

The Irish Internet Cluster:

Helping A Tiger
Regain Its Stripes



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Introduction

Since its humble inception in the early 1980s, the Irish ICT (Information and Communications Technology) sector has risen to become a cluster of noteworthy significance in the world as many of the industry's leading firms opt to locate their EMEA region headquarters (Europe, Middle East, and Africa) in the country, and increasingly invest their resources in high value activities and operations in the location. The small island's success in the ICT domain speaks to a transformation that has taken place more generally in Ireland. Once memorably referred to as "The poorest of the rich" in a 1988 *Economist* survey, the country underwent a period of export led growth from early the 1990s to the early 2000s, achieving average annual GDP growth rates of 6% in period popularly known as "the Celtic Tiger".¹ Since the global recession of 2008, however, Ireland has once again become embroiled in economic difficulty, and has suffered severe financial, public debt and employment crises as well as a heavy contraction in its GDP.

This report focuses on the Internet subcluster of ICT in Ireland in the aftermath of the financial crisis and argues that, with appropriate guidance, the cluster can play an important role in restoring the country's competitiveness. The report first analyzes the national economy, using the framework laid out by Porter et al.² to focus on the country's endowments, macroeconomic competitiveness, and microeconomic competitiveness. It then assesses the development and structure of Ireland's ICT cluster using the tools of cluster mapping and diamond analysis.³ Following this assessment, the report lays out some key competitiveness challenges ahead and offers problem-driven recommendations, which ought motivate the government's strategy in nurturing the cluster going forward.

¹ CIA World Factbook, 2012

² Delgado et al., 2012

³ *Ibid.*

Ireland: An Overview

Geography and Locational Factors

The Republic of Ireland is located on an island in the North Atlantic Ocean to the northwest of Europe. It is bordered by Northern Ireland to the north and has a total land area of 70,273km². The majority of the population of 4,775,982 (62%) (July 2013 est.) Dublin is Ireland's capital and largest city, with a metropolitan population of 1 million in 2009. Forty percent of Ireland's population lives within 100km of the city. Ireland has a cloudy but temperate climate year round.⁴

History of Ireland

Ireland's modern political history began in the 19th century, when a series of violent republican rebellions led to an Act of Union, establishing the United Kingdom of Great Britain and Ireland in 1801. Throughout the years that followed, Ireland experienced little of the Industrial Revolution taking place next door, remaining a largely agrarian society. The onset of the "Great Famine" of 1845-1852 led to massive depopulation and emigration to the United States, Britain, and elsewhere. In time, the Irish diaspora would grow to dwarf Ireland's national population, with an estimated 70 million people around the world claiming Irish ancestry.⁵ The December 1921 signing of the Anglo-Irish Treaty marked the beginning of Irish independence. In 1949, the Free State severed all ties with the United Kingdom and became a republic, while a region in the north remained under British rule as Northern Ireland.⁶ Following independence, Ireland pursued largely isolationist political and economic policies, engaging in protectionism and refraining from participation in WWII. As these measures proved unsuccessful, it shifted to liberalizing its

⁵ Boyle and Kitchin, 2008

⁶ EU Presidency, 2013

economy in 1958. In 1973, Ireland joined the UK as a member of the European Economic Community (EEC) and in 1999 it adopted the Eurozone currency.⁷

Overall Performance

The 1990s saw Ireland's transformation from one of the poorest economies in Europe to one of the richest, enjoying the second highest GDP per capita on the continent, with annual GDP growth from 1995-2007 outperforming all other members of the OECD at 6%. Throughout this period, unemployment fell to 4-5% and fiscal budgets were brought under control.⁸ See **Exhibit 1** for key economic indicators.

Ireland's remarkable progress has been attributed to its outward looking approach to economic development, as it opened itself up to trade and foreign investment, embracing knowledge-intensive, higher value-added industries such as computers, pharmaceuticals, and international services. To achieve this, Ireland significantly lowered its corporate tax rate to 12.5%, invested heavily in educating its citizenry, and built a robust telecommunications infrastructure. Standards of living greatly improved and the persistent trend of emigration out of the country finally reversed, leading to a period of population growth of 15% and considerable immigration from Eastern Europe.⁹

2008 Financial Crisis

The onset of the global financial crisis in 2008 marked an abrupt end to Ireland's success story. Ireland experienced a construction boom alongside the Celtic Tiger, with property prices growing at a compound rate of 11%. After the global financial crisis hit, the construction bubble burst, with residential property losing 47% of its 2007 peak value.¹⁰ The collapse of the housing

⁷ Dorgan, 2006

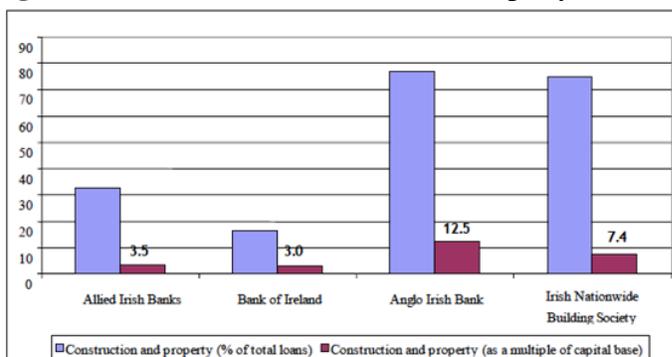
⁸ CIA World Factbook, 2012; Dorgan, 2006

⁹ Dorgan, 2006

¹⁰ Kennedy and McQuinn, 2012

sector led to a subsequent breakdown of the banking sector, which had supplied it with significant amounts of loans (**Figure A**). Rising public debt resulting from government bailouts to banks, access to capital, and unemployment became significant problems. Ireland was forced to enact severe austerity measures from which the economy is still reeling today.¹¹

Figure A: Loans for Construction & Property Excluding Residential Mortgages (2006)



*Data exclude residential mortgages and can thus be taken as representing the exposure of banks to commercial property in a broad sense.
 Source: Annual Reports
 Specifically the data are for: Allied Irish Banks and Irish Nationwide December 06; Bank of Ireland March 2007; Anglo Irish Bank September 07, estimated based on data in the 2008 annual report.

Source: “The Honohan Report”, 2010

Competitiveness Analysis

This section considers Ireland’s competitive positioning in terms of national endowments, macroeconomic competitiveness, and microeconomic competitiveness.¹²

Endowments

Native English-speaking population. The official and predominantly spoken language in Ireland is English, the preferred business language around the world. This places Ireland at a significant advantage in attracting foreign direct investment from American MNCs. It facilitates, furthermore, backward linkages between MNCs and local suppliers which naturally tend to operate in their native language.¹³ Ties with America extend beyond language: Thirty-five

¹¹ Ministry of Finance, 2010

¹² Porter, 1998

¹³ CIA World Factbook, 2012; Clark, 26 Oct 2012

million Americans — or more than seven times the population of Ireland — claim Irish ancestry.¹⁴ The Irish diaspora tends to self-organize around its heritage and provide economic and business support to its country of origin.¹⁵

Geographic hub. Ireland's location in Western Europe gives it easy access to the United States, Europe, the Middle East and Africa, and to a lesser extent Asia. This makes it an attractive location for MNCs to establish EMEA (Europe, Middle East and Africa) regional headquarters. Moreover, with only a five-hour time difference between Dublin and the East Coast of the United States, it is easier to schedule international conference calls and collaborate remotely in real-time.

