



NUI Galway
OÉ Gaillimh



Whitaker
Institute

Information and Communications Technology Sectoral Overview

**Galway City and County Economic
and Industrial Baseline Study**

INFORMATION AND COMMUNICATIONS TECHNOLOGY SECTORAL OVERVIEW

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03/04/2015

Table of Contents

Executive Summary Overview of the ICT Sector	6
Global Overview of the ICT Sector.....	9
1 Global Analysis	9
1.1 Global Market Size	9
1.2 Global Broadband Market	10
1.3 Global Mobile Subscriptions	11
1.4 Global Cloud Computing Market	12
1.5 Global Big Data Sector	13
1.6 Top 15 ICT Companies, 2014	14
1.7 EU Policy Objectives	15
1.7.1 Digital Agenda for Europe	15
1.7.2 EU Broadband Policy	15
1.7.3 Mobile Roaming Policy	15
1.7.4 Cloud Computing and the European Cloud Partnership	16
1.7.5 Digital Single Market Package	16
1.7.6 Other activities of the European Commission	16
National Overview of the ICT Sector.....	17
2 National Analysis.....	17
2.1 National Market Size	17
2.2 National Broadband Market.....	17
2.3 National Mobile Subscriptions	19
2.4 National Cloud Computing Market	20
2.5 National Big Data Sector	20
2.6 Top ICT Companies	21
2.7 National Policy Objectives.....	22
2.7.1 National Digital Strategy for Ireland.....	22
2.7.2 National Broadband Plan	22
2.7.3 ICT Skills Action Plan 2014-2018	22
2.7.4 e-Government Strategy	23
Regional and Local Overview of the ICT Sector	24

3	Regional Analysis.....	24
3.1	Regional Market Size	24
3.2	Broadband Market.....	25
3.3	Regional Mobile Subscription.....	27
3.4	Cloud Computing Market.....	27
3.5	Research Infrastructure for Big Data	28
3.6	Top ICT Companies	29
3.7	ICT Education and Training.....	31
4	References.....	36

Acknowledgements

We wish to acknowledge the support of Liam Hanrahan, Patricia Philbin, Sharon Carroll, Niamh Farrell of Galway City Council and Alan Farrell and Brian Barrett of Galway County Council in preparing this sectoral review.

Our Approach¹

Our approach in undertaking this overview of the information and communications technology sector was to take a global and national perspective before focusing on the regional and local level. One of the main limitations we faced preparing this sector review is the lack of quality and reliable data at the local level. The framing of the global and national level overviews against publicly available local data provides a basis and context to consider the future of the in Galway City and County.

¹ The information contained in this overview has been compiled from many sources that are not all controlled by the Whitaker Institute. While all reasonable care has been taken in the compilation and publication of the contents of this resource, Whitaker Institute makes no representations or warranties, whether express or implied, as to the accuracy or suitability of the information or materials contained in this resource.

Executive Summary Overview of the ICT Sector

Global Overview

- €3.3 trillion is the value of the global ICT industry.
- The forecasted global ICT revenue for 2016 is €3.663 trillion with a combined average growth rate of 5.3%.
- There are over 3 billion internet users, of which two thirds are from developing countries.
- The number of global mobile-broadband subscriptions is expected to reach 2.3 billion by the end of 2014, with 55% of subscriptions coming from developing countries.
- Some 44% of global households have internet access at home, with 31% of households in developing countries having access to the internet at home, compared to 78% in developed countries.
- There is almost the same number of mobile subscriptions as there are people on earth.
- The global cloud computing market is forecasted to reach US\$210 billion by 2016, with a growth rate five times that of the global IT industry as a whole.
- The global market for Big Data is estimated to have a value of \$28.5 billion.
- Every minute, the world generates 1.7 million bytes of data.
- Software providing companies are dominating the top 15 ICT companies globally list

National Overview

- Ireland has one of the highest concentrations of ICT activity and employment within the OECD.
- Over 105,000 individuals are employed within the ICT sector of Ireland with roughly 75% employed in multinational companies.
- 4 out of 5 of the top exporters in Ireland are technology companies.

- There are 5,000 job vacancies currently in Ireland's ICT sector.
- With every job that is filled in ICT, a further five jobs are generated in the local economy such as retail and services.
- At the end of March 2014, there were 1,701,714 broadband subscribers.
- Approximately 56.7% of broadband speeds in Ireland have speeds greater than 10Mbps, while 37.7% were above 30Mbps.
- Mobile phone usage in Ireland is one of the largest in Europe per head of population.
- The average number of call minutes per customers is 35% more than the European average.
- 38% of Irish SMEs use the cloud to reduce costs and improve the efficiency of information access.
- In the period up to 2020, it is estimated that 21,000 potential job vacancies could arise comprising of 3,630 deep analytical roles and 17,470 big data savvy roles with a further 8,780 potential job openings for supporting technical staff.
- Ireland is home to 10 of the top 10 global ICT companies and 9 of the top 10 software companies as well 4 of the top 5 semiconductor firms and 4 of the top 5 technology hardware companies.

Regional and Local Overview

- There are 196 ICT organisations in Galway.
- Galway is home to 4 of the top 5 ICT companies - IBM, SAP, Oracle and Cisco.
- There are 90 ICT organisations in Galway City, as categorised by NACE (Rev.2) Codes, with a further 106 ICT companies based in County Galway.
- Growing indigenous SME ICT companies have real potential to grow a vibrant ICT cluster.
- There are 2,229 science, research, engineering and technology professionals in Galway City and County in 2011.
- There are 917 science, engineering and technology associate professionals in Galway City and County in 2011.

- Oranmore and Tuam are the top two locations for concentration of science, research, engineering and technology professionals and science, engineering and technology associate professionals in 2011.
- Some 72.8% of households in the Galway city region have broadband connectivity compared to 63.8% nationally.
- County Galway has a lower percentage of households with broadband compared to Dublin County with 72.8% and County Cork with 64.7%.
- Some 84 rural communities in Galway are to get high-quality broadband for the first time.
- Galway has a foothold in the growing cloud computing market through SMEs.
- The expiration of The National Broadband Scheme means that there are no longer minimum service standards, minimum speeds, orders and installation standards, fault restoration times, engineer visits or service rebates which will impact on County Galway.
- There is a significant research infrastructure in Galway City - INSIGHT at NUI Galway.
- There is an array of ICT education provision and incubation support.

Global Overview of the ICT Sector

Global Overview

Introduction

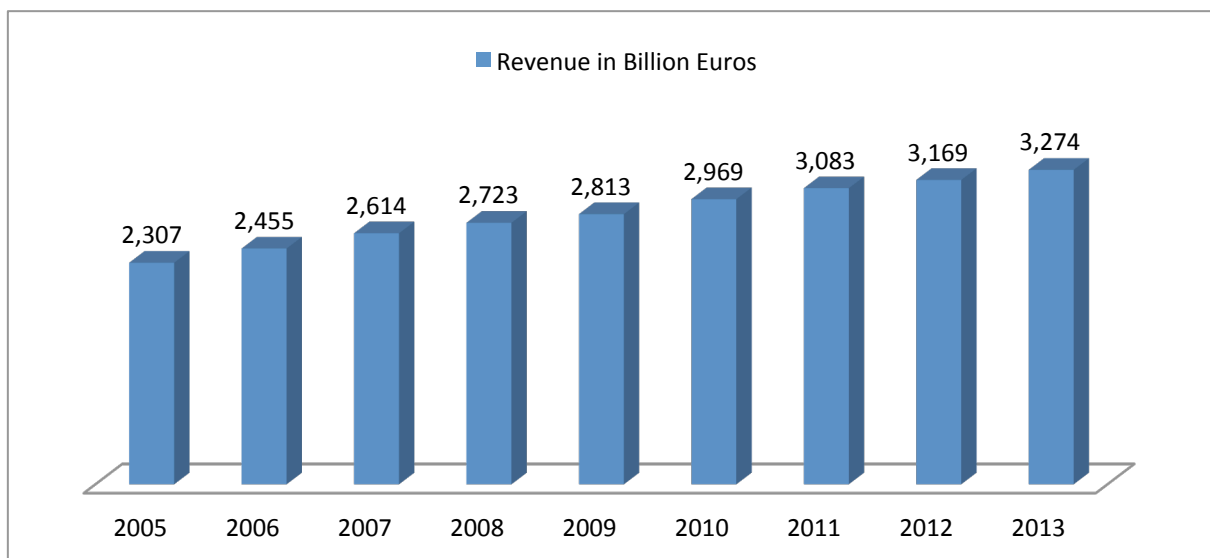
An integrated ICT industry helps the competitiveness and creativity of economies. Converged ICT technologies bring such advantages as smart devices and cloud services, improving e-government models, e-commerce, e-learning, online medical services as well as other web-based intelligent services. The convergence between information technology (IT) and communications technology (CT) is a major driver behind the rapid development of the ICT industry (Dutta, & Bilbao-Osorio, 2012).

