

# A report on e-Competence Frameworks

For the Malta Information Technology Agency MITA

As part of Contract C088/10



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## About this Study

This study was commissioned by the Malta Information Technology Agency (MITA) to collect data on the various e-competence frameworks in Europe. The study is intended to will help Government to make an informed decision on the eventual drafting of a Maltese e-Competence Framework. Such a Framework will aim to provide a working tool for all players involved in ICT business: ICT practitioners will be provided with clear guidelines to develop their competences in accordance with their position and progression; ICT managers will be able to anticipate and plan competence needs in accordance with their specific company development and recruitment policies; and higher education, vocational training and certification providers will be able to use this practical industry-based supporting tool to help design curricula that meet the needs of industry.

## Disclaimer

The views expressed in this report are those of the authors, and do not necessarily reflect those of the Malta Information Technology Agency, or of the Government of Malta. Neither the Malta Information Technology Agency, or any person acting on behalf of the agency, is responsible for the information provided in this document.

## About the Consortium

### Knowledge Innovation Centre (Malta)

The Knowledge Innovation Centre (Malta), is a dynamic consultancy focusing on knowledge brokerage and innovation of knowledge transfer processes. The Centre brings together a variety of local and European experts from a variety of fields, and has worked extensively within Quality Assurance of Higher Education, Technology Enhanced Learning, Student Services and knowledge economy (as it relates to the Lisbon Agenda and Barcelona Process). The Centre has forged close relationships with a number of stakeholders in the regional innovation and Higher Education fields, and is active in leveraging such relationships to build multi-disciplinary, multi-country networks for knowledge transfer and capitalisation.

### MENON Network EEIG

MENON is a European innovation and research network, established in Brussels since 1999. It provides information and advice to policy makers and authorities, education communities, and the ICT and media industry on issues that have to do with Education, Training, Lifelong Learning and Knowledge Society Development in Europe and worldwide. MENON provides the necessary insight to all the stakeholders of Education and Training in Europe to better understand the ICT market for education and training and the prevailing changes, to enhance a value-oriented and innovative the use of e-learning, and to develop useful e-learning applications and services of better quality.

The members of the Menon EEIG Network are the following: Lambrakis Research Foundation (Greece), FIM-New Learning, University of Erlangen-Nürnberg (Germany), SCIENTER (Italy), Tavistock Institute (UK) and Helsinki University of Technology, Lifelong Learning Institute Dipoli (Finland), Research Centre of People and Culture in Portuguese Expressions Catholic University of Portugal (Portugal).

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### MALTA

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In addition, the eskills contact points in several countries assisted us with the European aspect of the research. Here we would like to thank [insert list of people from which we received emails].

The Knowledge Innovation Centre (Malta) and MENON Network EEIG would like to thank the staff of the Malta Information Technology Agency, particularly Ms. Daniela Busuttill [anyone else?] for their continuous support.

The responsibility for the content lies exclusively with the study authors.

***Objective: Research E-Competence Frameworks in Europe, in a Maltese Perspective***

This study was commissioned by the Malta Information Technology Agency (MITA) to collect data on the various e-competence frameworks in Europe. The study is intended to help Government make an informed decision on the eventual drafting of a Maltese e-Competence Framework. This process included:

- Identifying all national e-competence frameworks in Europe through desk research and surveying of e-skills national contact points throughout Europe
- Presenting usability options for each of the identified frameworks
- Examining and identifying a lexicon of terminology used in the field, in light of the learning outcomes approach
- Analysing how industry and education classify job / qualification profiles for certification, recruitment, and promotion purposes.

The focus of the study was specifically on 'ICT Practitioner Skills' rather than 'ICT User Skills', i.e. it focused on the comprehensive skill set required for professionals in the ICT sector to successfully conduct their daily jobs to the highest degrees of excellence.

***Competence defined as a set of knowledge, skills and attitudes***

While a number of different specific formulations exist, as a rule, competences are defined in terms of knowledge, skills and attitudes. Generally speaking, knowledge is defined in terms of cognitive competence (tacit, technical, procedural and contextual knowledge), skill is defined in terms of functional competence (i.e. occupation-specific abilities including integration with the organisational process, cerebral and psychomotor abilities. Attitudes (which are often also referred to rather confusingly as 'competence'), include personal/behavioural competences as well as values / ethical competences.

While the European e-Competence Framework uses the specific knowledge / skills / attitudes formulation, all competence frameworks, as well as qualification frameworks such as the EQF, and the various other frameworks mapped to it, show an adaptation of this concept.

***The European e-Skills landscape is extremely uneven***

Analysis of e-skills actions throughout Europe shows a remarkable variation in the level, scope and intensity of activity with regards to e-skills promotion. In fact, a number of comparative studies have shown that the majority of EU-member states would not even achieve a passing grade on a notional e-skills activity index.

Furthermore, it is clear that policies focusing on ICT Practitioner skills are even rarer, with most countries focusing their e-skills activities on digital literacy, or on ICT User skills. In addition, a significant number of countries choose not to make a distinction between 'e-skills' and their vocational education policies, effectively removing ICT Practitioner Skills as a policy field altogether.