Temperate climate year-round. Ireland's temperate climate makes it an ideal location for ICT-driven clusters. The data centers that form the physical backbone of Internet services require cool temperatures to operate. Cooling servers typically cost more than the networking equipment itself and constitutes the bulk of data center expenditures which, in turn, are a key operating cost for internet firms.¹⁶

Social capital. Studies have suggested that high levels of trust and social capital have a positive impact on economic performance.¹⁷ Indeed, according to the OECD's *Better Life Index*, Irish people have an unusually strong sense of community.¹⁸ This leaves the country well placed to develop both co-operative and competitive institutional arrangements as it seeks to intensify its economic networks.

¹⁴ U.S. Census Bureau, 29 Jan 2013

¹⁵ Boyle and Kitchin, 2008

¹⁶ Fitch, 2012

¹⁷ Putnam, 2000; Fukuyama, 1995

¹⁸ OECD, *Better Life Index*

Macroeconomic Competitiveness

After decades of instability and paralysis, Ireland finally secured favorable macroeconomic conditions in early 1990s, which were maintained until the financial crisis of 2008. The country ranked 21 out of 71 economies in macroeconomic competitiveness in 2012.¹⁹

Monetary and Fiscal Policy (MFP)

Out of all the determinants of competitiveness, monetary and fiscal policy was affected most acutely by the crisis, falling from being the top ranked economy in the world in 2006-2008 to the 67th position in 2012.²⁰ The collapse of the construction bubble in 2008 caused Ireland to enter a recession for the first time in a decade, with real GDP growth shrinking by 3% and deepening to a dangerous -7% in 2009 (**Figure B**). Perhaps the most immediate manifestation of this problem has been the surge in unemployment, which jumped from 4.6% in 2007 to 6.3% in 2008, eventually reaching 14.4% in 2011.²¹ Only 60% of Irish citizens aged 15-64 work in a paid job, 6% below the OECD average.²²

While the crisis had its roots in the construction sector, the close relationship between Irish financial institutions and property developers left the largest banks in severe distress. Mistaking insolvency for lack of liquidity, the national government sought to temper the effects of the crisis by guaranteeing banks' balance sheets, taking on vast amounts of private debt in the process. This resulted in the government's fiscal balances falling under severe pressure after years of surplus, with deficit levels reaching 7.3% of GDP in 2008 and 31.2% of GDP in 2010 (**Figure C**).²³ Forced to seek assistance from the EU and IMF, the Government rolled out a series of pro-

¹⁹ Institute for Strategy and Competitiveness, 2012: *Ireland*

²⁰ Institute for Strategy and Competitiveness, 2012: *Ireland*

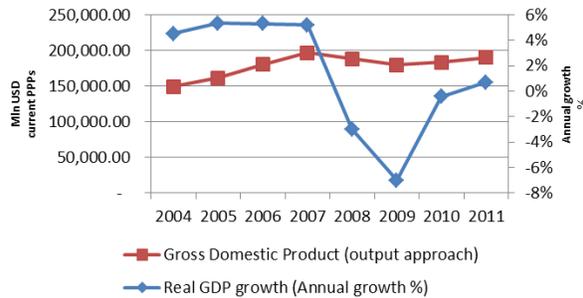
²¹ OECD Factbook statistics, 2013

²² OECD, *Better Life Index*

²³ OECD Factbook statistics, 2013

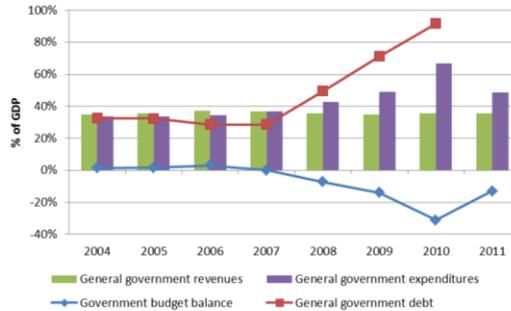
cyclical austerity measures, cutting government spending on social welfare, lowering minimum wage, and increasing sales taxes.²⁴

Figure B: Economic Performance



Source: OECD Factbook Statistics, 2013

Figure C: Government Deficits & Debts



Source: OECD Factbook Statistics, 2013

Thus, while the roots of the crisis had little to do with Ireland’s competitiveness strategy of export led growth, as the financial sector and the state became embroiled in difficulty; the Internet cluster was impacted in a number of ways. Most immediately, lending to small and medium sized businesses virtually collapsed, leaving many small companies in extraordinary difficulty. The capacity of the state to invest in supporting public institutions also declined dramatically as it was forced to cut its expenditures in the face of falling tax revenue and the increased financial burden associated with the guarantee of the banks. Third, as Ireland’s reliance on the European Union increased, competing nations began to exert pressure on the country to increase its corporate tax rate. Indeed, while the government remained committed to the maintaining the rate at 12.5%, the uncertainty caused by the pressure was, without doubt, costly.

Social Infrastructure & Political Institutions (SIPI)

Human Development

Basic health. . Ireland enjoys a fairly developed healthcare system, with 9.2% of GDP spent on the sector in 2010 and a physician density of 3.187 physicians/1,000 population, in line with the

²⁴ Shah, 25 Nov 2010

World Health Organization recommendations. Life expectancy at birth is 81 years, one year more than the average.²⁵

Education. Ireland has a literacy rate of 99%.²⁶ Its education system is in line with the OECD average, with girls outperforming boys in both high-school graduation rates and in PISA tests scores.²⁷ In 2009 Ireland spent 6.5% of its GDP on education, where it ranked 30 amongst 173 economies on that parameter.²⁸

Income. Ireland is classified as a high-income country,²⁹ with PPP-adjusted GDP per capita approximately \$40.5k in 2010.³⁰ Moreover, Ireland had a GINI index of 33.9 in 2010, reflecting relative equality,³¹ with 40% of national income going to the first quartile.³²

Political Institutions

Quality of political institutions. Ireland has had a strong constitutional and democratic culture since independence, but other less obvious factors affect its capacity to facilitate competitiveness. Its electoral and parliamentary systems have given the national government exceptionally strong executive power, enabling it to push through measures that have often been unpalatable in the short term but important for long-term growth. These powers have also led to problematic decisions, however, one notable instance being the infamous bank guarantee. Low voter turnout, moreover, suggests that trust in public institutions has been lagging since the financial crisis — only 67% of Irish citizens voted in the last election, compared with the OECD average of 73%.³³