1 Global Analysis

1.1 Global Market Size

The value of the global ICT industry is worth €3.3 trillion. Figure 1, illustrates the global ICT revenue from 2005 to 2013. The forecasted global ICT revenue for 2016 is €3.663 trillion with a combined average growth rate of 5.3% (Statista, 2014).

Figure 1:
Global ICT Revenue 2005-2013



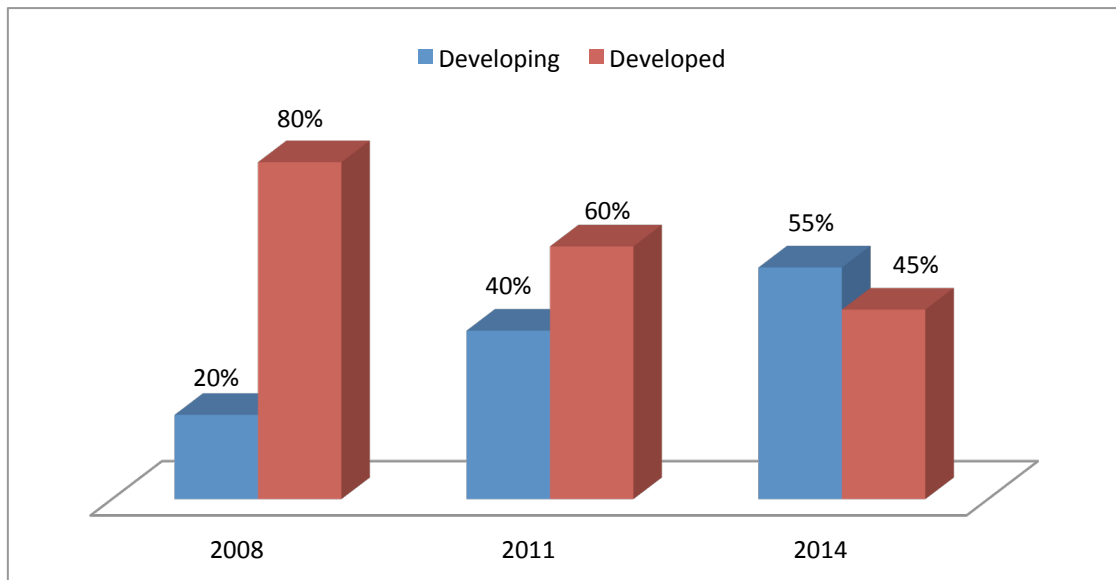
(Adapted from Statista, 2014).

1.2 Global Broadband Market

There are currently over 3 billion internet users, of which two thirds are from developing countries. Mobile broadband remains the fastest growing market segment with double-digit growth rates. The number of global mobile-broadband subscriptions is expected to reach 2.3 billion by the end of 2014, with 55% of subscriptions coming from developing countries. The Americas region will have more than half a billion mobile-broadband subscriptions by the end of 2014, while Asia-Pacific will have approximately 1 billion. Africa has the highest growth rate of over 40% which is twice as high as the global average. Figure 2 illustrates the share of active mobile-broadband subscriptions of developed and developing economies, between 2008 and 2014 (ITU, 2014).

Figure 2:

Share of Active Mobile Broadband Subscriptions, 2008, 2011, 2014



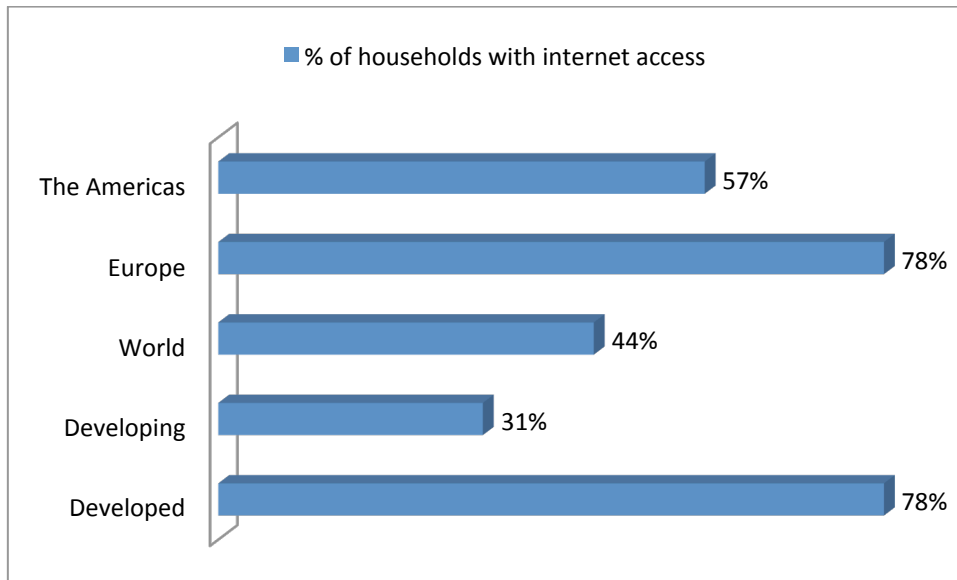
(Adapted from ITU, 2014).

Fixed broadband subscriptions continue to grow. In 2013, the number of fixed broadband subscriptions in developing countries overtook the number within developed countries (ITU, 2014). 44% of all fixed-broadband subscriptions are in Asia-Pacific, while 24% are in Europe. Africa only accounts for less than 0.5% of the world's fixed-broadband subscriptions.

Some 44% of global households have internet access at home, with 31% of households in developing countries have access to the internet at home, compared to 78% in developed

countries. Figure 3 illustrates which households that have access to the internet at home (ITU, 2014).

Figure 3:
Percentage of Households with Internet Access, 2014

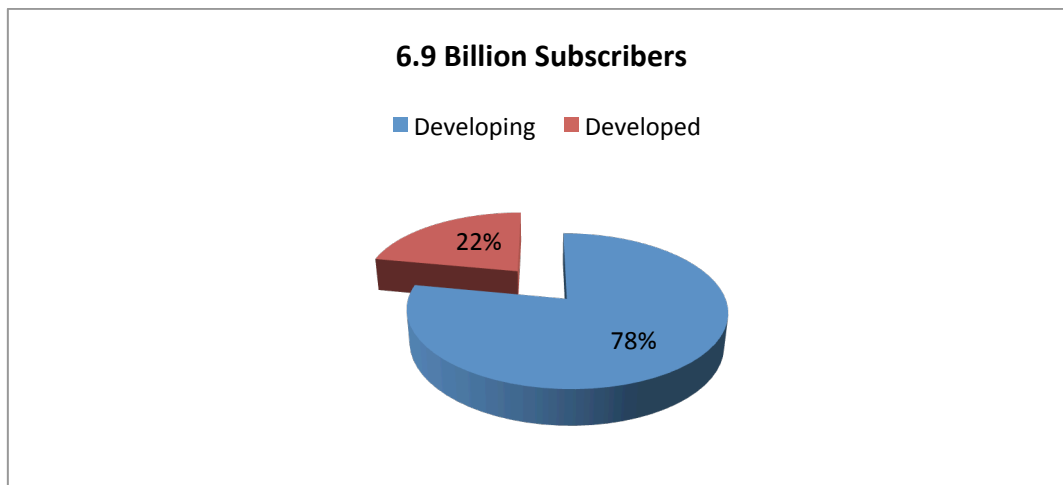


(Adapted from ITU, 2014).