In terms of intensity, it should be noted that intensity is often higher amongst countries which perceive large skill gaps, than amongst countries who already are meeting the skill demands of enterprise.

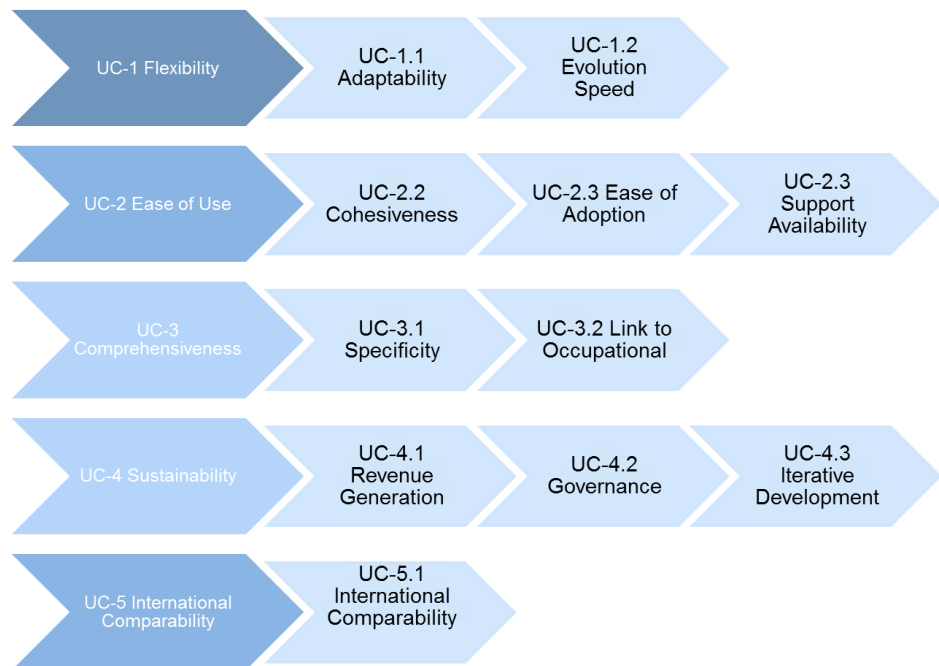
**National e-Competence Frameworks remain a pioneering field**

Within the EU-27, only three national e-competence frameworks for ICT Practitioners are in existence. These are the SFIA Framework in the United Kingdom, the CIGREF Nomenclature in France, and the AITTS Profiles in Germany. All three systems were in use well before the introduction of the European e-Competence Framework, meaning that effectively, as of yet, no national framework has been built on top of the European framework, although CIGREF was significantly restructured so as to be in harmonisation with it. In addition, frameworks are in the early stages of development in both Belgium and Estonia.

This study analyses each of these frameworks, describing their composition, their support structures, their mapping with the European e-Competence Framework, and proceeds to compare them on the basis of usability indicators.

**5 Dimensions for Analysing the Usability of Frameworks**

The study has identified a set of indicators which can be used to sort out best and worst practices from the various frameworks which are in action and consider their usability in the Maltese context. The indicators in question are:



**Flexibility is linked to low direct government involvement**

The study finds that the most flexible frameworks share a number of features in common:

- Their development is led by multi-stakeholder partnerships, such as e.g. sector skill councils, which have been tasked with their development, usually within the legal setup of foundations
- The legislative framework is limited to authorising the sector skill councils (or equivalent) to set and modify standards, with the standards themselves only passing through the administrative (as compared to the legislative) branches of government
- While linked to qualifications, flexible frameworks only link to EQF levels and set goals (in the form of learning outcomes) to be achieved by curricula. They do not

set the curricula *per se*.

***Ease of Use is facilitated by a standardised system description***

Of the frameworks surveyed, the easiest to use and understand had two features in common:

- They used a single, standardised matrix to describe all professions / qualifications / competences
- They were descriptive rather than prescriptive, i.e. they were used to describe the actual status quo, rather than impose a new one

In applying this principle to a new framework, these two aims can however be in conflict, if e.g. the system to be described already shows multiple levels of complexity. In this case, the trade-off between the two points, can only be determined by the policy priorities of the bodies formulating the standard.

In addition, all countries facilitate ease of use through continued support of their tools, usually in terms of the production of materials such as handbooks. Some countries, the UK in particular, have grown an entire consultancy industry and licensing model built around supporting their frameworks.

***A universal application of the learning outcome approach ensures comprehensiveness***

We find that competences lie at the centre of all frameworks we analysed, and furthermore that all the frameworks define competences similarly, in terms of knowledge / skills / attitudes approach.

All frameworks link competences in to (a) occupational profiles, and (b) qualifications offered in the home country, with varying approaches and levels of detail. Some of the frameworks are further linked directly to the day-to-day tasks in the workplace, and in turn to the recognition of non-formal learning through the translation of these tasks into competences.

