

## MATRIX REPORT INTO THE EXPLOITATION OF INTELLECTUAL CAPITAL BY SMEs IN NORTHERN IRELAND





# CONTENTS

## Executive Summary

1	Introduction	7
2	Intellectual Capital Best Practice Models	15
3	NI SME Intellectual Capital Results	29
4	Discussion of the Results	46
5	Recommendations	53
6	Annex	58



# CHAIR'S FOREWORD

IN NORTHERN IRELAND THE LANDSCAPE IS DOMINATED BY INDIGENOUS MICRO, SMALL AND MEDIUM SIZED ENTERPRISES AND IT IS ESSENTIAL THAT THESE BUSINESSES ARE CAPABLE OF UTILISING KNOWLEDGE GAINED EFFICIENTLY AND EXPLOIT THEIR INTELLECTUAL CAPITAL EFFECTIVELY

Innovation is one of the key drivers of economic growth and sustaining competitive advantage. Therefore there is little doubt that the most successful companies are those that continually innovate, relying on new processes and technologies and the skills and knowledge of their employees.

The expansion of the knowledge industry has raised issues around how knowledge is created, disseminated, retained and used to obtain economic returns and create a pipeline of future opportunities.

In Northern Ireland the landscape is dominated by indigenous micro, small and medium sized enterprises and it is essential that these businesses are capable of utilising knowledge gained efficiently and exploit their intellectual capital effectively. By exploiting intellectual capital in businesses, innovation will remain a central driver of economic growth. MATRIX identified this space occupied by knowledge-based SMEs as an area that required further exploration.

This report is the work of a panel which has identified that the overarching term "Intellectual Capital" needs to be used to cover the key categories of knowledge and intellectual capability retained in local businesses: Human Capital, Intellectual Assets and Intellectual Property.

From the outset of this study the key objective has been to gain an insight into the level of awareness amongst Northern Irish science and technology-based SMEs businesses of their Intellectual Capital and examine the processes that may be employed to drive and support economic growth by exploiting intellectual capital and local innovation.

The recommendations contained in the report have been



Bryan Keating CHAIR, MATRIX and Chair MATRIX IC Panel

driven by the panel's vision and in-depth knowledge of Intellectual Capital. They will act as a catalyst to drive innovation in Northern Ireland and help with identifying creative ways to exploit new opportunities and further develop a strong research and development platform in Northern Ireland.

I would like to thank the panel for their insights and expertise over the past few months and everyone who participated in and shaped the compilation of this report. I also acknowledge the work of IntegrityNI and Armstrong IPR who assisted at all stages in the publication of the Intellectual Capital Study.



# EXECUTIVE SUMMARY

The expansion of the knowledge industry, services sector, deregulation and the emergence of new information and communication technologies have brought to the fore the issue of how knowledge is created, disseminated, retained and used to obtain economic returns. In Northern Ireland (NI), this development is associated with a structural change from traditional industries to more new innovation-intensive activities, which rely heavily on intellectual capital. In fact these assets have become strategic factors for value creation for companies and as such are central to the economy's growth and competitiveness. The NI landscape is dominated by indigenous small and medium sized enterprises (SMEs). If innovation is to be a central driver of economic growth in NI, it is crucial for SMEs to utilise knowledge efficiently and exploit their intellectual capital.

To this end, the Department of Enterprise, Trade and Investment (DETI) have commissioned a Foresight Study into the Exploitation of Intellectual Assets by SMEs in Northern Ireland, to explore the issues surrounding intellectual effort, its use and outcomes in NI SMEs. In such a Study, to maximise the chance of capturing sufficient data it is important that the Study covers a wide list of possible intellectual effort. The overarching term 'Intellectual Capital' has therefore been used in the Study, covering the three main categories of Human Capital, Intellectual Assets and Intellectual Property.

A MATRIX Intellectual Capital (IC) Panel has been brought together by DETI to oversee the Study and the Integrity NI consortium appointed by DETI to support the MATRIX IC Panel in conducting the Study.

The main objectives of the Study are to gain an insight of the level of awareness amongst indigenous MATRIX industry-based Northern Irish businesses of their Intellectual Capital and examine the processes that may be employed to drive and support economic growth by exploiting intellectual capital and local innovation. Surveys were conducted with a number of SMEs and Key Opinion Leaders (KOLs) in Northern Ireland.

The Study has highlighted four noteworthy innovation and intellectual capital matters of particular relevance to SMEs.

**1. The majority of SMEs understand the generality of intellectual capital and particularly the vital element of human capital. Not all, however, understand how and**

**what tools would be best to capture, manage and ultimately improve the exploitation of their intellectual capital, to contribute to the health and value of their business.**

**2. SMEs understand the need to collaborate but mistrust it. There was a perception among some of the SMEs that collaboration with larger companies was more beneficial to the latter, with risks to the former in the possible loss of human capital, reputation and proprietary information.**

**3. In other regions around the world, led in part by Germany, SMEs are starting to use Intellectual Capital Statements to provide readily accessible IC information. Such statements can be used to aid internal business decisions and for banks and investor decision-making. The latter has resulted in a reduction of the cost of borrowing and appropriate evaluations for German SMEs, by demonstrating lower risks, achieving lower interest rates and providing better access to loans and equity as a result. At an investment or sale event, having an IC Statement can make for a much easier due diligence process and lead to fairer evaluation.**

**4. SMEs, particularly micro SMEs, because they are time and resource poor, and despite the efforts of programme suppliers, find the offered programmes in general to be less flexible and not as 'end user' friendly as they need or wish.**

Recommendations are proposed, for SMEs, NI government, public sector organisations and publically-funded knowledge providers, which take into account the above matters. The recommendations have been developed from the responses received in the SME and KOL surveys and the analysis of the responses, together with evaluation of the best practice models and input from the MATRIX IC Panel.



## Recommendation 1

### **Raise awareness at Board and senior management level of the importance of intellectual capital to a company's profitability and sustainable growth.**

IC, its capture, management and exploitation, to be an agenda item at Board and senior management meetings. An increased understanding, at a senior level, of the value of IC to an SME's business enables a top-down push for employing IC tools to maximise the use of and value-extraction from the IC.

#### **Action**

Introduce and promote SME IC Statements tailored for the NI market and encourage their use as a tangible item to complement SMEs' balance sheets

Impetus for these actions needs to be driven by the SMEs but support for the necessary information and advice for the development of IC statements will need to come from the government and public sector organisations with support from other private sector bodies who are engaged with SMEs.

## Recommendation 2

### **Raise the level of training of SMEs in the whole area of intellectual capital and enhance the tools currently available to allow SMEs to fully capture, manage and exploit their intellectual capital.**

#### **Action**

Encourage SMEs to carry out IC audits

#### **Action**

Continue to develop and promote IC tools appropriate for SMEs, especially micro SMEs

#### **Action**

A flexible approach to the delivery of future IC support

#### **Action**

Expansion of the NIBUSINESSINFO website to cover new procedures and approaches to IC

#### **Action**

Promote the need for SMEs to have internal IC procedures as part and parcel of their every day working lives

NI government and public sector organisations and in particular Invest NI will have the primary responsibility for these actions, with support from SMEs and other private sector bodies who are engaged with SMEs.

## Recommendation 3

### **Create a framework specifically aimed at allowing SMEs to work effectively in collaboration.**

Although collaboration can raise difficulties, it can also be of significant benefit to SMEs providing the means to acquire knowledge, skills etc. to grow their business and to import new ideas from other industries. Three areas need to be addressed in the development of a collaboration framework.

#### **Action**

Coordinate and promote guidelines for SME collaboration

#### **Action**

Develop and encourage the take up of collaboration agreements

#### **Action**

Support development and improvement of SMEs collaboration skills

These actions are the responsibility of all stakeholders, including NI government, public sector organisations, publically-funded research and knowledge providers and SMEs.



# LIST OF ABBREVIATIONS

Abbreviation	Definition
DETI	Department of Enterprise Trade and Investment
IC	Intellectual Capital
IA	Intellectual Assets
IP	Intellectual Property
HC	Human Capital
InCaS	Intellectual Capital Statement
ICE	Innovation for Competitive Enterprises
Invest NI	Invest Northern Ireland
QUB	Queen's University Belfast
UU	University of Ulster
R&D	Research and Development
SME	Small to Medium Sized Enterprise
SOP	Standard Operating Procedure
KTP	Knowledge Transfer Partnership
NDA	Non-disclosure Agreement
KPIs	Key Performance Indicators
KOL	Key Opinion Leader
KE	Knowledge Exchange
USP	Unique Selling Point
QMS	Quality Management System
CRM	Customer Resource Management



# INTRODUCTION

IT IS RECOGNISED BY DETI THAT NI BUSINESSES ALSO NEED TO BE ABLE TO DRAW DOWN ON THE EXPERTISE OF THE RESEARCH, SCIENCE AND TECHNOLOGY BASE IN THE REGION.

## 1.1 Background

Key to SME 'exploitation and commercialisation of science, technology and R&D' is the effective management of intellectual effort created in the R&D, design and in wider business activities. Such management requires Northern Ireland businesses to first identify and capture their Intellectual Capital (IC), and then to have access to the knowledge and tools that will allow them to manage and exploit this IC.

It must be noted that this Study covers a wide list of intellectual effort and as such the overarching term 'Intellectual Capital' is used to cover the three main intellectual categories of 'Human Capital', 'Intellectual Assets' and 'Intellectual Property'. Indeed intellectual effort is considered business property and can be seen as being **'the currency of the knowledge economy'**.

This becomes increasingly important in a globalising world, with the convergence of a wide number of political, economic, and environmental forces driving the development of new technologies within this global marketplace. Business needs to rely on innovation to improve competitive edge.

It is recognised by DETI that NI businesses also need to be able to draw down on the expertise of the research, science and technology base in the region. This necessitates the 'development of improved interfaces between NI business and the research, science and technology base'. Effective interfaces will allow NI businesses to form partnerships with each other, universities and other public sector organisations to utilise unique, collaborative IC to exploit market opportunities.

With understanding of their own IC and access to external IC, NI businesses can act to ensure that the region's science and

R&D strengths are exploited for maximum economic and commercial advantage.

The aim of this Study was to assess IC capabilities and needs from the perspective of NI SMEs, as a follow-on study from the research of commercialisation and impact of IC of publicly-funded research and knowledge providers (CMI MATRIX Report, 2012).

## 1.2 The Role of MATRIX

MATRIX, the Northern Ireland Science Industry Panel, is a business led expert panel, formed to advise government, industry and academia on the commercial exploitation of R&D and science and technology in Northern Ireland. MATRIX represents the voice of high tech industry and champions the role of Science and Technology as the key driver of economic growth in Northern Ireland. Its panel and sub panels are there to advise Northern Ireland government, relevant NDPBs, TPOs and other agencies on a strategic approach to maximise the economic impact of R&D, science and innovation. The MATRIX group works with industry and academia to identify new high tech market opportunities, IP and technologies for NI companies to exploit.

In this environment, a MATRIX Intellectual Capital Panel was brought together by DETI to explore the awareness of intellectual assets contained within indigenous NI SMEs. In this Study, the Panel was tasked with assessing the awareness, management and exploitation of SMEs' IC, together with consideration of issues in knowledge exchange and collaboration and identification of global exploitation processes and techniques that are used to commercialise IC within a region.



### 1.3 Defining Intellectual Capital

In the field of intellectual endeavour, many different definitions are used to describe the various elements of intellectual effort. Some describe such elements as intangible, due to their more incorporeal form in comparison to, for example, company assets comprising buildings, equipment, etc. Others describe such elements as both intangible and tangible, trying to distinguish between intellectual products, which are, for example, held by staff, and intellectual products which are recorded and sometimes registered. Further terms used in this field are intellectual assets, intellectual or industrial property, human capital and intellectual capital. Terms such as 'intellectual capital', 'intangibles' and 'knowledge capital' are often used interchangeably. Precise definitions of these terms tend to vary depending on the application and how the parties involved define these terms in order to meet the specific needs of the situation at hand.

Whichever term is used, intellectual effort is considered business property and could be 'the currency of the knowledge economy'. This view is substantiated by the 2006 Gowers Review of Intellectual Property which details increasing divergence between the market value of businesses and the value of their asset stock - the difference being accounted for by the intellectual effort or assets.

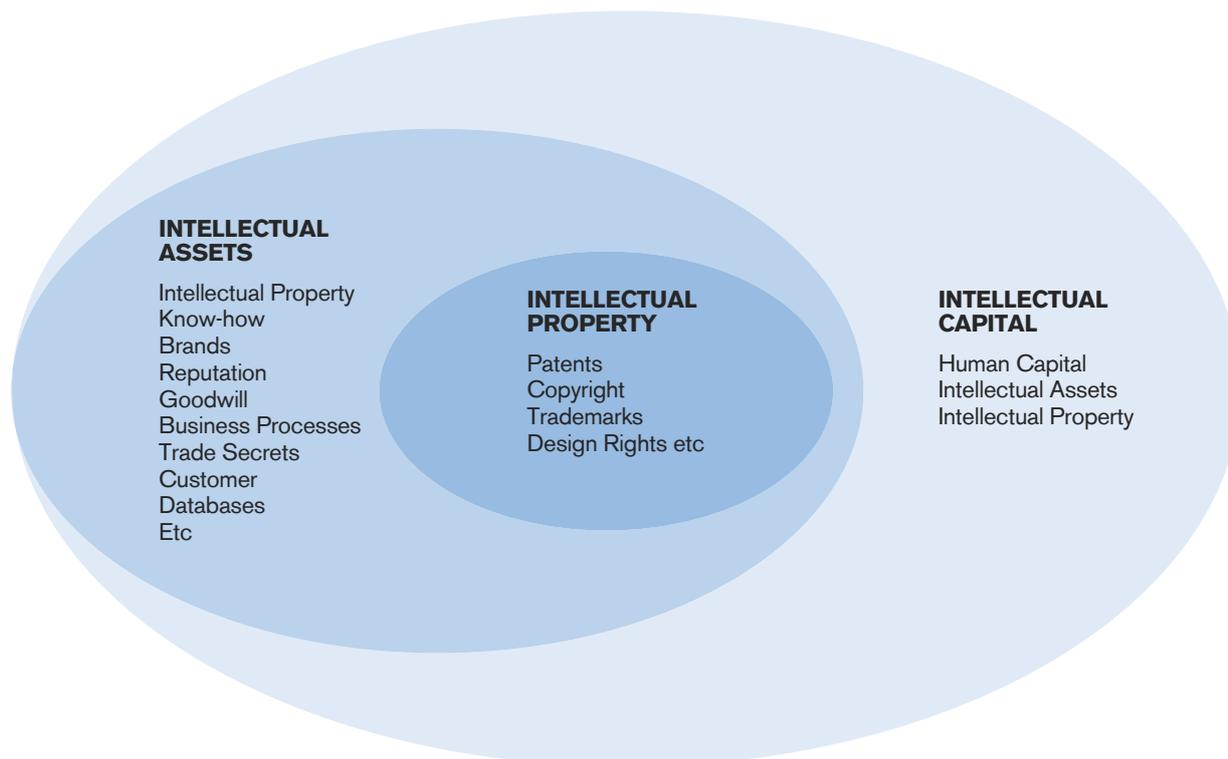
Intellectual effort is made up of three core premises, namely: it can be a source of competitive advantage, it is intangible and it can be retained and traded by a firm (Guthrie, 2012). In a knowledge-based society this intangible asset is regarded as the hidden value of an organisation and is strategically linked to the creation and application of knowledge (OECD, 2011).

To maximise the chance of capturing sufficient data in this Study to make appropriate recommendations, it is important that the Study covers a wide list of possible intellectual effort. To this end, use in the Study of the overarching term 'Intellectual Capital' was suggested, covering the three main intellectual categories of 'Human Capital', 'Intellectual Assets' and 'Intellectual Property'.

These three categories of intellectual effort were specifically chosen for use in the Study: human capital is an intellectual element of particular relevance in NI given its small knowledge-based workforce; it is important to capture data

on the SMEs awareness of the breadth of intellectual products comprised in intellectual assets; SME attitudes to and use of intellectual property is a significant measure, particularly for use in comparison with other studies. Use of the term Intellectual Capital and its division into the three categories was agreed with DETI and the MATRIX IC Panel.

The relationship between Intellectual Capital, Human Capital (HC), Intellectual Assets (IAs) and Intellectual Property (IP) is shown in the diagram on Page 9.