1.3 Global Mobile Subscriptions

There is almost the same number of mobile subscriptions as there are people on earth. By year end, 2014, there will be approximately 7 billion mobile subscriptions, with 3.6 billion of these from the Asia-Pacific region (ITU, 2014). The market has almost reached saturation point as mobile growth rates have reached their lowest-ever level of 2.6% annually. Figure 4 illustrates the share of mobile subscriptions in 2014.

Figure 4:
Share of Mobile Subscriptions, 2014

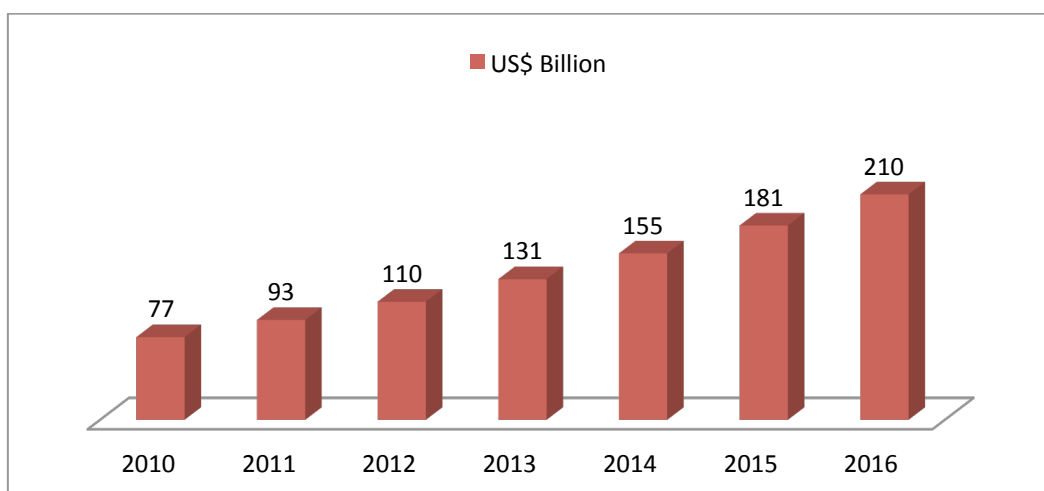


(Adapted from ITU, 2014).

1.4 Global Cloud Computing Market

Cloud computing allows both information technology infrastructure and software to be delivered directly over the internet as a service (openview, 2014). The global cloud computing market is forecasted to reach US\$210 billion by 2016 indicating a 17.7% compound annual growth rate from the 2011 through to 2016 (Forbes, 2014). This growth rate is five times that of the global IT industry as a whole. Figure 5 illustrates the revenue growth of the public cloud services global market.

Figure 5:
Forecasted Growth of the Global Cloud Computing Market



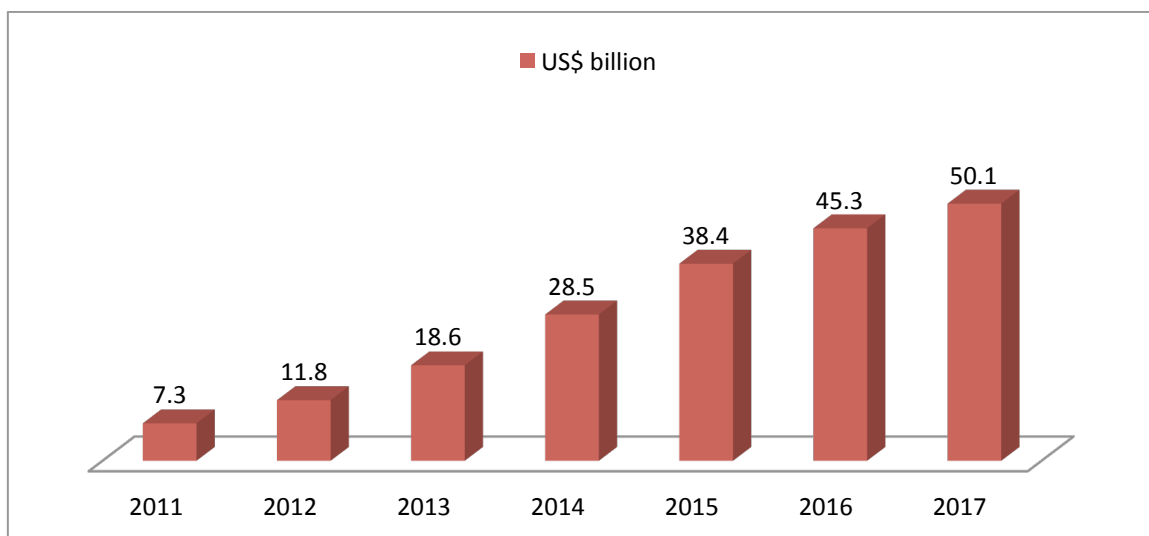
(Adapted from Forbes, 2013)

Cloud computing is becoming a rapidly growing IT solutions provider as companies can run applications directly from the vendor's network thus substantially reducing IT costs. The economic recession enticed countless companies to take to cloud computing as a cost saving strategy, having the potential to reduce IT costs by 35%. Cloud computing also offers offsite backup infrastructure, safeguarding against system failures, theft, vandalism, floods and fire. The United States is the largest regional market worldwide, while Asia-Pacific is one of the fastest growing regional markets, particularly within China and India (openview, 2014).

1.5 Global Big Data Sector

The global market for Big Data is estimated to have a value of \$28.5 billion (Statista, 2014). Every minute, the world generates 1.7 million bytes of data. YouTube users for example upload 48 hours of new video every minute of every day and 571 new websites are created every minute of every day. Data collected and generated by companies and governments is growing by approximately 40% per year, which is 7 times quicker than the overall ICT market (European Commission, 2014). The efficient leverage of this data can improve productivity by 4%, can increase profitability by 6% and can increase market share by 50% (Enterprise Ireland, 2014). Figure 6 illustrates the Global Big Data Market Forecast from 2011 to 2017. It is predicted that by 2020, over one third of all data will either live or pass through the cloud and data production will be 44 times greater than it was in 2009 (CSC, 2014).

Figure 6:
Global Big Data Market Forecast 2011-2017



(Adapted from Statista, 2014).

1.6 Top 15 ICT Companies, 2014

Table 1:
Top 15 ICT Companies, 2014

Rank	Company	Sector
1	IBM	IT Services, global
2	Microsoft	Software
3	SAP	Software
4	Oracle	Software
5	Cisco	Hardware
6	Apple	Hardware
7	Samsung	Hardware
8	Google	Software
9	Hewlett-Packard	Hardware
10	Accenture	IT Services, global
11	TCS	IT Services, offshore
12	Amazon	Software
13	EMC	Hardware
14	Infosys	IT Services, offshore
15	HCL	IT Services, offshore

(Adapted from Acker et al., 2014).

Due to the growing impact of cloud computing, software providing companies are dominating the top ICT list. There are no service or telecommunications providers within the top eight, suggesting that the competition for the cloud is just beginning (Acker et al., 2014). The 50 companies that are on the ICT50 generated revenue of US\$2.22 trillion in 2014, which is an increase of 2% from 2013. Although cloud computing and other subscription-based services don't produce the level of earnings that licence-based services have generated in the past, it is a growing trend. Hewlett-Packard decided in October 2014 to divide into two companies; one company selling hardware and the other, services.