***Stakeholder Consensus is the main criterion for Sustainability***

From a sustainability perspective, we find that governance structures and funding models do not seem to have a large impact on the sustainability of the various frameworks which are in place. Thus,

- SFIA is run by a foundation created for the purpose by the main representative stakeholders in the sector, and financed through licensing fees
- AITTS and the UK ICT National Occupational standards are run by competence centres – generally described as government-financed, industry-led organisations specifically created to deal with skilling issues
- CIGREF is a membership organization, which finances its nomenclature development through membership fees
- EuroCIO is run by an umbrella organization of National ICT bodies, and is financed through licensing fees

The only success factor we are hence able to determine in this area is the level of acceptance and adoption of the framework across the stakeholder spectrum. Once this is



achieved, it inevitably spurns a management structure and ‘social momentum’ to support it, usually in the form of a foundation or equivalent.

***EeCF compatibility eases International Comparison***

It is clear, including from our own experience in comparing the various frameworks currently present in Europe, that the European e-Competence framework is an invaluable tool in comparing and equating various frameworks with each other.

This said, we have found that the mapping process has a number of rather significant weaknesses. For some of the frameworks we analysed, ‘mapping’ would effectively involve creating an entirely new version of the framework in place, using the EeCF rather than the national criteria (the ‘mapping’ linchpin in this case would be that both frameworks use competences as their central concept).

In contrast, a ‘harmonised’ framework, whereby the concepts and definitions in the European e-CF are applied in a national context, largely using the language, structure and methodology of the e-CF, provide a far more easy-to-read and comparable result than simple mapping.

***Malta has 5 basic categories of ICT Practitioners***

From our research amongst Maltese enterprises, we have managed to identify five ‘occupational categories’, each of which shares a set of common competences as a group, which are then further divided into particular occupations, each with their own particular occupations. The five categories, and associated competences, include:

Programmer / Developer	Support / Customer Care	Administrator / Engineer	Analyst	Sales
<ul style="list-style-type: none"> <li>• Software design lifecycle</li> <li>• Definition of specifications</li> <li>• Specific technical competences (programming languages)</li> <li>• Transversal competences</li> </ul>	<ul style="list-style-type: none"> <li>• Transversal competences</li> <li>• Interpersonal skills</li> <li>• Languages</li> <li>• Problem-Solving</li> <li>• Basic technical skills</li> </ul>	<ul style="list-style-type: none"> <li>• Project management</li> <li>• Software design lifecycle</li> <li>• Technology watching</li> <li>• Problem solving</li> <li>• Documentation production</li> <li>• Specific technical competences (esp. Hardware / networking technologies)</li> </ul>	<ul style="list-style-type: none"> <li>• Quality assurance</li> <li>• Project management</li> <li>• Documentation writing &amp; design</li> <li>• Analytical skills</li> <li>• Transversal skills</li> <li>• Specific technical competences</li> </ul>	<ul style="list-style-type: none"> <li>• Communications</li> <li>• Workshop / presentation</li> <li>• Sales / Relationship management</li> </ul>

***Organisational hierarchies in Malta are generally flat***

In terms of management hierarchy, there seems to be four levels of progression commonly in use within Maltese ICT departments / enterprises:

- Entry level positions, where an employee will conduct a job at a junior level, under supervision
- Once the employee has gained experience and practical knowledge, he becomes a senior employee, with full responsibility for his own work, and the ability to coach junior employees
- The acquisition of significant experience, knowledge through training and/or management skills leads to promotion of the post of team-leader, which essentially involves coordinating a group of ICT Practitioners within a particular department
- The final level of hierarchy is that of general management, with responsibilities for

strategy development and overall administration of the functional block. The largest companies employ multiple levels of management. The main requirement for this level, is leadership and management skills (not *necessarily* ICT competences), although experience within the company, and success at previous positions are often considered as evidence for these traits.

***Transversal Skills and Practical Skills in Malta most lacking***

From interviews with industry, we have determined that they are largely satisfied with the technical competences of Maltese graduates, and find the Bachelor of Science as offered in Malta to be good evidence of acquired knowledge in the ICT area.

However, in all interviews, respondents showed general and pronounced dissatisfaction with the level of transversal skills held by graduates as they seek employment. All employers ask for job experience for their positions, as this is seen as one of the ways in which this transversal skill gap can be partially bridged. Industry also remarks that training institutions do not do enough to help graduates obtain practical experience in their fields, while at the time recognising that slow progress in this area is being made.

***Learning Outcomes are not yet the common currency of Maltese certification activities***

We define the learning outcomes ‘approach’ as implementation of the curricular and structural reforms in Higher Education Institutions to allow it to be used in education, and comparative changes in for its recognition in enterprise.

Our research concludes that:

- Relatively intense activity is going on in various parts of the Education & Training System to promote learning outcomes
- This said, the University of Malta in particular has as yet only taken initial steps at mainstreaming learning outcomes across all curricula, particularly at the credit level. On the other hand MCAST is comparatively advanced in this field.
- While social partners and stakeholders involvement in consultations on qualification frameworks has been exemplary, they only currently have a limited role in promoting those frameworks, hindering adoption in industry.