Definitions of intellectual products considered appropriate to each of Human Capital, Intellectual Assets and Intellectual Property are given below:

### Human Capital (HC)

Knowledge and capabilities of a company's employees

Includes the collective experiences, skills, creativity, and expertise of the employees

Refers to the capability of the employee to perform specific tasks necessary to the company

Companies do not own Human Capital - when employees leave, their knowledge goes with them

examples include know-how, trade secrets, unpatented inventions, business and technical processes, product information e.g. design drawings, service information, customer databases, operations manuals, brands, reputation, goodwill

Used in the operation of a company to provide an economic or competitive advantage

### Intellectual Assets (IAs)

Business and technical information that belongs exclusively to a company

Include codified descriptions of specific company knowledge

### Intellectual Property (IP)

Patents, trade marks, copyright, design right, registered designs

Rights which have specific mechanisms for identification and legislation to protect the legal owner



### 1.4 Context of the Study

According to DETI, in Northern Ireland innovation should be a central driver of economic growth and development. Firms need to rely on innovation and related investments to improve their competitive edge in a globalising world with shorter product life cycles. Overcoming barriers to innovation is hence a recurring and increasingly prominent business and policy challenge.

Northern Ireland is a member of the S<sup>3</sup> Platform, a European Union facility, with the purpose of assisting regions and Member States to develop Smart Specialization Frameworks. The Platform aims at supporting each region in identification and promotion of high-value added activities and a range of policies to achieve this. Definition by MATRIX of seven specialty areas of technology in NI fits with this framework.

In comparison with countries across Europe, Northern Ireland is lower in business expenditure in R&D and the innovation scoreboard, and particularly poor in patent activity.

#### Northern Ireland in Europe

NI RANKING (RELATIVE TO OTHER EU REGIONS)	INDICATOR	NI	EU27
Top quartile	--	--	--
Second quartile	Knowledge-based services employment	36.5%	31.9%
Third quartile	GDP per capita	94	100
	Employment rate	66.9%	66.3%
	Labour Productivity	96	100
	Patent activity	12.6	48.5
	Business expenditure on R&D	0.6%	0.9%
	Innovation scoreboard	0.41	0.45
Bottom quartile	Population	1.8m	496m
	Employees	0.7m	169m
	High-tech employment	3.3%	5.7%

(NI SMART Specialisation Framework, 2012)

<b>PUBLIC SECTOR</b>	Public Sector dominated economy (63% GDP)
	High reliance on Government support for B.E.R.D.
<b>LABOUR MARKET</b>	Service Sector Dominated (Lower value)
	High number not in employment (High Economic inactivity)
<b>BRAIN DRAIN</b>	One - third of students leave to study elsewhere
	Less than half of these (44%) return when degree is complete
<b>SME DOMINATED</b>	80% of NI private sector employment is in SMEs (under 60% for UK)
	Only 22% of turnover is in large firms compared with 51% in UK
<b>INNOVATION AND R&amp;D</b>	Lagging behind top EU performers in R&D spend
	480 out of 80,000 involved in R&D

(NI SMART Specialisation Framework, 2012)

We lag behind European top performers in R&D spend with only 480 out of 80,000 companies involved in R&D (Department of Enterprise, Trade and Investment, 2013 "SMART Specialisation Strategy").

The NI government, in their Economic Strategy for Northern Ireland 2012, has a focus on:

- **Innovation**
- **Export Led Growth**
- **Regional Strengths**

"An economy characterised by a sustainable and growing private sector, where a greater number of firms compete in global markets and there is growing employment and prosperity."

In order to drive the economy, NI firms need to rely on innovation and related investments to improve their competitive edge in a globalising world with shorter product life cycles. Overcoming barriers to innovation is hence a recurring and increasingly prominent business and policy challenge.

### Invest NI IA Support

The IP team at Invest NI is made up of four Technical Officers and Advisers who respond to enquiries from individuals, SMEs and larger companies about a range of IP issues including Patents, Trademarks, Design Registration, Copyright, Licensing and Patent Box. This team carries out patent and trademark searches on request.

This team also delivers free of charge IA audits. A total of 35 audits were completed in 2012-13. These audits encourage companies to explore the advantages of Patent Box and to take better control of their Intellectual Assets.

The 'IP Starter pack' contains both paper based and electronic information pertaining to all things IA relevant to business. Invest NI offers 50% support towards the costs of initial patent and trademark registrations and development of licence agreements to SMEs through its Technical Development Incentive (TDI) scheme. This scheme is often used to support costs of protecting identified IP gaps from IA audits or for patent applications to access Patent Box. The Invest NI Grant for R&D programme also provides support for IP costs.

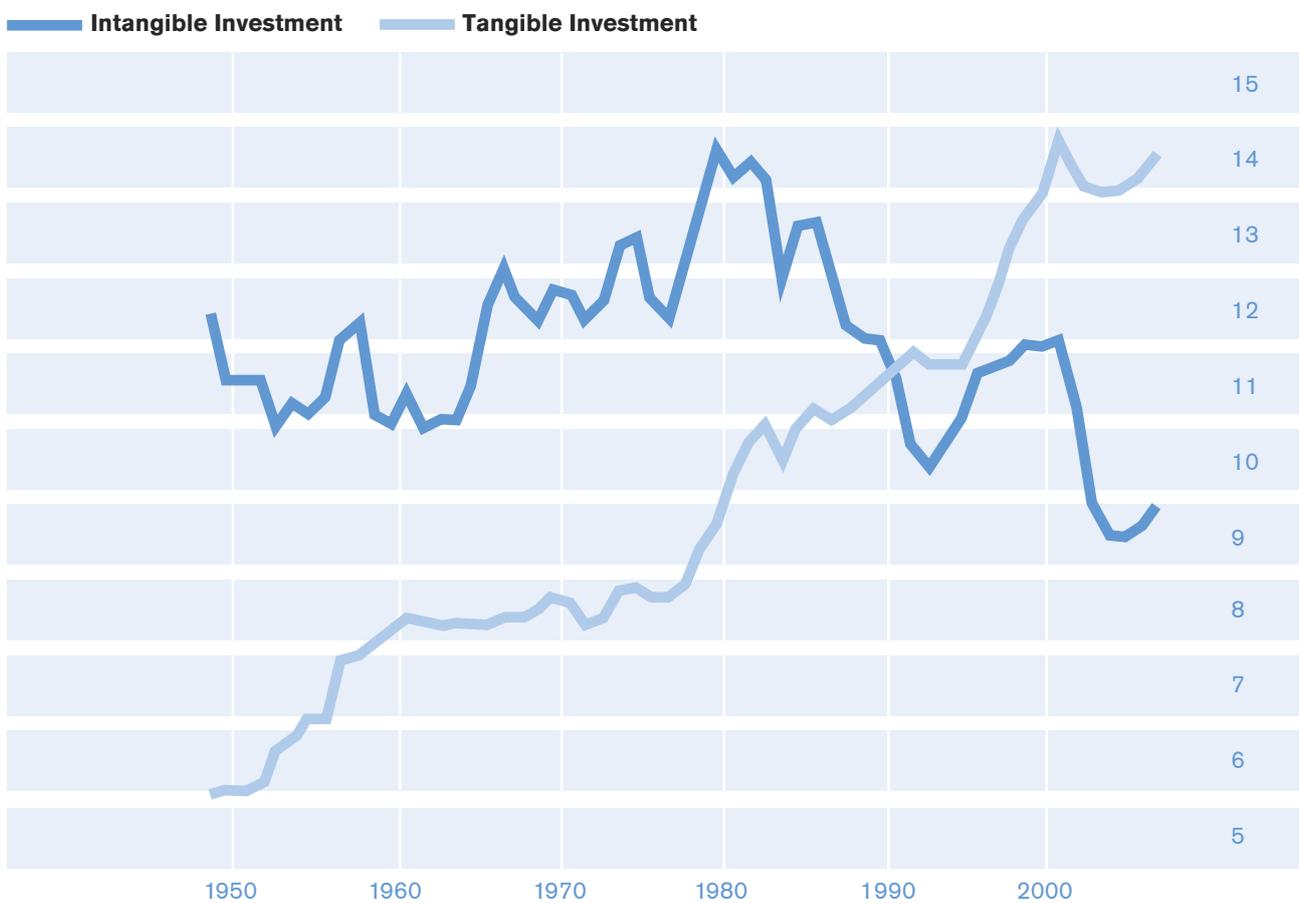
The IP team organises events, including the following:

- **IP protection for business (generic)**
- **IP for the Healthcare Sector**
- **Licensing**
- **IP for the Digital Media and Software Sectors**
- **IP for the Engineering Sector**
- **Patent Box**

Many of these presentations are available to view on the Invest NI YouTube Channel.



Business investment in the USA, tangible and intangible investment (ratio to business output)

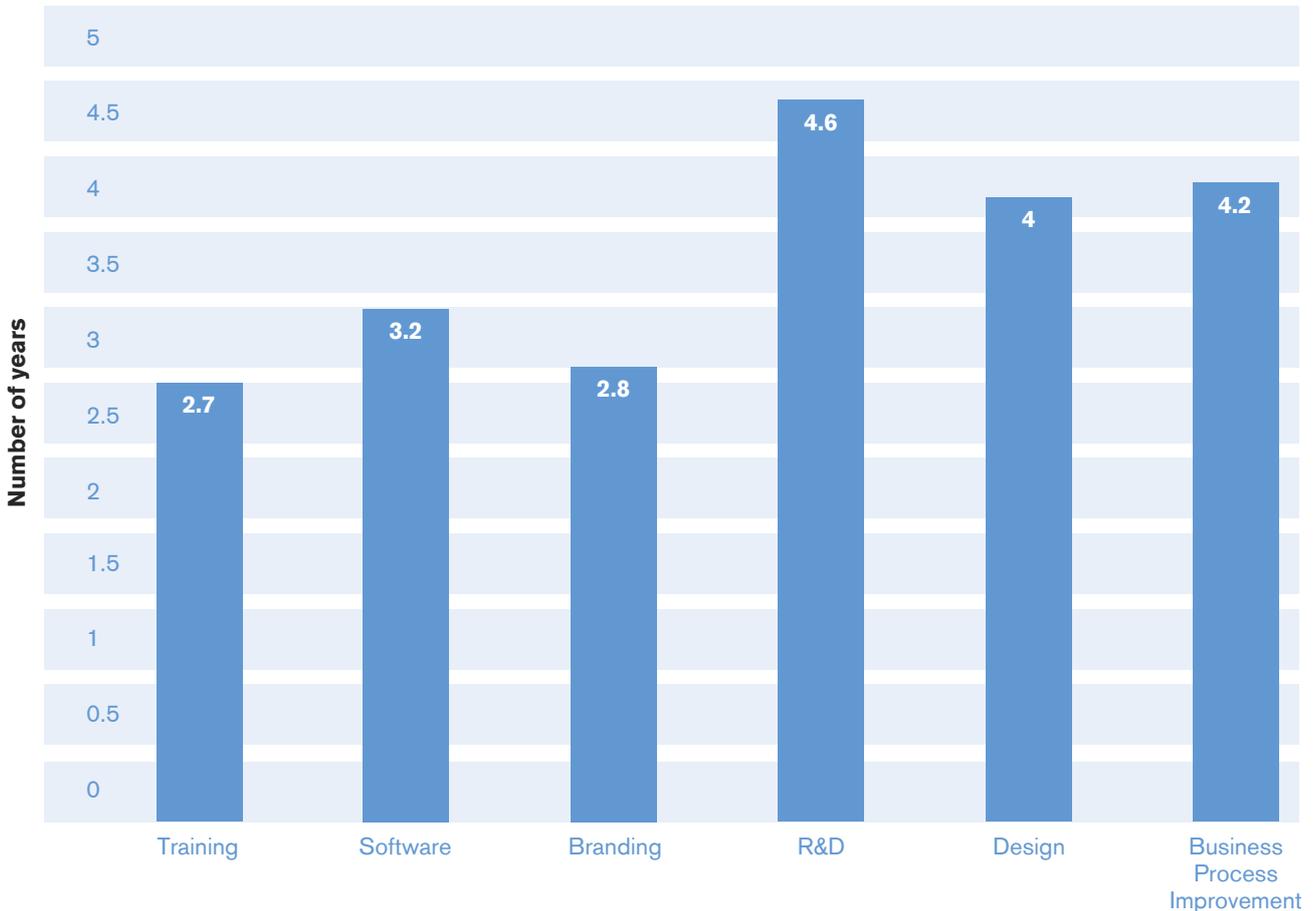


### Why this increased business investment in intangibles?

With globalisation and deregulation, competitive advantage is increasingly driven by innovation which in turn is driven by investments in intellectual capital. Secondly, fragmentation of value chains and increasing sophistication of production in many industries increase the importance of such capital. New ICT may itself increase the value of some intellectual capital to

firms and many products are becoming more knowledge intensive, whilst growth of the services sector relies highly on the use of this capital.

Haskel estimated the productive lives (years) of key intangible assets in firms in the UK as shown in the diagram opposite.



Whilst it may be difficult to separate some of these intangible, intellectual assets out for sale, they are still worth something - looking at the monetary values attributed to intangibles e.g.

- 2005 Procter & Gamble purchase of Gillette for \$57b, 97% of the value was attributed to the intangibles
- March 2006 L'Oreal bought The Body Shop for £652.2m, 81% of the purchase price was for intangibles (Thayne Forbes, 2006)

Intellectual capital is highly rated by investors, shareholders and others seeking to identify business value drivers. Understanding the IC of a business can:

- **Show the key commercial strengths of a business**
- **Inform business strategy**
- **Stimulate innovation, e.g. by suggesting and controlling diversification**

- **Help raise money e.g. investment, mortgaging**
- **Generate new income streams**
- **Be traded in – e.g. licensed, assigned**
- **Add kudos and act as a marketing tool**
- **Deter and prevent the competition**

As IC and the ability to create value from it increases, so does the ability to reap the economic gains from these assets. In some cases, this can be achieved through the use of a portfolio of IAs such as IP. Innovative and young SMEs can usefully employ IP, particularly formally-protected IP, as collateral in obtaining finance in cases when they cannot rely only on their tangible assets and do not yet have reputation or brands or other intellectual assets for use in raising capital.



## 1.6 Approach to the Study

The aim of this Foresight exploratory Study was to build on and develop the research already available pertaining to the field of Exploitation of Intellectual Capital through a thorough analysis of the research data collected from the SMEs. This inductive approach to research is rooted in theory building rather than theory testing and as such recognises the emphasis is on understanding the way in which humans recognise their world.

A study of a small sample of subject companies, and data collected qualitatively, is an appropriate research approach for this Study. An inductive approach offers a more flexible structure which allows changes of research emphasis as the research progresses.

Exploratory studies are a very useful way of clarifying an understanding of an organisational problem. An exploratory study will seek to find new insights and assess phenomena in a new light. However, the flexibility inherent in exploratory research does not mean absence of direction to the enquiry, it means that the focus is initially broad and becomes progressively narrower as the research progresses.

There are three ways to conduct exploratory research, firstly talking to experts in the subject, secondly a search of the literature and finally conducting target group interviews.

The use of interviews can help gather valid and reliable data that are relevant to the research question and objectives. The method of data collection selected therefore was semi structured interview. This technique provided the structure required to ensure reliability whilst also providing the opportunity for research exploration and thus ensuring validity.

The subject matter at the heart of this Study is complex, but again, qualitative semi-structured interviews can provide an idiosyncratic richness that other data collection methods cannot. The limited length of time available for this research Study also lends itself to qualitative interviews as a mode of data collection.

The nature of the questions and the ensuing discussion meant that data was recorded by note-taking. As soon as possible after the interview, the researcher made a detailed write-up from the notes taken at the interview. The researchers travelled to the subject companies' places of business.

The nature of qualitative data has implications for both its collection and its analysis. To be able to capture the richness and fullness associated with qualitative data, they cannot be collected in a standardised way, like that of quantitative data. The use of a framework can help to organise and direct qualitative data collection and analysis. In this case, a framework was developed following the identification of the main Intellectual Capital themes and issues that the Study seeks to address. This framework provided the structure for the SME and KOL surveys and for subsequent analysis of data.

## 1.7 The Structure of the Report

THE report is divided into the following chapters. Chapter 2 incorporates the findings of the literature review, research of models for IC recognition, management and exploitation and the identification of best practices in this field, nationally and globally.

Chapter 3 presents the results of the Study. In Chapter 4, an analysis of the results, and how they relate to the issues pertinent to the research objectives and implications for IC exploitation, are presented.

Finally, Chapter 5 outlines the overall conclusions ascertained from the Study in the form of recommendations for NI businesses, government, public sector and research providers.



# INTELLECTUAL CAPITAL BEST PRACTICE MODELS

# 2



A key deliverable of the Study is research of models for IC recognition, management and exploitation, and the identification of best practices in this field. The following chapter presents the results of this research, giving details and analysis of a number of national and global IC models.