Software companies' revenue is up 11% to \$284 billion, with the strongest margin of 22.5% of revenue. Hardware companies' revenue is up 3% to \$858 billion. Apple achieved two-thirds of the profit in smartphones and tablets, with most of its competitors making losses (Acker et al., 2014).

IBM, ranking number one in the ICT50 list owes its success to its enterprise-level cloud computing. Since 2000, IBM has filed more than 1,500 cloud-related patents and 15 cloud-related acquisitions (Acker et al., 2014). Microsoft, also through cloud investment, is at the top of the ICT50, ranked number two. It struggles to gain a foothold in the mobile hardware market competing with Apple and Google (Acker et al., 2014).

1.7 EU Policy Objectives

1.7.1 Digital Agenda for Europe

Launched in 2010 and updated in 2012, the Digital Agenda for Europe (DAE), one of the Europe 2020 initiatives, is focused on delivering sustainable economic and social benefits from a digital single market based on fast and ultra-fast internet and interoperable applications. This strategy contains 101 actions grouped around seven priority areas, with the review of the DAE, published in December 2012, identifying 7 key areas for further efforts to stimulate the conditions to create growth and jobs in Europe. Progress against DAE targets is measured in the annual Digital Agenda Scorecard.

1.7.2 EU Broadband Policy

One of the commitments in the Digital Agenda for Europe was to give every European access to basic broadband by 2013 and fast and ultra-fast broadband by 2020, with a key action of the updated DAE being to create a new and stable broadband regulatory environment. Fast broadband technologies capable of providing at least 30 Mbps are available to 64%, up from 54% a year ago, and more than twice that of 2010 (29%). Internet usage now stands at 72%, up from 60% with even faster progress among disadvantaged groups (Digital Agenda Scorecard 2014). In May 2014 the commission published a handbook on EU broadband state aid. This handbook helps local and rural authorities in particular to use adequately public funds to install broadband so citizens can enjoy faster and greater connectivity everywhere.

1.7.3 Mobile Roaming Policy

Between 2007 and 2014, there have been retail price reductions across calls, SMS and data of over 80%, data roaming is now up to 91% cheaper and the volume of the data roaming market has grown by 630% (European Commission, 2014). Furthermore, on the 3rd of April 2014 the European Parliament voted to abolish roaming charges across the EU as of December 2015. This means that, once legislation is finalised and comes into effect, consumers travelling within the EU will no longer face increased charges for using their phone while abroad.

1.7.4 Cloud Computing and the European Cloud Partnership

Establishing a coherent framework and conditions for Cloud Computing is one of the key priorities of the updated Digital Agenda for Europe. In September 2012, the European Commission adopted a strategy for “Unleashing the Potential of Cloud Computing in Europe”, outlining actions to deliver a net gain of 2.5 million new European jobs, and an annual boost of €160 billion to the European Union GDP (around 1%), by 2020. Three key actions of the strategy are developing safe and fair contract terms and conditions, cutting through the “jungle of standards”, and establishing a European Cloud Partnership. The most recent action of this partnership was to develop the “Trusted Cloud Europe” (2014), a policy vision document on how to help public & private organisations in Europe buy and sell cloud services in a safe & trusted environment.

1.7.5 Digital Single Market Package

One of the Commission’s actions as part of the Work Programme 2015 is to deliver a Digital Single Market Package: creating the conditions for a vibrant digital economy and society by complementing the telecommunications regulatory environment, modernising copyright rules, simplifying rules for consumers making online and digital purchases, enhancing cyber-security and mainstreaming digitalisation. This action will also support cross-border access to digital services and help create a level-playing field for companies.

1.7.6 Other activities of the European Commission

Other current activities of the European Commission include:

- Coordinating the e-Business Support Network for SMEs (eBSN), bringing together decision-makers in the field of e-Business, to share knowledge and experience, and to discuss strategic policy direction.
- Finding ways to improve the ICT and e-Business skills that are needed by Europe's enterprises.
- Measuring and economic analysis of e-business in Europe via e-Business W@tch which monitors the growth of electronic business across different sectors. Production of e-Business readiness index measures EU-25 developments on ICT adoption and use.
- Developing an annual work programme for ICT standardisation.
- e-Invoicing.

National Overview of the ICT Sector

National Overview

Introduction

Ireland has one of the highest concentrations of ICT activity and employment within the OECD. This is due to a highly skilled workforce, high education standards, competitive corporate tax rates, political stability, geographic advantages, EU membership and a proven track record of business development (IBEC, 2014). Exports and employment is generated from both indigenous and multinational ICT firms.

2 National Analysis

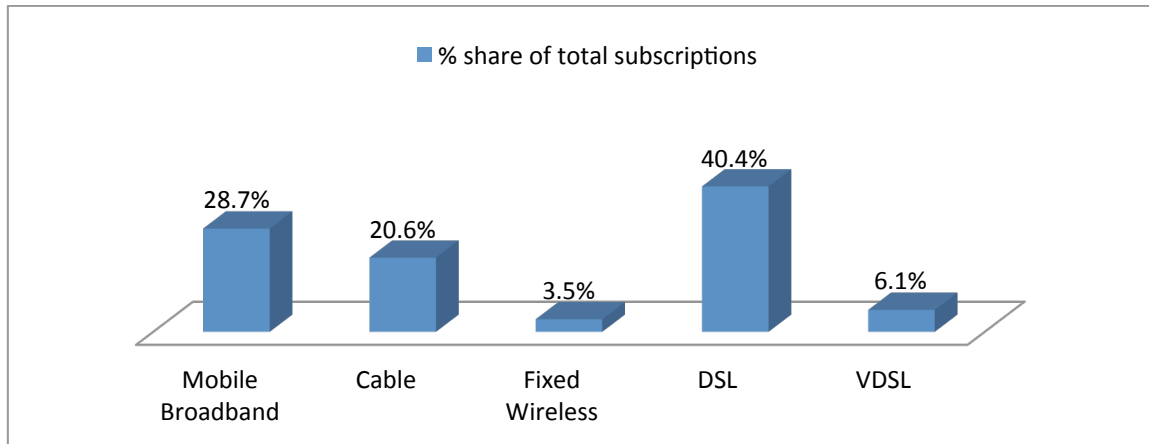
2.1 National Market Size

Over 105,000 individuals are employed within the ICT sector of Ireland. Some 75% are employed in multinational companies and the remainder in indigenous companies (ICT Ireland, 2014). Exports are worth €72 billion per year, which is 40% of total national exports. In fact 4 out of 5 of the top exporters in Ireland are technology companies (IBEC, 2014). The value of software and services in Ireland has grown from £100 million in 1987 to €50 billion in 2013 (Flynn, 2013). The market is expanding quicker than job openings can be filled. There are 5,000 job vacancies in Ireland's ICT sector and this number is increasing as Ireland strives to be the digital capital of Europe. Positive spillover effects arise from Ireland's ICT sector with every job that is filled in ICT, a further five jobs are generated in the local economy such as retail and services. As a result government actions are being taken in order to attract overseas workers to fill the ICT jobs vacancies and thus create further employment in Ireland (Kennedy, 2013).

2.2 National Broadband Market

Broadband subscriptions increased in Ireland in Q1 2014, up 0.7% from the previous quarter and up 1.8% year-on-year. At the end of March 2014, there were 1,701,714 broadband subscribers (Baker, 2014). The total number of fixed line subscriptions increased by 23,523 (Baker, 2014). Figure 7, illustrates the percentage share of broadband subscriptions in Ireland.