***A best-in-class Maltese Competence Framework should be built to local specifications***

In adapting the experiences from other countries into recommendations adequate for the Maltese scenario, we considered a number of options, including adopting the European e-Competence Framework as a whole, the licensing of a foreign framework (such as the EUCIP or the SFIA frameworks) or even that of opting out of a Maltese e-skills framework, considering instead as a part of vocational policy.

Each of these options provided significant disadvantages, leading us to recommend that a Maltese system be built in harmonisation with the European e-Competence Framework, using a set of best practices collected from across the various countries, to produce what we called the Integrated-Hybrid-Model-Malta (IHM-MT).

This Model was designed for maximum compliance with all the usability criteria as outlined in the report, sensitivity to the local context as well as full and simple coordination with the European e-Competence Framework

***An Integrated Hybrid  
Model based on 5  
elements***

The model we propose is based on the full integration of a future Maltese e-competence framework with the various elements it is meant to serve, specifically job profiles, education & training curricula, as well as certification including of non-formal learning. Thus, we suggest it to be made up of the following components:

- A competence framework with competence descriptors based closely on the European e-Competence Framework
- A system of credits (structured into qualifications) designed to deliver learning outcomes in line with the competence descriptors
- A system of recognition of non-formal/informal learning at the workplace, through description of work-place processes and outcomes
- Job Profiles for Maltese ICT Professions, integrating the three above tools together.

### 1.1 Professional Skills for ICT within an overall e-skills strategy

The concept of 'e-skills' originates in an evolving paradigm within European Education which links academic achievement with performance measured against specific indicators, namely with meeting a set of learning outcomes which are designed to stimulate the acquisition of a set of competences, which in turn are frequently defined as a set of knowledge, attitudes and skills.

Within this setting, e-skills are frequently used as a synonym for e-competences, with the term taking on a number of inter-related meanings, depending on the exact context of its use. As such, the broadest and most common use of the term, is to describe the collection of knowledge, skills and attitudes necessary for an individual to function in a digital world. The term encompasses concepts such as 'digital literacy', i.e. the acquisition of a basic familiarity with mobile and computing technologies, and with the acquisition of the necessary competences to take full advantage of digital (or information and communications) technologies in any number of daily situations, ranging from professional competence, to such mundane situations as use of entertainment systems within the home.

However, for one category of professionals, ICT-competence is more than ancillary to their daily activities, but rather the *raison d'être* of their profession, namely the category of ICT Professionals. Such professions include not only the workers involved in the IT industry, but also the ICT-centric jobs within companies, which again, while concentrated in IT-support departments, are increasingly being mainstreamed throughout companies, and, over the last 30 years, increasingly rising to executive level through the post of Chief Information Officer<sup>1</sup>.

We define a worker as a *professional* as opposed to a *technician* an *assistant*, or any of the other terms which may be applied, in terms of the near-universally accepted ISCO-88 standard, which defines professionals as persons who "increase the existing stock of knowledge, apply scientific or artistic concepts and theories, teach about the foregoing in a systematic manner, or engage in any combination of these three activities. Most occupations in this major group require skills at the fourth ISCO skill level"<sup>2</sup>, which, put simply, involves the achievement of some level of tertiary education or equivalent.

The EU prefers the term ICT Practitioners which it defines as workers with "the capabilities required for researching, developing, designing, strategic planning, managing, producing, consulting, marketing, selling, integrating, installing, administering, maintaining, supporting and servicing ICT systems."<sup>3</sup>

For this cadre of professionals, which are the main focus of this study, the concept of e-skills take on a different meaning, namely that which is often called *Professional Skills for ICT*. As such, within this conceptualization, an e-skill

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<sup>1</sup> The term 'chief information officer' was first coined in a 1980 computer world article. Since then, the post has increasingly appeared in both corporate boardrooms, as well as in academic literature. **Source:** James I. Penrod, Michael G. Dolence, and Judith V. Douglas, *The Chief Information Officer in Higher Education* (Boulder, CO: The Association for the Management of Information Technology in Higher Education, 1990): 3.

<sup>2</sup> International Labour Organisation. *International Standard Classification of Occupation*. ISCO-88, 2008, Geneva, Switzerland.

<sup>3</sup> Commission of the European Communities, *e-Skills extended view*. Retrieved from URL: [http://ec.europa.eu/enterprise/sectors/ict/e-skills/extended/index\\_en.htm](http://ec.europa.eu/enterprise/sectors/ict/e-skills/extended/index_en.htm) on 10.01.2011.

is any competence which is required for an ICT Professional to do their job. While such a skill-set would obviously include the required technical skills, it also includes any other required competences for a job, such as entrepreneurial skills, project management or quality assurance skills and even multilingualism for survival in what is increasingly a globalized environment. At higher managerial levels the importance of these competences increases and expertise is generally sought.