## 2.1 IC Exploitation Nationally

### 2.1.1 Scotland

#### Scottish Enterprise - Intellectual Assets Centre

The Intellectual Assets Centre was established almost 10 years ago and aimed to offer a range of free and impartial services to assist Scottish businesses to identify, manage and exploit their hidden value. The Centre provides support to businesses to better manage their Intellectual Assets. It is funded and now managed by Scottish Enterprise.

The aims of the Centre are:

- **To raise awareness and understanding of intellectual assets (IAs) among Scottish organisations**
- **To help those organisations identify and exploit the untapped potential of their IAs**
- **To work with independent IA management specialists and encourage their sector to grow**

The Centre does not replace the expertise of professional legal advice, but can assist companies to identify where their value lies, identify strategies they may consider to manage and protect their intellectual assets, and how their brand and reputation can be used to capitalize and promote them better to existing and new customers.

The following assistance is offered:

- **Developing new products/services - what types of Intellectual Property could potentially assist to legally protect business developments?**
- **Working with third-parties - how will a company manage confidentiality and ownership?**
- **Building a brand - what strategies to employ to build and establish a reputation and create meaningful relationships with customers and suppliers?**

- **Licensing – identifying specifically what will be licensed? Under what terms and what the implications will be?**
- **Presenting the company or its products for sale or investment – what are the unique assets which makes a business attractive to customers or investors?**

The service is delivered in three ways:

- 1 One-to-one interactions - The Centre engages with companies to identify their IAs and determine how effective management of these can be used to address challenges and add value.
- 2 Intellectual Assets Audit - An IA Audit can help businesses to identify and document the key value drivers that underpin or enhance their product/service offering.
- 3 Workshops - Workshops help companies understand what intellectual assets are and how managing them can have a positive impact on business. Through shared learning, delegates can gain a better understanding of how to identify intellectual assets.

Topics covered include:

- **How to improve commercial prospects through brand management**
- **Confidentiality**
- **Developing relationships with stakeholders**
- **Intellectual Property protection strategies**
- **The workshops are tailored to lead on to one-to-one interactions to assist companies to exploit what they have learnt to enable positive impacts**
- **The Intellectual Assets Specialist service supports an organisation's innovation and growth. The service offers free consultancy and advice to assist in identifying and developing strategies for the management of the key intellectual assets within a business**
- **The Intellectual Assets Specialist's advice covers all of the intellectual assets that a business may hold, including intellectual property such as patents, trademarks, designs, and copyright.**



It also includes wider, more intangible, intellectual assets that may be key value drivers for business. These include:

- **Know-how and show-how<sup>1</sup>**
- **Brands**
- **Goodwill and reputation**
- **Management structures and information**
- **Processes, procedures and technical information**
- **Confidential information and trade secrets**
- **Contracts**
- **Customer and supplier knowledge and networks**
- **Image enhancing customers and accreditations, such as industry awards etc.**

Prior to the establishment of an IAs Centre in Scotland (2003) about 66% of Scottish businesses had never heard of the term 'intellectual assets'. Approximately 74% would report not having a good understanding of IAs. More than half of Scotland's businesses had never considered the importance of IAs to their businesses and only 8% of Scottish businesses had taken steps to protect or safeguard their IAs (of that 8% about 58% had protected their IP).

The most protected IAs were company name, reputation of the company, company customer base and quality of products and services. The most frequently-used protection methods were confidentiality agreements and employee contracts. More specialised forms of protection such as registered designs, patents, IP insurance and copyright were less well used. Only 3% of Scottish businesses reported using patents to protect their IAs.

The Scottish IAs Centre offers businesses tailored one-to-one support to individual companies, a programme of events & workshops, case studies and downloadable resources such as:

- **Publications**
- **An IA Audit tool**
- **IA Glossary**
- **IA Register**

Almost all services from the IAs Centre are currently free or for

minimum charge to Scottish companies and the outlay by the Scottish government is approximately £1.5m per annum.

The most recent results of the IAs Centre show that:

- **Awareness and appreciation of IAs – up**
- **Consolidation of IA activity amongst the active population of companies**
- **Numbers of companies exploiting IAs – up**
- **9% recognition level amongst the general sample of companies**
- **Low proportion of 'dead-weight'**
- **90% of the sample had a very good experience of their interaction with the Centre and would recommend the Centre to others**
- **Staff competence rated very highly**
- **10% of the funding has come from non-core sources**
- **Scotland was seeing above average increase in trade mark applications (up to 2007) and substantial increase in the interest in copyright**
- **Good recognition among key partners and suppliers**



HISTORICALLY, DEFENCE RESEARCH HAS PRODUCED MANY ADVANCES INCLUDING SUPERSONIC AIR TRAVEL, LIQUID CRYSTAL DISPLAYS AND INFRARED DETECTORS



### 2.1.2 Ploughshare Innovations

Ploughshare manages the commercial licensing to industry of Intellectual Property developed by the UK Defense Science and Technology Laboratory (Dstl). Ploughshare Innovations are the commercially-connected, industry-aligned experts in technology transfer.

The naming of Ploughshare Innovations reflects long standing ideologies related to converting 'swords into ploughshares' and converting items developed for military purposes into civilian applications.

Ploughshare can help companies:

- **Lower technology risk**
- **Reduce R&D costs**
- **Speed time to market**
- **Maximise the business opportunity**

There are more than 30 patent applications arising from advanced research programmes every year and Dstl is actively pursuing the government policy, via Ploughshare, of releasing the economic potential of Public Sector Research.

Establishments through the transfer of good ideas, research results and skills to business and ultimately the UK taxpayer.

Historically, defence research has produced many advances including supersonic air travel, liquid crystal displays and infrared detectors. By licensing that technology from Ploughshare, companies can benefit from a £350+ million R&D budget, and the capabilities of 2500+ scientists, working on advanced technology. The technology is also extremely well protected through extensive patenting.

Ploughshare's role is to predict and respond rapidly to the fast moving environments in which their clients operate.

As well as licensing technology, Ploughshare has established many new businesses ('Spin-Outs') as a highly effective route to market. Whilst Ploughshare continues to work with both existing and new sources of IP generation, they also have networks with Venture Capital and private equity investors to take that IP to industry.



### 2.1.3 The ICE Programme

Innovation for Competitive Enterprises (ICE) Programme promotes regional economic growth and development through the establishment of a Tri Regional Innovation Network.

It aims to build the innovation capacity and capability of existing SMEs in:

- **Northern Ireland**
- **Six southern Border Regions of Ireland (Louth, Monaghan, Cavan, Sligo, Leitrim and Donegal)**
- **Western Scotland (Lochaber, Skye and Lochalsh, Arran and Cumbrae and Argyll and Bute, Dumfries and Galloway, East Ayrshire and North Ayrshire mainland and South Ayrshire)**

The project is a three year programme with a three month set-up phase and a three month wrap-up phase. The total programme funding is €2.49m from the EU INTERREG IVA Programme with matched funding contribution from Scottish Enterprise.

The programme has the direct involvement of Enterprise Ireland, Invest NI and Scottish Enterprise. The ICE initiative is a collaboration between the Dundalk Institute of Technology, University of Glasgow, Glasgow Caledonian University, University of Ulster.

The objectives of this programme are to increase the innovative capacity and capability of local companies, especially SMEs, who have completed early stage development and moved into growth.

ICE identified the following problems in SMEs:

- **Not an innovation culture within most SMEs**
- **Lack of training**
- **Problems identifying commercial potential of their ideas**
- **Difficulty in resourcing /accessing technology transfer or licensing opportunities**
- **Do not have the absorptive capacity\* to implement innovation within their enterprises**
- **Urgent tasks prioritised and innovation neglected**

\* In business administration, absorptive capacity has been defined as 'a firm's ability to recognise the value of new information, assimilate it, and apply it to commercial ends'.

The ICE programme aims to promote and encourage the development of an innovation culture in SMEs through a dedicated in-house, project-led approach.

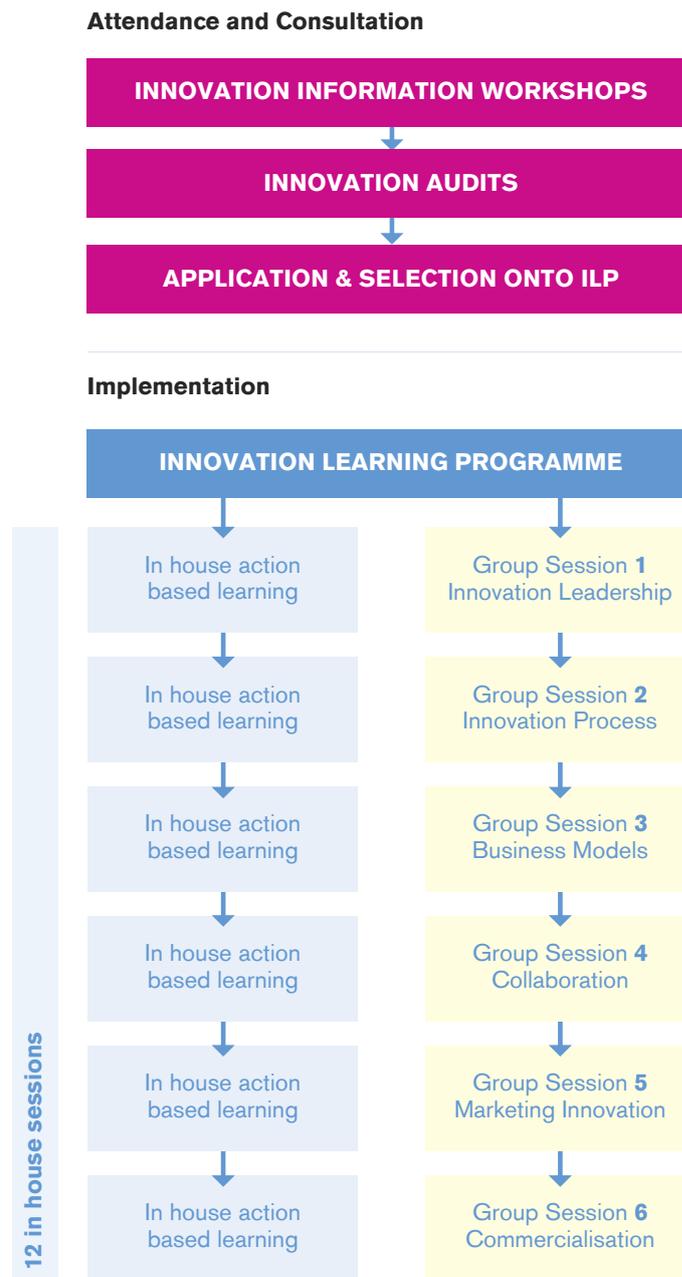
The programme adopted a 4 strand approach:

- 1 Regional Information Resource and Network of SMEs for sharing of information, resources and knowledge**
- 2 Access to regional Panel of Experts**
- 3 Access to Technology Transfer and Licensing Opportunities**
- 4 Specialist SME Innovation Learning Programme coupled with in-company mentoring and assistance with innovation planning and implementation**

The programme was delivered on a modular basis combining workshop-based learning and on-site, company-specific, action-based learning sessions for the participating companies over a 12 month period.

At the end of the training and action learning programme, each participating company will have taken identified opportunities through the complete process, resulting in identified commercialisation opportunities and routes.

By the end of the programme, companies participating in ICE have an understanding of the importance and value creation of innovation and are able to develop and tailor the most appropriate approach to innovation within their business. They should also have a clear understanding of the various stages involved in the innovation cycle and create an environment where the stimulation of ideas can begin. Finally, they should understand and create a mechanism for the identification of commercially valuable ideas for further progression and develop commercial and financial business risk assessment plans for any good ideas and realise these business plans through a structured commercialisation process to increase revenue.



The ICE Programme is on course to increase participant company turnover by over €56 million, generate 300 new jobs and take nearly 40 companies into new export sales when it is completed.

ICE is working in a series of 3 cycles or cohorts of companies going through the ICE process. Each cohort has 30 SMEs so the full ICE Programme is developing innovation in 90 companies spread across the Border Counties, Northern Ireland and Western Scotland.

The first hard evidence of the success of ICE emerges from an independent evaluation of the Programme completed during 2012 at a time when a first cohort of 30 companies had completed the Programme.

The evaluation found that in the 30 companies:

- **103 new jobs had been created or existing jobs safeguarded**
- **13 of the 30 companies had increased export sales**

Other impacts include:

- **34 new products developed**
- **10 licensing and technology transfer opportunities were realised**
- **23 companies entered new markets**
- **25 companies achieved increased sales**



## 2.2 IC Exploitation Internationally

### 2.2.1 InCaS Europe

As a result of constant changes caused by globalisation, emerging technologies and shorter product life-cycles, knowledge and innovation have already become the main competitive advantages of many companies. Especially European SMEs are highly dependent on the ability to identify changes in their global economic environment quickly and respond to these changes with suitable solutions. Since the EU aims to become the most competitive and dynamic knowledge-based market in the world, this effect is even expected to multiply (Mertins, K. and Will, M., 2007).

Market-oriented innovation, transparent structures as well as a strategic development of core competencies are therefore essential preconditions for sustainable growth and future competitiveness. Intellectual Capital (IC) forms the basis for high quality products and services as well as for organisational innovations. So far, conventional management instruments and balance sheets do not cover the systematic management of IC.

In view of this background, the project 'Intellectual Capital Statement – Made in Europe' (InCaS) has aimed to:

- **Strengthen the competitiveness and innovation potential of European organisations by systematically activating their Intellectual Capital**
- **Establish the Intellectual Capital Statement (ICS) as an important and valuable management tool in a knowledge driven economy**
- **Integrate and consolidate individual national approaches on Intellectual Capital Statements on a European level**

The InCaS consortium comprises 25 enterprises in five European countries, several experts and research institutions and six business associations. In three phases, the partners have drafted the ICS methodology, implemented and evaluated the ICS together with the companies, and optimised and enhanced the methodology according to the needs of the users. All of these project experiences have led to a European ICS Guideline (Mertins, K. and Will, M. (2007).

An intellectual capital statement is an instrument to precisely assess and to develop the intellectual capital of an organisation.

It shows how organisational goals are linked to the business processes, the intellectual capital and the business success of an organisation using indicators to visualise these elements.

A typical team should consists of employees from all parts of an organisation, not just management, for example:

- **Chairman/MD**
- **Head of Corporate Planning**
- **Head of Sales / Strategic Marketing**
- **Representative of Public Relations**
- **Project Manager**
- **Branch Head**
- **Sales employee**
- **Specialist worker**

The aim of InCaS is to enable businesses to realise internal benefits by:

- **managing their intangibles to realise their innovation potential and taking the strategic steps to become more efficient and competitive**

To realise external benefits by:

- **substantially enhancing their business model and significantly improving their access to finance and investment**



## THE KEY MOTIVATION FOR THE PROJECT WAS TO REDUCE THE COST OF CAPITAL FOR MITTELSTAND COMPANIES THAT RELY PRIMARILY ON BANK LENDING FOR THEIR CAPITAL

### 2.2.2 Germany

The Wissensbilanz project has resulted in the implementation of intellectual capital statements and of knowledge management systems in a number of SMEs. The impetus behind the project, which was sponsored by the Federal Ministry of Economics and Labour, was to protect and enhance the competitiveness of Germany's Mittelstand (the SMEs that are the source of much German productivity) in the face of increased competition, according to the guidelines

*"The future of Germany as an industrial location can only be safeguarded in the face of international competition by ensuring high-quality work and innovation."*

The key motivation for the project was to reduce the cost of capital for Mittelstand companies that rely primarily on bank lending for their capital. The promise of the Wissensbilanz project was to reduce the cost of borrowing for innovative and risk-prone investments by offering banks and investors better information for their decision-making, by allowing SMEs the opportunity to report intangible assets as a component of their value.

The Wissensbilanz project also aimed to address the impact of the Basel II accord on SMEs in Germany. Basel II (promulgated by the Basel Committee) aims to make the international financial system safer by reflecting the riskiness of bank loan portfolios in the capital charges banks set aside for unexpected losses. For many reasons that are only partially linked to the new Basel II agreement, German banks had changed their lending behaviour and were paying more attention to the riskiness of their clients. Riskier SMEs were facing higher interest rates and higher collateral requirements. The Wissensbilanz project estimates that SMEs that can show that they have a lower risk because of their intellectual capital can expect to benefit from lower interest rates and better access to loans.

With these rationales and objectives in mind, the guideline offers practical help. Most of the guideline is taken up by detailed case studies that are designed to help the reader implement an intellectual capital management system and develop intellectual capital reports.

A typical Wissensbilanz covers a large number of factors including human, structural and relational capital. Companies are directed to go through an initial brainstorming session to identify the factors which have the greatest influence on the production process and the greatest impact on business success. Below, are some of the human capital-related questions that are suggested for management to consider.