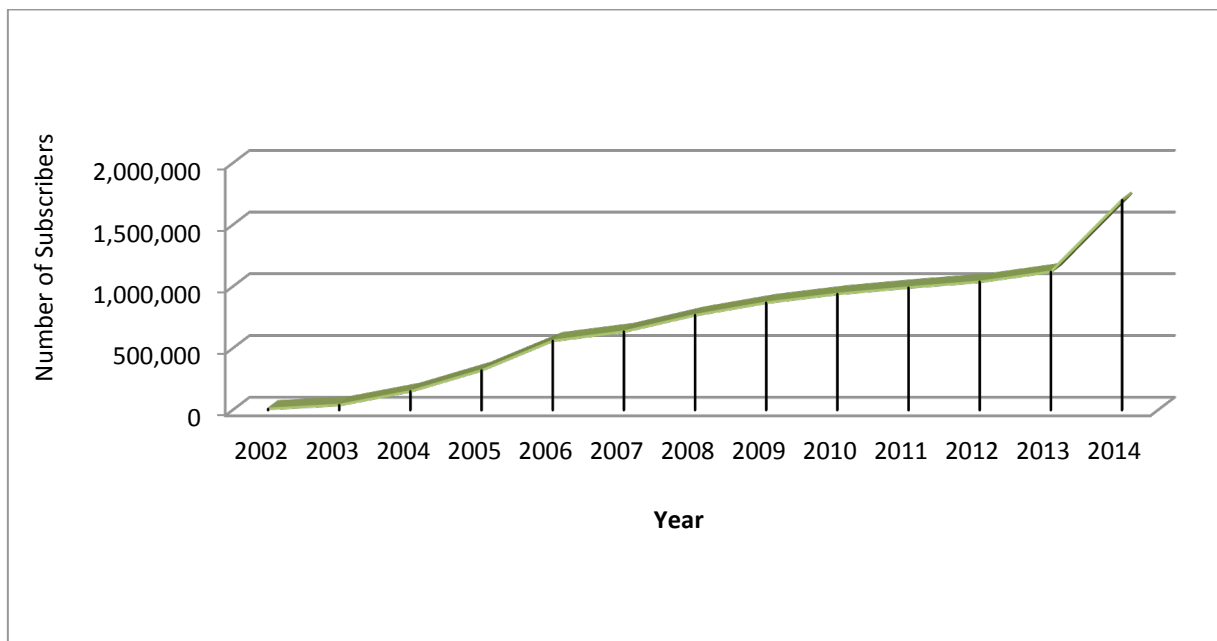
Figure 7:
Percentage Share of Broadband Subscriptions in Ireland, 2014



(Adapted from Baker, 2014).

Figure 8 illustrates the accumulating number of fixed broadband subscriptions in Ireland between 2002 and 2014 (ITU, 2014).

Figure 8:
Accumulating Number of Fixed Broadband Subscriptions in Ireland, 2002-2014



(Adapted from ITU, 2014).

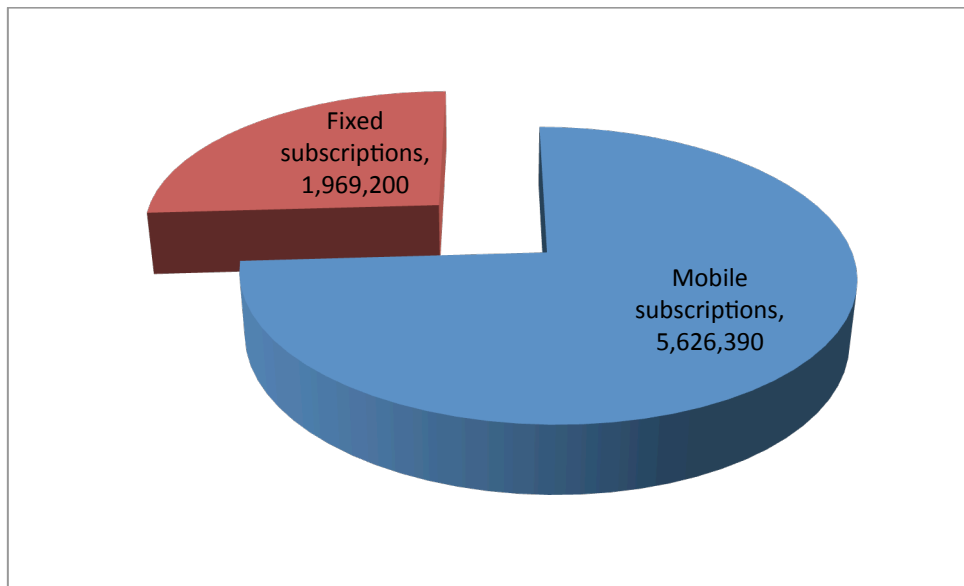
Approximately 56.7% of broadband speeds in Ireland have speeds greater than 10Mbps, while 37.7% were above 30Mbps (Baker, 2014). Approximately 62.2% of residential subscriptions

have subscriptions with speeds above 10Mbps. The number of Wi-Fi hotspots points increased by 18.4% in Q1 2014 while the number of access points increased by 16%. The use of Wi-Fi minutes rose by 68.4% with 2,860 hotspots. Regarding broadband prices, Ireland is eight places above the benchmarked average, putting it fourth highest out of 27 countries (Baker, 2014).

2.3 National Mobile Subscriptions

Mobile phone usage in Ireland is one of the largest in Europe per head of population. There is in excess of 122% penetration with nearly 5.6 million subscribers in a population of 4.2 million. Figure 9 illustrates the number of mobile and fixed subscriptions.

Figure 9:
Total Subscriptions (Fixed and Mobile)



(Adapted from ICA, 2014).

The average number of call minutes per customers is 35% more than the European average. Mobile broadband subscriptions dropped by approximately 11,000 in Q1, 2014 (Baker, 2014). Smartphone penetration reached 59% of the total Irish mobile subscriber bringing an increase in data volumes, which rose by 53.9% in the year to the end of June 2014, reaching 15,724 terabytes. The total number of text messages sent was over 1.88 billion with average revenue per user of €25 per month (Communications Regulations, 2014).

2.4 National Cloud Computing Market

A recent report by Sage Ireland found that 38% of SMEs use the cloud to reduce costs and improve the efficiency of information access (ISOCEL, 2015). A recent report details how Ireland can generate €9.5 billion a year in revenue, creating 8,600 new jobs and establishing 2,000 new non-IT SMEs, which in turn would employ a further 11,000 individuals. This forecast can be made possible due to Ireland's proximity to Europe and the United States, its skilled workforce and its technology infrastructure.

2.5 National Big Data Sector

Ireland continues to invest heavily in research capabilities that services Big Data needs. Table 2 displays some examples the research capabilities include. The Irish government's policy into the medium-term is for Ireland to become a leading country in Europe for big data and analytics. In the period up to 2020, it is estimated that 21,000 potential job vacancies could arise comprising of 3,630 deep analytical roles and 17,470 big data savvy roles with a further 8,780 potential job openings for supporting technical staff (Forfás, 2014).

Table 2:

Estimate of Baseline Employment Demand for Big Data and Analytics Skills in Ireland, 2013

Category	Employment Demand	% Total Employment
Deep analytic talent	3,000	0.18
Emerging Analytics roles	1,500	0.08
Established Analytics roles	1,800	0.10
Big data savvy	25,780	1.38
Supporting technology professionals	6,000	0.32
Total	35,080	1.88

(Adapted from Forfás, 2014).

Table 3 displays the current estimated employment demand for Big Data and Analytics skills in Ireland. NUI Galway is a hub for INSIGHT and ICHEC which is a significant asset for the city and county.

Table 3:
Examples of Ireland's Big Data Research Capabilities

Research Centre	Description
The INSIGHT Centre	The National Centre for Data Analytics
CeADAR	Centre for Applied Data Analytics Research
ICHEC	The Irish Centre for High-End Computing
TSSG	Telecommunications Software & Systems Group

(Adapted from Enterprise Ireland, 2014).