As will be detailed in the next chapter, initial efforts towards e-skilling in Europe focused on the acquisition of generic e-skills as part of the mainstreaming of ICT into daily life of the population. In recent times however, particularly linked to Europe's jobs and growth strategy, which amongst other aims, intends to preserve and enhance Europe's competitive edge in the global economy, the issue of Professional Skills for ICT has increasingly come to the forefront, particularly in view of the significant skill gap which exists in the sector<sup>4</sup>.

Thus, this study focuses specifically on the development of Professional Skills for ICT, and consequently uses the terms *professional e-skills* and *e-skills*, to avoid confusion. As such, we are considering methods and strategies to classify, measure and promote the competence set, in terms of knowledge, skills and attitudes, of professionals working in any full-time ICT role, whether in the ICT-sector or outside of it, in terms of their tertiary and continuing education whether formal (in schooling or in the workplace) or informal.

## 1.2 Policy Context: the EU e-skills strategy and actions promoting professional skills

In September 2007, the European Commission adopted a Communication on "e-Skills for the 21st Century: Fostering Competitiveness, Growth and Jobs", presenting a long term e-skills agenda and including five major action lines at EU level (2008-2010). The Competitiveness Council of Ministers subsequently adopted Conclusions on a long term e-skills strategy in November 2007. The five major action lines involved:

- Longer term cooperation: in terms of the various stakeholders from academia, government, business and civil society working together to promote e-skills, and attract highly skilled human resources to Europe
- Human resources investment: ensuring sufficient investment in human resources and e-skills, including through the development of frameworks and tools facilitating mobility, transparency of qualifications, and promoting recognition and credit transfer between formal, non-formal and industry ICT education and certifications.
- Attractiveness: Promoting Math, Science and Technology, particularly ICT, as attractive study and career paths from school-level, especially amongst groups, such as girls, who are statistically less likely to be incentivized.
- Employability and e-Inclusion: Ensuring digital literacy amongst the population as a whole, tending particularly to marginalized or disadvantaged groups.

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<sup>4</sup> A recent study estimates that the EU labour market may face an excess demand of 384000 ICT practitioners by 2015. **Source:** Empirica, IDC EMEA Government Insights *After the Crisis, the e-skills gap is looming Europe*. Press Release. Brussels, 3rd December 2009.

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- Lifelong acquisition of e-skills: ensuring that workers can continuously update their e-skills in line with technological and societal developments, with a foreseen role of government as a distributor of good practice.

As part of the second of these priorities (human resources investment), the communication recommended the creation of a European e-Competence Framework (for professional competences / skills), based on a recommendation by the European E-Skills forum and the ICT Skills workshop within CEN (the European Standards' Organisation) made in 2005.

The creation of the framework was entrusted to the coordination of the CEN workshop on ICT skills, which put together a team of experts made up from ICT framework stakeholders, representatives from larger European companies and an applied research foundation. This was complemented by an extensive multi-stakeholder consultation amongst further ICT sector representatives and stakeholders from business, politics and education. The first version of the European e-Competence framework was consequently published in 2008.

As the extensive feedback received could not be fully integrated into the first version of the guidelines, work continued for another two years, leading to the publication of the European e-Competence Framework 2.0 in 2010.

Also, during 2010, the European Commission launched its' Digital Agenda – a roadmap to coordinate all actions across Commission DGs

### EUROPEAN ACTIONS PROMOTING THE E-SKILLS AGENDA

#### Promoting long-term cooperation and monitoring progress

- promoting a regular dialogue with Member States and stakeholders and maintaining an online virtual community;
- monitoring annually the supply and demand of e-Skills;
- assessing the impact of global sourcing on ICT jobs

#### Developing supporting actions and tools

- supporting the development and the promotion of a European e-Competence Framework;
- fostering multi-stakeholder partnerships;
- promoting mobility of highly-skilled professionals and the Europass initiative;
- promoting the European e-Skills and Careers portal;
- encouraging the development of European quality criteria for existing e-Skills industry-based training and certifications;
- supporting and promoting European e-competences curriculum guidelines;
- encouraging appropriate financial and fiscal incentives

#### Raising awareness

- exchanging good practices for the promotion of science, maths, ICT and e-Skills;
- supporting awareness campaigns at EU and national levels (i.e. European e-Skills Week);
- promoting ICT education and training to young people, especially girls

#### Fostering employability and social inclusion

- further implementing the Communication on e-inclusion adopted at the end of 2007;
- encouraging corporate social responsibility and partnerships with job placement support services;
- investigating how public and private funding can support stakeholders initiatives

#### Promoting better and greater use of e-learning

- promoting successful strategies and policies for e-learning;
- promoting the development of e-learning courses and exchange mechanisms of e-Skills training resources;
- supporting the networking of training centres and research

in this field, where it made specific reference to developing “tools to identify and recognize the competences of ICT practitioners and users, linked to the European Qualifications Framework and to EUROPASS and develop a European Framework for ICT Professionalism to increase the competences and the mobility of ICT practitioners across Europe”. This action line in the digital agenda, effectively guarantees continued political commitment to the development and promulgation of the e-Competence frameworks around Europe at least until 2012.