²⁵ CIA World Factbook, 2012

²⁶ *Ibid.*

²⁷ OECD, *Better Life Index*

²⁸ CIA World Factbook, 2012

²⁹ World Bank, 2012: *World Development Indicators*

³⁰ Economist Intelligence Unit, 2012

³¹ CIA World Factbook, 2012

³² Eurostat, 2010: *Distribution of income by quantiles*

³³ OECD, *Better Life Index*

Rule of law. Moving beyond politics, Ireland ranks highly in rule of law, regulatory and government effectiveness indicators. As can be seen in **Figure D**, the country outperforms international stars of economic development such as Germany and the UK.³⁴ However, the financial crisis has had a negative effect on people’s perceptions of corruption in Ireland; especially relevant is their mistrust of the business culture and belief in the government’s failure to effectively address white collar crime.³⁵

Figure D: Percentile Rankings of Rule of Law, Regulatory Quality & Government Effectiveness



Source: Worldwide Governance Indicators, World Bank, 2013

Microeconomic Competitiveness

Quality of Business Environment

Factor conditions. Ireland has a relatively developed physical and communications infrastructure, both ranking at 24 in 2012.³⁶ There are 96,036km of paved roadways, 16 airports and 5 marine ports in the country. Ireland is highly connected, with 2.047 million telephone landlines and 4.906 million cellular phones in 2011. In 2012 there were 1.387 million internet hosts and about 3 million internet users.³⁷ Irish professionals are among the most educated in the European Union. Five Irish universities were ranked among the world's top academic institutions

³⁴ World Bank, 2013: *World Governance Indicators*

³⁵ Transparency International, 2012

³⁶ Institute for Strategy and Competitiveness, 2012: *Ireland*

³⁷ CIA World Factbook, 2012

by the 2013 US News & World Report; and Ireland's relative expenditures on public education regularly rival those of Sweden and the United Kingdom.³⁸

While Ireland ranks 15th in the world in terms of ease of doing business, there are definite administrative hurdles that willing entrepreneurs need to overcome, especially when trying to obtain construction permits.³⁹ Moreover, the financial crisis and its resulting austerity measures have led to diminished capital availability, resulting in some of the toughest lending conditions in Europe. Small and medium enterprises (SMEs) have been hit particularly hard. In a 2012 study on European competitiveness, Ireland was found to have the second-worst small business conditions in the EU, with only Greece having a worse climate for SMEs trying to get credit.

Demand conditions. With a population of only 4 million, internal demand in Ireland is small, however being member of the EU gives it access to a much larger market. Moreover, the fact that Ireland has a strong regulatory environment and the same environmental laws as the rest of the EU raises the quality and sophistication of demand.⁴⁰

Context for strategy and rivalry. A main draw for Ireland is its highly competitive tax rate. Additional efforts are being undertaken in order to make entrepreneurship accessible to Irish professionals, including low registration costs and generous tax credits that have made the cost of starting a business in Ireland consistently lower than EU average. What supports these efforts by the government is the fact that Ireland in general has a solid entrepreneurial culture and entrepreneurs are regarded highly in society. In addition, one-tenth of Ireland's entrepreneurs are involved in medium to high technology industries, which is considered a very high percentage compared to world averages.⁴¹ Moreover, the Irish government has recently started crafting a

³⁸ Eurostat, 2010: *Expenditure on education as % of GDP or public expenditure, 1991-2010*

³⁹ International Finance Corporation, 2012

⁴⁰ Your Europe, 2012

⁴¹ Fitzsimmons and O'Gorman, 2011

deliberate strategy toward supporting and engaging the diaspora and helping build stronger business networks between the diaspora and local citizens.⁴²

Supporting and related industries. The venture capital sector is an important supporting industry for the knowledge-intensive clusters that drive Irish competitiveness, including ICT. Following the crisis, the drastic downturn in lending availability for nascent, small and new businesses in Ireland put significant pressure on Ireland's underdeveloped venture capital sector. Ernst & Young's 2010 globalizing venture capital report notes that the UK and Ireland continued to raise the most capital in Europe, beyond France, Germany and even Switzerland. However, Ireland's situation is a reflection of Europe's greater struggle to develop a vibrant venture capital industry after the crisis. Funding amounts in the region were historically low compared to American venture capital and have been shrinking due to post-crisis capital flight: Fundraising in Ireland shrunk to €269 million in 2012, a 2% decline over the previous year.

State of Cluster Development

Given its small size, Ireland enjoys a strong presence in a number of high value industries. As can be seen in **Figure E**, in addition to information technology and communications services clusters (between which, the internet cluster can be found) it also hosts strong and growing biopharmaceutical, financial and business services clusters. While chemical products have been a traditionally strong cluster, it has been steadily losing share in global exports. Agricultural products, once Ireland's major cluster,⁴³ have dwindled as the country moved up the value chain to industry and services.⁴⁴ Ireland's major export destination is the United States (22.3% of exports), followed by the UK (16.1%) and Belgium (15.5%).⁴⁵