2.6 Top ICT Companies

Ireland is home to 10 of the top 10 global ICT companies and 9 of the top 10 software companies (ICT & ISA, 2014) as well 4 of the top 5 semiconductor firms (see Table 4) and 4 of the top 5 technology hardware companies (see Table 5) have a significant presence in Ireland (ICT Ireland, 2014).

Table 4:
Top 4 Semiconductor Firms in Ireland

Rank (2013)	Semiconductor Firm	Revenue US\$ m (2013)
1	Intel	48,590
2	Samsung Electronics	30,636
3	Qualcomm	17,211
4	SK Hynix	12,625

(Adapted from Gartner, 2014).

Table 5:
Top 5 Hardware Companies in Ireland

Rank	Semiconductor Firm	Revenue US\$ billion
1	Hewlett-Packard	127.2
2	Apple	108.2
3	Samsung	99.8
4	Dell	61.5
5	Fujitsu	55.5

(Adapted from Gartner, 2014).

2.7 National Policy Objectives

2.7.1 National Digital Strategy for Ireland

The National Digital Strategy for Ireland, launched in July 2013, sets out measures to ensure that Ireland reaps the full rewards of a digitally enabled society. These measures are grouped around four key areas: trading online & entrepreneurship for indigenous businesses, increased citizen engagement, education & eLearning, and cross-Government measures & eGovernment Strategy.

2.7.2 National Broadband Plan

The core objectives of the National Broadband Plan are to contribute to sustained macro-economic growth and competitiveness and to ensure that Ireland is best placed to avail of emerging ICT opportunities. In April 2014, a proposed State intervention was announced involving an end-to-end strategy for the delivery of quality and reliable high speed broadband that includes a major fibre build-out to rural areas. To date, over 1,000 locations have been identified as target areas for the proposed fibre based connections.

2.7.3 ICT Skills Action Plan 2014-2018

The focus of this Plan is to build the supply of graduates and skilled professionals with core ICT and electronic/electrical engineering qualifications at honours degree level and above and to increase the supply of highly skilled ICT professionals from abroad. Measures include

streamlining the operation of the employment permit regime and through the greater promotion of Ireland as a destination for skilled ICT professional.

2.7.4 e-Government Strategy

The e-Government Strategy (published by the Department of Public Expenditure and Reform) aims to improve the use of technology and in so doing, improve service delivery to customers of Government services. Priority actions include the use of new and emerging technologies; designing e-Government around customer needs, steps to improve take-up, ensuring that public data is available for re-use, use of e-Identification and back-end integration.

Regional and Local Overview of the ICT Sector

Regional and Local Overview

Introduction

Galway has recently been identified as a central hub for the information and communications technology sector (SOLAS, 2013). The sector is growing with ICT companies like Hewlett-Packard and SAP continuously expanding and increasing employment within Galway.

3 Regional and Local Analysis

3.1 Regional and Local Market Size

There are 196 ICT organizations in Galway (Geodirectory, 2014). There are 90 ICT organisations in Galway City, as categorised by NACE (Rev.2) Codes, with a further 106 ICT companies based in County Galway. Table 6 below provides a breakdown of science, research, engineering and technology professionals and associate professionals in Galway City (and comparisons to other cities) and towns in County Galway. The highest concentration of science, research, engineering and technology professionals and science, engineering and technology associate professionals is in Galway City and Suburbs. Oranmore and Tuam are the top two areas of concentration of science, research, engineering and technology professionals and science, engineering and technology associate professionals.

Table 6:

Professionals and Associate Professional in Science, Engineering and Technology

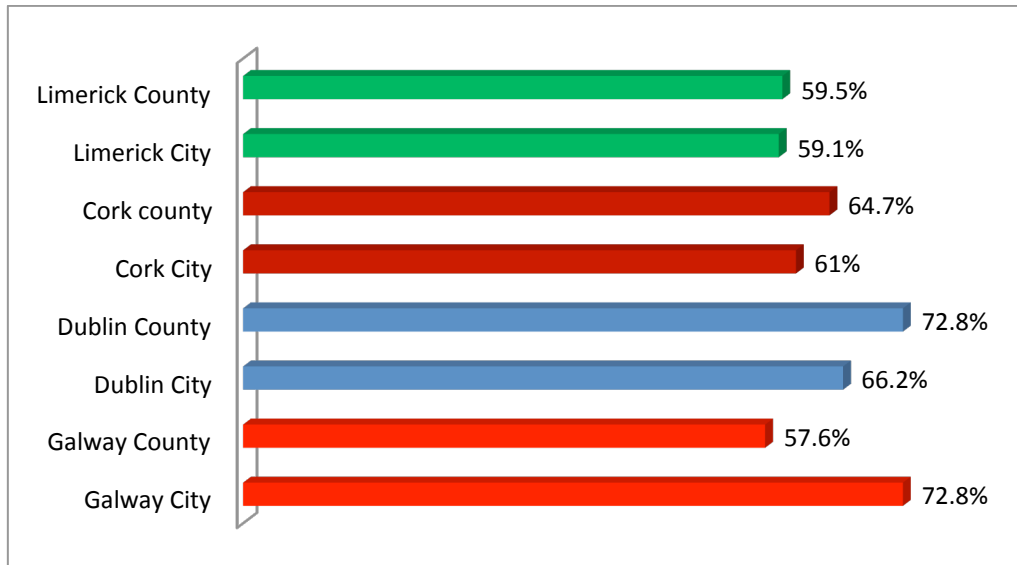
Area		No of Individuals		Area		No of Individuals	
Science, research, engineering and technology professionals				Science, engineering and technology associate professionals			
Dublin City and suburbs		26,956		Dublin City and suburbs		9,872	
Cork City and suburbs		4,497		Cork City and suburbs		2,524	
Limerick City and suburbs		1,674		Limerick City and suburbs		995	
Galway City and suburbs		2,229		Galway City and suburbs		917	
Co. Galway				Co. Galway			
Tuam		127		Tuam		80	
Ballinasloe		63		Ballinasloe		39	
Loughrea		80		Loughrea		81	
Oranmore		227		Oranmore		104	
Athenry		89		Athenry		52	
Gort		38		Gort		21	
Clifden		27		Clifden		5	
Bearna		59		Bearna		12	
Moycullen		60		Moycullen		12	
Portumna		16		Portumna		6	

(Source: CSO 2011 Census)

3.2 Broadband Market

Some 72.8% of Households in the Galway city region have broadband connectivity compared to 63.8% nationally (CSO, 2013). 75.6% of households in the Galway City region and 71.3% of Galway County households have a personal computer, roughly in line with the national average of 74.3% (CSO, 2011). Figure 10 compares the percentage of households with broadband in Galway, Limerick, Cork and Dublin. Some 72.8% of households in Galway city have broadband, compared to 66.2% in Dublin city and 61% in Cork. County Galway has a lower percentage of households with broadband compared to Dublin County with 72.8% and county Cork with 64.7% (CSO, 2013).

Figure 10:
Percentage of Households with Broadband



(Adapted from CSO, 2013)

Due to growing consumer and business demand, eighty-four rural communities in Galway are to get high-quality broadband for the first time. The new fibre-based connection will service the following villages in Galway set out in Table 7. This is particularly significant considering the low level of broadband availability in the most peripheral areas of the county.