## 1.3 Maltese Context

### 1.3.1 Objectives for an evolving National Skills Strategy

The IT policy landscape within Malta is dominated by the *smart island* National ICT strategy, which covers the period until end of 2010 and beyond. The strategy sets out seven key priorities, or streams aiming at making the island a world-leader in the field of ICT<sup>5</sup>. Of these streams, one focuses on the development of the potential for a smart workforce, which puts a consistent and strong emphasis on the development of e-skills at all levels, ranging from generic e-skills / digital literacy for the population at large to the market for professional skills. Of particular note for this study, the strategy includes a specific priority on ICT certification which commits the government to “link Maltese certification to leading international skills and position profiles, to ensure that ICT specialisations are synchronized with the global requirements of the ICT industry. These certifications will be brought into the national vocational qualifications system to give them greater recognition.”

To contribute towards achieving this aim, the Malta Information Technology Agency set up the Malta e-Skills Alliance in October 2010, which brings together public sector actors, business representative bodies and the private ICT sector. Amongst its responsibilities for its first year of operations (2011), the Alliance is to:

- Contribute to the drafting and promote the endorsement of a Maltese e-Skills competence framework
- Contribute to the scoping of an ICT Skills Demand and Supply Monitor and promote across the industry the participation in such a Monitor



<sup>5</sup> This strategy has shown a number of early results from various rankings particularly in the fields of e-government, e-health and e-skills, which consistently rank Malta as either the best or amongst the best in Europe.

### 1.3.2 Key Characteristics of the Maltese System

As the smallest country within the European Union, with an evolving niche specialization in ICT, the Maltese context presents several unique features which need to be taken into account in considering any usability analysis:

- **A highly centralized Tertiary Education system:** Malta has only two institutions of Tertiary/Higher Education, namely the University of Malta and the Malta College for Arts, Science and Technology. This effectively means that the decisions on which training to offer made by these two institutions, condition the entire e-Skills supply of the country.
- **A business environment dominated by micro-enterprises:** Recent statistics<sup>6</sup> show that 91% of Maltese enterprise is made up of micro-enterprises, with the rest classified as small. Medium and Large enterprise make up less than 1.5% of the entire system. This in turn means that within the Maltese enterprises, skill definition tends to be less precise; organisational hierarchies tend to be flatter; and multi-skilling is more frequent than in their foreign counterparts.
- **Strong incentives towards diversified provision:** The inherent limitations of having a small tertiary education sector means that a significant number of specialisations are not offered by the public education sector. This creates strong incentives for small and specialized private providers to fill the gaps (e.g. through the provision of industry certifications and/or delivery of distance degrees offered by foreign institutions) and for Maltese students to choose to undertake studies abroad<sup>7</sup>.
- **The ICT-Skills Landscape is intrinsically linked to external decisions on FDI:** This can be summarized as the 'Smart City' effect. A single instance of Foreign Direct Investment can lead to the creation of an entirely new (and not forecasted) skill sector. In the instance of Smart City, this office complex is expected to create 18000 knowledge-industry jobs. If we assume that half of these constitute ICT-practitioners, the demand of Smart City alone, will equate to the entire output of ICT practitioners from the university of Malta and MCAST for 6 years, assumed at current levels. Other similar instances of FDI creating industry sectors within the country have included ST-Microelectronics creating a semi-conductor industry, and, more recently, Lufthansa Technik being solely responsible for the launch of an aircraft repair industry and related training programmes
- **Intense Activity to Overcome an e-Skills Gap:** The recently published external evaluation of the EU's e-skills strategy, also considers the position of individual countries with respect to e-Skills strategies. In Malta's case, industry reports one of the highest e-skills gaps in Europe, while at the same time the government's strategies in addressing and overcoming such a gap are rated amongst the best structured and best-implemented.

The Maltese Qualification structure is governed by a Maltese Qualification Framework, which sets out descriptors in line with the 8 levels of the European Qualifications Framework. Complimentary to this is the currently-underway definition of Occupational Standards in nine identified sectors. However, despite the existence of a *framework* for qualifications, its use has to this point been extremely limited, with little to no evidence of mapping of qualifications

<sup>6</sup> Source: SBA FactSheet Malta 2009. *EIM Business and Policy Research*. Published by DG Enterprise and Industry (Commission of the European Communities – Brussels). 2009.

<sup>7</sup> This phenomenon is further encouraged by the fact that Maltese students show high fluency in English and Italian, making pursuit of studies in these countries even easier



being put into practice by institutions. Thus, for example, the latest version of the University of Malta course prospectus makes no mention of EQF levels in its course descriptions. A sample of course outlines chosen randomly from across the university website also found no evidence of course outlines being defined according to a strict qualification framework approach.

