Guidance for Higher Education providers on current and future skills needs of enterprise

Springboard 2012

Forfás

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1. Current & Future Skills Needs – Executive Summary

The following is a summary of skills shortages identified in reports of the Expert Group on Future Skills Needs, which should provide guidance for providers tendering for higher education places for job seekers. ***Even though some reports date back as far as 2007, the skills demands identified still hold true, as confirmed in the annual EGFSN National Skills Bulletins***. Given the importance of international trade to future growth, there is an additional focus on the key skills required for exporting companies (both multinational and SMEs/ foreign owned and indigenous) across sectors. This is based on research undertaken with exporting companies in late 2011, which will underpin a forthcoming report by the Expert Group on Future Skills Needs on skills for enterprise to trade internationally.

EGFSN Report: Addressing High-Level ICT Skills Recruitment Needs: Research Findings (January 2012); EGFSN Report on Skills for Enterprise to Trade Internationally (Forthcoming)

Research findings indicate that the immediate skills recruitment difficulties being experienced mainly relate to:

- Computer Software Engineers: for the design and development of applications & systems: Specific skillsets required are;
  - Programming languages - Java, JavaScript, C#, C++, C+++, Visual Basic; .Net; SQL data base; Perl, Ruby, Python, Objective-C, Objective – Orientated Programming (OOP).
  - Knowledge of operating platforms – Windows, UNIX / Linux processing environment.
  - Web Development - understanding of Web 2.0 development technologies, XML, Microsoft ASP.Net (web application framework to build sites, applications and services), Personal Homepage Tools (PHP), Microsoft Sharepoint family of software products, HTML skills.
  - Cloud Computing - as a different commercial business model, project management, network skills, data centre experience with operating systems - Microsoft Windows Azure, CITRIX, IBM Tivoli, skills in products such as VMware and hyper-V.
- **ICT – Network specialists and engineers:** e.g. Server Message Block (SMB), wireless sensor testing, collaboration functions, process management, search modules and document management platform, router configuration and management, experience with scripting language Java, C, C+ and network configurations.
- **ICT – security experts:** Internet security and network security models and solutions - certified IT systems, architecture, engineering and management (e.g. Cisco information security systems), firewall configurations administration, authorisation mechanisms.
- **ICT Telecommunications:** Mobile software applications development and programming (.Net and Java have mobile modules as part of their certifications).
- **ICT – Project managers with technical background:** IT professionals with ability to define objectives, control processes and manage people in a new regulatory environment.
- **Sales and Marketing personnel with IT Technical Background and relevant industry knowledge:** To support business development; Oracle and SAP business applications and services and other software solutions for specific business solutions.

- **Personnel with foreign languages skills and ICT technical background**: To fill positions in IT technical support, accounting, marketing and business development; requirement for fluent oral and written French, German, Spanish, Dutch, Flemish and Swedish.

See section 3.1 for further detail. Link to report:

http://www.egfsn.ie/media/EGFSN31012012-Addressing-High-Level-ICT-Skills-Recruitment-Needs.pdf

Note, the ICT Action Plan 'Meeting the High Level Skills Needs of Enterprise in Ireland' recently launched by the Department of Education and Skills showed that current and medium-term recruitment difficulties experienced by companies mainly relate to ICT honours degree (computing/electronic engineering NFQ Level 8) and above – both for graduate entry level positions and particularly for ICT professionals with experience. In this context, the ICT conversion programmes outlined in the ICT Action Plan is the most appropriate short term response. Therefore, in assisting in addressing this demand, Springboard ICT programmes should primarily be for major awards at NFQ Levels 6&7 with a view to providing progression opportunities to full NFQ Level 8 awards in computing/electronic engineering. In addition, programmes should ideally have an identified enterprise partner or local need; and/or include a work placement component.

Link to ICT Action Plan: http://www.hea.ie/files/ICT_AP.pdf

Key Skills For Exporting ICT Companies

Sales, marketing and related linguistic and soft skills have been identified by companies as top skills needed for success in exporting. These are in addition to strategic planning skills which are required in the medium term. Companies report some difficulties in finding these skills. Key future skills needs, especially for indigenous ICT companies, for exporting are:

- Managers to have competencies in strategic export business planning, export sales planning, strategy, target market identification.
- Sales skills for business to business selling and business to Government selling.
- Key account management and channel management for international distribution.
- Customer service roles require engineers with linguistic and good communication skills
- Generally technical graduates lack soft skills in written and oral communications.

EGFSN report: Future Skills Needs of Enterprise within the Green Economy in Ireland (November 2010); EGFSN Report on Skills for Enterprise to Trade Internationally (Forthcoming)

Current and emerging skills demands in the following sub-sectors (see section 3.2 for full list and relevant NFQ levels).

- Renewable energy – e.g. power, hydraulic, marine engineers; IT systems; project managers; physicists
- Energy efficiency use and management – e.g. energy engineers; international sales; energy auditors; home energy consultants
- Water and Waste Water Treatment – e.g. process engineers; telemetry skills; hydrologists; laboratory technicians; polythene welders

- Waste Management and Recovery – e.g. anaerobic digestor operatives; logistics managers and planners; mechanical engineers, waste recycler trainers
- Environmental Consultancy – e.g. energy, environmental, electrical engineers; hydrology; product design;
- Green ICT Skills – e.g. business analysts; principal researchers; mathematicians; statisticians
- Cross disciplinary – e.g. organisation skills; personal skills; technical skills; core professional skills (business; engineering; sustainable building and design).

Link to report:
http://www.egfsn.ie/publication/egfsnSearch.jsp?ft=/publications/2010/title,7063,en.php

Key skills for Exporting Clean Tech Enterprises:

- International Project Management, strategic planning and entrepreneurial skills.
- Sales functions require foreign language(s) and key account management skills as well as managing stockist relationships.
- Foreign languages as well as market research are key skill requirements in the marketing function.
- Establishing and managing relationships for international selling, negotiations, communications are key skill requirements for channel management.
- Fulfilment key skill requirements are, logistics, distribution and product management.
- Foreign language and cultural awareness are requirements for customer service and support. (There is a limited pool of sales professionals with languages).
- Communication skills, foreign languages and cultural awareness along with entrepreneurial and technical product knowledge are generic skill requirements across occupational groups.

Key skills required specifically for exporting engineering firms are:

- Strategic export business planning, global partnership management along with communications and cultural awareness at management level.
- E business, global account management and cultural awareness for sales.
- International and online marketing, market research and positioning of the brand for the marketing function.
- Defining the role of the partners, managing the global partners as well as providing them with adequate support for fulfilment and channel management.
- Cultural awareness as well as project management for multi country locations for the customer service functions of the business.

EGFSN report: Future Skills Requirements of the Bio-Pharma -Pharmachem Sector (November 2010); EGFSN Report on Skills for Enterprise to Trade Internationally (Forthcoming)

- **Chemistry** – analytical chemistry; organic chemistry; crystallisation; formulation; generic/soft skills (e.g. problem solving; IT systems; informatics.
- **Biological sciences** – formulation; stem cell research; vaccine development
- **Pharmacology** – drug/body interaction
- **Bio-analytics and Bio-informatics** – standardised modules within undergraduate programmes
- **Cross-disciplinary** – compliance and regulatory affairs; continuous manufacturing; green technologies including lean manufacturing; business and management skills.

See section 3.3 for further detail.

Link to report:
http://www.egfsn.ie/publication/egfsnSearch.jsp?ft=/publications/2010/title,6968,en.php

Key Skills for Exporting Life Sciences Companies:

The top skill requirements to drive export performance have been strategic export business planning, sales, marketing and related skills. These same skills in addition to production and legal / intellectual property skills are also seen to be the key skill requirement for companies over the next 3 years.

Key future skills needs within companies for trading internationally include:

- Management competencies particularly require strategic planning and negotiation, quality and cost control skills
- Marketing functions require market research skills and country specific knowledge on regulations
- Sales competencies require skills in establishing and managing key accounts and distributor relations
- Customer Service and Fulfilment competencies require language, inter-culture competencies, logistics and customer service skills

EGFSN report: Future Skills Requirements of the Food and Beverages Sector (November 2009); EGFSN Report on Skills for Enterprise to Trade Internationally (Forthcoming)

Skills demand identified in:

- **Internationalisation** – sales; account management; regulation; brand management.
- **Innovation** – product and services innovation
- **Lean Manufacturing** (inc. Six Sigma)
- **Supply Chain Management**, need to include supply chain management on graduate programmes.
- **Commercial Acumen** - include financial / commercial modules on graduate programmes;

Develop commercial skills for the non-finance functions

See section 3.4 for further details.