Table 7:
Villages to Receive Fibre-Based Connection Service

Abbey	Annaghdown	Ardmore	Attymon
Ballinafad	Ballinamore	Ballinderreen,	Ballycrossaun
Ballyglunin	Ballymacward	Ballynakill	Ballyshrul
Bealadangan	Belclare	Boyouanagh	Brownsgrrove
Bullaun	Caherlistrane	Caltra	Camus
Oughter	Cappataggle	Carna	Carrowmoreknock
Cartron	Castleblakeney	Castlequarter	Claddaghduff
Cleggan	Clonbern	Clonfert	Clontuskert
Cloonminda	Colmanstown	Corrandulla	Corofin
Creggs	Curragh West	Derreen	Doonreaghan
Doorus	Eyrecourt	Garrafrauns	Glassillaun
Glinsk	Gorteeny	Gorumna	Illion
Inishbofin	Inisheer	Inishmaan	Inishmore
Inveran	Kilchreest	Kilconly	Kilkerrin
Kilkieran	Killeenadeema	Killimor	Killinny
Killoran	Kilreekill	Kilronan	Kilsallagh
Kiltullagh	Lettermullan	Levally	Loughaunbeg
Maum	Menlough	Moyard	New Inn
Peterswell	Rosmore	Rossaveel	Rosscahill
Roundstone	Toomard	Tubber	Tully
Tynagh	Woodford	Woodlawn	

3.3 Regional Mobile Subscription

The state-funded National Broadband Scheme set up to service rural broadband ‘blackspots’ has expired leaving ‘3 Ireland’ with a virtual monopoly on broadband services. The areas in County Galway without any other broadband will be affected. The expiration of the National Broadband Scheme means that there are no longer minimum service standards, minimum speeds, orders and installation standards, fault restoration times, engineer visits or service rebates.

3.4 Cloud Computing Market

Galway has a foothold in the growing cloud computing market through MNCs – HP and SAP and some indigenous companies such as Cloud Strong and SourceDogg. Hewlett Packard Galway are currently constructing an 87,000 square foot facility in Ballybrit with a capacity for up to 700 staff dedicated to cloud technology and business services and software R&D (Business Ect, 2014). This expansion symbolises the success of the company and promotes Galway as being capable of hosting a cloud centre of excellence. HP, Galway is adding 100 jobs to its cloud R&D team in Galway which will assist HP’s enterprise customers with cloud planning, implementation and operational needs as well as engaging customers seeking to deploy

OpenStack clouds (IDA Ireland, 2014). SAP is Europe's largest software company. Some 100 new jobs were recently created in its Galway branch, which is a Cloud Services & Support Centre (IDA Ireland, 2014b). This is a multilingual service and support centre for their SME and multinational enterprise sectors.

There is a growing indigenous sector. For example in 2011, Cloud Strong provided cloud services to ICT providers (cloudquest, 2014). The company helps their clients migrate their systems onto the cloud and handles infrastructure and maintenance. Galway based firm SoureDogg.com was founded in 2009 and has such customers as Aer Lingus, the Blood Transfusion Service, Bord Bia and the Marine Institute. The company produces software that makes it cheaper and more efficient for its clients to source suppliers (Kelpie, 2014).

To support the development the development of Cloud NUIG, in collaboration with Hewlett-Packard Galway's cloud Services Innovation Centre has recently designed a Master of Science in Cloud computing. The course is designed to develop participants' research skills with a business-focused area of cloud computing and services (Forfás, 2014).

3.5 Research Infrastructure for Big Data

Insight was established in 2013 by Science Foundation Ireland with funding of €75 million. The Insight Centre for Data Analytics is a joint initiative between University College Dublin, the National University of Ireland at Galway, University College Cork and Dublin City University. Insight brings together five of Ireland's leading research centres (DERI, CLARITY, CLIQUE, 4C, TRIL) and the IDA in key areas of priority research including The Semantic Web (Insight, 2014).

One project is using RTÉ Archives in collaboration with INSIGHT and the Digital Repository of Ireland (DRI) plan to develop an innovative semantic content discovery platform, designed to meet audience needs. The analysis of RTÉ's archives will provide opportunities to investigate Ireland's culture, historical, sporting and linguistic heritage (O'Donoghue, 2013).

Digital Enterprise Research Institute (DERI) is to lead a €3 million EU project designed to create a strategy for Big Data in Europe. The challenges of Big Data will be addressed and major European Big Data players will be brought together, including ATOS, Press Association, Siemens, AGT Group, Uni Innsbruck, University of Leipzig, DFKI, Exalead, Open Knowledge Foundation and STI International (DERI, 2013).

3.6 Top ICT Companies

Galway is home to four of the top five ICT companies. IBM, SAP, Oracle and Cisco all have branches in Galway. IBM has a Cloud and Smarter Infrastructure Lab in Galway. Apple is investing \$850 million in a new data centre in Athenry, County Galway. The facility projected to come into operation in 2017 will measure 166,000 square metres and will create 300 jobs for the west of Ireland. The centre will power Apple's online services such as the iTunes Store, App Store, iMessaging, maps and Siri. The Galway plant will provide outdoor education space for schools as well as a walking trail. It will be built on a Coillte-owned green-field site at Derrydonnell (Hayes, 2015).

An example of a privately held Irish software development company based in Galway is Ex Ordo. Ex Ordo develops web application software that enables academics and researchers to manage events. Originally founded in 2008, today the company has offices in Galway, London and San Jose and their technology is being used by academic conferences in Europe, the USA, South America, Asia and Australia. The company expects that Ex Ordo will become the industry standard platform for running research conferences by 2016. The company is backed by Enterprise Ireland, the Galway Enterprise Board and other private investors (ExOrdo, 2015).

There is no comprehensive list of software development companies, or even ICT companies, in Galway. An indication of the range and scale of ICT companies can be obtained by looking at the list of current members of ITAG in Table 8.

Table 8:
ITAG Member Companies

Ablo Consultants	Acorn Life	Analyze IQ Ltd	APC
ATFM Solutions	Avaeon Solutions	BackupAnytime	Blue Tree Systems
Boston Scientific	Brightwork	CBE	Celtic Technology Ltd
Celtrak	Cisco Systems Ireland Ltd	Collins McNicholas	Computer Troubleshooters
CSG International	CSV Solutions	CT Solutions	Dataplex
DBA Ireland	Duolog	eFast Teo	Enerit Ltd
Fidelity Investments Ireland	Fintrax	FKM Group	Futiro Ltd
GenBase Solutions	GoldTech Solutions	Goodside Software Solutions	Hewlett-Packard Galway
ICE Computer Services	Lumension Security Ireland Ltd	Medtronic	Metalogic
Netfort	NetIQ Europe	Neueda	Novavision
O2 Ireland	PFH Technology Group	Pivot Shared Services	PlanNet21 Communications Ltd.
Proactive Design and Marketing	QSET	Reaney Computer	Russell Brennan Keane
Sigma-X	Silicon and Software Systems	Sogeti	SolanoTech Ltd
South East Software Ltd	Storm Technology	Team BDS	TecSupport
Vulcan Solutions	Xyea		

ICT focussed startups and indigenous companies include OnePageCRM, Ex Ordo, Element Wave, Netfort, BuilderEngine, Pocket Anatomy, Altocloud, SpamTitan, RealSim, Storm, SourceDogg, GAME GOLF, CGA, Instillo, Rivada, Tribal City Interactive and Alison. These are in close proximity to multinational operations from companies like Valeo, Cisco, HP, Avaya, SAP, IBM, APC, Arm (Duolog), Schneider, Oracle, Fidelity, SAP, Aspect, SmartBear and EA. These companies are fuelled by a highly skilled talent pool available through graduates from both NUI Galway and GMIT as well as through PhDs from the Insight Centre for Data Analytics and LERO. A large number of organisations such as the Galway Chamber of Commerce, Galway Harbour, Startup Galway, WestBIC and NUI Galway have collaborated to kickstart a new innovation hub called the 'Galway City Innovation District'. The vision is to replicate other cities' city centre innovation hubs in an attempt to attract young technology companies with strong growth potential to Galway's city centre, thus creating a cluster. Innovation districts consist of an amalgamation of entrepreneurs and educational institutions, start-ups and schools, mixed-use development and medical innovations (Costello, 2015).