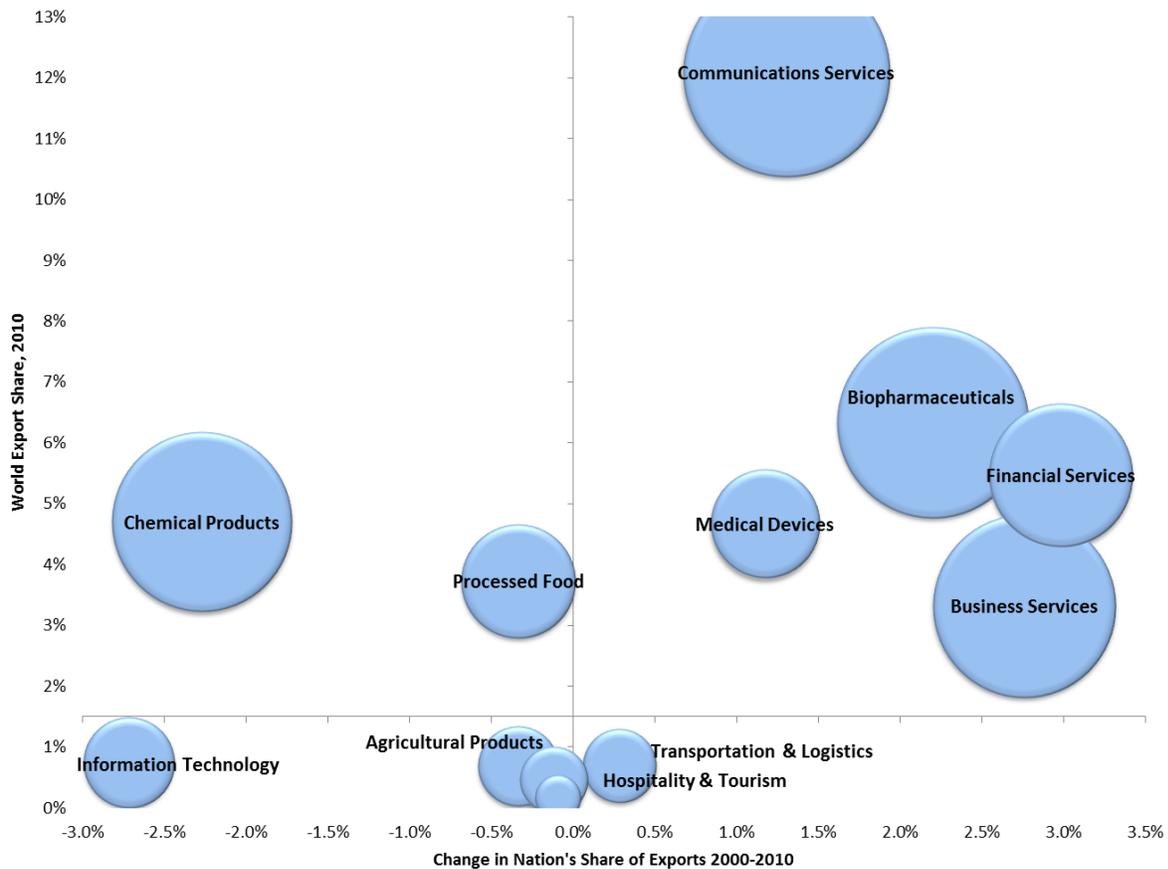
⁴² Boyle and Kitchin, 2008

⁴³ CIA World Factbook, 2012

⁴⁴ Institute for Strategy and Competitiveness, 2012: *International Cluster Competitiveness Profiles*

⁴⁵ CIA World Factbook, 2012

Figure E: Export Portfolio By Cluster, 2000-2010



Source: International Cluster Competitiveness Profiles (ICCP), 2010

Sophistication of Company and Operations Strategy

A final factor of particular importance in driving the microeconomic competitiveness of Ireland is the quality and sophistication of its companies’ operations and strategy. This includes aspects such as production, marketing and organizational practices of local enterprises. Ireland’s success in attracting MNCs with sophisticated organizational capacity and operational capability leaves it well placed to supply indigenous firms with an internationally experienced workforce.

The Ireland ICT Cluster

Known as the “Silicon Docks,” (or “Silicon Bog”) Ireland’s thriving ICT cluster is anchored by large, multinational firms, but also includes many young Irish companies. Global leaders in computing, such as Google and Microsoft, have established their EMEA headquarters in Ireland. Accenture, a leader in global IT consulting, has gone one step further by moving its corporate headquarters to Dublin in 2009, citing Ireland’s “sophisticated, well-developed corporate, legal and regulatory environment” as a key driver for the move.⁴⁶

Cluster History

The Internet cluster traces its roots to the first integrated telecommunications firms established in Ireland early in the 20th Century. Some large telecommunications players, such as Telecom Ireland, were established in the early 1980s. Soon after, multinational technology manufacturing firms such as Hewlett Packard and IBM set up operations in Ireland. Thus, the Information and Communications Technology sector drew its strength for many years from hardware manufacturers and telecommunications service providers. Hardware enterprises were soon joined by software companies, including Microsoft and Oracle. Irish ICT later expanded into the Internet and e-business, attracting major players such as Google, Yahoo!, Amazon and eBay to set up their EMEA (Europe, Middle East and Africa) regional headquarters there. Today, about half of the firms operating in Ireland ICT cluster are located in Dublin.⁴⁷

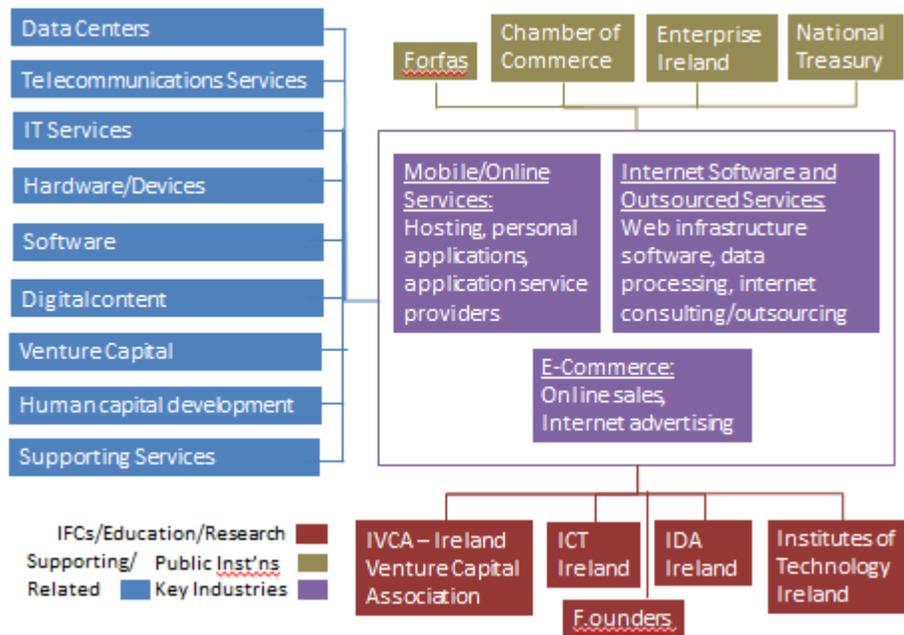
Today, the separate functions associated with telecommunications, software, and information technology have become increasingly interrelated, giving rise to a large number of newer firms engaged in new kinds of hybrid activities: online services, internet software, online retail stores, internet advertising, web service outsourcing such as web design, and data processing and

⁴⁶ Accenture, 26 May 2009

⁴⁷ Ireland Central Statistics Office, 2010

outsourcing of functions such as internet merchant services. These activities form the core of what we have defined as the Internet cluster, as shown in **Figure F. Table 1** provides some examples of related and supporting industries.

Figure F: Ireland Internet Cluster Map



Source: Compiled from interviews and Capital IQ, Inc., a division of Standard & Poor's

Table 1: Examples of Supporting and Related Industry firms

Industry	Example Firm	Main Activities
IT Services	Sabeo Technologies, Limited	Customer support, consulting, and systems integration, and service and maintenance for IT systems.
Devices	Huawei Technologies Ireland, Netgear, and Dell Direct	Manufacture, wholesale, and retailing of digital devices and equipment
Hardware/Devices	Symantec Limited	Research, development, localization, packaging and distribution of software
Software	Dovetail Group, The Press Association of Ireland, Lionsbridge International	Digital content includes content generation firms like game producer and news agencies; translation and localization of software.