Link to report:
http://www.egfsn.ie/publication/egfsnSearch.jsp?ft=/publications/2009/title,5016,en.php

Key skills for Exporting Food/Beverages Companies

Sales, marketing, foreign language and soft skills are the main skills to drive trade and export market performance in the years ahead. Foreign language skills that can be addressed through Springboard primarily require business language fluency mainly in European languages (French, German, Spanish, and Italian).

Key future skills needs by function within the companies are:

- Management skill requirements include strategy, effective communications
- Sales skill requirements include inter culture competencies, effective communicator, networking, knowledge of logistics, and competencies such as tenacity, ability to work on own initiative
- Channel Management need skills in selection, support of channel partner and ability to manage a network of agents.
- Marketing requires e-commerce and social media skills

EGFSN report: Future Skills and Research Needs of the International Financial Services Industry (December 2007)

Level 8

- Maths/Economics/Quantitative Modelling
- Accountancy with funds experience
- Risk Management
- Quantitative Financial Analysis
- Credit Analysis
- Hybrid technologists – business analysis with IT/systems skills

Level 6/7

- Business Development with detailed product knowledge/industry qualifications
- Middle management with financial services experience

See section 3.5 for further details.

Link to report: http://www.egfsn.ie/publications/2007/title,2515,en.php

EGFSN report: Future Skills Needs of the Irish Medical Devices Sector (February 2008); EGFSN Report on Skills for Enterprise to Trade Internationally (Forthcoming)

Engineers and Scientists (Level 8)

- Electronic Engineers
- Mechanical Engineering/Biomedical Engineering with strong practical engineering design skills
- Mechanical/Mechatronic and Production/Industrial/Manufacturing Engineers

Technicians and Trades (Level 6/7)

- General Level 6 or 7 Engineering or Science Courses
- Diagnostics - Level 6 or 7 Laboratory-based Courses
- Level 6 Biomedical Technician Courses

Medical Device Industry Skills (Management and Professionals)

- Regulatory Affairs Professionals
- Clinical Trials Management Professionals

See section 3.6 for further details.

Link to report: http://www.egfsn.ie/publications/2008/title,2514,en.php

Skills for exporting Medical Devices Companies:

The top skill requirements to drive export performance are largely the same as within the Biopharma sector and include strategic export business planning, sales, marketing and related skills. These same skills in addition to production and legal / intellectual property skills are also seen to be the key skill requirement for companies over the next 3 years.

Key future skills needs by function within companies are:

- Management require strategic planning and negotiation, quality and cost control skills
- Marketing requires market research and country specific knowledge on regulations
- Sales require skills in establishing and managing key account and distributor relations
- Customer Service and Fulfilment require language, inter-culture competencies, logistics and customer service skills

EGFSN report: Future Skills Needs of the Wholesale and Retail Sector (May 2010)

Need to ensure adequate provision in higher education in modules:

- **Business Leadership** – e.g. strategy; finance; brand management; small business management
- **Professional Disciplines** – e.g. category management; purchasing; Customer Relationship Management; supply chain technology; data mining; online marketing
- **Retail Operations** – e.g. customer service; marketing; stock control; selling
- **Cross disciplinary** – e.g. product expertise; lean improvement; application of retail and

distribution technology

- **Distribution centre and logistics** – e.g. back office and security operations
- **Personal skills** – e.g. technology; relationships; communication; personal effectiveness

See section 3.7 for further details

Link to report:
http://www.egfsn.ie/publication/egfsnSearch.jsp?ft=/publications/2010/title,6230,en.php

EGFSN Cross sectoral Enterprise/Soft Skills Needs

The following skills demands have emerged in EGFSN reports that are apparent across sectors. ***The main objective is not to address these demands individually but to embed them within programmes so that they can be practically applied and developed***.

- Management
- International Sales – Business to Business; Business to Government; Technical Selling; Foreign Language Fluency)
- Foreign language and cultural awareness - European languages, particularly business language fluency. It has been noted by employers that the level of fluency of those entering the workforce from third level is not generally of the required standard for international business.
- Skills for creativity, innovation and design
- Improving skills such as oral and written communication, project management, networking.

See section 4 for further detail.

Current Occupational Skills Shortages

Current skills shortages (or 'difficult to fill' vacancies) identified in the 2011 EGFSN National Skills Bulletin are primarily confined to highly skilled and experienced candidates in the following areas:

- ICT (e.g. Java, C# (C sharp))
- Engineering (e.g. power generation engineers)
- Management (e.g. project management)
- Science (e.g. chemists)
- Healthcare (e.g. medical practitioners)
- Sales (e.g. multilingual telesales)
- Finance (e.g. risk experts)

See section 5 for greater detail.

Link to report:
http://www.egfsn.ie/publication/egfsnSearch.jsp?ft=/publications/2011/title,8141,en.php

2. Introduction

The following information is a synthesis of recent Expert Group on Future Skills Needs reports, aimed at providing guidance for the 2012 Higher Education call for places for jobseekers. It covers specific skills demand (current and future) as reported by enterprises. The information covers:

- **Sectoral Skills Needs** – skills shortages identified in particular sectors (typically forecast over a 3-5 year period), based on various sectoral reports of the EGFSN (Section 3).
- **Enterprise/Generic Skills Needs** – skills deficits that are common across enterprises regardless of sectors (Section 4).
- **Current Occupational Skills Shortages** – the most recent information on vacancies reported by employers as 'difficult to fill' (Section 5).

Forfás believes that the optimal labour market outcomes for participants under Springboard 2012 will be delivered by:

- Ensuring programmes are **relevant to enterprise skills needs** as identified by the EGFSN, in conjunction with companies or through identifying a local or sectoral need.
- Ensuring there is **appropriate screening of candidates**, for example, that candidates are of sufficient calibre to manage the demands of the course or that candidates with significant previous experience in the sector could proceed by advanced entry to programmes (recognition of prior learning). In each case, the objective is that they will gain through enhanced specialism in addition to their existing qualifications and experience, making them more employable in the current labour market.
- Programmes should ideally seek to offer a **structured work placement** focussed on enhancing the **employability** of the graduate (particularly with regard to enterprise/generic skills (see section 4 for further detail).
- Where less than full awards are proposed, modules should focus on very specific skills requirements, ideally in conjunction with companies and aimed at a highly targeted cohort, for example, international sales training for unemployed business graduates.

3.1 Addressing High-Level ICT Skills Recruitment Needs: Research Findings (January 2012)

Current skills recruitment difficulties mainly relate to high-level ICT Honours Bachelor Degree (Level 8) and above. These difficulties result from a steep decline in the domestic supply of ICT graduates over recent years. Companies are sourcing approx 55% of their high-level ICT skills supply needs (for expansion and replacement needs) through inward migration, although with increasing difficulty, as these skills are also in high demand globally, for example, Germany currently has 400,000 unfilled vacancies in 'MINT' business areas, Maths, Informatics, Natural Sciences and Technology.

While the annual increase in the ICT sector employment (+4% for 2010) is modest, an increasing share of employment within the sector is being accounted for by people with high-level skills. This is a result of a shift in subsector employment from hardware towards software; a general shift in the skills mix; and a pattern of simultaneous creation and loss of jobs, resulting in lower-skilled jobs being replaced with higher-skilled ones. There is a resilient demand arising within the ICT sector due to:

- An expansion of the business operations of companies over the last year, inflow of foreign R&D investment and formation of new start-ups;
- Potential for foreign companies to win mobile investment from the parent company and the availability of high skilled personnel to enhance their business proposition;
- An increasing share of employment within the sector comprises staff with high-level skills, a result of a movement of business activity from hardware towards software services and an ongoing pattern of simultaneous job creation and loss.

Immediate skills demand is at (i) graduate-entry level; (ii) ICT professionals with 2-8 years experience; and (iii) ICT professionals with 8+ year's experience (while smaller in number, their recruitment is linked to the additional hiring of a team of graduate and professional staff).

This requirement varies across companies. It ranges from those looking only for level 8 graduate-entry staff, to those seeking a balance between new graduates and experienced personnel. There are some companies seeking only postgraduates (MSc and PhDs) and specialised personnel with several years experience, for example, software development architecture professionals with 15 years experience. On the other hand, discussions with companies indicate that they are continuing to fill a substantial number of managerial, professional, administrative and sales and marketing positions without too much difficulty, especially firms located in main commercial centres.

Specifically, research findings indicate that the immediate skills recruitment difficulties being experienced mainly relate to:

- Computer Software Engineers: for the design and development of applications & systems: Specific skillsets required are;
  - Programming languages - Java, JavaScript, C#, C++, C+++, Visual Basic; .Net; SQL data base; Perl, Ruby, Python, Objective-C, Objective – Orientated Programming (OOP).
  - Knowledge of operating platforms – Windows, UNIX / Linux processing environment.
  - Web Development - understanding of Web 2.0 development technologies, XML, Microsoft ASP.Net (web application framework to build sites, applications and services), Personal Homepage Tools (PHP), Microsoft Sharepoint family of software products, HTML skills.

