a more pro-active focus by all parties on completed PoC projects to continue to explore commercialisation potential, could have yielded more positive results. This suggests that the Research Organisations need to be much more pro-active on all PoC projects still categorised as active, and prepare a commercialisation road map for each, supported by Invest NI as appropriate - with a view to progressing the VFM position on investment in Phase I. In addition looking forward to a potential Phase III of PoC, a range of options beyond the status quo need to be considered, to improve the scope for economic impact and associated VFM. These are detailed further in Section 6.4. It is not possible to robustly project future economic impacts from Phase I funded projects and therefore at this point to give a definitive view as to whether in 2025 (the end of the trajectory for assessing commercialisation impacts arising from the overall portfolio of Phase I projects), that VFM will be achieved. The analysis within this evaluation has indicated that the majority of Phase I projects remain 'live prospects' for commercialisation, and clearly a strong performance by only one or two of these could skew the headline results into a positive return on investment (i.e. an NPC rather than an NPV). Therefore a straightforward 'linear' projection of headline GVA now to a 2025 position is not appropriate. However if there is the requisite focus on the commercialisation road maps/ action planning for all of the Phase I

Table 6.4: Summary of Value to Money (to Date)	
VFM Indicator	
	projects, as above there remains reasonable prospects that VFM will be achieved.

6.3 Strengths and Weaknesses of the Invest NI POC programme, including lessons learnt

Strengths and weaknesses of the PoC programme, including lessons learnt are set out below:

Table 6.5: Lessons, Strengths and Weakness and Areas for Improvement
Strengths
• The PoC programme fits strategically with PfG, DETI and Invest NI objectives of exploiting the linkages between innovation, productivity and economic growth; • The PoC programme addresses market failure and fills a recognizable gap between funding for pure research (typically from the Research Councils and pre TRL level 3) and funds supporting company development (Invest NI, seedcorn, private sector investment etc). Accordingly, a high level of programme additionality exists; • The Invest NI PoC support is complementary to the DEL HEIF funding, in place to 2015/16; • Assessment of the outcomes from the Pilot and Phase I indicates that a number of projects have, or have the potential, to demonstrate economic outcomes; • PoC activity has enhanced the skill sets and knowledge of PIs in a range of areas; • The PoC programme has delivered on a range of wider and regional benefits; • Changes introduced to PoC under Phase II have been positive – ie additional funding support, longer timeframe, commercialisation mentors • All of the teams responsible for PoC, within Invest NI and the Research Organisations, are committed to ensuring its success.
Weaknesses
• Impact targets for the Pilot and Phase I stage have been unrealistic; • There are challenges in determining economic impact. PoC performance requires assessment over a 13 year period – however the Phase I projects have only been in existence between 3 and 5 years. The Pilot PoC was launched in 2003, ie 10 years ago, however the robustness of the selection process and the resources employed by the ROs[80] undermine the level of anticipated commercial success; • There have been delays in the programme and project approval process for Phase II, not all of which have been within Invest NI's control. This has however created unnecessary gaps between calls for applications, including from the end of Phase I; • There continues to be a heavy reliance on L&HS where the timescales for commercialisation are longer and the opportunity for regional impact is challenging; • There is no/limited cconsideration given to succession planning for PIs; • Invest NI has no mechanism by which it can influence the commercialisation of PoC projects where these do not appear to be progressing within the ROs; • Invest NI has not defined how it will maximize the regional impact from PoC; • The ROs and Invest NI have acknowledged that more could be done to market the PoC projects which have met their technology development objectives; • Further guidance is required for the Research Organisations/PIs on eligible commercialisation activities[81] and support around the Invest NI's claim process;
Lessons learnt
Lessons learnt from other regions include: • There should be timely evaluation and approval processes between each Phase of the

[80] HEIF funding was not in place when the Pilot was launched
[81] This is provided at the initial meeting but feedback from PIs suggests that it needs reinforcing with the PIs

Table 6.5: Lessons, Strengths and Weakness and Areas for Improvement
PoC programme; • There should be a Stage 1 and stage 2 application process for PoC; • There should be increased commercialisation support where warranted by the project; • PoC should be a "Team led" approach by the Research Organisation and the Economic Development agency in identifying and supporting good applications; • Projects supported should have a broad sectoral spread; • The Panel composition should be as wide reaching as possible; • There is now an opportunity for the NI Universities to access SFI funding.