Human Capital Development	Ballycommon TeleWork and Training Centre Limited	Training in the working and operation of computers and software.
Supporting Services	The Westcon Group	Performs personnel recruitment and specialized training, digital marketing, and other business counseling

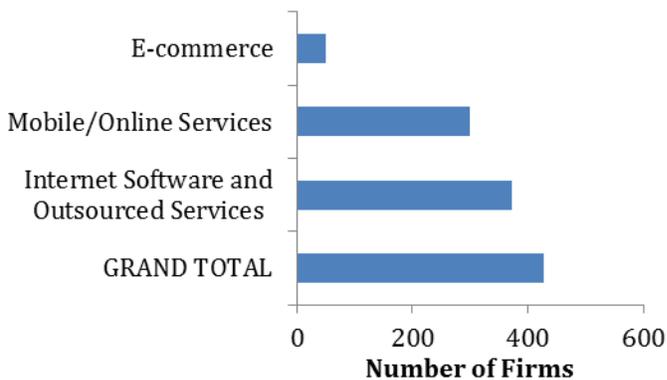
Cluster Profile

Figure G shows the number of firms in each of three main industries of the Ireland Internet cluster: online and mobile services, internet software and outsourced services, and electronic commerce. According to Capital IQ, this cluster comprises more than 400 firms. The largest firm in the cluster is Accenture, with about \$28.3 billion in annual revenues worldwide. In fact, large multinational firms such as Accenture, Google, Microsoft and Experian together reported more than \$50 billion in revenue in 2012, accounting for the lion's share of the cluster's total reported revenues.⁴⁸ Some firms are active in multiple industries; for instance, Google Ireland is active in several industries from internet software to applications to advertising. This means that the total number of firms in **Figure G** is smaller than the sum of the firm counts by industry. About 70% of firms in cluster are located in Dublin. Certain sectors, especially internet software and services, are quite young, with average firm age of 10 years.⁴⁹ The cluster's main industries are described below.

⁴⁸ Capital IQ, 2012

⁴⁹ *Ibid.*

Figure G: Ireland Internet Cluster, Number of Firms by Industry



Source: Compiled from Capital IQ, Inc., a division of Standard & Poor's

Electronic commerce. This is the least developed industry in the cluster, with only about 50 active firms. It includes firms like Shop Direct Ireland, which operates an online department store selling a broad range of products. It also includes digital advertising agencies.

Mobile and online services. This is a large industry with about 300 firms. Its online services work focuses on application hosting and application services. Other firms in mobile and online services focus on web hosting, personal applications, and internet service providers.

Internet software and outsourced services This is the most developed industry in the cluster, with 373 firms. It includes firms like Vordel Limited, a network management company that provides enterprise-level hardware and software products to enable enterprises to deploy services oriented architecture (SOA). It also includes firms like An Billpost Processing Services Limited, which provides payment, call center and data processing services. Other firms in this industry provide website infrastructure software and content management applications for website or mobile operators.⁵⁰

⁵⁰ Capital IQ, 2012

Performance and Current Trends

According to Capital IQ, revenues from the Ireland Internet cluster totaled \$60.8 billion in 2012. This is likely to be a conservative estimate, since many firms do not report revenues.⁵¹ As shown in **Figure G**, the Internet cluster is an economic engine with more than 400 firms. It is a subcluster of the Information and Communications Technology (ICT) sector, which comprises IT Services, hardware/devices, software, and digital content.⁵² The ICT cluster is responsible for approximately 25% of Ireland's total operating turnover.⁵³

The Internet cluster has not stopped growing, in spite of recent economic difficulties in Ireland. The 2008 crisis had little to do with Ireland's competitiveness strategy of innovation and export-led growth, but its effects on the financial sector impacted the Internet cluster nonetheless. On the other hand, government interest in telecommunications infrastructure has proven a boon to companies operating in this field. In 2012, the Ministry of Communications announced the Delivering a Connected Society Action Plan (DCSAP), which committed €175 million in public funding to developing Irish radio spectrum for more advanced mobile and Internet applications.⁵⁴ The associate multi-band 4G spectrum auction secured commitments to provide 4G services to at least 70% of the population from Telefonica, Vodafone, and 3 Ireland. Vodafone plans to be the first to debut its 4G services this fall.⁵⁵

Competing Clusters

Global interest in the ICT sector has created significant competition for Ireland's cluster. ICT exports from the UK, Germany, and India are direct competition for Ireland — together with

⁵¹ *Ibid.*

⁵² Rene et al., 2010

⁵³ ICT Ireland, *Sector Profile*

⁵⁴ Ministry of Communications, 2012

⁵⁵ O'Brien, 16 Nov 2012

Ireland, these clusters account for 44.5% of global ICT exports.⁵⁶ As cities located within the EU, Berlin and London represent a direct threat to the Irish ICT cluster. Bangalore is a more distant competitor, but was included because of its role as a global leader in ICT exports.

United Kingdom: Tech City. David Cameron's newly created Tech City Investment Organisation (TCIO) has worked in partnership with University College London (UCL) and Imperial College London to establish a technology business park in the heart of London. Flagship companies Cisco and Intel played an active role in the project, establishing European offices in the area. Ireland has a longer history in ICT, but the UK's larger economy means access to more financing and venture capital. In addition, its English-speaking worker base and geographic location make it a key competitor.⁵⁷

Germany: East Berlin. Over the last five years, East Berlin's Kreuzberg neighborhood has transformed into a burgeoning ICT scene. Bolstered by a pool of strong technical talent and Germany's economic progress in spite of crisis, the Kreuzberg cluster has been able to focus funding on ICT startups in particular. The East Berlin cluster competes directly with the Irish cluster because of its position as an 'entrepôt' to Europe and its host country's reputation as a base for technological innovation on the continent.⁵⁸

Bangalore: Silicon Plateau. Bangalore's tech cluster began as a base for low-cost software development for major tech MNCs Microsoft, Hewlett-Packard, and Oracle during the mid-80s and mid-90s. The Indian government's commitment to engineering education through the Indian Institutes of Technology helped establish a pool of engineering talent that makes the area an excellent low-cost outsourcing hub. Knowledge spillovers have led to the growth of major

⁵⁶ Institute for Strategy and Competitiveness, 2012: *International Cluster Competitiveness*