In the area of human capital, key questions are:

- **How are suitable employees found, recruited and retained?**
- **How are employees trained and given further skills?**
- **How are the competencies and skills of employees systematically strengthened and refined?**
- **How is employee motivation and satisfaction ensured?**
- **How is employee performance promoted and challenged?**

The result of the process of questioning and examination is a statement that reflects the specificities of each enterprise. An excerpt of the human capital and relational capital indicators from an intellectual capital statement of the Seibersdorf Austrian Research Centre is illustrated in the table opposite:



HUMAN CAPITAL	2002	2003	EVALUATION	GOAL
Academics		21	✓	
Specialists		8		
Unskilled workers (uncompleted students)		4		
Apprentices		3		
Trainees		0		
Acceptance rate of apprentices, interns and trainees		33%		
Per capita further training costs (external)		1.014e	✓	↗
Further training days per employee (external)	2.6	3.3	✓	↗
Building up employee experience				
Experience in years		4.7	✓	↗
Experience in years not incl. apprentices		6.2		
Building up social competence				
Estimation of the customers				
Motivating employees and building up leadership competence				
Index of employee questionnaire		0.61	✓	↗
Employee fluctration (in and out)		0.31		
Absenteeism	5.6	5.7	✓	↗



The table shows indicators for factors such as training expenditures, employee experience and motivation. These factors receive numerical valuations that allow for comparison over time. The use of the indicators is designed to provide companies with an insight into the intellectual capital that is relevant to competition and what could be done to manage these factors better.

The guideline distinguishes clearly between internal and external reporting. The former is more detailed and task specific, the latter more focused on outcomes and different stakeholder information needs. The guideline was tested on real companies. Intellectual capital statements were developed for a number of small and medium-sized enterprises with the support of the Federal Ministry of Economics and Labour.

Overall, companies that participated in the testing expressed satisfaction with the experience. The implementation of an intellectual capital statement was perceived by all participating organisations as a positive contribution to their competitiveness and the development of the organisation. All of the enterprises involved reported benefits from the implementation of an intellectual capital statement that emanated from new perspectives on the value of intellectual capital and the importance of its management.

### 2.2.3 Japan

#### Guidelines for Disclosure of Intellectual Assets in Japan

The Guidelines for Disclosure of Intellectual Assets in Japan were compiled by the Ministry of Economy, Trade and Industry (METI) to help corporations create intellectual capital statements.

The objectives of the project were to:

- 1 produce “sustainable profits” and enhance “corporate value” to stakeholders, and
- 2 share a sense of value with stakeholders

The guidelines describe the disclosure process as a management method designed to enhance corporate value from the perspective of multiple stakeholders. The ultimate promise is to optimise the allocation of management resources

for the whole economy. The guidelines also seek to address the issue of corporate short-termism caused by modern reporting. They suggest that it may be necessary to emphasise “mid-term corporate value and the possibility of sustainable profits” as opposed to “near-term items directly linked to profits”.

The guidelines provide detailed descriptions of how intellectual capital statements could be drawn up.

From Past to Present:

**A: Management policy in the past**

**B: Investment including performance figures**

**C: Unique intellectual assets accumulated in the company, strengths based on them, and value creation methods**

**D: Actual performance in the past, such as profits**

From Present to Future:

**E: Intellectual assets that will be effective in the future, and future value creation methods based on them.**

**F: Identification of future uncertainty/risks, how to deal with them, and the future management policy including those elements**

**G: New/Additional investment for maintenance and development of intellectual assets**

**H: Expected future profits, etc.**

Other intellectual assets indicators (optional).

Under the guidelines, the structure of an intellectual capital report has three components which can be summarised as: 1) descriptive, 2) backwards-looking historical information, and 3) future-looking. Reports may be produced as free standing items or be a part of existing documents such as annual or sustainability reports.

The guidelines also provide examples of key performance indicators (KPIs) that it suggests are important to developing the “story” that the enterprise wishes to tell and to enhance the credibility of statements.



Some of the performance indicators related to human capital are summarised as:

- 1 Management stance/ Leadership: Degree of internal penetration of management principles**
- 2 Selection and concentration: Employee assessment**
- 3 Knowledge creation/ innovation/ speed: Employees' average age and increase/decrease from the previous year**
- 4 Teamwork/organisational knowledge: In-house improvement proposals for quality control systems, number of proposals and improvements achieved, number of lateral projects, degree of employees' satisfaction. Incentive system (including yearly contract system), job leaving ratio**

These general indicators are described in detail in the guidelines and, in some cases, mathematical formulas are provided for calculating them. The formulas should, in principle, permit comparison of indicators between companies.

#### 2.2.4 Innovation Norway

The Norwegian Centres of Expertise (NCE) enhance innovation activity in the most expansive and internationally-oriented industrial clusters in Norway. Firms with a better basis for initiating and conducting intensive innovation processes are supported, based on collaboration with relevant business partners and knowledge providers. It provides better conditions for new businesses, through the commercialisation of new business ideas and the localisation of external operations in the cluster. The Centres offer clusters technical and financial support for development of up to ten years. Presently 12 clusters are supported by the NCE programme.

Innovation Norway is the Norwegian government's most important instrument for innovation and development of Norwegian enterprises and industry. It supports companies in developing their competitive advantage and to enhance innovation.

Innovation Norway offers:

- **Funding**
- **Special loans at good rates which might be difficult otherwise**
- **Longer term, bigger, secured loans for major investment**
- **Grants are available where a project will add value to Norway**
- **Bigger grants for convincing and ambitious projects**
- **R&D funding assessed on a case-by-case basis of up to 50% (also tax breaks)**
- **Funding is very favourable to environmentally friendly projects.**

Innovation Norway is strongly focussed on IP and offers support in:

- 1. IP consultancy in several phases including news reviews and Protection Strategies**
- 2. EU Affairs**
- 3. International consultancy**
- 4. Financing: grants in two rounds, capital loans**
- 5. Design Consulting**
- 6. Mentoring**



## 2.2.5 USA

The level of IC exploitation in the USA has developed more or less organically according to USA IP attorneys and continues to do so through free market economics and competition, entrepreneurship, and the aid of private and non-profit organisations (e.g. grants, lobbying, mentorship programmes or tech accelerator programmes). Therefore it is difficult to point to any particular USA government scheme or initiative of great note or impact. At the Federal level, there are grants and tax-friendly policies, by the NSF, USA departments of commerce and energy for example, which may not be specific to SMEs, including lower administrative (e.g. patent office) fees for small/micro entities.

### Innovation Ecosystem Initiative

In September 2010, the Department of Energy's (DOE) Office of Energy Efficiency and Renewable Energy (EERE) Commercialisation Team made five three-year awards to five projects. The goal of the five projects was to build and strengthen "innovation ecosystems" that accelerate the movement of cutting-edge energy efficiency and renewable energy technologies from university laboratories into the market. The five projects were led by universities and nonprofits located in five distinct geographic regions across the United States, and convened more than 80 project partners, uniting the strengths of universities, business, finance, government, research institutes, economic development organisations, accelerators, and national laboratories. The five projects have accomplished such activities as: pursuing intellectual property protection for technological innovations; nurturing and mentoring entrepreneurs; engaging the surrounding business and venture capital community; and integrating sustainable entrepreneurship and innovation across university schools and departments.

State government initiatives are more targeted, understandably to help local businesses and innovation, e.g.

### New Hampshire Innovation and Research Centre (NHIRC)

The NHIRC was created in 1991 by the New Hampshire Legislature, designating \$500,000

annually to increase collaboration, technology development and innovation between New Hampshire businesses and universities. Businesses match their project awards to fund research which often leads to new products and processes. Outcomes include:

- **Increased competitiveness and profitability for businesses**
- **An increase in the tax-base and in the number of quality jobs**
- **Additional funding from venture capitalists**
- **Federal funding of Small Business Innovation Research (SBIR) awards**
- **Federal funding (EPSCoR) for NH educational institutions**

Other benefits from NHIRC projects included:

- **Use of specialised equipment at universities that individual companies could not purchase**
- **Field experience for students sometimes leading to employment following graduation**
- **Patenting and/or licensing research, often leading to commercial ventures**
- **Testing a theory before investing substantially**

## 2.3 Summary of Best Practice Models

Now that a number of IC best practice models have been identified, it is important to recognise how learning from these models can be applied to SMEs in Northern Ireland. This section considers the strengths and weaknesses of each model specifically in relation to their IC exploitation support.



# NATIONAL BEST PRACTICE MODELS

MODEL	STRENGTHS	WEAKNESSES
<p>Scottish Enterprise</p>	<p>Aim of IA Centre is to assist businesses to identify, manage and exploit their hidden value</p> <p>Helps companies improve commercial prospects through brand management</p> <p>Provides advice on confidentiality</p> <p>Helps companies develop relationships with stakeholders</p> <p>Provides support for Intellectual Property protection strategies</p> <p>Offers services of independent IA management specialists</p> <p>Provides licensing identification and advice</p> <p>Supports companies to assess their unique assets when selling</p>	<p>Positive feedback, but impacts very limited, particularly around exploiting IA</p> <p>More awareness than action – expected – long term agenda</p> <p>Economic impacts very low, although additionality reasonably strong and improving</p> <p>Evidence of on-going demand particularly around IP, but on-going reluctance to pay for services</p>
<p>Ploughshare</p>	<p>Manages the commercial licensing of IP to industry</p> <p>By licensing technology from Ploughshare, companies can benefit from a £350+ million R&amp;D budget, and the capabilities of 2500+ scientists</p> <p>The technology is also extremely well protected through extensive patenting</p> <p>Ploughshare has established many Spin-Outs as a highly effective route to market</p>	<p>Focus on licence sharing rather than IC exploitation</p>
<p>ICE</p>	<p><i>Focus on</i></p> <p>New product development</p> <p>Licensing &amp; Tech Transfer</p> <p>Developing export sales</p> <p>Job creation</p>	<p>No specialist support for IA management or exploitation</p> <p>Broad focused innovation programme</p>



# INTERNATIONAL BEST PRACTICE MODELS

MODEL	STRENGTHS	WEAKNESSES
InCaS Germany	<ul style="list-style-type: none"> <li>Thorough analysis of company's IC</li> <li>Process established and proven</li> <li>Case studies available</li> <li>Focus on financial benefits of valuing IC for banks / VCs</li> <li>Key motivation – reduce cost of capital</li> </ul>	<ul style="list-style-type: none"> <li>Requires specialist skilled trainers to implement</li> <li>Complicated process</li> <li>Time consuming</li> <li>Requires input from several employees (resource drain)</li> </ul>
InCaS Japan	<ul style="list-style-type: none"> <li>Encourages companies to focus on IC that they could exploit in the future</li> <li>Helps companies tell their IC 'story' to encourage investment</li> </ul>	<ul style="list-style-type: none"> <li>Focus on optimising the allocation of management resources</li> </ul>
Innovation Norway	<ul style="list-style-type: none"> <li>Supports companies for 10 years</li> <li>Provides IP consultancy in several phases including news reviews and Protection Strategies</li> </ul>	<ul style="list-style-type: none"> <li>General Innovation support, not IC specific</li> </ul>
USA	<ul style="list-style-type: none"> <li>Patenting and/or licensing research, often leading to commercial ventures</li> </ul>	<ul style="list-style-type: none"> <li>Innovation support available to SMEs</li> </ul>

To conclude, this assessment of IC best practice models provides direction as to how SMEs could manage and exploit their IC. There are opportunities for learning from each model particularly in the areas of IC management and exploitation and knowledge sharing. This assessment, along with the results of the SMEs interviews, will form the basis for the recommendations of this report.

PROFITING FROM SCIENCE  
[www.matrix-ni.org](http://www.matrix-ni.org)



# NI SME INTELLECTUAL CAPITAL RESULTS

# 3



### 3.1 Introduction

THE premise of the Study is the importance of IC for economic growth in NI. The MATRIX IC Panel were tasked with understanding how SMEs deal with their IC in order to make their recommendations.

The Study follows on from and complements previous studies undertaken by DETI on the importance of research, development and innovation and its commercialisation for the growth and prosperity of the Northern Ireland economy.

For some research a deductive approach is appropriate where a hypothesis is developed and a research strategy designed to test the hypothesis. The deductive approach is ground in theory testing. However, this Study aims to build on and develop the research already available pertaining to the field of Exploitation of Intellectual Assets through a thorough analysis of the research data collected. A study of a small sample of subject companies, and data collected qualitatively, is an appropriate research approach for this Study (Easterby-Smith et al, 1991).

There are three ways to conduct qualitative research, firstly talking to experts in the subject, secondly a search of the literature and finally conducting target group interviews (Saunders et al. 2003).

The use of interviews can help gather valid and reliable data that are relevant to the research question and objectives. The method of data collection selected therefore was semi structured interview. This technique provided the structure required to ensure reliability whilst also providing the opportunity for research exploration and thus ensuring validity (Robson, 2002).

The Panel was tasked with looking at IC from the point of view of SMEs and so a small number of companies were chosen from the MATRIX priority sectors of Advanced Materials, Advanced Engineering, Agri-Food, ICT, Life & Health Sciences, Sustainable Energy / Clean Tech and Telecoms.

Necessarily, the Study has limitations in terms of length and time available and the small sample size, so a qualitative research method and analysis is much more appropriate using qualitative interviews as a mode of data collection.

The subject matter at the heart of this Study is complex, and the results will not provide statistically significant data, however, qualitative semi-structured interviews can provide an idiosyncratic richness that other data collection methods cannot.

The nature of qualitative data has implications for both its collection and its analysis. To be able to capture the richness and fullness associated with qualitative data, they cannot be collected in a standardised way, like that of quantitative data (Yin, 1994). The use of a framework can help to organise and direct qualitative data collection and analysis (Miles and Huberman, 1994). In this case, a framework was developed following the identification of the main Intellectual Capital themes and issues that the Study seeks to address. This framework provided the structure for the SME surveys and for the subsequent analysis of the data.



# SME SURVEY OVERVIEW

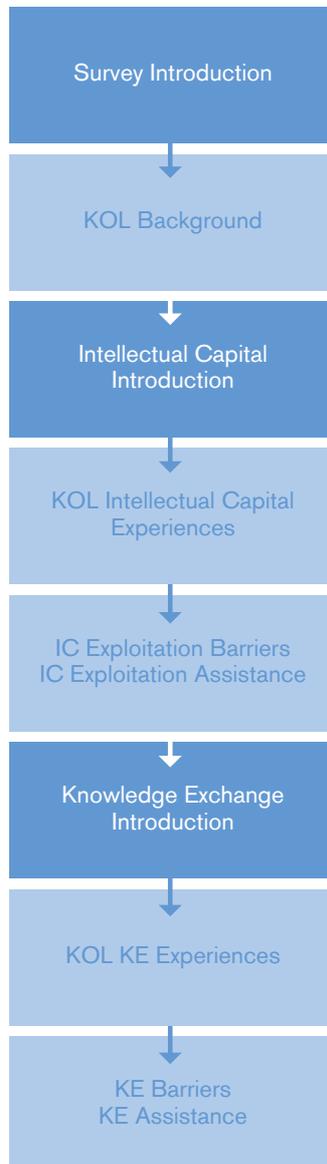


Twenty SMEs from Northern Ireland were interviewed. The researchers travelled to the subject companies' places of business and conducted interviews using the SME survey, which lasted for approx 1-1.5 hours. The nature of the questions and the ensuing discussion meant that data was recorded by note taking. As soon as possible after the interview, the researcher generated a detailed write-up from the notes taken at the interview.

As suggested, in this type of research it is also generally considered valid to collect data from experts in the field of research (Saunders et al. 2003). So a small number of key opinion leaders with experience of starting, working with or growing SMEs in Northern Ireland were interviewed. Again a framework was developed which provided the structure for the KOL surveys and for the subsequent analysis of the data.