6.4 Looking Forward and Options for any future PoC programme

In looking forward to determine the rationale for any future PoC programme and the objectives of the programme and its strategic fit, consideration has been given to the NI Economic Strategy, the new NI Innovation Strategy, the proposed new Life Sciences Strategy, the focus on Smart Specialisation, the likely constraints on Invest NI funding (with the need to prioritise funding), and the evolving role of the Research Organisations in supporting the growth and competitiveness of the NI economy.

The Evaluation Team's view is that the original objectives of the PoC programme are still valid and there is a strategic rationale for future PoC support.

Moreover, it is generally accepted that the stop/start nature of PoC funding in NI is not conducive to supporting an innovative economy, with periods having arisen, especially between 2005 and 2008, and 2010 and 2012, when Invest NI PoC funding was not available. Moreover, the high number of L&HS projects does not currently fit well with the targets for regional impact, with many looking to licence agreements with non NI companies. Consideration might therefore be given to a separate L&HS programme with tailored commercialisation support, more demanding commercialisation criteria and more funding per project.

An Economic Appraisal should therefore be prepared informing the case for any future phase of the PoC programme. Based on the evaluation evidence, illustrative options have been developed below, albeit there is a recognition that options will be developed in more detail as part of the Economic Appraisal process.

This said, a number of options should be considered for the PoC programme, as follows[82]:

Table 6.6: Options for future of PoC	
Option	**Description**
One	Do nothing – no future PoC programme
Two	Status quo – continue to fund PoC projects at the current rate (69 projects over circa 2-2.5 years)

[82] This is not a full long list of options but are likely to include shortlisted options in any future economic appraisal

Table 6.6: Options for future of PoC	
Option	**Description**
Three	PoC programme put on hold for 3 years until VFM demonstrated for Pilot and Phase I programme
Four	PoC programme put on hold until VFM demonstrated for Pilot and Phase I programme, but with PoC sequential funding provided for Phase II projects demonstrating commercial potential and with potential for regional impact
Five	New PoC programme launched but for non L&HS projects only, with existing L&HS projects able to access PoC sequential funding
Six	PoC programme to continue and across all sectors, but with a smaller number of projects awarded a higher level of funding, similar to SE
Seven	New PoC programme launched but with two separate PoC programmes for L&HS and non L&HS projects.
Eight	PoC programme continues but at a small scale (say 5 projects a year) for non L&HS projects (and with PoC sequential funding as per Option Four) until the commercialisation potential of all Pilot and Phase I projects are more fully demonstrated.

Each of these options should be further considered as part of any future Economic Appraisal; however their pros and cons can be set out as follows:

Table 6.7: Pros & Cons of Options

Option number	Pros	Cons
One	• No further spending on future PoC programmes • Research Organisations have a limited PoC portfolio for supporting and monitoring	• Such an approach would not be in keeping with UK and regional government thinking on the significant economic impact to be generated from commercialising the innovation within the Research Organisations • No opportunity to commercialise any innovative research coming from the NI Research Organisations
Two	• Strategic Fit with UK and NI government objectives of commercialisation of innovative research • Opportunity to fund all innovative research projects, with commercial potential, coming from the NI Research Organisations	• Increase in the PoC portfolio to be managed by the Research Organisations • Phase III commences before full assessment of Pilot and Phase I projects • Assumed no change in sectoral mix – continued predominance of L&HS projects
Three	• Research Organisations have an opportunity to focus on existing portfolio for the next 3 years • Invest NI would have clarity over VFM assessment • This option would allow for an assessment period after which, subject to a positive VFM assessment, PoC could recommence	• Such an approach would not be in keeping with UK and regional government thinking on the significant economic impact to be generated from commercialising the innovation within the Research Organisations • No opportunity to commercialise any innovative research coming from the NI Research Organisations over the next 3 years – opportunities for spin-outs/licences lost to NI
Four	• Research Organisations have an opportunity to focus on existing portfolio for the next 3 years • Invest NI would have clarity over VFM assessment • Invest NI can actively support current PoCs showing potential for economic returns • This option would allow for an assessment period after which, subject to a positive VFM assessment, a full PoC could recommence	• Such an approach would not be in keeping with UK and regional government thinking on the significant economic impact to be generated from commercialising the innovation within the Research Organisations • No opportunity to commercialise any new innovative research coming from the NI Research Organisations over the next 3 years – opportunities for spin-outs/licences lost to NI
Five	• Invest NI can actively support current L&HS PoC projects showing potential for economic returns	• Increase in the PoC portfolio to be managed by the Research Organisations