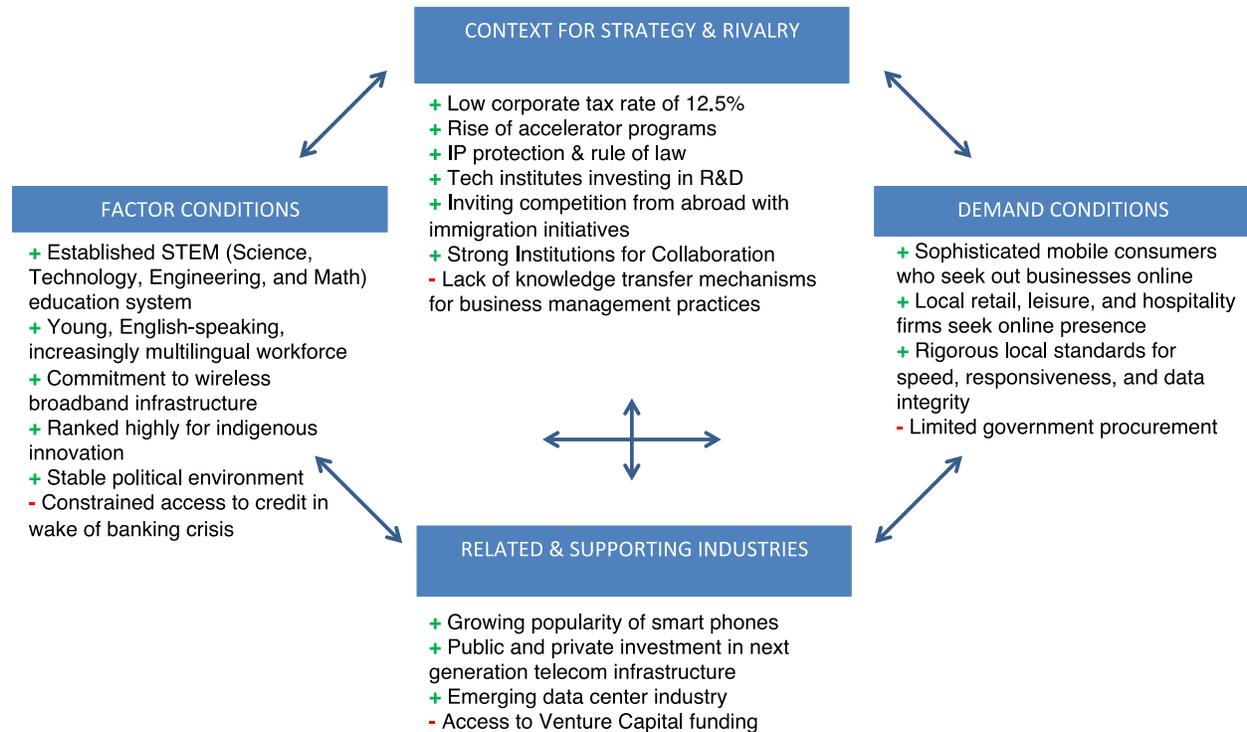
⁵⁷ Mumford, 10 Mar 2013

⁵⁸ Morgan, 15 Aug 2011

Indian-owned tech firms including Infosys, Wipro, and Tata Consultancy Services.⁵⁹ Although it is the most geographically distant cluster in our comparison, Bangalore is also the most well-developed and represents an important competitor for the Silicon Docks.

Competitiveness Assessment (Diamond Analysis)

Figure H: Internet Cluster Diamond



Factor Conditions

Ireland has several factor conditions that make local ICT businesses well positioned for success and attract foreign investment.

Well-educated technical workforce. Over the last decade, expenditures on education have focused particularly on the Science, Technology, Engineering, and Mathematics (STEM) fields, with the Institutes of Technology Ireland (IOTI) being major recipients.⁶⁰ This network of 14 technical universities traditionally focused on engineering and the applied sciences, but has

⁵⁹ Florida, 29 April 2012

⁶⁰ Higher Education Authority, 2012

begun to incorporate business and management courses into its curriculum to equip Irish engineering graduates with the skills needed to commercialize their innovations. Public-private partnerships are also becoming more common: Google and IDA Ireland recently joined forces to invest over \$340,000 in a Dublin-based center designed to engage younger students in computer science-related disciplines, one of 26 Google-sponsored STEM education initiatives worldwide.⁶¹

Multilingualism. Ireland's flexible immigration policy has produced a young, well-educated, and increasingly multilingual workforce. Polish is the third most commonly spoken language in the country, followed by French, German, and Spanish.⁶² During the 1990s, Internet MNCs established operations in Ireland in part because of its EU membership status and educated, English-speaking workforce. Today, Irish workers' main draw is their ability to communicate across several languages, enabling development of quality Internet services and applications in an increasingly globalized world.

Indigenous innovation. The Irish government focused on knowledge-intensive industries as a force for growth after the crisis, prompting greater investment in innovation in these sectors, particularly ICT. Public sector expenditures on ICT R&D historically lagged behind biosciences, but grew to lead the EU, reaching over 2% of GDP in 2008.⁶³ Renewed emphasis on indigenous innovation has corresponded with an increase in Irish patent filings, with the number of indigenous Irish patents filed with the US Patent and Trademark Office (USPTO) exceeding co-authored or foreign-authored Irish patents for the first time.⁶⁴

Demand Conditions

⁶¹ IDA Ireland, 2013

⁶² Malone, 31 Mar 2012

⁶³ Eurostat, 2010: *R&D expenditure (BERD) of businesses in ICT sector as % of total R&D expenditure*

⁶⁴ Eurostat, 2010: *Patent Ownership in Ireland (USPTO)*

ICT firms large and small are drawn to Ireland because it is a gateway to accessing the collective demand of the EMEA region. While this is the dominant demand condition for ICT in Ireland, it should be noted that local demand for ICT products is also sophisticated. Irish Internet businesses face two distinct kinds of local demand: those of end-customer (B2C), and those of businesses that are expanding their operations to include an Internet component (B2B).

The rise of mobile. Irish end-customers are notable compared to their other EU counterparts for several reasons. First, they have proven to be speedy adopters of smartphone technology. As of 2012, Ireland had one of the highest smartphone adoption rates in the EU. While most Irish smartphone users were only on their first smartphone, a Google's 2012 *Our Mobile Planet* report found phones to be rapidly assuming the same level of importance as computers — much more so than in other European countries. Irish consumers were also found to be more likely to use their phone to research product information and make purchases than consumers in France, the UK, or the United States. Finally, Irish smartphone users appear to experiment more with applications than users in other countries, with the average Irish smartphone owner reporting 5-10 more applications on their device than users in Germany or the UK.⁶⁵ It should be noted, however, that Irish Internet firms have not tapped into this latent demand: The average number of purchased applications lagged behind the EU average.⁶⁶

Local businesses. Irish businesses are also expanding into the online realm and developing sophisticated requirements for engaging their customers over the Internet as more consumers begin to interact with local enterprises using the web. In 2012, 89% of Irish smart phone users reported using mobile devices to look up local information, with 69% of users visiting the

⁶⁵ Google, 2012

⁶⁶ *Ibid.*

websites of local businesses before visiting their physical locations. End-consumers' tastes thus drive the needs of Irish businesses as well.⁶⁷

Increasingly rigorous local standards. Today, there is a significant disparity between urban and rural Internet speeds, with many rural Internet connections as slow as 1-2Mbps, while most Internet applications require download speeds of 15Mbps-20Mbps to function properly. The CSAP announced by the Ministry of Communications in 2012 will provide broadband Internet speeds of 70-100 Mbps to more than half of Irish citizens by 2015.⁶⁸ As network speeds increase, Irish users will demand faster, more responsive applications and services. Despite its commitment to increasing access to Internet applications for Irish residents, the government has not taken an active role as an early adopter of the Internet services it seeks to support.

Context for Strategy and Rivalry

As noted in the cluster profile, competition in the Irish internet cluster is characterized by two distinct company segments: A handful of large, foreign MNCs with internet-driven operations and a multitude of smaller start-ups. The cluster has a number of attributes that benefit both larger foreign MNCs and their smaller local counterparts.

A reputation for excellence. Foreign multinationals are drawn to Ireland by its low 12.5% tax rate and a tax system that is among the most transparent in the European Union. The resulting concentration of world-renowned Internet companies has prompted investment from other large Internet firms, boosting competition for large-scale enterprises. Smaller enterprises do not face the same levels of local competition imported from abroad.