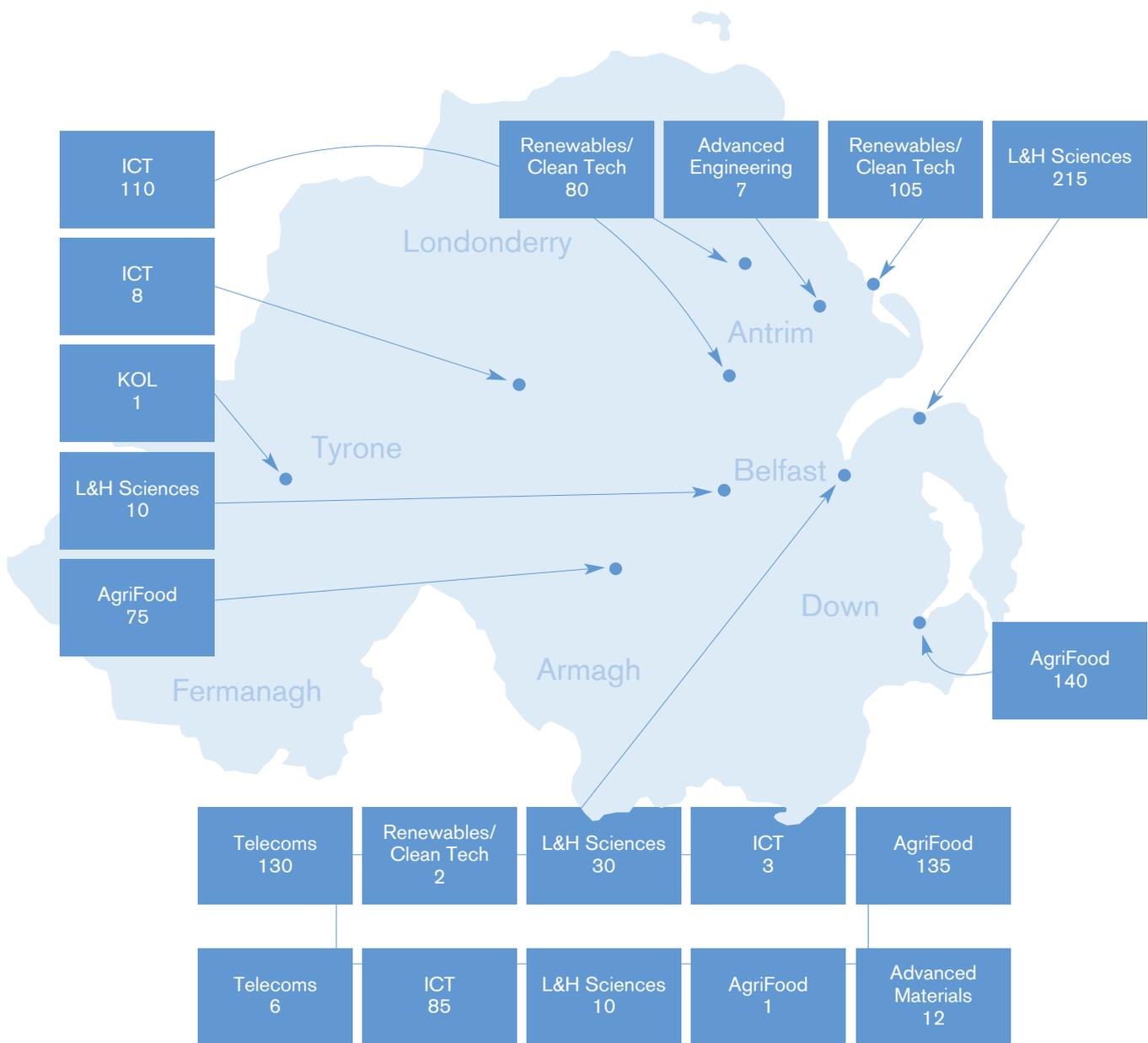
# SURVEY OVERVIEW: KEY OPINION LEADERS



## 3.2 Summary of the SMEs involved in this Study

The remit of the Study was to survey a 'small sample of NI businesses', selected from members of the MATRIX Collaborative Network Programmes, in consultation with the MATRIX IC Panel. In discussions with the Panel, the importance of interviewing a range of stakeholders in order to satisfy the aims of the Study was decided. It was agreed that approximately twenty SMEs and a small number of key opinion leaders should be part of the Study. SMEs were chosen according to the following criteria:

- 1 From the MATRIX priority sectors including Advanced Engineering, Advanced Materials, Agri Food, ICT, Life and Health Sciences, Sustainable Energy/Clean Technology and Telecommunications**
- 2 SMEs should, as far as possible, be represented from across Northern Ireland**
- 3 A full range of SME size should be targeted (from 1-250 employees)**



The map shows the geographical and sector spread of the SMEs interviewed, with the number of employees:

Whilst efforts were made to survey SMEs from as wide a geographical spread as possible, this was limited within the confines of the Study, as discussed more fully in chapter 6, section 6.1.

For each SME, background information was obtained through a series of questions including the length of time of operation of the SME, the USPs of the SME, the keys to the success of the SME, the most important factor for competitive edge, the products/services of the SME, their life cycle, technology level and range, and the channels to market of the SME.



WE WOULDN'T BE HERE WITHOUT INNOVATION. WE INNOVATE IN OUR PRODUCTS, PROCESSES, PACKAGING AND MACHINERY

### 3.3 Results of the SME Surveys

#### 3.3.1 SME Innovation Level

To provide context for the data collected from each SME, a measure of their innovation level was assessed qualitatively using the following questions:

- **Do you consider your company to have a culture of innovation?**
- **Is there a need to develop new products/services in your company's markets?**
- **How new is your company's current most important product/service?**
- **Has your company introduced any new products/services in the last 3 years?**
- **Does your company improve existing products/services, adapt existing products/services to meet market demands, replace existing products/services, develop new products/services?**
- **Does your company expect to increase, maintain, decrease or cease its innovation in the next 1 to 3 years?**

All of the SMEs interviewed considered that their company had a culture of innovation, expressing opinions such as:

*"We wouldn't be here without innovation. We innovate in our products, processes, packaging and machinery."*

*"We really understand innovation – it's what we do; we innovate and guarantee excellence."*

All of the Study's participants consider it essential to develop new products and services in their target markets in order to maintain or gain competitive advantage.

Approximately half of the companies' newest, most important products have been developed within the last 3 years, with the others having been in the market for more than 3 years.

The life cycle of products / services varied greatly depending on the SME sector, but a few companies mention that they use Ansoff's Product Market Matrix to extend the life cycle of their products and maximise sales (see Annex).

Most of the companies interviewed expect to increase or maintain innovation in the next 1 to 3 years, with none expecting to decrease or cease innovation.

Two of the ICT SMEs in the Study actively encourage staff to participate in innovation by rewarding them for ideas. In one company all staff are encouraged to submit ideas via the company intranet to the 'ideas section'. Every quarter the creators of the top two best ideas are rewarded with a weekend away.

In another ICT SME, some of the senior management team have participated in Intertrade Ireland's Challenge Programme which is delivered by Matrix UK.

The CTO suggested that this Programme was *"transformational, he didn't realise they needed this sort of training and support, but it has been excellent and provided a good method for getting new products to market."*



### 3.3.2 Human Capital

In each SME survey it was explained that, for the purpose of the Study, Human Capital is described as:

- **The knowledge and capabilities of a company's employees**
- **The collective experiences, skills, creativity, and expertise of the employees**
- **Refers to the capability of the employee to perform specific tasks necessary to the company**
- **Companies do not own Human Capital - when employees leave, their knowledge goes with them**

To assess the importance of HC to the SMEs, the following questions were considered with each SME:

#### SME Awareness of HC

- **What does your company consider to be its most significant HC (e.g. management, employees, contractors, etc.)?**
- **How important is your HC to your company's success?**
- **Does your company have employees who are key to innovation?**
- **Can you place a value on your company's HC?**
- **How can your company get more from its HC?**

#### HC Knowledge

- **How does your company capture and manage the knowledge of its HC?**
- **Does your company have contracts in place for its HC?**
- **Do any HC contracts have clauses for the protection of company information?**

#### HC Protection

- **How does your company retain its HC?**
- **Does your company understand the risks of losing key HC?**
- **Does your company have a process in place for HC leaving the company?**

All interviewees consider their human capital to be 'essential', 'vital', 'key', 'critical', '100% important' to their company's success.

*"Our most significant human capital is the collective experience of all the employees. Our products and patents are led by these people."*

*"If we lost our HC it would take years to build up again. The tacit knowledge of the entire team - their product and industry knowledge, is vital for the success of the company."*

*"Our employees are ambassadors for the company, they are passionate about the technology."*

Some SMEs acknowledge that they had employees who were key to innovation and for the very small, early stage companies losing these people would be disastrous for the business. Companies use a variety of methods to retain staff, including; management style, leadership, training, setting and assessing key performance indicators (KPIs), setting clear boundaries, incentive schemes, stock options, fair and competitive salary and equal opportunities. Many companies try to get more from staff by providing training, ensuring staff develop a 'skills matrix' and involving them as shareholders to ensure ownership. Investors in People and winning awards are all part of valuing and developing staff in the SMEs in this Study.

A number of companies interviewed mention their very low staff turnover and attribute this to people feeling valued, providing a pleasant working environment and employing a management style that was more 'carrot than stick'.



### 3.3.3 Intellectual Assets

To assist discussion of intellectual assets with each SME, examples of IAs were provided as:

- **Business and technical information that belongs exclusively to a company**
- **Codified descriptions of specific company knowledge**
- **Examples include know-how, trade secrets, unpatented inventions, business and technical processes, product information e.g. design drawings, service information, customer databases, operations manuals, brands, reputation, goodwill**
- **Used in the operation of a company to provide an economic or competitive advantage**

IA data was obtained using the following questions:

#### **SME Awareness of IAs**

- **What does your company regard as its most significant IA?**
- **How important are IAs to your company's success?**
- **Can you value your company's IAs?**
- **Has your company a process in place for identification of IAs?**
- **How could you get more from your company IAs?**

#### **SME Capture of IAs**

- **Does your company have processes in place for the capture of IAs?**
- **Is there specific IA documentation?**
- **Does your company have processes in place for the protection of IAs?**
- **Has your company carried out an IA audit?**
- **Does your company understand the risks involved in losing IAs?**

Overall, the SMEs felt that their IAs Are of great importance and value to them.

*"We would be nothing without our intellectual assets, we would have no products and no sales."*

*"We could reproduce our Intellectual Assets if they were lost, as long as we retained our Human Capital, however, it's our intellectual assets - our reputation and our brand that give us our competitive edge."*

*"Our most important intellectual asset is our reputation, we do whatever it takes for our customers. We go the extra mile every time."*

*"One person could do a lot of damage to the company by stealing our intellectual assets."*

Companies in this Study cite reputation, technical models, brand, customer databases, technical records, know-how, formulations, technical processes, design drawings, unpatented technical and business know how and product design as their most important intellectual assets.

When assessing the value of IAs, most of the companies interviewed consider that a combination of HC and IAs represent most of the value of the company – 70 to 90%.

The SMEs feel they could get more from their IAs by:

- **Placing a value on them**
- **Having more resources (time and staff) would enable more IA exploitation**
- **Have dedicated resource who could focus on the technology exploitation – have better ideas than large companies, but don't have the resources to exploit them all**
- **Working harder and faster**
- **More marketing and promotion**
- **Extending the brand**
- **Expanding the market**
- **Mining assets from existing product subsets to develop new products**
- **Improving customer data analysis and mining**
- **Changing software and processes**
- **Capitalising on employee knowledge and feedback**
- **Decrease costs by relocating and so have more resource to exploit IAs**



INTELLECTUAL ASSET	MANAGEMENT PROCESS
Know-How, Trade Secrets, Unpatented inventions	Unregistered design rights, confidentiality clauses in employment contracts, high level security of QMS, NDAs, know-how not exposed, obfuscate code, backed up to cloud servers, keep out of public domain, restricted access to lab books, material formulations, SOPs, grant proposals, board reports, restricted access formulations.
Business and Technical Processes	ISO9001 QMS, digital dashboard, sales & marketing metrics, ISO 2700 QMS, NDAs, employees contracts, IT systems, SOPs, flowcharts, working documents, ISO 14001.
Product Information e.g. Design Drawings	Limited access to electronic designs, controlled QMS documents, technical data, part numbers, annotated code, project files, ISO9000.
Service Information	Service reports, help desk (tracked), post sales service procedure, ticketing system, proposal system, template folders, internal bespoke system, user manuals.
Customer Databases	Restricted access CRM system, spread sheets, backed up, trade agreements, internal CRM, online forums, complaints procedure, market feedback, protected customer database, SAGE.
Operation Manuals	QMS, intranet, CE branding, safety manuals, user guides.
Brands	Registered trade marks, corporate brand guidelines.

The SMEs in this Study capture IAs in a variety of ways as shown above.

Unregistered design rights, confidentiality clauses in employment contracts, high level security of QMS, NDAs, know-how not exposed, obfuscate code, backed up to cloud servers, keep out of public domain, restricted access to lab books, material formulations, SOPs, grant proposals, board reports, restricted access formulations.

Business and Technical Processes ISO9001 QMS, digital dashboard, sales & marketing metrics, ISO 2700 QMS, NDAs, employees contracts, IT systems, SOPs, flowcharts, working documents, ISO 14001.

Product Information e.g. Design Drawings Limited access to electronic designs, controlled QMS documents, technical data, part numbers, annotated code, project files, ISO9000.

Service Information Service reports, help desk (tracked), post sales service procedure, ticketing system, proposal system, template folders, internal bespoke system, user manuals.

Customer Databases Restricted access CRM system, spread sheets, backed up, trade agreements, internal CRM, online forums, complaints procedure, market feedback, protected customer database, SAGE.

Operation Manuals QMS, intranet, CE branding, safety manuals, user guides.

Brands Registered trade marks, corporate brand guidelines.

- **Form more partnerships and collaborations**
- **Should develop procedures for IA exploitation**



Many use their business plans and Quality Management Systems to capture IAs and CRM databases are used to capture customer information.

SMEs protect against the loss of IAs by electronically backing up data, however in some cases many employees have access to IAs so they are aware that there should be more safeguards in place. One company uses signed logbooks to help protect IAs.

Only four companies have conducted IA audits.

### 3.3.4 Intellectual Property

In this Study Intellectual Property has been defined as patents, trade marks, copyright, design right, and registered designs, i.e. rights which have specific mechanisms for identification and legislation to protect the legal owners.

The SMEs were asked a number of questions relating to the importance of their IP, processes for the protection of IP, their knowledge of Patent Box, and how they use their IP.

When companies were asked 'how important is IP to your company's success?' there were mixed views on this. Many companies have no patents and their success is based on other sources of intellectual capital such as brand, know how, trade secrets, formulations and technical processes. Many of the ICT companies do not hold patents. Companies who have patents state that they are vital for the company's success.

*"We have a core patent, which is the essence of the company."*

*"Patent Box is a great incentive – very generous."*

*"We will try and patent anything novel – there is more value now because of Patent Box."*

*"We don't have any IP, but this will become more important to us in the next 2 – 3 years."*

*"Our IP is vital to our company's success because we bring innovative, disruptive technologies to the marketplace and do not want to risk infringement and also because we are a medtech company and need IP protection to boost the value of the company."*

Most companies have processes in place for capturing IP. Interviewees understand the importance of protecting IP, but many mention that although they have many inventions and ideas, the patent protection process was onerous for SMEs due to the high cost.

Only three companies have an employee IP remuneration scheme available. Two provide share options in return for patentable inventions and the third provide a £10,000 'reward' for a patentable idea. Just over half of the SMEs interviewed have heard of the UK Patent Box scheme.

When asked whether the goal for its IP was for internal or external use (eg, licensing) only two companies use IP solely for external use, four SMEs use their IP for exploiting both internally and externally, but most use their IP for internal use only. When companies exploit their IP internally it is through the development and sales of their products or services. If they exploit their IP externally, it is by licensing to partners who then exploit these through product development.



### 3.3.5 Intellectual Capital Exploitation Barriers and Assistance

To obtain data on perceived barriers to IC exploitation, a number of exploitation issues were discussed, including particularly the skills and resources needed to exploit IC, the suitability of external conditions for IC exploitation and financial issues (e.g. time lag between IC exploitation and financial return, lack of access to finance, cost of IC).

SMEs in this Study perceive the following non-financial issues as barriers to exploiting their intellectual capital:

- **Lots of ideas, but not enough resources and cash to exploit them**
- **We have lots of ideas, but don't have the skills and resources to exploit them as we are growing so fast**
- **Resources are an issue – getting the time, skills and knowledge in the company and being able to exploit this**
- **SMEs are at a real disadvantage because although all IC exploitation is worth doing, we just don't have the means to do it**
- **Being located in Northern Ireland is a barrier**
- **Lack of design and engineering talent in Northern Ireland**
- **Planning system in Northern Ireland**
- **Competitive market**
- **Buyer power such as procurement changes in government**
- **As an SME when we deal with large companies we have to accept their terms and conditions**
- **Increasing regulations, such as quality standards – this is a drain on resources**
- **Substantiation of product claims such as clinical trials**
- **Punitive insurance premiums in the USA**
- **Plagiarism in the Far East, there is no point in protecting our brand there**

The following financial issues were stated by some SMEs as barriers:

- **Product development time**

- **The long return on new product development**
- **Lack of access to finance for SMEs – banks won't lend**
- **Cost of materials**
- **Customer database tools are very expensive but would really help us exploit our intellectual capital**
- **Cost of the product registration process**
- **Plenty of innovative ideas and experts in our field, but the cost and bureaucracy of converting this into legal intellectual capital is too much, we prefer to get to market first**
- **The cost of patenting is a real barrier, in Europe this is affecting innovation exploitation**
- **The time it takes to get licensing deals set up, start-ups don't have a steady revenue stream to support this**
- **With a VC on board, we find that their short term view constrains our desire to invest more in the company**

Information on IC exploitation assistance was acquired by considering with the SMEs topics such as perceived need for assistance in IC exploitation, any obligation for provision of government-funded IC exploitation incentives, awareness of and engagement with IC exploitation support programmes in NI, use of any IC exploitation external training or advice, and need for particular support in R&D and sales and marketing.