The innovation district will begin with the opening of the Portershed which is a disused former Guinness storehouse located on CIE land at the back of Ceannt Station and will house

innovative start-ups and established tech companies. It will provide for hundreds of tech jobs in Galway (Portershed, 2015).

3.7 Business Support, ICT Education and Training

NUI Galway and GMIT offer a wide range of ICT courses in Galway. Based at DERI (Digital Enterprise Research Institute) and at the Information Technology Department in NUI Galway, Coderdojo hosts free weekly computer coding classes, one of the key skills essential to lay the foundations for a sustainable progressive knowledge-based economy and society. On Saturday mornings, up to 200 children, teenagers and their parents come to the on-campus Coderdojo sessions to learn a range of computer languages including Scratch, Python and HTML ably assisted by volunteer mentors from DERI.

ITAG (Information Technology Association Galway) is a network of over 50 multinational and indigenous IT companies involved in the IT sector in the Galway area. The goal of ITAG is to promote, strengthen and grow the information technology industry in Galway City and County. ITAG Skillnet offers tailored ICT training and learning programmes and to date has trained over 2,000 employees from member companies (ITAG Website, 2015).

Alongside the well-established incubation centres at Galway Technology Centre, hosted by WestBIC, GMIT's Innovation in Business Centre and NUI Galway's Business Innovation Centre, a new incubation centre has been opened in Galway. Every six months, StartX6 will offer ten entrepreneurs support, mentoring and motivation to help launch their business by an expert panel of experienced professionals and entrepreneurs.

3.7.1 Local Enterprise Office Galway

Local Enterprise Office (LEO) Galway provides information, support and advice for anyone starting up or expanding a business. The original 31 LEOs have recently progressed from being independent agencies to being a network of offices within local authorities. The establishment of the LEOs will mean that all categories of business – including sole traders, micro businesses and small and medium sized companies – will have access to Government supports and advice (Enterprise Ireland, 2014). Their role is to drive the development of local enterprise and to support business start-ups and to increase micro and small businesses job and export potential (business-startup, 2015).

3.7.2 Information Technology Association Galway

The Information Technology Association Galway (ITAG) was established in September 2000 by a group of forward-looking IT professionals from indigenous and IT companies. Board members include representatives from CISCO, Hewlett-Packard, IBM, Schneider Electric, Netfort Technologies, GMIT, Storm Technologies, and INSIGHT. ITAG aims to ensure that Galway's IT sector continues to thrive, benefitting both those employed within the sector as well as the wider community (Crunchbase, 2014). Its mission is to advance ICT networking and business opportunities in Galway by fostering strategic business partnerships (Torres & Whyte, 2006).

ITAG SKillnet is a network of over 50 start-up and multinational enterprise companies involved in the IT sector in Galway with the objective of strengthening and developing the IT sector of Galway. The network provide software, telecommunications, computer, internet, online and systems integration products to a national and international client base (Torres & Whyte, 2006). This is achievable by improving competitiveness and reducing training costs through tailored training and learning programmes. ITAG Skillnet has trained over 2,000 employees from member companies (ITAG, 2015).

3.7.3 Galway Technology Centre

Galway Technology Centre (GTC) was established in 1994 and has supported over 120 companies, employing in excess of 1,000 individuals and currently houses over 30 companies. The state-of-the-art ICT cluster has accommodated the requirements of both indigenous start-ups and in-bound international companies. Some of the companies that have spent time in the facility include Duolog Technologies, Storm Technology, Abbott Vascular and BioWare. GTC provides a high quality environment where entrepreneurs can grow their enterprise from concept to commercialisation. GTC offers low cost office space for start-ups and growing companies with access to connectivity with a range of services. VOIP telephony, broadband, firewall, 24x7 access, a HP training suite and an on-site sandwich bar are inclusive of other services provided by GTC. The centre also hosts some of IDA's multinational clients as they establish a base in Galway (Corcoran, 2013). The GTC is supported by Galway Chamber, Enterprise Ireland, Galway County & City Enterprise Board and WESTBIC.

3.7.4 WESTBIC

WESTBIC was established in 1987 and as an ISO accredited organisation, provides tailored support to innovative enterprises and community development projects from initial concept all the way through to commercialisation and post-launch stages of development. WESTBIC operates from its regional offices located in Galway, Tuam, Kilcar, Letterkenny, Mayo, Sligo, Roscommon and the Midland region.

WESTBIC provides support to its business clients in the form of start-up training, feasibility study assistance, market research and marketing planning, business planning, business development advice and sourcing finance. They have the aim of improving the competitiveness and innovativeness of companies through participation in suitable EU projects with transnational partners.

Technical support is also delivered to intermediaries, such as action planning, programme identification, project conceptualisation, application assistance and evaluation assignments. Tailored training services include idea generation and development workshops, entrepreneurial training, business planning and community development modules. Support is provided for incubation space development throughout the region as well as support for Social Economy and Community Development projects that add regional value are other services provided by WESTBIC (Tuam Guide, 2015).

3.7.5 Startx6

Startx6 is a recently established private incubator for start-up businesses located in Galway's city centre. Real life experience from tech experiment enables the business to launch fast and flourish or fail, allowing the entrepreneur to move onto the next opportunity. It provides service to entrepreneurs of all sectors with the aim of catering towards a mix of Technology, Health, Food, Arts and Social Entrepreneurs

The incubation procedure operates by joining ten entrepreneurs in a start-up experiment for a six month period. Free rent is provided with local enterprise sponsored mentoring, broadband, free OnePageCRM and access to local networking events as well as WebSummit. After the six month period the original idea will either survive and launch or be abandoned allowing room for new ideas (Business Startup, 2015).

3.7.6 Udaras na Gaeltachta

Údarás na Gaeltachta offers qualifying businesses and companies from various sectors a range of incentives and supports to start up, develop, expand or locate in a Gaeltacht region. Hundreds of businesses have already gained establishment due to the support provided by Údarás na Gaeltachta.

It was established in 1980 and has the role of developing the economic, social and cultural sectors of the Gaeltacht. The authority provides funding and a wide range of enterprise development and jobs creation initiatives for new and existing enterprises within the Gaeltacht. The organisation supports businesses in developing new markets, technologies, products and strategic alliances through research and development including companies spanning across a range of commercial sectors like ICT, tourism, audio and digital media (Údarás na Gaeltachta, 2015).

Support is provided to ICT businesses in the Gaeltacht region of Galway in the form of telecommunications infrastructure like a competitive high-speed broadband service (Údarás na Gaeltachta, 2015). ÉireComposites Teoranta, a Gaeltacht-based firm developing new technologies for space launchers and satellites for example received contracts worth €1.9 million with the European Space Agency (ESA) with the support of Údarás na Gaeltachta and Enterprise Ireland (Irish Dev, 2010).

3.7.7 LERO

LERO is the first Irish software engineering research centre. With a strong industry focus it strives to bring together teams of leading software engineering teams from both Universities and Institutes of Technology in a coordinated centre of research excellence. The collaborating educational institutions are University of Limerick, National University of Ireland, Galway, Trinity College Dublin, University College Dublin, Dublin City University, Dundalk Institute of Technology, Maynooth University and University College Cork.

LERO is considered to be one of the best known and most highly regarded software engineering centres in the world. Its mission is to “establish Ireland as a location synonymous with high quality software development through advanced research and smart collaboration with industry partners, national agencies, other Research Centres and a broad outreach programme” (LERO, 2015).

LERO, based at NUI Galway is focused on lean and agile software development. The enterprise Agility research cluster at the University's Whitaker Institute have a €4 million funded project by the Science Foundation Ireland to which companies sign up to in order to receive further development and implementation of management practices. The projects involve international companies such as Dell, Atlassian, Information Mosaic and HP as well a number of SMEs and public sector universities in Ireland and Australia. As these companies operate in turbulent economic times, the projects attempt to improve their reactions to change.

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