This said, interviews with Malta Qualifications Council, as well as with the various educational institutions, confirm that a number of multi-stakeholder initiatives are underway to improve adoption of the qualification frameworks, with the intention of having all qualifications in Malta mapped to the framework by 2012.

## 1.4 Introduction to the European e-Competence Framework

Any study of e-competence frameworks needs to be made in reference to the European e-Competence Framework, which thanks to its provenance as a joint initiative of the European Commission, major stakeholders (including business) and the CEN workshop on ICT skills is the de-facto standard when it comes to competence frameworks for professional e-skills in Europe.

### 1.4.1 Purpose, Objectives and Target Groups

The main purpose of the European e-Competence framework is to provide a reference framework of ICT competences that can be used and understood by ICT user and supply companies, ICT practitioners, managers and HR departments, the public sector, educational and social partners around Europe. Particularly, it provides a structure which can be utilized by nations without an ICT competence model, while allowing existing national ICT competence models to be linked to it, so as to provide a common European framework for translation.

The User Guide for the European e-Competence Framework identifies the following as the intended target groups for the framework:

- ICT practitioners and managers: by providing clear guidelines to build competence development pathways
- Human Resource managers: by enabling the anticipation, planning and standardized description of competence requirements
- Education and Training: by enabling effective planning and design of ICT Curricula
- Market Researchers and Policymakers: by providing standardized European-wide agreed reference and definitions for evaluating, anticipating and measuring ICT skill needs across the continent.

The User Guide additionally envisages a number of usage scenarios where the framework might applied. These include:

- For human resource and competence managers in companies, particularly SMEs, to plan, develop and manage competences (particularly in terms of managing the LLL pathways of employees)
- Adding value to existing national/local/sectoral competence frameworks by introducing a European dimension

- Providing inspiration for the development of national/local ICT frameworks
- Using it as input for describing qualifications, training courses and certification, particularly within tertiary education
- As a tool for individuals to plan their career development pathway as an ICT practitioner
- As a tool guiding recruiting and sourcing processes within companies
- As a framework by which to conduct skills forecasting, as well as demand and supply monitoring of professional e-skills, on local, regional, national or European levels

### 1.4.2 Basic Structure of the European e-Competence Framework

The European e-Competence Framework is structured from four dimensions. These dimensions reflect different levels of business and human resource planning requirements in addition to job/ work proficiency guidelines and are specified as follows:

**Dimension 1:** 5 e-Competence areas, derived from the ICT business processes PLAN – BUILD – RUN – ENABLE – MANAGE.

**Dimension 2:** A set of reference e-Competences for each area, with a generic description for each competence. 36 competences identified in total provide the European generic reference definitions of the framework.

**Dimension 3:** Proficiency levels of each e-Competence provide European reference level specifications on e-Competence levels e-1 to e-5. Each of the e-competence levels has been mapped to the European Qualifications Framework levels 3 through 8, although such mapping isn't perfect since the European eCF focuses on job profiles while the EQF focuses on qualification profiles.

**Dimension 4:** Samples of knowledge and skills related to the e-Competences are indicated as optional framework components for inspiration.

So as to define a particular job profile, the set of competences involved is selected from the list of 36 (Dimension 2), then the expertise level of each competence is defined as necessary (Dimension 3), and finally, the specific knowledge and skills under each competence is defined (Dimension 4).

The way these dimensions interact on a specific competence, is shown in the diagram below, taken directly from the EeCF v2.0:

<b>Dimension 1</b> e-Competence area	<b>B. BUILD</b>				
<b>Dimension 2</b> e-Competence: Title + generic description	<b>B.1. Design and Development</b> Designs and engineers software and/or hardware components to meet required specifications, including energy efficiency issues. Follows a systematic methodology to analyse and build the required components and interfaces. Performs unit and system testing to ensure requirements are met.				
<b>Dimension 3</b> e-Competence proficiency levels (on e-CF levels e-1 to e-5, related to EQF levels 3 to 8)	<b>Level 1</b>	<b>Level 2</b>	<b>Level 3</b>	<b>Level 4</b>	<b>Level 5</b>
		Systematically develops small components.	Acts creatively to develop and integrate components into a larger product.	Handles complexity by developing standard procedures and architectures in support of cohesive product development.	Has ultimate responsibility for strategic direction of product, technical architecture or technology development.
<b>Dimension 4</b> Knowledge examples  Skills examples	<p>Knows/ Aware of/ Familiar with:</p> <ul style="list-style-type: none"> <li>K1 appropriate software programs/ modules, DBMS and programming languages</li> <li>K2 hardware components, tools and hardware architectures.</li> <li>K3 functional &amp; technical designing</li> <li>K4 state of the art technologies</li> <li>K5 programming languages</li> <li>K6 power consumption models of software and/ or hardware</li> </ul> <p>Able to:</p> <ul style="list-style-type: none"> <li>S1 explain and communicate the design/ development to the customer</li> <li>S2 perform and evaluate test results against product specifications</li> <li>S3 apply appropriate software and/ or hardware architectures</li> </ul> <p>software components.</p> <ul style="list-style-type: none"> <li>S5 manage and guarantee high levels of cohesion and quality in complex software developments</li> <li>S6 use data models</li> </ul>				