Most of the SMEs interviewed consider that they required assistance in IC exploitation. In particular, a mechanism for supporting IP costs and help with looking for possible IP infringements would be very useful.

There was general agreement that there should be government-funded IC exploitation incentives. The following comments were made in this respect:

- **Start-ups need government-funded assistance – not for large companies**
- **An IC education process is needed**
- **Would like case studies of how other companies exploit their IC**
- **There is a role for government in pump priming, i.e. to act as a catalyst to kick start new businesses and to provide early stage finance**



- **SMEs should have access to government funded science such as available within DARD or AFBI**
- **More schemes such as Patent Box**
- **Government-funded assistance is critical as attorneys are so costly**
- **Use the Technical Team in Invest NI to help with patent filings, however, they are frustrated that they can't do more for SMEs, they are helpful but it is too little, there are lots of follow on costs that the company has to commit to**
- **Support to track competitor developments**
- **Government funded R&D support is essential, it helps reduce the risk of a project and so encourages us to proceed with innovation**
- **Need external support for training, help in market channels, external PR support**

All companies agree that R&D and sales and marketing support is required and most companies use patent attorneys when they require IC exploitation external training or advice.

### 3.3.6 Knowledge Exchange and Collaboration

To gather data on knowledge exchange (KE) in the SME surveys, the subject was first of all split into internal KE, i.e. within each SME, and external KE, i.e. from and into the SMEs.

For internal KE, an assessment of this was made by inquiring into the following:

- **How does your company share information internally?**
- **Are lessons learned from daily experiences and projects captured and disseminated?**
- **Is new information and knowledge incorporated within products/services and/or processes of the company?**
- **How does your company understand its customers' needs?**
- **How is customer information fed back into the company?**
- **How often do the sales and marketing team meet with the R&D team?**

Companies use a variety of ways to share information internally such as standard phone calls, meetings, emails and informal conversations, and also intranet, Google Plus, project retrospections & action, board papers and Dropbox. One company conducts management meetings every Monday and Friday, with a 'change control' meeting every Thursday in which complaints / issues / problems are discussed and solutions determined and planned. All meetings were minuted and made available to the board. Another company has a 30-minute project management meeting every day at 10:30.

Some examples of ways new information is incorporated into products and services in the companies interviewed include:

- **Standard operating procedures (SOPs), which are communicated from the senior management team**
- **Post implementation project reviews**
- **Preventative and corrective action procedures**
- **Reviews of new products after 6 and 12 months**
- **Analysis of bespoke customer requests which can be fed into new product development**
- **Formalised meeting notes with action plans**
- **Technical updates to ensure projects are always improved for the next time**

All of the companies meet with customers to understand their needs. Generally this is the responsibility of the sales & marketing teams and senior management teams. Customer information is fed back via surveys, forums, conference calls, customer visits, market surveillance reports, management review, third party independent customer surveys, product design documents, field trials, customer focus groups, market intelligence and conferences. One company has a customer advisory board which provides a road map of ideas. Another company incorporates customer project feedback as a KPI for its employees and their account managers and directors receive daily 'high priorities' (customer problems) that they can act on immediately.

There is a realisation that customer information and feedback can be useful for product development, but that this is not the only, and may not be the most important, source for innovation.

*"Customer led innovation is not always the best".*



In order to understand if companies feed market information back into R&D they were asked how often do the R&D team meet with the sales & marketing team. In some of the small organisations this is one and the same person, but in larger organisations there is an awareness of the importance of this type of knowledge exchange and multidisciplinary team meetings take place both formally and informally, sometimes daily.

*“In our company there is close involvement of the sales and marketing teams and new product development.”*

External KE was researched by asking questions relating to the import of knowledge into the SMEs, particularly the sources of any such KE and any licensing-in.

The companies import the following sources of external knowledge as shown below:

<b>PUBLIC SECTOR</b>	<b>% COMPANIES THIS IS IMPORTANT TO</b>
Other local companies	70
Foreign companies	88
Suppliers	80
Customers	100
Consultants	75
Government funded research organisations	80
Rivate research institutes	60
Public sector bodies	75
Trade associations / trade fairs	100
Regulatory bodies	80



When discussing licensing, half of the companies interviewed use licensing as a method of importing knowledge.

The issue of external KE was further assessed by discussing the export of knowledge from the SMEs, and particularly issues raised by such KE.

The SMEs share information externally, using websites, press releases, speaking at conferences, online case studies, e-shots and publications. When sharing critical information externally, all companies have knowledge sharing agreements in place such as NDAs. Only one third of the SMEs have licensed out their products or services.

Knowledge exchange from, into and between SMEs through the medium of collaboration was also considered.

There were varying attitudes to collaboration, depending on the industry of the SME. Some companies, especially in the Agri Food sector feel that their sector was so competitive that organisations were afraid to collaborate.

*"Collaboration doesn't work in this industry – it's too competitive."*

The companies collaborate with a variety of other organisations, such as suppliers and customers.

*"Collaboration is essential for small businesses."*

*"We are actively looking for collaboration with a Centre of Excellence."*

When asked 'should information be shared freely between organisations in networks?' all companies believe that this is difficult. Companies generally do not share proprietary information and there is always an agreement such as an NDA in place. One company felt that to 'make a difference' they needed to collaborate but is very careful about what they share in order to protect their competitive advantage.

SMEs in this Study are members of sector specific networks such as: Telecommunications Strategy Board, Smart Grid Technology, Assistive Technology Industry Association, NI Grain Association, Agri Industries Confederation, NI Food & Drink Association, British Health Trade Association, BioBusiness, Intertrade Ireland, Linked In groups, Global Wind Alliance, Energy Skills & Training

Network, Global Maritime Alliance and the NI Plastics Association.

Many of the SMEs are, however, skeptical about the worth of networks, feeling that they are not as beneficial to smaller companies as they are to larger companies and so avoid them. One SME states an advantage of being in a network is to lobby government. Another SME is aware that there is the possibility of losing human capital when part of a network, as they could be head hunted by competitors / collaborators within the network.

*"You don't have to be in a collaborative network to work like you are in a collaborative network."*



### 3.3.7 Knowledge Exchange and Collaboration Barriers and Assistance

To assess barriers to knowledge exchange and collaboration, the SMEs were asked if they had encountered any barriers, were these sector specific, was disclosure of IAs a barrier, do the SMEs have the skills needed to engage in KE and collaboration, are they able to develop links with external organisations, determine knowledge required, and if any financial barriers existed.

SMEs in this Study perceive the following issues as barriers to Knowledge Exchange:

- **Losing commercial advantage**
- **Competitive clashes**
- **Commercial barriers such as agreements**
- **Risk of eroding brand and reputation**
- **Risk to reputation**
- **Risks associated with knowledge exchange such as losing IP**
- **Technology transfer at universities have ideals that are too high**
- **Larger companies in the network don't share**
- **Upfront costs of employing a KTP**

*"Knowledge providers should be more open and treat SMEs like customers – i.e., come have a face to face meeting and sell their services. We would love to know what is available."*

*"We find knowledge exchange and collaboration difficult, it's a strategic decision by the board to avoid it to ensure our brand and reputation is not damaged."*

The SMEs are concerned that larger companies in collaborative networks could exploit their knowledge and so would be detrimental to the SME.

When asked if their companies have the skills needed to engage in knowledge exchange two thirds of the SMEs in this Study suggest that they did have the skills needed and that financial issues were not a barrier to knowledge exchange.

The SMEs were also asked if they thought assistance was needed in knowledge exchange and collaboration, specifically, should government-funded knowledge exchange incentives be available, what is the level of awareness of and engagement with knowledge exchange support programmes in NI and is any knowledge exchange external training or advice used.

The SMEs agree that assistance in KE would be useful and that there should be government-funded KE incentives. One company suggests that support with key grant applications in the UK would be very useful, for example if the devolved government could influence London to enable NI SMEs to successfully apply for and win large grants. They suggested the Welsh assembly was very good at this.

*"Government should act as the accelerant and initiate the spark for knowledge exchange."*

*"We find the EU programmes a very important source of funding at the early stage of development, they are also useful for engaging customers."*

*"The government need to take more risks with high tech start-ups."*

SMEs in this Study participate in various KE and collaboration programmes such as Intertrade Ireland's Innova, EU FP7, Technology Strategy Board, MAINS, European Space Agency, Proof of Concept, Wellcome Trust, KTP, Strategic Investment Board and Innovation Vouchers.



### 3.4 Results of the KOL Surveys

#### 3.4.1 Intellectual Capital Experiences

THE focus of the key opinion leaders survey was on their experiences and opinions of IC and Knowledge Exchange and their experience of barriers and assistance of each.

When asked 'do you consider NI companies to have a culture of innovation?' the KOLs felt that there is a culture of innovation in NI but the main issue is measuring the extent of this and inability of companies to exploit their innovation. They agreed that the definition of innovation can be too narrow, it is not just restricted to developing new technology.

"The CBI definition of 'innovation is any profitable change' is a good definition to use. Government can use measures of innovation and definitions that are too restrictive and therefore does not collect all the data available on NI innovation."

"Companies are innovative but often fail to keep records of their innovation and their spend on it, so this information cannot be collected."

There is an impact on the NI economy of the failure to properly measure innovation:

- **Lack of government knowledge of the real level of innovation in NI prevents them from providing meaningful assistance**
- **There is a lack of forward thinking concerning the impact of innovation in privately-owned companies re what will happen to these companies and their employees when their owners leave, and a need to 'lock' such companies into the NI economy**

When considering IC knowledge, management and exploitation in NI SMEs, the KOLs' experience was that IC capture and exploitation was low and that SMEs have not received any information on what to value and how.

The experience of the KOLs was that NI SMEs are aware of and value their HC and IA, but are not very experienced in capturing or managing their IC effectively. It was suggested that interfaces such as accountants and lawyers should know about and be able to recommend IC experts to SMEs.

Regarding exploiting IC, all KOLs agreed that SMEs do this by selling or licensing their products or services or by identifying products from overseas to sell or license.

#### 3.4.2 IC Exploitation Barriers and Assistance

Regarding barriers, KOLs were asked:

- **Do you perceive any barriers to exploiting IC in NI?**
- **Do you think that NI companies have the skills needed to exploit their IC?**
- **How important are NI economic conditions for IC exploitation?**
- **To what extent do you think financial issues are a barrier to exploitation of IC in NI?**

It was indicated that, as a result of over-narrow thinking on innovation and its exploitation, government R&D initiatives focus too much on research and neglect the development part and investment in this. There is a lack of proper sharing of experiences between companies due to the NI innate culture of privacy. The banks in NI do not provide sufficient funding and investment in company innovations, e.g. in Japan, the banks are prepared to take a large share in innovative companies.

Regarding skills – it was again acknowledged that key skills in areas such as technical and sales & marketing are needed. There are people with these skills, just not enough of them and the cost of this resource is a financial barrier.

Regarding assistance, KOLs were asked:

- **Do you consider that companies in NI require assistance in IC exploitation?**
- **Do you think specific support is necessary e.g. in R&D or sales and marketing?**
- **Do you think that there should be government-funded IC exploitation incentives?**
- **Are you aware of IC exploitation support programmes in NI?**
- **Have you engaged in IC exploitation support programmes in NI?**

It was thought that there is a need for assistance. The areas in which assistance is needed the most are IP, specifically Patent Box, contacts for further projects, market identification and knowledge of market requirements. Help is not needed in R&D so much, they either have it in house, or the long timing of R&D does not fit with the experience of SMEs. IC exploitation support programmes are generally not used due to poor experience with interaction with, for example, the universities.



SMEs need a function delivered not a structured programme. There needs to be one-to-one rolling recruitment, not just a set enrolment period, which may not fit with SMEs needs. Assistance programmes need to be short, not spanning many months and taking up time away from the company. SMEs will pay money up-front if they see value in a programme, if they are not prepared to do so, then this is a useful filter for the participants in the programme. Wide qualification criteria are needed for programmes. There is little awareness of available programmes - there is a need to put information out there in a language that SMEs will understand and relate to.

### 3.4.3 Knowledge Exchange Experiences

KOLs were asked about their understanding of knowledge exchange in NI and what barriers and assistance they have experienced.

In SMEs, there is often a lack of time to be able to disseminate their knowledge to others. Publicly-funded institutes have inappropriate targets with regard to knowledge exchange, their targets are often focussed on revenue generation rather than on dissemination of knowledge.

There is not much collaboration between SMEs and publically-funded bodies, e.g. under the Innovation Vouchers programme, as this is too difficult.

SMEs need to be more aware of how they can protect their products and services and let others know that they own their IAs. 'Innovation' is seen as something that is owned by universities and the SMEs cannot or do not need to interact with this.

Regarding KE and collaboration assistance, the KOLs considered assistance was essential:

*“There is value in assistance provided using private sector business services and programmes - however, these need to be protected and ownership understood. Overall, there is good IC in SMEs, but if an SME needs assistance then this needs to be focussed, at the right time, flexible and at the right price.”*

There is a need for funding for a 'pull' of knowledge from companies and for the right kind of academic contracts and targets for proper knowledge exchange. The universities should be asked to produce a report detailing the current research in the areas MATRIX have identified as key to the NI economy.



# DISCUSSION OF THE RESULTS

# 4



## 4.1 SME Innovation Levels

The level of innovation and the innovation culture or ecosystem of Northern Ireland has been much studied and debated (CMI MATRIX Report, 2012; DFP, 2012). In this Study, it was felt appropriate to gauge the levels of perceived innovation within the participant SMEs, in order to provide a context for the subsequent IC information acquired in the surveys.

Without exception, the SMEs believed their companies demonstrated a culture of innovation and considered innovation essential to maintain or gain competitive advantage. For approximately half of the SMEs, the most important products had been developed within the last 3 years. Most of the companies interviewed expected to increase or maintain innovation in the next 1 to 3 years, with none expecting to decrease or cease innovation.

This indicates that, for the SMEs who participated in the Study, the levels of innovation can be considered as high. This is in contrast to some studies on NI innovation levels (DFP, 2012). This could be a result of the disproportionately high percentage of SMEs here in NI: 80% of NI private sector employment is in SMEs, compared to 60% for the UK and only 22% of turnover is in large firms compared with 51% in the UK (NI Smart Specialisation Framework, 2012).

Others factors which influence this finding are the accuracy of innovation measurements - these cannot be expected to capture the entire innovation picture in NI - and the selection criteria used for participants in the Study. It was intended, in the Response to Tender, to try to include in the Study SMEs with various levels of innovation. However, this intention was restrained by a number of matters, for example the target SME pool of MATRIX Collaborative Network Programme members, the SME suggestions from the MATRIX IA Panel, both of which produced a Study participant list of innovative companies, and largely, the availability of companies for interview.

This result may not be surprising given the companies approached and participating are technology based.

## 4.2 SME Intellectual Capital Awareness and Management

As discussed in Chapter 1, the extent of awareness and management of IC in the participant SMEs was assessed by examining with the SMEs their IC, in the form of their human capital, intellectual assets and intellectual property.

All of the participant SMEs considered their human capital to be vital for their success and that losing their personnel would have a significant detrimental effect on their business. The retention of staff was therefore considered to be important and various actions were taken to value and develop their HC.

The participant SMEs demonstrated good awareness of their intellectual assets, with a majority believing their IAs to be of great importance and value to their business. However, only four companies had conducted IA audits. A range of IAs were highlighted as significant including technical know-how and processes, business know-how and brand. The SMEs captured and managed their IAs, using a number of schemes, including quality management systems (such as ISO registration schemes) and CRM databases. Implementation of protection against the loss of IAs was variable, with some SMEs acknowledging that more could be done in this area.

The SMEs attitudes to and experience of intellectual property proved quite polarised, with some companies relying heavily on their IP and others regarding IP, particularly patents, as inappropriate to their business. Most companies, however, indicated that they had processes in place for capturing IP and understood the importance of protecting IP. Just over half of the participant SMEs were aware of the UK Patent Box scheme. A majority of the SMEs used their IP for internal use only, in the development and sales of their products or services.