  - Cloud Computing - as a different commercial business model, project management, network skills, data centre experience with operating systems - Microsoft Windows Azure, CITRIX, IBM Tivoli, skills in products such as VMware and hyper-V.
- **ICT – Network specialists and engineers:** e.g. Server Message Block (SMB), wireless sensor testing, collaboration functions, process management, search modules and document management platform, router configuration and management, experience with scripting language Java, C, C+ and network configurations.
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- **Personnel with foreign languages skills and ICT technical background**: To fill positions in IT technical support, accounting, marketing and business development; requirement for fluent oral and written French, German, Spanish, Dutch, Flemish and Swedish.

Emerging skills demands are around cloud computing, service design, database management, social networks and media, development of e-commerce applications and internet marketing.

Link to EGFSN report:

http://www.egfsn.ie/media/EGFSN31012012-Addressing-High-Level-ICT-Skills-Recruitment-Needs.pdf

Note, the ICT Action Plan 'Meeting the High Level Skills Needs of Enterprise in Ireland' recently launched by the Department of Education and Skills showed that current and medium-term recruitment difficulties experienced by companies mainly relate to ICT honours degree (computing/electronic engineering NFQ Level 8) and above - both for graduate entry level positions and particularly for ICT professionals with experience. In this context, the ICT conversion programmes outlined in the ICT Action Plan is the most appropriate short term response. Therefore, in assisting in addressing this demand, Springboard ICT programmes should primarily be for major awards at NFQ Levels 6&7 with a view to providing progression opportunities to full NFQ Level 8 awards in computing/electronic engineering. In addition, programmes should ideally have an identified enterprise partner or local need; and/or include a work placement component.

Link to ICT Action Plan: http://www.hea.ie/files/ICT_AP.pdf

Key Skills for Exporting ICT Companies

Sales, marketing and related soft skills have been identified by companies as top skills needed for success in exporting. These are in addition to strategic planning skills required in the medium term. Companies report some difficulties in finding these skills. Key future skills needs, especially for indigenous ICT companies, are:

- Managers to have competencies in strategic export business planning, export sales planning, strategy, target market identification.
- Sales skills for business to business selling and business to Government selling.
- Key account management and channel management for international distribution.
- Customer service need engineers with linguistic and good communication skills
- Generally technical graduates lack soft skills in written and oral communications.

3.2 Future Skills Needs within the Green Economy in Ireland (November 2010)

The main focus within initial education and training provision for this sector should be on the development of core business, engineering and ICT skills capability. Additional expertise in emerging areas such as wind, marine, solar, biomass, geothermal etc could best be acquired through the integrated provision of 'add-on' specialism modules within third and fourth year of undergraduate courses or through Master Degree/postgraduate diploma provision. Training programmes aimed at unemployed graduates should take account of the qualifications / competences individuals already possess and then provide upskilling in the specialism area required to obtain employment. Current skills demand and emerging skills needs of relevance for the call are:

3.2.1 Renewable Energies

Current Skill Demand by Work area

Occupation	Work Area
▪ Power Engineers (Level 8)	▪ HV Power System Design; Grid connection; Wind Power Generation.
▪ Electro Mechanical Technicians (Level 7)	▪ Operation and maintenance of renewable installations.
▪ Marine Engineers (Level 8)	▪ Cable laying, lifting and installing, use of equipment like sub-ploughs and knowledge of marine legislation.
▪ Hydraulic Engineers (Level 8)	▪ Concerned with the flow and conveyance of fluids
▪ IT Systems Developer (Level 8)	▪ Smart Metering, Smart Networking
▪ Project Managers (Level 8)	▪ Wind Energy.
▪ Mechanical Engineers (Level 8)	▪ Biomass/ Thermal Energy.
▪ Mechanical Engineering Technicians (Level 7)	▪ Operation and maintenance of biomass installations
▪ Physicists (Level 8)	▪ Analysis of wind movement.
▪ Systems Engineers (Level 8)	▪ Integrating systems comprising a range of technologies (mechanical, electrical, hydraulic, marine, instrumentation).
▪ Nano Systems Engineers (Level 8/9)	▪ Design, develop, the production of materials, devices, and systems of unique molecular composition.

Emerging Skills

Occupation	Work Area
▪ Wind Turbine Service Technicians (Level 7)	▪ Operation and maintenance of installed wind capacity
▪ Electro Mechanical Engineering Technicians (Level 7)	▪ Operation and maintenance of renewable technologies systems including biomass
▪ Smart Grid Technicians (Level 7) electrical technicians with enhanced ICT skills	▪ Providing consumers with access to more accurate data and knowledge about electricity pricing.
▪ Technicians and Skilled Workers (Levels 6/7)	▪ Installation and maintenance of charging points for electric cars

3.2.2 Energy Efficiency Use & Management

Current Skill Demand by Work area

Occupation	Work Area
▪ Energy Engineers (Level 8)	▪ Design of energy efficiency installations. Identifying energy usage and efficiency improvements. Advising customers on ways to save energy.
▪ International Sales (Level 7-8)	▪ Technical selling into international markets – with language skills.
▪ Architects (Level 8)	▪ Understanding of sustainability – energy efficient design and retrofitting of buildings. Understanding of overseas construction techniques & regulations -UK method of building assessment (BREEAM) and the USA method (LEED)

New and Emerging Skills

Occupation	Work Area
▪ Energy Auditors (Level 7)	▪ Assessing the scope for energy savings and the implementation of energy efficiency initiatives in the industrial and commercial sectors.
▪ Home Energy Consultants (Level 6)	▪ Assessment of energy efficiency in dwellings and liaison with householder to specify and implement measures to improve efficiency.
▪ Small Scale Installers & Technicians (Level 6)	▪ Installing and servicing small scale renewable technologies.

3.2.3 Water and Waste Water Treatment

Current Skill Demand by Work area

Occupation	Work Area
▪ Process Engineers (Level 8)	▪ For the design and construction of wastewater, water and sludge treatment plants – mechanical, electrical and instrumentation skills.
▪ Telemetry Skills (Level 7/8)	▪ Maintains telemetry lines and related systems as well as applicable instrumentation used by water and sewerage departments.
▪ Installers of Meters (Levels 6/7)	▪ Install, repair, and maintain regulating and controlling devices, such as electric meters, gas regulators, thermostats, safety and flow valves.
▪ Hydrologists (Level 8)	▪ Research the distribution, circulation, and physical properties of underground and surface waters.
▪ Geographic Information Systems (GIS) (Level 8)	▪ Presenting geological and hydrological data in three dimensions and transforming this into hard data to be imported into a computer model.
▪ Laboratory Technicians (Level 7)	▪ For the testing of water and waste water.
▪ Electrical and mechanical Technicians (Level 7)	▪ For the servicing and maintenance of treatment plants.
▪ Specifiers for water metering solutions (Level 8)	▪ Persons (staff and consultants for local authorities) with responsibility to specify contracts for metering and related services.

New and emerging skills

Occupation	Work Area
▪ Asset Manager of Water Meter Systems (Level 8)	▪ Following on from installation of domestic and commercial water meters, there will be a requirement to manage water assets.
▪ SCADA Engineer (Level 8)	▪ Evaluate, design, maintain and support highly technical and complex aspects of Process Control Network/SCADA communications and security as well as existing and proposed data and voice telecommunication systems.
▪ Plumbers (Level 6)	▪ Rainwater harvesting – diverting rainwater off roof to be used for toilet flushing, gardening and car cleaning.

3.2.4 Waste Management & Recovery

New and Emerging Skills

Occupation	Work Area
▪ Anaerobic Digestor Operatives (Electro Mechanical Technicians) (Level 6)	▪ Operation and maintenance of larger commercial anaerobic plants.
▪ Anaerobic Digestor Expert (Level 8)	▪ Support commercial anaerobic digestor farms as well as smaller (50 kw) farm based plants.
▪ Logistics Managers & Planners (Level 8)	▪ Including GPS route planning and logistics management to planning the safest, most cost efficient collection and delivery of waste.
▪ GPS route planners and logistics management (Level 7)	▪ For the efficient and safe collection, transfer and delivery of waste by road.
▪ Mechanical Electrical Engineer (Level 8)	▪ Managing all aspects of commercial biomass plants.

3.2.5 Environmental Consultancy

Current Skill Demand by Work area

Occupation	Work Area
▪ Energy Engineers (Level 8)	▪ UK method of building energy assessment (BREEAM) ▪ USA method of building assessment (LEED)
▪ Environmental Engineers (Level 8)	▪ Prevention, control, and remediation of environmental health hazards utilizing various engineering disciplines
▪ Electrical Engineers (Level 8)	▪ Consultancy in renewable energy (wind, tide and biogas)
▪ Modelling Design & Planning (Level 8)	▪ Relating to drainage and river basins, the grid and traffic management
▪ Hydrology (Level 8)	▪ Research the distribution, circulation, and physical properties of underground and surface waters.
▪ Product Design (Level 7/8)	▪ Recycling and Recovery.