Accelerators. Indigenous ICT SMEs are notably absent in the Irish Internet cluster. The Irish government has attempted to address some of the commercialization and scaling challenges

⁶⁷ Google, 2012

⁶⁸ Department of Communications, 2012

confronting startups by jointly financing IT accelerators with the private sector. The Competitive Start Fund (CSF) and New Frontiers Entrepreneur Development Program (both managed by Enterprise Ireland, CSF is in part self-funding) provide access to funding, facilities, and mentorship in exchange for a 10% equity stake in participating startups.⁶⁹ Privately funded accelerators, such as Spanish telecom Telefonica's Wayra Program, are also gaining popularity.⁷⁰

Strong IP protection. Ireland has invested heavily in intellectual property (IP) rights to ensure that ideas generated by entrepreneurs and corporations operating in Ireland are protected. The 2012 Global Intellectual Property Index ranked Ireland's IP protection standards as 7th out of 24 globally and 4th in the EU.⁷¹ Ireland scored particularly well on protection of domain names and enforcement of patents and trademarks. GIPI commended the Irish Commercial Court for its consistent, efficient treatment of complex IP disputes.

Supporting and Related Industries

Data Storage. Ireland's temperate climate translates into minimal cooling costs and has prompted data center investments of \$75 million from Google, \$630 million from Microsoft; and €100 million from UK data center leader TelecityGroup over the last five years.⁷² Today, Ireland has one of the highest per capita concentrations of data centers in the EU. According to the Data Center Map Project, Ireland boasts more colocation centers per capita (300,000 people per center) than any other EU competitor besides Estonia, including Germany (about 570,000 people per data center) and the Czech Republic (about 660,000 people per data center).⁷³ Colocation centers provide server space, cooling, and security services for Internet businesses on an as-needed basis. Fledgling internet and mobile enterprises benefit from such colocation centers

⁶⁹ Enterprise Ireland, 2013

⁷⁰ O'Brien, 12 May 2012

⁷¹ IDA Ireland, 2012

⁷² Mogg, 26 December 2012

⁷³ Data Center Map Project, 2012

because they enable them to store data without paying the high overhead costs of establishing their own data centers.

Telecommunications. Whether wireless or fixed, network infrastructure is a key supporting industry internal to this cluster. According to Ookla's Net Index, Ireland's telecoms have lagged behind the rest of the EU in network development: Irish household internet speeds today average 11.23Mbps, well below the EU average of 18.06Mbps. Irish fixed internet connectivity also falls below Germany and the Czech Republic on several quality indicators. Despite these slow speeds, Internet penetration in Ireland is on par with or greater than most EU countries, with 66.8% of adults online as of 2012.⁷⁴ Ireland's government plays an increasingly active role in telecommunications infrastructure, which is rapidly becoming a key supporting industry as consumers access the Internet using mobile devices.

Mobile devices. Mirroring global trends, mobile phone sales in Ireland actually fell over the last two years, while purchases of smart phones and tablets increased. In 2011, smartphone and tablet ownership among Irish residents increased by 9% and 8% respectively, while laptop ownership increased by 6%. Irish consumers use both iOS and Android operating systems, but prefer iPhones overall.⁷⁵

Venture capital. The venture capital industry has contributed over €800 million in funding to startups in Ireland through networks of angel investors, seed capital, and venture capital firms. This is promising, but is not sufficient to properly support and grow a capital-intensive cluster like ICT. In comparison, the US National Venture Capital Association (NVCA) reports that its members spent \$22 billion into nearly 2,749 companies in 2010. Industry-wide lack of funding is

⁷⁴ European Travel Commission, 2012

⁷⁵ Constanza, 2012; Google, 2012

coupled with declining interest in ICT in favor of the life sciences.⁷⁶ Mirroring overall EU investment trends⁷⁷, ICT has not recovered its prominent role in VC funding circles since the financial crisis.⁷⁸ The government has undertaken several initiatives to nurture ICT entrepreneurship in this challenging environment, including a recently announced 10-year, €175 million commitment to match VC funding in the sector.⁷⁹ Additionally, restoration of banks as the economy recovers should improve small business lending conditions.

Institutions for collaboration. Ireland has a large number of IFCs which provide different kinds of support to the cluster. Examples of such IFCs are depicted in **Table 2**. These IFCs are essential to the success of the cluster as they provide a platform for industry leaders in different fields, both within and outside Ireland, to communicate their needs and coordinate their activities to the betterment of the cluster as a whole.

Table 2: Institutions for Collaboration

Name of IFC	Industry	Description of Activities
Forfas	National-level advisory board for trade, enterprise, and innovation	<ul style="list-style-type: none"> • Coordinates the activities of other high-level government-sponsored initiatives, including IDA Ireland and Enterprise Ireland
IVCA – Ireland Venture Capital Association	Venture Capital	<ul style="list-style-type: none"> • Represents VCs across IR and N-IR. • Also provides business support services such as corporate finance houses, commercial and intellectual property law firms, accountants and other advisers experienced in the venture capital field.
ICT Ireland	ICT Industry	<ul style="list-style-type: none"> • Coordination and lobbying body for Irish firms in the ICT sector. • Key activities are influencing policy, improving markets and supply chains, providing information and helping members to grow their business.
F.ounders	Tech conference	<ul style="list-style-type: none"> • Invitation-only gathering of the founders of 150 of the world’s top tech companies.

⁷⁶ National Venture Capital Association, 2013

⁷⁷ Ernst & Young, 2011

⁷⁸ Kennedy, 6 Mar 2013

⁷⁹ *Ibid.*

		<ul style="list-style-type: none"> • Founders are allowed to socialize, network and discuss important topics in their fields.
IDA Ireland	Inbound investment promotion	<ul style="list-style-type: none"> • Privately funded, dedicated to attracting and developing foreign investment. Focus on the knowledge economy and related clusters. • Services include industry statistics and key business indicators, introductions for new arrivals and building industry-academia linkages.
Enterprise Ireland	Domestic export promotion	<ul style="list-style-type: none"> • Publicly funded, dedicated to making Irish business more competitive abroad. • Services include introductions to clients overseas, assistance with R&D partnerships, and access to "one stop shops" for entrepreneurs. Provide funding to entrepreneurs who want to investigate an idea in Ireland to develop a business plan.
IOTI – Institutes of Technology Ireland	Education	<ul style="list-style-type: none"> • Coordinating body for Ireland's 13 institutes of technology, which offer courses on business, engineering, and technology with strong ties to Enterprise Ireland. • From 2006-2010, 28% of IOTI funding went toward ICT research, including 15 on-site innovation and incubation centers which provide dedicated space, support, facilities and access to research expertise for up to 300 new and growing companies at any one time.

Source: Compilation research

Challenges / Recommendations

As Ireland continues on the path to becoming a world-class Internet cluster, it must confront some growing barriers that could lead to a slowdown in the sector. There are also a number of opportunities on the horizon that it could benefit from pursuing. Going forward, Ireland should seek to maintain its open markets and low-tax environment. **Table 3** provides a detailed suggested action plan based on our recommendations.