Carrying out a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of the data captured on intellectual capital awareness and management revealed the following.



**SME Intellectual Capital Awareness and Management SWOT:**

<p><b>STRENGTHS</b></p> <ul style="list-style-type: none"><li>• Technically skilled HC</li><li>• Industry-experienced HC</li><li>• Loyalty of HC</li><li>• Extent of intellectual capacity</li><li>• Good awareness of broad range of IAs</li><li>• Use of multiple methods of IA capture, management and protection methods</li></ul>	<p><b>WEAKNESSES</b></p> <ul style="list-style-type: none"><li>• Dependence on HC particularly when innovation is the product of a small number of personnel</li><li>• HC skills gap, specifically in innovation, design and sales and marketing</li><li>• Reliance on IAs for business success</li><li>• Large detrimental effect of losing IAs</li><li>• Lack of full knowledge of company-wide IAs</li><li>• Adequate resources to more fully capture and manage IAs</li><li>• Lack of knowledge of how to place a value on IAs</li><li>• Rigour of IA protection schemes</li><li>• Limited use of IP could result in exposure to copying</li><li>• Lack of knowledge and use of IP for Patent Box cuts off access to corporation tax reduction</li></ul>
<p><b>OPPORTUNITIES</b></p> <ul style="list-style-type: none"><li>• Schemes for retention of HC</li><li>• HC training in specialist skills</li><li>• Development of HC innovation reward methods</li><li>• Systems for improved capture, management and protection of IAs</li><li>• Uptake of IA audits and strategy creation</li><li>• Training in IA valuation</li><li>• IP strategy development, to increase understanding of relevance of different IP rights to business</li><li>• Increased use of IP Patent Box</li></ul>	<p><b>THREATS</b></p> <ul style="list-style-type: none"><li>• Losing HC, especially to larger companies</li><li>• External parties gaining access to IAs</li><li>• Time and cost of IP systems</li></ul>



## DISCUSSION OF THE RESULTS

### 4.3 Intellectual Capital Exploitation

The SMEs interviewed in this Study all confirmed commitment to exploitation of their IC. In the main, exploitation took the form of internal development of products and services and subsequent sales and marketing. In addition, or as an alternative, some companies exploited their IC by external use, predominantly in the form of licensing.

It was generally acknowledged that the SMEs could make fuller use of their IC. The overwhelming restraint in this respect was the lack of resources - time, HC and funds - to expand their IC exploitation, for example by recruiting new staff, undertaking further product or service development, improving internal processes and skills and increasing marketing. Other internal restraints included lack of knowledge of how to value IC and develop procedures for maximising IC exploitation and long return on product development.

External pressures also played a role in the level of IC exploitation of the SMEs. Particular external exploitation

barriers which were articulated included: access to finance to enable an increase of resource; limited NI government support; lack of appropriately-skilled personnel in NI; increasing regulatory environment; costs of IP procurement; time and cost of licensing.

The majority of the SMEs were of the opinion that assistance in IC exploitation is required for their category of company size. There was general agreement that there should be government-funded IC exploitation incentives, for example for IC exploitation training, IP costs, R&D and sales and marketing support.

Evaluation of the responses received regarding IC exploitation by the SMEs was further developed using a SWOT analysis as detailed below.



Intellectual Capital Exploitation SWOT:

<p><b>STRENGTHS</b></p> <ul style="list-style-type: none"> <li>• Exploitation of SMEs' internally generated IA and IP in product and services development and sales</li> <li>• Existing NI government support</li> </ul>	<p><b>WEAKNESSES</b></p> <ul style="list-style-type: none"> <li>• Restrictions on IC development and therefore exploitation due to modest resources, e.g. time, HC and finance</li> <li>• Restraints on marketing and promotion due to a lack of resources</li> <li>• Limited skills in market assessment and expansion</li> <li>• Internal product development time resulting in long-term ROI</li> <li>• Limited cognisance of 3rd party IP could result in issues of infringement and limit IC exploitation</li> </ul>
<p><b>OPPORTUNITIES</b></p> <ul style="list-style-type: none"> <li>• Development of HC skills required for IC exploitation to aid increased use of current resources</li> <li>• Support for accessing external assistance for IC exploitation</li> <li>• A portal for IC exploitation information, e.g. case studies, and sources of IC exploitation advice</li> <li>• Courses for developing procedures for IC exploitation</li> <li>• HC training in marketing skills</li> <li>• Increased support for R&amp;D</li> <li>• NI government initiatives like STEM for increasing provision of skilled HC</li> <li>• Better advice on different schemes for use of IP systems to maximise value versus spend</li> <li>• Accessing external training to develop skills for assessing 3rd party IP</li> <li>• Extension of existing NI government funding for IP</li> <li>• More government schemes like the Patent Box</li> </ul>	<p><b>THREATS</b></p> <ul style="list-style-type: none"> <li>• Lack of availability of financing for SMEs to enable increased IC exploitation e.g. through HC recruitment</li> <li>• Restricted supply of NI government support for IC exploitation</li> <li>• Perceived lack of appropriately-skilled HC in NI</li> <li>• NI government procurement procedures limiting SME ability to compete</li> <li>• Regulatory requirements, e.g. quality standards, trials and insurance</li> <li>• Copying of SME products and services e.g. in the Far East</li> <li>• Bureaucracy and costs of IP system, particularly patents</li> <li>• Time and costs involved in setting up licensing agreements</li> <li>• Dominance of larger companies</li> </ul>



IT WAS GENERALLY THOUGHT THAT ASSISTANCE WAS NEEDED IN KNOWLEDGE EXCHANGE AND COLLABORATION, SPECIFICALLY GOVERNMENT INCENTIVES TO ENCOURAGE PARTICIPANTS

#### 4.4 Knowledge Exchange and Collaboration

Responses from the SMEs in the Study demonstrated good internal KE. Knowledge and information from the SMEs' personnel and from customers was incorporated into products and services, through the use of, for example, regular multidisciplinary team meetings.

The SMEs exported information externally, using various methods, and all used knowledge sharing agreements, such as NDAs, when sharing critical information externally.

Good use of a plurality of external sources of knowledge was made by the SMEs, for example, other foreign companies, suppliers, trade associations and trade fairs, government-funded research organisations and regulatory bodies.

A majority of the SMEs believed that they had the appropriate skills to engage in KE, and that financial issues were not a barrier to KE.

The SMEs exhibited varying attitudes to collaboration, some being generally in favour and others believing that their sector

was so competitive that collaboration was prohibited. The majority of SMEs disclosed reservations and difficulties in forming collaborations, such as appropriate sharing of proprietary information, risks to competitive advantage, brand and reputation, IA and IP.

SMEs in this Study are members of sector-specific networks, but many displayed skepticism of the worth of such networks. Concerns included the perceived balance of power between small and large network members, particularly with regard to losing IP and HC.

It was generally thought that assistance was needed in knowledge exchange and collaboration, specifically government incentives to encourage participants.

Again, evaluation of the data received from the SMEs regarding knowledge exchange and collaboration was further developed using a SWOT analysis as detailed below.



Intellectual Capital Exploitation SWOT:

**STRENGTHS**

- Use by SMEs of various methods for internal KE
- Input of SME personnel and customer feedback into R&D
- Use of agreements in the sharing of critical SME knowledge
- Good use of multiple sources of external knowledge
- General willingness of SMEs to collaborate

**WEAKNESSES**

- Perceived inability to collaborate in competitive markets
- Balancing the need to collaborate to improve with the need to keep proprietary information confidential
- Risks of losing IC, particularly HC to larger companies in collaborative networks
- Risk to competitive advantage in collaborations
- Erosion of reputation in collaborations
- Risks of losing IAs and IP in collaborations
- Restrictions in collaborations with knowledge providers

**OPPORTUNITIES**

- Industry/Product/Process Matrix development to encourage SMEs to import new ideas from other industries
- Honest brokering and networking in competitive markets
- Advice and skills development in fostering trust in collaborations
- Increased access to advice on minimising risks to SMEs' IC in collaborations and networks
- Development of IC guidelines for collaborative networks
- Training in negotiation skills for engagement with larger organisations
- NI government support for collaboration, particularly KTPs
- Increased access for SMEs to government funded science
- Development of 'customer' relationship between SMEs and publically funded research providers
- Extension of existing NI government schemes for supporting collaboration between SMEs and the private sector

**THREATS**

- Perception that collaborative networks are more beneficial to larger companies
- Unequal power of large companies in partnerships / collaborations, e.g. having to accept their terms and conditions
- Costs of collaboration, e.g. for KTPs
- Limitations of NI government involvement in KE and collaboration
- Publically-funded knowledge providers IC perceived to be difficult to access and expensive



# RECOMMENDATIONS

A large, white, stylized number '5' is positioned in the bottom right corner of the page. The background of the entire page is a light green color with a faint, large-scale image of a human head profile containing several interlocking gears, symbolizing the intersection of science and industry.



## 5.1 Introduction

THE Study has highlighted four noteworthy innovation and intellectual capital matters of particular relevance to SMEs.

- 1 **The majority of SMEs understand the generality of intellectual capital and particularly the vital element of human capital. Not all, however, understand how and what tools would be best to capture, manage and ultimately improve the exploitation of their intellectual capital, to contribute to the health and value of their business**
- 2 **SMEs understand the need to collaborate but mistrust it. There was a perception among some of the SMEs that collaboration with larger companies was more beneficial to the latter, with risks to the former in the possible loss of human capital, reputation and proprietary information**
- 3 **In other regions around the world, led in part by Germany, SMEs are starting to use Intellectual Capital Statements to provide readily accessible IC information. Such statements can be used to aid internal business decisions and for banks and investor decision-making. The latter has resulted in a reduction of the cost of borrowing and appropriate evaluations for German SMEs, by demonstrating lower risks and achieving lower interest rates and providing better access to loans and equity as a result. At an investment, sale or liquidation event, having an IC Statement will make for a much easier due diligence process and lead to appropriate evaluation**
- 4 **SMEs, particularly micro SMEs, because they are time and resource poor, and despite the efforts of programme suppliers, find the offered programmes in general to be less flexible and not as 'end user' friendly as they need to be or wish to be**

Recommendations are proposed, for SMEs, NI government, public sector organisations and publically-funded knowledge providers, which take into account the above matters. The recommendations have been developed from the responses received in the SME and KOL surveys and the analysis of the responses, together with evaluation of the best practice models and input from the MATRIX IA Panel.

## 5.2 Recommendations

### Recommendation 1:

**Raise awareness at Board and senior management level of the importance of intellectual capital to a company's profitability and sustainable growth.**

IC, its capture, management and exploitation, to be an agenda item at Board and senior management meetings. An increased understanding, at a senior level, of the value of IC to an SME's business enables a top-down push for employing IC tools to maximise the use of and value-extraction from the IC.

**Action: Introduce and promote SME IC Statements and encourage their use as a tangible item to complement SMEs' balance sheets**

Introduce and promote the concept of an IC Statement, containing IC information and valuation, as an important and valuable IC management and valuation tool. This could be a free standing item or be a part of an existing document such as an annual report. For example, the IC best practice model, InCaS, endorsed IC Statements to strengthen the competitiveness and innovation potential of European organisations. IC Statements were adopted by Japanese and German SMEs, where their implementation was perceived as a positive contribution to SME development and competitiveness, and benefits were derived from new perspectives on the value of IC and the importance of its management.

Introduce and promote IC as a complement to balance sheets, for example goodwill which normally only has a tangible value when a company is being sold. It is recommended that SMEs document and present their IC in such a way that it can be considered as a tangible asset to supplement assets on their balance sheet. In addition, at an investment event or a sale, having an IC Statement will make for a much easier due diligence process and lead to appropriate evaluation. Having an IC statement at hand at a point when time is usually of the essence to complete many tasks, can be a tremendous bonus. In summary, the intangible is made tangible, and can be used for very practical and important points in the life of a company.



In Germany, SMEs have developed reporting of intangible assets, such as IC, as a component of the SME value. This has provided better information for banks and investors decision-making, and resulted in a reduction of the cost of borrowing. SMEs that could demonstrate a lower risk because of their IC benefitted from lower interest rates and better access to loans.

Impetus for these actions needs to be driven by the SMEs but support for the necessary information and advice for the development of IC statements will need to come from the government and public sector organisations with support from other private sector bodies who are engaged with SMEs.

### R&D Metric

A few years back R&D expenditure was capitalised, so far as possible. Today, it is highly recommended as good accounting practice to have such costs written off in the accounting period in which the expenditure is incurred.

The reasons for the change were,

- **Firstly when R&D tax relief was first introduced the legislation was unclear as to whether tax relief would be available if expenditure was capitalised. HMRC subsequently clarified that relief was available even if expenditure was capitalised, but trends may have changed since then, and**
- **Secondly auditors may now be harder to persuade that criteria for capitalising are satisfied**

The result of this change of accounting practice is that there no longer are entries on the balance sheets showing the accumulative investment in R&D made by tech SMEs. This can lead to difficulties in communicating to external parties such as investors, bankers or potential acquirers the extent of the investment in this vital area. Having R&D expenditure as part of the IC statement associated with financial reporting puts it in context with the overall expenditure of the company. It puts figures to projects and words and commentary on the outcomes or expected outcomes of named R&D projects.

### Recommendation 2:

**Raise the level of training of SMEs in the whole area of intellectual capital and enhance the tools currently available to allow SMEs to fully capture, manage and exploit their intellectual capital.**

**Action:** Encourage SMEs to carry out IC audits

The starting point for effective use of IC is an IC audit, to 'help businesses to identify and document the key value drivers that underpin or enhance their product/service offering' (Scottish Enterprise). The emphasis of audits should be on the breadth of IC within an SME, i.e. include human capital and intellectual assets, as well as intellectual property.

SMEs need to be supplied with and encouraged to make use of IC audit tools. For example, Scottish Enterprise provides an on-line audit tool, InvestNI provides support for IA audits, this could be enhanced by provision as an on-line service.

**Action:** Continue to develop and promote IC tools appropriate for SMEs, especially micro SMEs

Once an SME is aware of all of its IC, through an audit, use of various IC tools will enable the SME to understand, manage and exploit their IC.

The IC tools could be based on, for example, existing InvestNI tools or those developed in the Scottish Enterprise IC best practice model. Such IC tools are to include:

- **A specialist SME IC education tool: to include modules such as Understanding IC, Identifying IC, IC Strategies, IC Capture and Management, IC Exploitation, IC KE and Collaboration**
- **IC capture and management tool: describing what IC, including innovation-related HC and company IAs and IP, should be captured and how to document the captured IC, for example on a register, and template IC management process documents**
- **IC valuation tool: providing training in IA/IP valuation and communication of the value of these assets**
- **IP strategy tool: to determine the relevance of and appropriate level of engagement with IP and how to use IP systems to maximise value versus spend**



# RECOMMENDATIONS

**Action:** A flexible approach to delivery of future IC support

Due to the less tangible nature of IC, support for IC need a different approach from those for tangible assets. Flexibility is needed in the provision of future IC advice and focus, for example in terms of the issues being addressed and length, allowing SMEs' engagement as they require and in a time scale that fits with the nature of their IC and their business demands.

**Action:** Expansion of the NIBUSINESSINFO website to cover new procedures and approaches to IC

A further recommendation in this area is InvestNI to expand and promote the Create, Innovate and Protect section of the NIBUSINESSINFO website to include information on and access to IC audits and IC tools, when appropriate.

**Action:** Promote the need for SMEs to have internal IC procedures as part and parcel of their 'every day' working lives

Using the IC information gained from use of the various IC tools, it is recommended that SMEs develop internal procedures to take full advantage of their IC, for example:

- **IT procedures to provide appropriate protection for and access to company IAs and IP**
- **HR procedures for the proper management and retention of their HC, as personnel is a major contributing factor to the success of the SMEs**
- **Training procedures to develop requisite exploitation and marketing skills in their HC**

NI government and public sector organisations and in particular Invest NI will have the primary responsibility for these actions, with support from SMEs and other private sector bodies who are engaged with SMEs.

### Recommendation 3:

**Create a framework specifically aimed at allowing SMEs to work effectively in collaboration.**

Although collaboration can raise difficulties, it can also be of significant benefit to SMEs providing the means to acquire knowledge, skills etc. to grow their business and to import new ideas from other industries. Three areas need to be addressed in the development of a collaboration framework.