3.2.6 'Green ICT' Skills

Current Skill Demand by Work area

Occupation	Work Area
▪ Business Analysts (Levels 8 & 9)	▪ Experienced in the solar, wind power, environmental business, smart buildings to work with software engineers
▪ Specialists in Water Management, Energy Management, Smart Grids, Transport (Levels 8 & 9)	▪ Specialists (Professional Engineers & Scientist) with cross over skills in Professional Business
▪ Product Manager-Mechanical Engineer with IT (Level 9)	▪ Product development and supporting infrastructure, hosting and managing for clients
▪ Mathematicians (Levels 8 & 9)	▪ Solutions to problems in various fields by mathematical methods
▪ Statistician (Level 9)	▪ Masters level to work as an analyst.
▪ High-End IT Disciplines	▪ Storage management products

3.2.7 Key Skills Set Requirements across Sector

Summary of cross-sector skills requirements	
▪ Organisation Skills	▪ Initiative/Adaptability; Project Management; Planning & Coordination; Decision Making; Applying theory in practice; Team working
▪ Personal Skills	▪ Entrepreneurship; Leadership; Critical thinking; Communications and Influencing; Foreign Languages; Team working; Creativity and Innovation
▪ Technical Skills	▪ Sales and Marketing; Commercial Awareness; ICT proficiency; Maths proficiency; Systems Knowledge; Finance; Health and Safety
▪ Core Professional Skills	▪ Business Skills – Finance/Business Development, Sales and Marketing ▪ High Level Engineering and ICT Skills – with 'add-on' specialism/expertise ▪ Sustainable Building – Eco-design and use of new materials and technologies
Occupational Groups – Summary of Emerging Skill Requirements	
▪ **Managers** – Leadership, corporate governance, access to finance / business planning , marketing skills particularly for export markets, entrepreneurial skills, Intellectual Property	

- **Engineers & Scientists**: core mechanical/electrical skills; commercial awareness & product knowledge; multi-skilling re knowledge of converging technologies; language skills (for exporting); software development; 'green chemists'.
- **Professionals** – project management; finance, environmental & regulatory skills; Geographic Information Skills; Sustainable buildings materials & standards; Carbon Monitoring & Accounting – understanding of carbon market.
- **Technicians** – mechanical-electrical skills for the operation & maintenance of renewableenergy generators (ocean and wind), high voltage IT skills, servicing and maintenance.
- **Supervisors** – IT Skills in new software and management of teams working in dispersed locations.
- **Marketing & Sales** –technical sales, language skills, knowledge of green public procurement opportunities; legal skills re procurement/contracts.
- **Skilled Trades** – multi-skilling re installation, operation & maintenance; integration of systems i.e. energy upgrading & retrofitting of buildings, electricians could be given specialist training in energy efficient lighting.
- **Operatives** – operation & maintenance skills; health and safety.

Link to report:
http://www.egfsn.ie/publication/egfsnSearch.jsp?ft=/publications/2010/title,7063,en.php

Skills for exporting enterprises in Clean Tech sector

The UK, Eurozone Middle East, Russia and Asian countries are the main current and expected future markets for these companies.

The main factors and skills that contributed to success in the export markets are in marketing (knowing customer requirements, developing products linked to requirements, defining value propositions and routes to market).

The highest ranked skills deemed necessary to drive exports are strategic planning, sales and marketing. These along with entrepreneurial and foreign language and communications are also considered to be the key skill requirements over the next 3 years.

Key skills for Exporting Clean Tech Enterprises:

- International Project Management, strategic planning and entrepreneurial skills.
- Sales functions require foreign language(s) and key account management skills as well as managing stockist relationships.
- Foreign languages as well as market research are key skill requirements in the marketing function.
- Establishing and managing relationships for international selling, negotiations, communications are key skill requirements for channel management.
- Fulfilment key skill requirements are, logistics, distribution and product management.
- Foreign language and cultural awareness are requirements for customer service and support. (There is a limited pool of sales professionals with languages).
- Communication skills, foreign languages and cultural awareness along with entrepreneurial

and technical product knowledge are generic skill requirements across occupational groups.

Key skills required specifically for exporting engineering firms are:

- Strategic export business planning, global partnership management along with communications and cultural awareness at management level.
- E business, global account management and cultural awareness for sales.
- International and online marketing, market research and positioning of the brand for the marketing function.
- Defining the role of the partners, managing the global partners as well as providing them with adequate support for fulfilment and channel management.
- Cultural awareness as well as project management for multi country locations for the customer service functions of the business.

3.3 Future Skills Requirements of the Bio-Pharma / Pharmachem Sector (November 2010)

The EGFSN Bio-pharma/Pharmachem report highlights that the main focus within initial education and training provision for this sector should be on the core disciplines, however, additional expertise could best be acquired through the integrated provision of 'add-on' specialism modules within undergraduate courses or through Master Degree/postgraduate diploma provision. The following table identifies the skills demand that need to be addressed in the sector.

Discipline	Skills Demands
Chemistry	Both undergraduate and postgraduate ▪ **Analytical Chemistry** – including process analytical technologies (PAT), chemometrics, quality by design (QBD), and impurity identification. ▪ **Organic Chemistry** – high level skills required to underpin process development including synthesis, mechanism, understanding impurity formation and how this can be avoided, and polymer chemistry. ▪ **Crystallisation** – solid state properties of pharmaceuticals. ▪ **Formulation** – critical that chemistry and chemical engineering graduates are familiar with formulation in an industrial context linking active pharmaceutical ingredients (API) and finished dosage form (FDF), and physical properties of APIs. ▪ **Problem solving competences, IT systems skills and informatics** are becoming increasingly important and will also need to be embedded into HEI programmes. ▪ **Undergraduate Chemistry programmes** - Modules in physical characterisation and method development, formulation, innovation methodologies and polymer chemistry. Industrial formulation; industrial pharmacy programmes. ▪ **Postgraduate Chemistry programmes** - Structured industrial programmes at Masters/Phd Level; CPD programmes (e.g. organic chemistry)
Biological Sciences	▪ Formulation, stem cell research and vaccine development are key areas and should be covered at some stage in the education process.
Pharmacology	▪ Drug/body interaction; 1st and 2nd Year electives in biology for chemistry students and in chemistry for biology students
Bio-analytics and Bioinformatics skills demand	▪ Bio-analytics and Bioinformatics modules should be embedded in undergraduate programmes – especially in drug design, DNA sequencing.
Cross-	Compliance and regulatory affairs ▪ **Postgraduate Compliance and Regulatory Affairs** – postgraduate modules and CPD

Disciplinary	programmes. Technical compliance expertise combined with leadership and influencing skills. Blended and converging skills ▪ Deep core knowledge with **soft skills** embedded in undergraduate and postgraduate programmes, in particular, team-working and communications. ▪ Postgraduate level programmes in **'Transition Skills' for process development** e.g. to enable engineers to become familiar with chemistry; or chemists to become more familiar with engineering. ▪ **Continuous Manufacturing Modules** (undergraduate engineering) ▪ **Green Technologies -** Include 'Lean Manufacturing' within green engineering programmes. Updated CPD programmes in green technologies. Business skills ▪ Business modules should be embedded in science, engineering and technology programmes focussed on Legal Tax and Finance Skills; Leadership and Entrepreneurship; Team working, Communications, Creativity; Problem Solving; Project Management; Lean Technologies and Six Sigma; Sales Marketing and Business Development; Intellectual Property Management; Information Technology. Link to report: http://www.egfsn.ie/publication/egfsnSearch.jsp?ft=/publications/2010/title,6968,en.php **Key Skills to Trade Internationally:** While English is the predominant language used throughout the sector, some companies have stated a need to increase Russian and Chinese language skills. Success in export markets to date has resulted from performing well in a range of business areas from R & D through to distribution. The top skill requirements to drive export performance have been strategic export business planning, sales, marketing and related skills. These same skills in addition to production and legal/intellectual property skills are also seen to be the key skill requirement for companies over the next 3 years. Key future skills needs within companies for trading internationally include: ▪ Management competencies particularly require strategic planning and negotiation, quality and cost control skills ▪ Marketing functions require market research skills and country specific knowledge on regulations ▪ Sales competencies require skills in establishing and managing key accounts and distributor relations Customer Service and Fulfilment competencies require language, inter-culture competencies, logistics and customer service skills

3.4 Future Skills Requirements of the Food and Beverages Sector (November 2009)

Skills for Internationalisation

The most important factors influencing success in export markets are marketing related (understanding customer needs, fulfilling this need, getting product to them on time and promotion etc).