Table 6.7: Pros & Cons of Options		
Option number	**Pros**	**Cons**
	• Opportunity to fund all non L&HS innovative research projects, with commercial potential, coming from the NI Research Organisations • Partial Strategic Fit with UK and NI government objectives of commercialisation of innovative research • Invest NI would have clarity over VFM assessment • This option would allow for an assessment period after which, subject to a positive VFM assessment, a full PoC programme could recommence	• Such an approach would not be in keeping with UK and regional government thinking on the significant economic impact to be generated from commercialising all significant innovation within the Research Organisations • No opportunity to commercialise any new L&HS innovative research coming from the NI Research Organisations in the short to medium term – opportunities for spin-outs/licences lost to NI
Six	• Strategic Fit with UK and NI government objectives of commercialisation of innovative research • Opportunity for Invest NI to be more selective and to significantly fund a small number of projects that can demonstrate significant commercial potential	• Increase in the PoC portfolio to be managed by the Research Organisations • Phase III commences before full assessment of Pilot and Phase I projects • It is recognised that Government is not well placed to "select winners"
Seven	• Strategic Fit with UK and NI government objectives of commercialisation of innovative research • Opportunity to fund all innovative research projects, with commercial potential, coming from the NI Research Organisations • Can assess the potential for L&HS and Non L&HS projects separately and ensure sectoral spread	• Phase III commences before full assessment of Pilot and Phase I projects • Potential Increase in the PoC portfolio to be managed by the Research Organisations
Eight	• Strategic Fit with UK and NI government objectives of commercialisation of innovative research • Opportunity to fund a small number of innovative research projects, with commercial potential, coming from the NI Research Organisations • Research Organisations have an opportunity to focus on existing portfolio for the next 3 years • Invest NI would have clarity over VFM assessment • Invest NI can actively support current PoCs showing potential for economic returns • This option would allow for an assessment period after	• Such an approach would not be in keeping with UK and regional government thinking on the significant economic impact to be generated from commercialising the innovation within the Research Organisations, and that government should not be picking winners

Table 6.7: Pros & Cons of Options		
Option number	**Pros**	**Cons**
	which, subject to a positive VFM assessment, a full PoC could recommence	

All of the above would need to be considered in any future PoC programme.

6.5 Recommendations

Recommendation 1: Invest NI should continue with the PoC programme, at a scale based upon the findings of an Economic Appraisal. This should benchmark the trajectory for commercialisation at an international level. The Economic Appraisal should include a staff resourcing comparison with the benchmarked programmes at SE and EI. Invest NI should also ensure that there is a timely evaluation and appraisal/approval process between each Phase of the PoC programme.

Strategic

Recommendation 2: RoadMap to Commercialisation: The Research Organisations should conduct a review of all active PoC projects (and consider if this should exclude "performing" spin-outs) and prepare a commercialisation road map for each. This should be reviewed by Invest NI. Invest NI should be more directly involved in the commercialisation process and have a mechanism to introduce an arbitrator where disputes on the approach to commercialisation arise. These may require additional Invest NI resources.

Recommendation 3: Marketing: The Research Organisations and Invest NI should consider the mechanism by which a process can be introduced for the marketing of all technically successful PoC projects and their results. This should include the use of programmes such as VITAL to market PoC projects.