**Action:** Coordinate and promote best practice guidelines for SME collaboration

SMEs, NI government and publically-funded research and knowledge providers (such as universities and further education colleges) to continue to work together in the coordination and dissemination of guidelines relating to IC issues in collaboration. These could be used for:

- **Fostering of trust between collaborators**
- **Setting down mechanisms for honest brokering of collaboration and networking**
- **Specifying good practice in collaboration, regarding use of collaborators information, HC and brand**
- **Providing strategies for minimising risks to SMEs' IC**
- **Providing negotiation instructions for SME engagement with larger organisations**
- **Promoting development of customer-type relationships with SMEs**

**Action:** Develop and encourage the take up of collaboration agreements

- **Provide access to existing good practice and template agreements in collaboration with, for example NHS and Universities practice and agreements**
- **Support the customisation of agreements for use by SMEs**
- **Add collaboration agreement information to the NIBUSINESSINFO website**

**Action:** Support development and improvement of SMEs collaboration skills

- **Support for IC Collaboration advice to define processes within SMEs for KE and collaboration**
- **Development of the skills required for effective collaboration in SMEs**
- **Training in the appropriate sharing of proprietary information, explaining what can and cannot be disclosed and how to be more commercially astute with regard to KE**

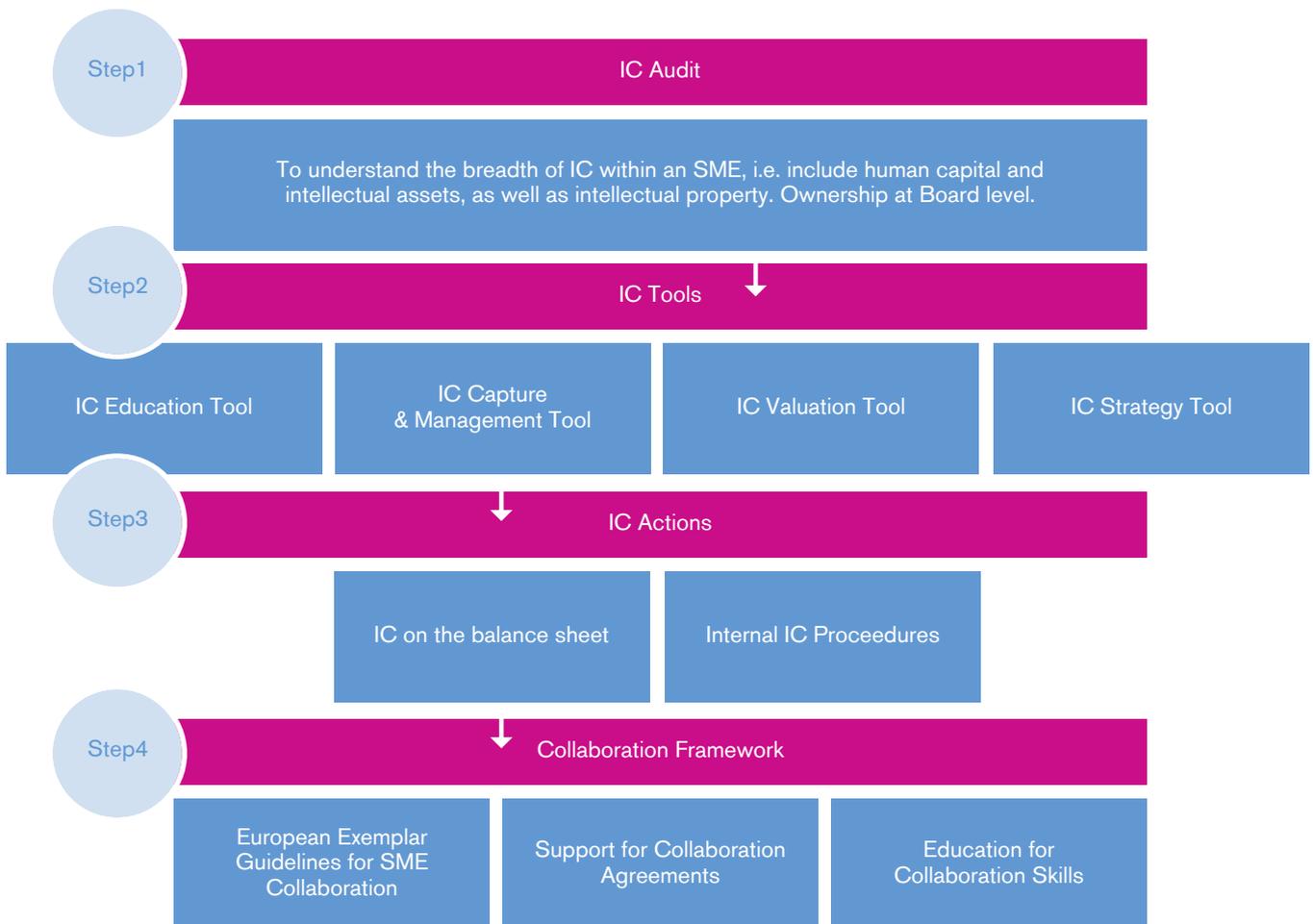
These actions are the responsibility of all stakeholders, including NI government, public sector organisations, publically-funded research and knowledge providers and SMEs.



# RECOMMENDATIONS

## 5.4 Intellectual Capital Road Map

A roadmap, as below, was developed from the results of the SME and KOL surveys, feedback from the MATRIX IA Panel and the analysis of the best practice models.



PROFITING FROM SCIENCE  
[www.matrix-ni.org](http://www.matrix-ni.org)



# ANNEX

# 6



# ANNEX

## 6.1. Limitations of the Study

There are a number of limitations to the Study definition which impact on the results and findings. Firstly as with all studies, there are limitations on time and resources. In the MATRIX IC Panel Workshops, it was suggested by a Panel member that the terms of reference were narrow and that the scope and parameters of the Study should be much wider in order to gain a wider representation of opinion. It was felt that more companies should be interviewed and feedback events such as workshops should be conducted. This was discussed with the Panel and DETI and it was agreed that scope of the Study was sufficient at this time.

As suggested in the discussions, this Study indicates that levels of innovation in the participant companies is high. The finding on SME innovation levels is, of course, very dependent on the participant SMEs. As stated earlier, it was intended to try to include in the Study SMEs with various levels of innovation. However, this intention was restrained by a number of matters, and largely by the availability of companies for interview.

The timing of the Study presented difficulties in obtaining SME and KOL interviews, as these had to be conducted during the summer months of July and August. Many SMEs were interested in the Study and would have been happy to participate but due to annual leave and the subsequent limits on resources were unable to do so.

While there are potential limitations in this Study, its richness and depth provide benefits which outweigh the limitations. As such the Study has implications for future development of the understanding of intellectual capital exploitation, knowledge exchange and collaboration in SMEs in Northern Ireland.

## 6.2 Terms of Reference for the MATRIX Panel Foresight Study

### Key Outputs to be achieved from the Study

IC Awareness and Management

- 1 Gain an insight of the level of IC awareness
- 2 Explore the limitations for Northern Irish businesses in managing their intellectual assets
- 3 SWOT inherent in the existing Northern Ireland capabilities and resources

### 4 Establish MATRIX related industry needs to access intellectual assets by their business

IC Exploitation

- 1 Explore the limitations for Northern Irish businesses in exploiting their intellectual assets.
- 2 SWOT inherent in the existing Northern Ireland capabilities and resources exploitation.
- 3 Establish MATRIX related industry needs to exploit intellectual assets by their business.

KE and Collaboration

- 1 Identify internal and external relationships /collaborations essential to the exploitation of intellectual assets and maximising opportunities
- 2 Establish MATRIX related industry needs to access and exploit intellectual assets from the wider economy

Best Practice Models

- 1 Identify best practice models both locally, nationally and globally and identify how learning from these models can be applied to Northern Ireland
- 2 SWOT in systems and processes used by similar regions of the UK, the Republic of Ireland and selected international comparators



# ANNEX

## Recommendations

To NI businesses

- 1 How to manage and exploit their intellectual assets more effectively.
- 2 To create an open system of knowledge exchange and innovation to increase accessibility to SMEs looking for new ideas and technologies.

To government and public sector

- 1 To create an open system of knowledge exchange and innovation to increase accessibility to SMEs looking for new ideas and technologies.
- 2 The introduction of/changes to programmes to support the overall open knowledge exchange system.

To publically-funded research providers

- 1 To create an open system of knowledge exchange and innovation to increase accessibility to SMEs looking for new ideas and technologies.
- 2 To make short, medium, long term process changes to support an open innovation model for NI that maximises the benefits of publicly funded knowledge creation.
- 3 To create a clear and practical pathway for industry to link into public sector research expertise, from both locally and international sources

Road Map

Develop a road map that presents the steps necessary for Northern Ireland businesses to respond effectively to opportunities by exploiting intellectual assets. This should include a system to create a sustainable system of knowledge creation and exchange.

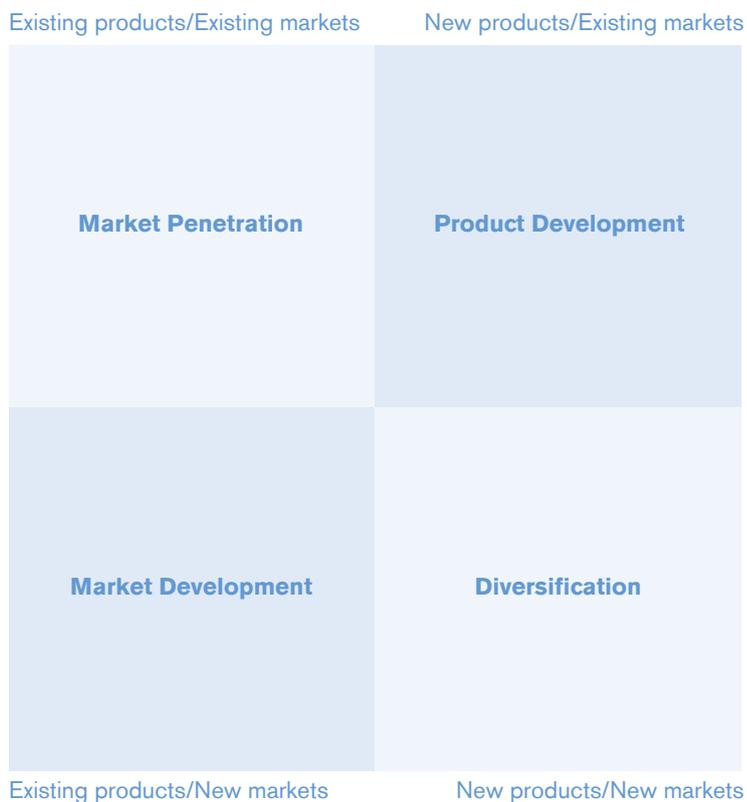
## 6.3. The MATRIX IC Panel

NAME	ORGANISATION
Bryan Keating <b>Chair</b>	MATRIX / Andor
Ann McGregor	NI Chamber of Commerce
Brian Durnin	Seagate
Paul Donachy	QUB
Jennifer Cook	UU
Alan Blair	Colleges NI
Rob Grundy	Almac
Joel Ferguson	AFBI
David Brownlee	HSC
Rory Campbell	Forde Campbell LLP
Lynsey Mallon	Arthur Cox
Nicola Young	Formally Schrader
Ian Wilkinson	Invest NI (Observer)



# ANNEX

## Ansoff's Product Market Matrix



### 6.4 Ansoff's Product Market Matrix

Ansoff's Product Market Matrix helps companies understand and assess marketing or business development strategy. Any business, or part of a business can choose which strategy to employ or which mix of strategic options to use. This is a fundamentally simple and effective way of looking at strategic development options. Once a business has established its products in its existing markets (market penetration) it can look to market development (existing products in new markets) or product development (new products in existing markets) as methods for growth. Diversification is considered a higher risk growth strategy (taking new products to new markets) and is generally regarded as supplementary to the core business.



## 6.5 References

- Guthrie, J., Ricceri, F. and Dumay, J. (2012) “Reflections and projections: A decade of intellectual capital accounting research”, *British Accounting Review*, Vol. 44, No. 2, pp.68-82.
- OECD, (2011) “New Sources of Growth: Intangible Assets”, [online], [www.oecd.org/sti/ind/47945772.pdf](http://www.oecd.org/sti/ind/47945772.pdf)
- European Commission Research Monitor Baden-Württemberg – regional profile <http://www.rim-europa.eu/index.cfm?q=p.regionalProfile&r=DE1#policy>
- European ICS Guideline (InCaS)
- Corrado, C., C. Hulten and D. Sichel (2005), “Measuring Capital and Technology: An Expanded Framework”, in C. Corrado, J. Haltiwanger and D. Sichel (eds.), *Measuring Capital in the New Economy*, NBER Studies in Income and Wealth Volume 65, University of Chicago Press.
- Scottish Enterprise (2013), “Grow Your Business”, <http://www.scottish-enterprise.com/grow-your-business/innovation/intellectual-assets.aspx>
- Haskel, J. (2008), “Industry-level Expenditure on Intangible Assets in the UK”, <http://www.coinvest.org.uk/bin/view/CoInvest/CoInvestGilHaspaper>
- Thayne, Forbes Intellectual Assets Magazine <http://www.iam-magazine.com>
- Kuusisto, J. and S. Paallysaho (2007), “Informal ways to protect intellectual property in small and medium size businesses”, a paper submitted for the IPR Expert Group, DG Enterprise, European Commission
- OECD, 2008 “Intellectual Assets and Value Creation”.
- Alexander G. Welzl, (2009) “The EFFAS Principles for Effective Communication of Intellectual Capital – a Guideline for Investment Professionals”.
- Mertins, K. and Will, M. (2007). *Electronic Journal of Knowledge Management* Volume 5 Issue 4 (427-436); European Commission; “Intellectual Capital Statement – Made in Europe (InCaS)”.
- Guidelines for disclosure of Intellectual Assets in Japan [http://www.meti.go.jp/policy/intellectual\\_assets/pdf/GuidelineforIAM.pdf](http://www.meti.go.jp/policy/intellectual_assets/pdf/GuidelineforIAM.pdf)
- US Department of Energy: [http://techportal.eere.energy.gov/commercialization/initiatives/innovation\\_ecosystem\\_initiative](http://techportal.eere.energy.gov/commercialization/initiatives/innovation_ecosystem_initiative)
- Northern Ireland Executive, (2012) “Economic Strategy; Priorities for growth and prosperity”.
- Department of Enterprise, Trade and Investment (2013) “SMART Specialisation Strategy” <http://www.detini.gov.uk/deti-eco-dev-index/eco-dev-smart-specialisation.htm>
- <http://www.akwissensbilanz.org/index-en.htm>
- Ploughshare Innovations <http://www.ploughshareinnovations.com/about-us>
- ICE Programme <http://www.iceprogramme.com>
- (<http://www.innovasjon Norge.no/Contact-us/>)
- (<http://www.matrixuk.com/index.php?page=ecodev-intertradeireland>).
- (<http://www.nhirc.unh.edu/>)
- Easterby-Smith, M., Thorpe, R. and Lowe, A. *Management Research: An Introduction*. Sage Publications Ltd: London.
- Saunders, M.N.K., Lewis, P and Thornhill, A., (2003) *Research Methods for Business Students*, 3rd edition, FT Prentice Hall.
- Robson, C. (2002), *Real World Research*, second edition, Oxford, Blackwell.
- Yin, R.K. (1994) *Case Study Research: Design and Methods*, 2nd edit, Beverly Hills, CA: Sage.
- Miles, M.B. and Huberman, A.M. (1994) *Qualitative Data Analysis*, 2nd edit, Thousand Oaks, CA: Sage.
- CM International, 2012 “Maximising the Commercial and Economic impact of the Northern Ireland Publicly funded Research Base” MATRIX Report.
- Department of Finance & Personnel, 2012 “UK Innovation Survey 2011: Northern Ireland results”.
- European Intellectual Capital Statement Guidelines [http://www.psych.lse.ac.uk/incas/page114/files/page114\\_1.pdf](http://www.psych.lse.ac.uk/incas/page114/files/page114_1.pdf)
- Intellectual Capital Statement – “Made in Germany” (Federal Ministry of Economics and Labour) [http://www.akwissensbilanz.org/Infoservice/Infomaterial/Leitfaden\\_english.pdf](http://www.akwissensbilanz.org/Infoservice/Infomaterial/Leitfaden_english.pdf)

MATRIX have produced a number of publications which outline the work, findings and recommendations of the HORIZON Panels. This Report into Intellectual Capital is the 12th in the series – the previous 11 are:





# MATRIX

## **NORTHERN IRELAND SCIENCE INDUSTRY PANEL**

FORESIGHT AND HORIZON SCANNING UNIT  
DEPARTMENT OF ENTERPRISE, TRADE AND INVESTMENT  
NETHERLEIGH  
MASSEY AVENUE  
BELFAST BT4 2JP

**PROFITING FROM SCIENCE**  
[www.matrix-ni.org](http://www.matrix-ni.org)