Skills gap. Even with Ireland's well developed STEM education system, there is still a strong perception of a skills gap within the industry. According to one estimate, Ireland has more than 5,000 open positions in the tech sector.⁸⁰ Ireland can address this shortage in two ways: (1) attract foreigners with the appropriate skillset and (2) train more Irish engineers. In the short-

⁸⁰ Make IT in Ireland, 2013

term, Ireland can address this skills gap by marketing positions throughout the EU and EEA. In the long-term, however, Irish schools and universities must find ways to improve and promote technology courses. Technology firms can assist with curriculum and scholarships for students, fellowships for researchers, and employment opportunities targeted at graduates.

Difficult financing environment. Ireland's financing environment is difficult. In order to compete with overseas clusters like those in Israel and Silicon Valley, it is essential to provide entrepreneurs and small businesses with adequate, patient capital. To this end a vibrant venture capital industry needs to be further developed.

Barriers to Knowledge Transfer. Irish professionals often lack expansive management and strategy competencies. This hurts the viability of startup ventures, because there is a lack of qualified managers that can scale an organization. Education programs need to better incorporate business curricula.

Demand Creation. Ireland has an opportunity to further stimulate the demand for its products and services by or expanding in new fields such as the ever-growing mobile market. The government can also play a major role by becoming a substantial and sophisticated client itself in building e-government services for the public.

Global Competition. In the face of growing global competition, Ireland can aim at targeting new territories to move away from the highly congested markets it competes in today. We believe that Asia, with its rising standard of living and increasing demand for Internet services, offers a lucrative opportunity.

Table 3: Suggested Action Plan for Recommendations

Challenge/ Opportunity	Suggested Action	Priority Level	Principal Actor	Time Horizon	Feasibility
Skills Gap	<ul style="list-style-type: none"> Invest in the quality and experience of STEM education in third level institutions. Build partnerships between universities and multinationals to sponsor academic opportunities and support workplace training through internships 	High	Universities & MNCs; through a focused IFC	Medium term	Challenging
	<ul style="list-style-type: none"> Establish Computer Science as a Leaving Certificate subject and establish promotional campaigns to encourage young people to develop interest in the profession. 	High	Department of Education	Short to medium term	Reasonable
	<ul style="list-style-type: none"> Incorporate academic incentives into secondary education, encourage students to enroll in existing STEM courses (e.g. offer bonus points in the Leaving Certificate). 	Low	Department of Education	Short term	High
Difficult Financing Environment	<ul style="list-style-type: none"> Create Government one-for-one matching fund on high risk start-ups to encourage venture capitalists to invest in Ireland. 	High	National Treasury Management Agency	Short term	Low due to public debt issues
	<ul style="list-style-type: none"> Establish Ten Year Tax Holiday for venture capitalists who invest in activities in Ireland. 	High	Department of Finance	Short term	High
	<ul style="list-style-type: none"> Expand focus of IDA to incorporate access to venture capital and commercial finance for domestic companies. 	Medium	IDA	Short term	High
Barriers to Knowledge Transfer	<ul style="list-style-type: none"> Establish programs in managerial rotations for recent graduates from Irish universities now working in the cluster. 	Medium-high	Partnership between MNCs and IDA	Medium term	Reasonable
	<ul style="list-style-type: none"> Establish funding for research and teaching in local universities on the subject of bringing start-ups to the next stage of development – working in partnership with existing start-ups. 	Medium	Department of Education, Universities, Institutes of Technology	Medium term	Reasonable
	<ul style="list-style-type: none"> Leverage IFCs and create public-private partnerships to increase networking opportunities and create mechanisms for transfer of management and leadership skills from MNCs to locals. 	Medium	IBEC and ICT Ireland	Short term	High
Demand Creation	<ul style="list-style-type: none"> Become a more sophisticated consumer of Internet products and services through e-government initiatives, fostering innovation by acting as a test bed for emerging technologies with applications in government (e.g., big data and analytics). 	Medium	Department of an Taoiseach	Medium to long term	Challenging
	<ul style="list-style-type: none"> Focus attention to the growing mobile sector, by developing services and applications targeting that market. 	Medium	MNCs and local businesses	Short to medium term	High
Global Competition	<ul style="list-style-type: none"> Add focus of marketing and country branding efforts on emerging Asian markets, where Ireland does not enjoy an 	High	IDA	Short term	High

	existing cultural relationship through its diaspora, to highlight success of its Internet cluster.				
	<ul style="list-style-type: none"> Initiate an International Entrepreneurial Fellowship Program, offering established entrepreneurs accommodation, stipends and administrative support in launching their firms. 	High	Forfas	Short-medium term	Reasonable

Exhibits

Exhibit 1: General Country Statistics

	Unit	2004	2005	2006	2007	2008	2009	2010	2011
Production and income									
GDP	Bln USD	187	203	224	260	264	223	205	217
GDP per capita	USD current PPPs	36 796	38 896	42 522	45 418	42 575	39 754	40 478	..
Gross national income (GNI) per capita	USD current PPPs	31 562	33 553	37 286	39 365	36 897	33 070	33 552	..
Household disposable income	Annual growth %	5.8	7.8	4.3	6.9	5.0	-2.0	-2.2	..
Economic growth									
Real GDP growth	Annual growth %	4.5	5.3	5.3	5.2	-3.0	-7.0	-0.4	0.7
Net saving rate in household disposable income	%	0.9	1.7	-0.9	-0.1	5.5	10.1	8.9	..
Gross fixed capital formation	% of GDP	9.5	14.7	4.4	2.3	-10.1	-28.8	-25.1	..
Government deficits and debt									
Government deficit	% of GDP	1.4	1.7	2.9	0.1	-7.3	-14.0	-31.2	-13.0
General government debt	% of GDP	32.5	32.4	28.6	28.7	49.6	71.2	91.7	..
General government revenues	% of GDP	34.9	35.4	37.2	36.7	35.5	34.8	35.6	35.7
General government expenditures	% of GDP	33.5	33.8	34.3	36.6	42.8	48.8	66.8	48.7
Trade									
Imports of goods and services	% of GDP	68.3	69.4	69.3	71.3	74.4	75.4	82.0	..
Exports of goods and services	% of GDP	83.2	81.1	78.9	80.2	83.4	90.9	101.1	..
Goods trade balance: exports minus imports of goods	Bln USD	42.0	39.7	32.2	35.3	42.2	54.3	57.8	62.3
Imports of goods	Bln USD	62.3	70.3	76.6	86.7	85.0	62.6	60.5	67.1
Exports of goods	Bln USD	104.3	110.0	108.8	122.0	127.1	116.9	118.3	129.3
Service trade balance: exports minus imports of services	Bln USD	-12.7	-11.6	-8.5	-1.5	-11.2	-9.6	-8.8	-2.5
Imports of services	Bln USD	65.4	71.5	80.2	94.6	110.6	103.5	107.2	115.8
Exports of services	Bln USD	52.7	59.9	71.6	93.0	99.3	93.9	98.4	113.3
Current account balance of payments	% of GDP	-0.5	-3.5	-3.5	-5.3	-5.7	-2.3	1.1	1.1
Unemployment									
Unemployment rate: total labour force	%	4.5	4.4	4.5	4.6	6.3	11.9	13.7	14.4

Source: OECD Factbook statistics; World Development Indicators

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