Sales, marketing, foreign language and soft skills are the main skills identified as needed to drive trading and export market performance in the years ahead. Foreign language skills that are needed include European languages (German, French, Spanish, Italian, Portuguese) and Chinese.

Key future skills needs by function within the companies are:

- Management skill requirements include strategy, effective communications
- Sales skill requirements include inter culture competencies, effective communicator, networking, enumerative, knowledge of logistics, and competencies such as tenacity, ability to work on own initiative
- Channel Management need skills in selection, support of channel partner
- Marketing requires e-commerce and social media skills
- Managing a network of agents is a key skill requirement of channel management
- Customer service need order administration

Skills issues specific to multinationals in the food sectors are attracting and retaining high performers to the sector and specifically international sales talent management.

Innovation Skills

- Portfolio management – ability to evaluate and prioritise multiple projects
- Awareness/understanding of regulatory environment
- Industrial design (products/packaging/process)
- Commercial/business case assessment
- Ability to identify deep consumer market insights
- Focus on incremental/existing product development at third level

Skills for Lean Manufacturing

- Lean/World Class Manufacturing/Six Sigma with food sector experience
- Process diagnostics and control/super-skilled technicians/crafts

Skills for Supply Chain Management

- Bespoke SCM in-service programmes encompassing financial and performance management

- Supply Chain Management at undergraduate level

Financial and Commercial Acumen

- Financial, Commercial and IT expertise to deliver insightful, financial information across the operations.
- Finance modules at third level with a food industry slant

Leadership Skills

- Leadership, Entrepreneurship and Communication skills for the sector.

Link to report:
http://www.egfsn.ie/publication/egfsnSearch.jsp?ft=/publications/2009/title,5016,en.php

3.5 Future Skills and Research Needs of the International Financial Services Industry (December 2007)

Note, the ICT skills shortages described in section 3.1 also apply to the International Financial Services sector, which also has strong ICT requirements. In this context, measures to address ICT shortages also apply strongly to the Financial Services sector, aside from the specific financial shortages described below.

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Skill demand	Course topics/ contents	Course features (delivery, scale, etc)
Graduate level		
Maths/Economics/ Quantitative Modelling	General Mathematics and Economics degree programmes with a focus on higher level quantitative skills. Modules might include: ▪ Econometrics; ▪ Quantitative modelling in C++; ▪ Product development; ▪ Product modelling; ▪ Asset pricing; and ▪ Stochastic modelling.	▪ Degree programme ▪ Incorporating applied/case study elements from financial services ▪ Work experience
Accountancy with funds experience	Accounting courses with a focus on fund accounting (modular format)	▪ Degree programme with professional exams ▪ Incorporating applied/case study elements from funds servicing environments ▪ Work experience
Risk Management	General Risk Management courses with modules covering ▪ Risk management in financial institutions; ▪ International risk management; ▪ Risk modelling; ▪ Regulation; and ▪ Compliance. Reference course – BSc in Insurance and Risk Management offered by Penn State and BSc in Investment and Financial Risk Management offered by Cass.	▪ Degree programme ▪ Specialised modules incorporated to existing degree programmes ▪ Incorporating applied/case study elements from financial services ▪ Work experience

Skill demand	Course topics/ contents	Course features (delivery, scale, etc)
Quantitative financial analysis	Quantitative finance/ Mathematics courses with modules in the following areas: ▪ Technical skills in quantitative financial analysis; ▪ Quant asset management; ▪ Financial engineering; ▪ Quantitative strategic analysis; and ▪ Quantitative strategy implementation.	▪ Degree programme ▪ Specialised modules incorporated to existing degree programmes ▪ Incorporating applied/case study elements from financial services ▪ Work experience
Credit analysis	General Financial services degree programmes with modules in: ▪ Financial analysis technology; ▪ Scenario modelling; ▪ Credit analysis and rating interpretation; ▪ Company research; and ▪ Asset quality/ Forensic accounting.	▪ Degree programme ▪ Specialised modules incorporated to existing degree programmes ▪ Incorporating applied/case study elements from financial services ▪ Work experience
Hybrid technologists – business analysis with IT/systems skills	IT Courses with a specific focus on financial services, including: ▪ Applying IT to financial services; ▪ Financial products; ▪ Financial modelling; ▪ Product development; and ▪ Business systems analysis.	▪ Degree programme or 6 month/1 year graduate diploma programme/ conversion course to provide graduates from IT courses with basic financial services skills ▪ Classroom based
Business development with detailed product knowledge/ industry qualifications	Incorporation of financial services aspect into general Business/ Marketing courses: Topics might include: ▪ Introduction/ background to international financial services; ▪ Products, services and markets; and ▪ Financial products and markets.	▪ Certificate course/module providing business and marketing graduates with an understanding of financial products and instruments
Middle-management with financial services experience	Incorporation of following skills into financial services related courses:	▪ Certificate course/ conversion course providing a basic understanding of

Skill demand	Course topics/ contents	Course features (delivery, scale, etc)
	▪ General business skills; ▪ Marketing skills; ▪ Business development skills; and ▪ Effective communication skills.	financial products and instruments, the IFS sector and general management training

The full EGFSN report on International Financial Services skills requirements is available at:
http://www.skillsireland.ie/publication/egfsnSearch.jsp?ft=/publications/2007/title,2515,en.php

3.6 Future Skills Needs of the Irish Medical Devices Sector (February 2008)

Ireland is one of the leading global medical devices industry centres. Employment in the sector rose rapidly since the early 1990's. The sector is particularly focused on the manufacture of medical and surgical instruments and on surgical appliances and supplies. There is also a significant activity in the manufacture of ophthalmic goods and in diagnostic test kits.

Key Roles	Future Requirements
▪ Assemblers	▪ Low skilled. Numbers likely to fall steeply with automation, or eventually migration overseas.
▪ "Technicians" (sometimes "operators" at lower end) – wide range of types and levels of skill	▪ Numbers, and level of technical and team working skill required, to rise as automation increases
▪ Biological Scientists and/or chemists in bioconvergence areas	▪ Numbers to increase from very low level, as bio-convergence progresses
▪ Operations Managers & Supervisors	▪ To require more technical skill. Also people management skills required will change as work force moves to a higher level of skill and education.
▪ QC Staff	▪ Becoming more technically demanding as automation progresses and quality management improves. Numbers may fall significantly in some operations as inspection becomes more automated.
▪ Process Design Engineers	▪ Very small numbers in industry (or in consultancy operations) with sufficient skill. Critical area where significantly more are needed to drive effective automation.
▪ Validation Engineers	▪ To increasingly require engineering graduates rather than scientists. To become more intellectually challenging as automation makes processes more complex.
▪ Production Engineers & QA staff	▪ To become more intellectually challenging as automation makes processes more complex.
▪ Engineers (mechanical, biomedical, electronic, and a few materials engineers)	▪ Need more experienced development engineers. Need more new graduates who are strong in practical engineering design.
▪ Clinicians (mainly external)	▪ Need much greater engagement in innovation and commercialisation by Irish clinicians.

▪ Development Technicians (especially prototyping)	▪ Increasing need as development increases, but total numbers will still be quite small. Likely to come from a variety of educational backgrounds – craft as well as higher education.
▪ Clinical Trial Managers	▪ More innovation will require more people strong in design and management of clinical trials. Often come out of nursing in the US.
▪ Regulatory Affairs	▪ Need more now and in future
▪ Healthcare Economists	▪ Need to develop locally. In interim, may need contacts with US specialists for part of work.
▪ Specialist Legal, VC, …	▪ Need to develop locally. In interim, need contacts with US specialists for part of work.
▪ Sales Management & Sales	▪ Need to develop sales management skills. May need in-country experienced recruits rather than Irish sales people for start-ups.

The full EGFSN Medical Devices Report is available at:
http://www.skillsireland.ie/publication/egfsnSearch.jsp?ft=/publications/2008/title,2514,en.php

▪ Skills for Exporting Medical Devices Companies (from forthcoming EGFSN research on skills for enterprise to trade internationally.	The top skill requirements to drive export performance include strategic export business planning, sales, marketing and related skills. These same skills in addition to production and legal / intellectual property skills are also seen to be the key skill requirement for companies over the next 3 years. Key future skills needs by function within companies are: ▪ Management require strategic planning and negotiation, quality and cost control skills ▪ Marketing requires market research and country specific knowledge on regulations ▪ Sales require skills in establishing and managing key account and distributor relations ▪ Customer Service and Fulfilment require language, inter-culture competencies, logistics and customer service skills

3.7 Future Skills Requirements of the Wholesale and Retail Sector (May 2010)

Skills shortages unlikely out to 2016, however, Higher Education Institutes need to ensure there is adequate provision in modules such as:

- Category management
- Supply chain modelling
- Professional sourcing, purchasing and negotiation
- Geographic Information Systems (GIS) and Location Analysts
- Price sensitivity analysts
- Systems analysts with specialist knowledge of retail
- Customer loyalty/Relationship Management
- Retail, distribution centre and supply chain management
- Property management
- Business to Business Selling and Account Management
- Data mining
- Online Marketing
- Product Expertise
- People Development
- Lean/Quality improvement
- Communication
- Sales, Marketing, Brand Management
- SME Management
- Finance
- Leadership
- Business Strategy
- Security

See relevant NFQ levels by skill/qualification area in Draft Retail Skills Framework below.