Recommendation 4: Revision of targets: The original targets for the Pilot and Phase I PoC need to be 'recast' to be consistent with assumptions applied in the Phase II Economic Appraisal on the percentage that will commercialise (i.e. licence or spin-out) and the timescale for the same, and as follows:

Table 6.8: Revised Targets

Programme	Revised target
Pilot and Phase I	43% of funded projects to achieve either a spin-out or a licence, with the timeline to achieve outcomes being as per the Phase II PoC economic appraisal
Phase II	PoC Phase II targets should be redefined to include all aspects of direct income as well as follow on funding.

Recommendation 5: Assessment of Regional Benefits: There should be greater weighting given, in the Invest NI scoring mechanism, to the opportunity to generate regional impacts, with the requirement for the identification in the application form of potential NI licencing partners, and when a spin out is noted as a viable options, an assessment of the level of further testing, and associated future development costs and funding, plus an assessment of skill base, that would make the creation of a spin out company a viable and feasible option.

Recommendation 6: Monitoring: A Monitoring and Evaluation Framework has been developed and should be agreed and implemented. This will require a technology led data collection process.

Recommendation 7: Proof Of Principle: There should be a two stage approach to PoC, initially through a £10-£15,000 Proof of Principle (PoP) grant scheme, which would be awarded by Invest NI, with the funding criteria to include an independent endorsement of the market opportunity by the Research Organisations. The number of PoP awards made annually will need to be agreed with Invest NI and exceed the proposed number of PoC awards, to allow for a conversion rate of say 80% (to be determined in any subsequent Economic Appraisal.

Recommendation 8: DEL: Invest NI should engage more closely with DEL in relation to HEIF funding to ensure that the adequate support of PoC projects is a condition of HEIF funding and that HEIF targets are reviewed by DEL in light of the substantial PoC support provided by Invest NI.). Invest NI may wish to engage with DEL to determine the extent to which PoP does/should form part of HEIF funding.

Recommendation 9: Invest NI Wraparound support: Invest NI should consider the full range of support that it can provide to PoC projects achieving their technical objectives, including the opportunity to support projects at application stage and the opportunity to avail of the proposed Accelerator programme, Propel, sectoral support, networks etc. This wraparound support should commence immediately. It is further recommended that that the new NISPO programme proactively engages with PoC projects and sets out the roadmap required for each project to secure NISPO funding, with terms offered to potential spin-outs to be conducive to encouraging the formation of new companies and management teams

Recommendation 10: Separate L&HS programme: consideration should be given in the Economic Appraisal to having a separate L&HS strand to the PoC programme with different targets/timescales associated. Invest NI should also consider the commercialisation support offered to L&HS projects and to address any gaps arising since the GIAp ended.

Recommendation 11: Prioritisation of Projects by Research Organisations; Invest NI should ensure that the Research Organisations fully screen and prioritise good quality projects before submission of PoC projects to Invest NI.

Operational

Recommendation 12: Levels of Support: Consideration should be given in any future PoC programme to the overall level of funding for PoC projects, including for salaries and commercialisation activities, and in particular to

ensure that Research Organisation have the funding available to offer salaries at competitive rates.

Recommendations 13: Targets for Drawdown: There should be targets for the drawdown of commercialisation funds written into LoOs (say 75% by month 18 – to be assessed during any Economic Appraisal process).

Recommendation 14: The Appraisal Process: The existing appraisal and communication arrangements should be augmented:

- The PoC Panel members should be reviewed and extended to maximise access to expertise, with ongoing engagement with MATRIX panel members, venture capitalists (particularly those delivering on Invest NI's Fund of Funds), business leaders and Invest NI sectoral teams, and consideration of off-line review by industry experts where niche areas are being considered.
- Invest NI should constantly monitor its marketing appraisal framework and ensure that all relevant areas are being covered.

Recommendation 15: Claims Process: Invest NI should ensure that sufficient guidance is issued to the Research Organisations/PIs on eligible commercialisation activities and that the Invest NI's claim process is as straightforward as possible, so as not be act as a barrier to PIs undertaking commercialisation activity.