Given current high unemployment, HEI tenders for Springboard places should employ a highly targeted approach to offering modules for unemployed people in wholesale/retail. Candidates should be specifically targeted (significant previous retail experience, particularly supervisory with modules to build on their expertise) and programmes in conjunction with employers should be prioritised.

Link to report:

http://www.skillsireland.com/publication/egfsnSearch.jsp?ft=/publications/2010/title,6230,en.php

Retail Skills Framework

	Level in National Framework of Qualifications	Level 6	Level 7	Level 8	Level 9	Level 10
		Management/ Supervision	Store Management	Management & Retail Professional	Corporate Leadership	Corporate Leadership
Business Leadership	Business Strategy			■	■	■
	Leadership	■	■	■	■	■
	Finance		■	■	■	■
	Brand Management	■	■	■	■	■
	Enterprise and Small Business Management	■	■	■	■	■
Professional Disciplines	Category Management	■	■	■	■	
	Supply Chain Management	■	■	■	■	
	Customer Loyalty / Relationship Management Systems	■	■	■	■	
	Sourcing & Purchasing	■	■	■	■	
	Retail, Distribution Centre and Supply Chain Technology	■	■	■	■	
	Property Management	■	■	■	■	
	Business-to-Business Selling and Account Management	■	■	■	■	
	Data Mining	■	■	■	■	
	Online Marketing	■	■	■	■	
Retail Operations	Customer Service	■	■	■		
	Payment / Point of Sale	■	■	■		
	Merchandising	■	■	■		
	Selling	■	■	■		
	Marketing	■	■	■	■	■
	Security	■	■	■	■	■
	Brand Consistency	■	■	■	■	■
	Retail Stock Control	■	■	■		
	Retail Back Office	■	■	■		
Cross-Cutting Competencies	Product Expertise	■	■	■	■	■
	People Development	■	■	■	■	■
	Lean / Quality / Improvement	■	■	■	■	■
	Application of Retail and Distribution Centre Technology	■	■	■	■	■
Distribution Centre and Logistics Operations	Warehouse Picking	■				
	Packing	■				
	Driving and Delivery	■				
	Distribution Centre Back Office	■	■	■		
	Security	■	■	■	■	■
Personal Skills	Technology User Skills	■	■	■	■	■
	Personal Effectiveness	■	■	■	■	■
	Communication	■	■	■	■	■
	Relationships	■	■	■	■	■

4. Cross-Enterprise Skills Needs

A number of areas of skills demand have emerged in EGFSN sectoral reports that are apparent across sectors, including: the need to improve: management skills; international sales skills; foreign language capabilities; skills for creativity, innovation and design and; improving generic skills such as oral and written communication skills, project management and team working. The main objective is not to address skills demands individually but to embed them within existing programmes so that they can be practically applied and developed.

4.1 Management Skills

In 2006, the EGFSN report *SME Management Development in Ireland* highlighted deficits across a range of management capabilities relative to competitors including general management such as HR, marketing and finance skills, strategic management skills such as inability to plan ahead, product management skills, and functional management skills (sales, training, marketing, supply chain management, IT and R&D. In 2010, the Management Development Council (MDC) found that improved management practice is closely correlated with a range of corporate performance metrics, including labour productivity, sales growth and return on capital employed. In particular, the MDC report had the following key findings:[1]

- McKinsey and Co. measured and benchmarked management practices in 5,600 manufacturing firms across 14 countries, including Ireland, which ranked 10th place. Ireland's underperformance partly relates to relatively poor target management, indicating that manufacturers have been slow to adopt many of the modern production techniques that have been applied with great success across industry and in other countries.
- Scores in Irish firms for people management are also below average. The implication is that while firms work hard to attract good people, they are far less effective at equipping their employees to deliver improved performance and at motivating them to do their best.
- A detailed examination of the criteria used in the survey to assess management highlights three particular areas where Irish firms need to improve their practice:
  - Defining the right metrics;
  - Reviewing these metrics; and
  - Addressing poor performance
- Many firms in Ireland have difficulties in defining a balanced set of financial and operational metrics necessary to align the shop floor with the corporate agenda. Some have difficulties at reviewing performance against these metrics, and firms are reluctant to take the necessary corrective actions to tackle poor performance.

Management skills are crucial for firms adapting their business offerings, or moving into new markets, as well as for firms striving to be innovative. The Management Development Council identified the following competencies as core characteristics of 'good managers'.

[1] Management Development Council (2010) Management Development in Ireland

Strategic Competencies

Strategic Competencies are associated with a manager's strategic capacity and the relationship with the company's external environment. These include:

- *Business vision* – identifying opportunities, and potential forces that impact on the company's performance;
- *Problem solving skills* - identifying the key features of a complex situation or problem and the ability to synthesize and make decisions;
- *Resource management* – use of the available resources in the fastest, most economic and most efficient manner to obtain the desired results;
- *Customer orientation* - responding promptly and effectively to customers' suggestions and needs;
- *Effective networking* - developing and maintaining a broad network of relationships with key individuals within the company and in the industry; and
- *Negotiation* - securing the support and agreement of key individuals and groups that can influence the particular area of responsibility.

Executive & Leadership Competencies

Executive and Leadership Competencies comprises the following basic competencies:

- *Communication* – effective, using both formal and informal procedures, and providing specific data to back up observations and conclusions;
- *Organization* – assigning objectives and tasks to the most suitable people, and monitoring task fulfilment;
- *Empathy* - paying attention to other people's concerns, and respecting their feelings;
- *Delegation* - ensuring that the members of the team have the decision making capacity and resources they need to meet their objectives;
- *Coaching* – helping collaborators to discover areas for improvement and to develop their skills and professional capabilities; and
- *Teamwork* - fostering an atmosphere of collaboration, communication and trust among the members of the team, and stimulates them towards the achievement of common goals.

Forthcoming research from the EGFSN on skills for enterprise to trade internationally indicates that specific management skills mostly required across different sectors include:

Key Management Skills by Sector	
ICT	HRM Negotiation Communication Key account management. Export sales planning Project management. Strategy

Life Sciences	Lean management skills Networking & relationship building Negotiation & communication Strategic export business planning Director of Technical Operations New Product Development
Engineering	Global partnership management Product innovation Cultural awareness Negotiation & communication Strategic export business planning Strategic business planning Sales, Marketing & operations management Knowledge of business opportunities Strategic thinking & planning Communications Entrepreneurship International Engineering Service Management
Clean Tech	International Project Management & technical issues Entrepreneurship Strong management to deal with stockists Strategic export business planning Contract management Strategic business development Strategic Planning Market intelligence Strategy Planning
International Services	Entrepreneurial Skills Identify & compete for opportunities & winning sales Project Management
Food	Ability to examine opportunities Creating real time to strategise Communicate strategies to all Working as a team

4.2 International Sales Skills

According to forthcoming research by the EGFSN on skills for international trade, the general view by companies on international sales is that recruitment and selection of sales people could benefit from psychometric testing to provide a personality profile. People with a certain personality profile are more likely to be more effective sales people than other personality profiles. The requirement to have technical product / service knowledge can be taught and also the sales person can be supported by technical employees at the company.

There is a lack of training provided on international sales in the education system. Much of the sales education and training that is provided relates to business to consumer and often fast moving consumer goods. This overlooks the skills required in sales for business to business, business to government and business to person.

Apart from the deficit of formal training in the education system, there is a general consensus that the role of salesperson is not held in high esteem notwithstanding the fact that it is key to every business. While it is accepted that every personality type will not be suited to sales, the general views by companies is that there is need to address sales in a modular way in business courses and thereby giving an option to students to focus on sales. Furthermore, a view has been expressed by companies that there is a need to provide a postgraduate qualification on sales (and with special reference to international sales) for graduates from technical disciplines and business graduates with no sales modules within their undergraduate programmes in order to align graduate skills with those required by industry. Customer awareness training and overall ethos of client focus needs to be developed across business courses in the colleges.

4.2 Foreign Language Skills and Cultural Awareness

The Enterprise Strategy Group report stressed the importance of greater understanding of international markets.[2] In this context the ability of Irish-based enterprises to communicate effectively with other nationalities and cultures can enhance their success. International business relationships are crucial to indigenous enterprise. Success in marketing and selling Irish goods and services are contingent on the ability of Irish enterprise to establish and maintain close relationships with customers in global markets. In addition, partnerships and collaborations with foreign enterprises are key drivers of innovation and growth. The importance of foreign languages and cultural awareness from a competitiveness perspective was set out in the EGFSN 2005 report *the Supply and Demand for Foreign Languages in the Enterprise* Sector and recently reiterated in the Royal Irish Academy's *National Language Strategy* (August 2011).

Language skills are complementary to other skills such as business, science, engineering and technology. The graduate with these combined skills is in increasing demand by employers. Owing mainly to historical factors, throughout the education system the provision of languages education is concentrated in a limited number of foreign languages. Forthcoming research by the EGFSN on skills for trading internationally indicates the following:

- The level of fluency attained by Irish students entering the workforce from college needs to be better aligned to meet the required standard for international business purposes.
- The range of languages taught needs to be expanded (over a 5 year period) to enable Irish companies to exploit what are and will continue to be some of the fastest developing markets in the world - Germany, China, India, Japan, Brazil, Russia and the Middle-East etc.

[2] Enterprise Strategy Group (2004) Ahead of the Curve – Ireland's Place in the Global Economy

- European languages will continue to be important, especially in the ICT, Life Sciences, Engineering, Cleantech and Food sectors.
- In the German Market as regards basic selling skills, apart from language, the products, services and solutions offered by Irish companies tend to be higher value add and are therefore more complex sales involving technical sales. While an introductory meeting can be in English, the need to switch to German comes quickly to achieve the technical sale.
- Languages for new and emerging markets (BRIC, Middle East) will be important, particularly in the International Education, Life Sciences, Engineering, Cleantech and International Education sectors.
- Foreign nationals will engage through the medium of English to a certain level but decisions on buying from a particular supplier can be enhanced where the buyer can communicate in their primary language.
- Internships overseas in countries where English is not the first language are highly useful to develop foreign language proficiency and cultural awareness.
- Those who are directly engaging with customers overseas need to have undertaken cultural awareness training. Cultural awareness must be factored in to business development planning of companies entering new markets. Language and cultural awareness modules in business and technical programmes are important to develop.
- Employees (sales, marketing, customer services, channel management, technical people engaged with customers) require training in the cultural awareness factors in target markets.

Given its focus, Springboard can have a direct impact mainly on developing proficiency in foreign languages, primarily European languages (French, German, Spanish, Italian) to a business proficiency level.

4.3 Skills for Creativity, Design and Innovation

The concepts of creativity, design and innovation as essential ingredients for economic success are well established and accepted. The 2010 EGFSN report on Skills for Creativity, Design and Innovation defined the terms creativity, design and innovation specifically in the enterprise context and demonstrates how their application has potential direct relevance across the full range of enterprise and occupational activities. [3]

Skills required for creativity, design and innovation, are needed in all industries and in all occupations. While there is some variation between occupations and across industries, some universal points emerge.

- Depth of skill and knowledge is important to creativity and innovation;
- Designing and building products and services to meet customer requirements is key. This means listening to the customer, being aware of country specific regulations and specifications, and

[3] **Creativity** is imagination applied to the purpose of creating economic value. Most creativity is about finding ways to combine existing ideas to do something new. **Design** is the process of moving from an initial creative idea to developing a new or changed product, service or process that can be brought to market or implemented internally within a business. An **innovation** is change that creates economic value. This is generally through creating a new or improved product or service; improving the way a business operates internally; or changing the way the business relates to the business system of which it forms a part to bring greater value to its customers.

ensuring that the R&D / product development process receives real time feedback on required improvements / adaptations

- Creativity relies heavily on finding new ways to combine existing ideas. In skills terms, this means that the capability to work well with people whose deep skills lie in other areas is critical;
- All other capabilities have to be underpinned by strong generic skills in areas including communication skills, team-working and problem solving; and
- Creativity and innovation are influenced heavily by the culture of the organisation, and how innovation is managed and led.

4.5 Other 'Soft' Skills

It would appear that virtually all sectors of industry are becoming more knowledge-intensive, in the very broad sense of the term. This involves a change in the types of skills required, with a rise in the importance of generic skills, including the ability of individuals to work more autonomously; be self-managing, work as part of flexible teams, adapt to change, solve complex problems, think creatively and engage with innovation as a continuous process.

What is encompassed within individual generic skills has also been expanding in scope. Thus, what was seen as the 'specialist' skill of IT just 10-15 years ago is now regarded as a 'basic' skill, essential for a great proportion of jobs and occupations, although the level and complexity of actual skill utilised will vary substantially across and even within occupations.

Based on the national and international academic evidence available, the Expert Group has identified the key and most widely shared elements that should be included in a generic skills portfolio as:

- People-related skills — such as communication, interpersonal, team-working, customer-service skills; and
- Conceptual/thinking skills — such as collecting and organising information, problem-solving, planning and organising, learning-to-learn skills, innovation and creative skills.

The need to improve soft and generic skills has emerged consistently throughout EGFSN reports, for example, the Wholesale and Retail Sector; the Green Economy; for engineering and science graduates in the Bio-pharma and Pharmachem sectors; the Food and Beverages Report and within the ICT sector. These skills are required by enterprises in addition to core specialisms and expertise (for example science, engineering, technology) and should be embedded in programmes. The key issues around soft skills for trading internationally include:

- Networking, establishing and maintaining relationships and communications (oral and written) are key parts of increasing the performance in exports sales. This is particularly true of BRIC and Middle-East countries where business discussions often only commence after relationships have been established. This takes substantial time and resource investment by the company.
- The level of competency attained by Irish students entering the workforce from college – in terms of working in teams to solve problems, developing products, and innovation could be enhanced to improve their employability.

- There is a requirement and particularly in large companies for international project management and product management skills.
- There is a need to train employees (in sales, marketing, customer services, channel management, technical people engaged with customers roles) in communications (particularly oral, effective presentations and particularly for communicating with businesses/customers in foreign countries, clear diction, avoiding use of colloquialisms, slow down pace of speaking) when speaking in person or virtual.
- Train employees (sales, marketing, customer services, channel management, technical people engaged with customers) in communications (particularly written in respect of punctuation, grammar, report writing, clear and concise).
- Re emphasise the need for increased competency of written and oral communications with education providers and particularly for business and technical disciplines.
- Continue to resource Skillnets to provide training for those in employment in soft skills such as communications, international project management, and cultural awareness factors.
- Reduce the level of rote learning in the education system and maximise problem solving and entrepreneurship skills.

5. Current occupational skills shortages identified in the EGFSN *National Skills Bulletin 2011*

Skills shortages are identified annually through the Skills and Labour Market Research Unit (SLMRU) Recruitment Agency Survey, which reports on posts or occupations that are 'difficult to fill' for employers. The skill shortages identified in the National Skills Bulletin 2011 relate to a small number of posts and are confined to:

- specialists within an occupation (e.g. electrical engineers with an expertise in high voltage grids)
- senior positions (e.g. senior software developer)
- niche areas (e.g. telesales with Nordic languages)
- a specific skill mix (e.g. ICT and business).

The information presented here should be read in conjunction with the sectoral information on future skills needs presented earlier.

5.1 Science Occupations

Data from the 2011 National Skills Bulletin points to shortages of chemists in product development, chemical scientists (e.g. analytical chemists, formulation, process chemists, regulation experts, quality control, food chemists) biological analysts, medical scientists and nutritionists (particularly agricultural). There are a number of factors expected to positively impact on the demand for science skills:

- The expected strong performance of the high technology manufacturing sector, primarily medical devices and pharmaceuticals; despite the economic crisis, employment in the manufacturing of basic pharmaceutical products increased by 6,000 between quarter 4 2009 and quarter 4 2010.
- Job creation is expected in the coming years for scientists in a number of areas including pharmacokinetics, pharmacodynamics and pharmacogenomics.
- Moves towards higher value added activities within the high technology manufacturing sectors; between quarter 4 2009 and quarter 4 2010 alone, the share of operatives in the manufacturing of basic pharmaceutical products (NACE 21) declined by 5 percentage points to 22%, while the share of professionals and technicians (super-operatives) increased by 2 and 3 percentage points respectively.
- The Government's on-going investments in science, technology and innovation (e.g. Science Foundation Ireland and the IDA) are expected to facilitate further job creation in high technology activities such as biotechnology (Bio), ICT, and sustainable energy and energy-efficient technologies; during 2010, the IDA announced a significant number of jobs in research in the pharmaceutical, medical devices and other sectors, to be rolled out over the coming years; by hosting the EuroScience Open Forum, Dublin will be the City of Science 2012 and will facilitate an international dialogue on the latest advances in science and technology, further enhancing Ireland's reputation as a scientific hub.
- Technological advances and the green agenda are expected to drive demand for interdisciplinary teams which bring together science, ICT, engineering and other skills to be deployed in the area of renewable energy, environmental protection, healthcare, bio-convergence etc.

- The increase in demand for healthcare and healthcare products is also expected to be driven by the aging population, greater expectations and a higher awareness of health issues.

5.2 Engineering Occupations

The following engineering skills have been reported as difficult to source: chemical (process safety), design (electrical electronics, mechanical, process development, product development, industrial design) and development (biopharmaceuticals, chemical, validation, regulation.), electrical (power generation, high voltage, wind, high tension power), electronic (printed circuit board (PCB) microchip), planning and quality control (standards compliance, validation, e.g medical devices, pharmaceutical and automation engineers with FDA experience or IT Skills such as SAP/EBR/MES), mechanical (renewable energy) and production (process automation and Six Sigma).

The demand for engineering skills is expected to be driven by a number of factors:

- The strong performance of the high technology manufacturing sector is expected to continue to drive the economy out of recession with engineering skills being one of the key enablers of this growth. For example, a significant number of jobs for engineering skills in the areas of transport equipment manufacturing, medical devices and electronic equipment, machinery and equipment manufacturing, the manufacture of rubber and plastic, spanning managerial, professional, technician and craft (e.g. metal working production and maintenance fitters) levels have been announced by the IDA.
- Global competition and the need to reduce the costs of manufacturing through process automation, the implementation of lean manufacturing and Six Sigma principles, increased efficiencies, and material, product and process innovation, will drive job creation in high level engineering skills.
- Changes in the regulatory environment are expected to enhance the demand for engineers with expertise in regulatory standards (e.g. safety), quality control and validation.
- Rising concerns about the sustainability of energy supply is driving investment in improvements in the generation, transmission and efficiency of energy production, and the rise of renewable energy technologies are expected to impact positively on the demand for engineering skills (mechanical, electrical, electronic etc.). In particular, engineering skills are expected to be needed for the installation, servicing and maintenance of renewable energy installations; the development of international interconnector and a national grid connection system that is capable of incorporating a range of small-scale renewable power supplies; the development and installation of smart network technologies including smart metering etc.

5.3 ICT Professional Occupations

Along with engineering skills, IT skills were the most frequently mentioned as difficult to source by recruitment agencies.

Job titles in short supply include:

- senior software applications developers (Java, C++, C#, VB, Ruby, Perl, Python)
- network and security experts (.net, SharePoint, encryption, cloud computing, virtualisation (VMware))
- system administrators (Oracle, J2EE, SQL Server)

- web developers (PHP, JavaScript, XML, HTML, Flex, ColdFusion)
- business analysts
- IT project managers.

Job creation is expected to be sustained as the greatest number of jobs announced by the IDA is in ICT. Jobs are expected to span managerial, professional and technician levels, with a significant majority in software development.

The demand for IT skills is expected to be driven by the following factors:

- Harnessing ICT is expected to feature prominently in businesses' efforts to reduce costs and improve efficiencies through innovation in business processes. This is expected to further expand the use of SaaS (software as a service) and cloud computing platforms.
- Increased use of the internet for marketing, advertising, sales, networking, communication (blogs and social networks) and recruitment purposes throughout the economy.

5.4 Business and Financial Occupations

Despite significant job losses and job loss announcements, high level financial skills in the areas of risk analysis, management and cost accounting, actuary, compliance and regulatory standards (domestic, EU (e.g. MiFID, Solvency II) and global (e.g. Basel II)) and financial analysis skills are in short supply. Financial experts with proficiency in financial software packages (e.g. SUMMIT and SAP) are particularly difficult to source.

International financial services activities have held up well during the recession in terms of employment levels. Further job creation is expected in the medium-term driven, in part, by projects announced by the IDA in 2010. These jobs include financial management, accounting, hedge fund, risk, compliance and financial analysis positions.

Demand for high level financial skills is expected to be driven by the global recovery, reform of the banking system, product innovation, changes in the regulatory environment and attitudes to risk.

5.5 Healthcare Occupations

Employment opportunities in the public healthcare sector are heavily influenced by current pressures on public expenditure. Nonetheless, shortages of the following skills persist:

- Medical practitioners (general practitioners and non -consultant hospital doctors (Senior House Officer grade)); 300 non-EEA doctors were issued new employment permits in 2010.
- Specialist nurses (theatre, intensive care, dialysis, geriatric and midwives); just under 150 non-EEA nurses were issued new employment permits in 2010.
- Medical radiographers (CT and MRI).
- Senior therapists (including speech and language therapists); 24 employment permits were issued to non-EEA therapists in 2010.

5.6 Transport and Logistics Occupations

Multilingual international supply chain managers with forecasting, planning and scheduling skills have been mentioned as difficult to source.

Supply chain management skills are required across many sectors, with a significant demand coming from the bio-pharma chemical and medical devices manufacturing sectors.

5.7 Sales Occupations

The following sales and marketing skills have been identified as in short supply:

- experienced marketing managers; over 50 new employment permits were issued to non-EEA persons with high level marketing skills; as the use of on-line marketing increases, IT skills (e.g. pay per click marketing, search engine optimisation, social media, data retrieval and analysis etc.) are becoming an integral part of the marketing skills set along with traditional marketing and business development skills (market research, client relationship, design, creativity, innovation)
- technical sales representatives with specific industry (e.g. medical devices, pharmaceuticals, food, etc.), product and market knowledge and proficiency in foreign languages.
- multilingual telesales (particularly with German and Nordic languages), customer care and customer support staff.

Further growth is expected as over 2,500 jobs announced by IDA client companies in 2010 are rolled out over the medium term. Marketing and business development positions are mostly in the IT, manufacturing (e.g. medical devices and pharmaceuticals) and financial sectors, while sales and technical support roles are mostly in the IT sector.

5.8 Social and Care Occupations

Clinical psychologists have been mentioned by recruitment agencies as difficult to source.

5.9 Quantitative Estimates of Skills Shortages

In assessing skills shortages, the SLMRU also provided some tentative estimates as to numbers concerned in current skills shortages.

Note: Shortage estimates are highly tentative; they are based primarily on the estimated excess demand expressed through difficult to fill vacancies and without a detailed analysis of the supply side.

Shortage	Shortage specifics	Tentative magnitude estimates*
Software developer/web developer	Senior level E.g. Java, C++, C#, VB, Ruby, Perl, Python, PHP, JavaScript, XML, HTML, Flex, ColdFusion), etc.	800
Network and security expert	E.g. SharePoint, encryption, cloud computing, virtualisation (VMware) etc.	200
ICT telecommunications	Mobile software applications development and programming	200

ICT Project manager		150
Scientists	Medical scientists	<50
Nutritionists		<20
Technicians	Laboratory technicians in product development and prototyping	<50
Chemists	Product development in pharmaceutical, food etc. sectors.	<50
Biologists		<50
Chemical	Pharmaceutical, food sectors Process safety	<50
Design and development	Pharmaceuticals, medical devices, food etc.	<50
Electrical	Power generation (including renewable energy) High voltage	<50
Electronic	Printed circuit board (PBC), microchip	<50
Mechanical	Renewable energy	<50
Production	Process automation design Process diagnostics Lean manufacturing/Six sigma principles	<50
Planning and quality control	Standards compliance Validation	<50
Marketing managers	Multilingual, product knowledge and experience in foreign markets	150+
Technical sales representatives	Technical sales (e.g. medical devices, bio-pharma, food, IT etc.)	200+
Telesales	Multilingual (e.g. Nordic, German etc.) telesales for various sectors (e.g. ICT, financial etc.)	100+
Customer support	Multilingual (e.g. Nordic, German etc.) for various sectors (e.g. ICT sector, on-line commerce etc.)	100+
Medical practitioner	General practitioners Non-consultant hospital doctors (Senior House Officer and Register grades) Specialist doctors	100+
Nurse	Advanced level Theatre Intensive care Geriatric	DOH decision

	Midwives Renal	
Radiographer	E.g. CT, MRI etc.	<50
Therapist	Senior level E.g. Speech and language	<50
Clinical psychologist		<20
Accountants	Chartered management and cost accounting	<50
Compliance expert	Regulation (e.g. MiFID, Solvency II, Basel II)	<50
Risk expert	Market, product and operational	<50
Hybrid Specialist	Finance + IT (e.g. SAP, SUMMIT etc.)	
Butcher	Meet cutters and de-boners for food Employers etc.	<50
Supply chain manager	Multilingual international supply chain management	<50
Clerk	Multilingual (e.g. debt collecting, transfer agency, accounts)	50+

Notes