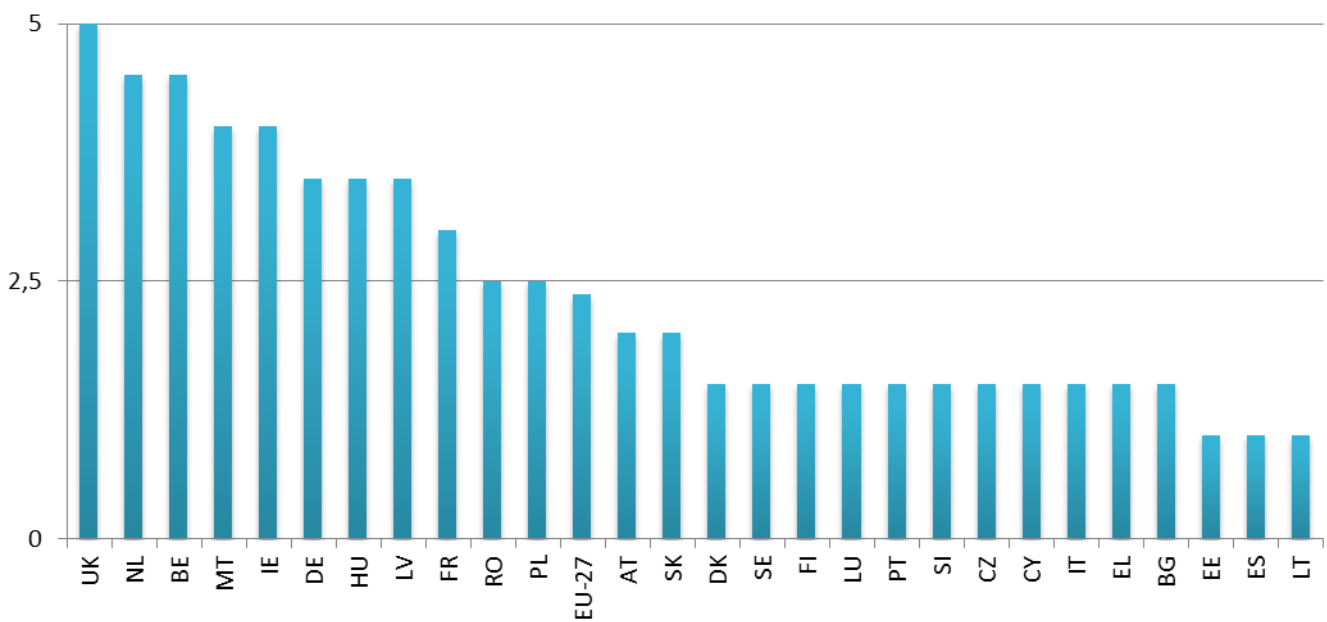
Dimension 1	Dimension 2	Dimension 3				
5 e-Comp. areas (A - E)	36 e-Competences identified	e-Competence proficiency levels e-1 to e-5, related to EQF levels 3-8				
		e-CF levels identified per competence				
		e-1	e-2	e-3	e-4	e-5
A. PLAN	A.1. IS and Business Strategy Alignment					
	A.2. Service Level Management					
	A.3. Business Plan Development					
	A.4. Product or Project Planning					
	A.5. Design Architecture					
	A.6. Application Design					
	A.7. Technology Watching					
	A.8. Sustainable Development					
B. BUILD	B.1. Design and Development					
	B.2. Systems Integration					
	B.3. Testing					
	B.4. Solution Development					
	B.5. Documentation Production					
C. RUN	C.1. User Support					
	C.2. Change Support					
	C.3. Service Delivery					
	C.4. Problem Management					
D. ENABLE	D.1. Information Security Strategy					
	D.2. ICT Quality Strategy Development					
	D.3. Education and Training Provision					
	D.4. Purchasing					
	D.5. Sales Proposal Development					
	D.6. Channel Management					
	D.7. Sales Management					
	D.8. Contract Management					
	D.9. Personal Development					
	D.10. Information and Knowledge					
E. MANAGE	E.1. Forecast Development					
	E.2. Project and Portfolio Management					
	E.3. Risk Management					
	E.4. Relationship Management					
	E.5. Process Improvement					
	E.6. ICT Quality Management					
	E.7. Business Change Management					
	E.8. Information Security Management					
	E.9. IT Governance					

## 2. E-Competence Frameworks in Europe

### 2.1 Overview of Strategies and Actions on e-Skills in Other Countries

In October 2010, the European Commission published the independent evaluation of its 'e-skills for the 21<sup>st</sup> century' communication, which examined e-skills and digital literacy initiatives in all 27 member states over the past several years. The report creates a compound, non-comparative, indicator for actions on professional e-skills, based on implementation of recommendations from the said communication.

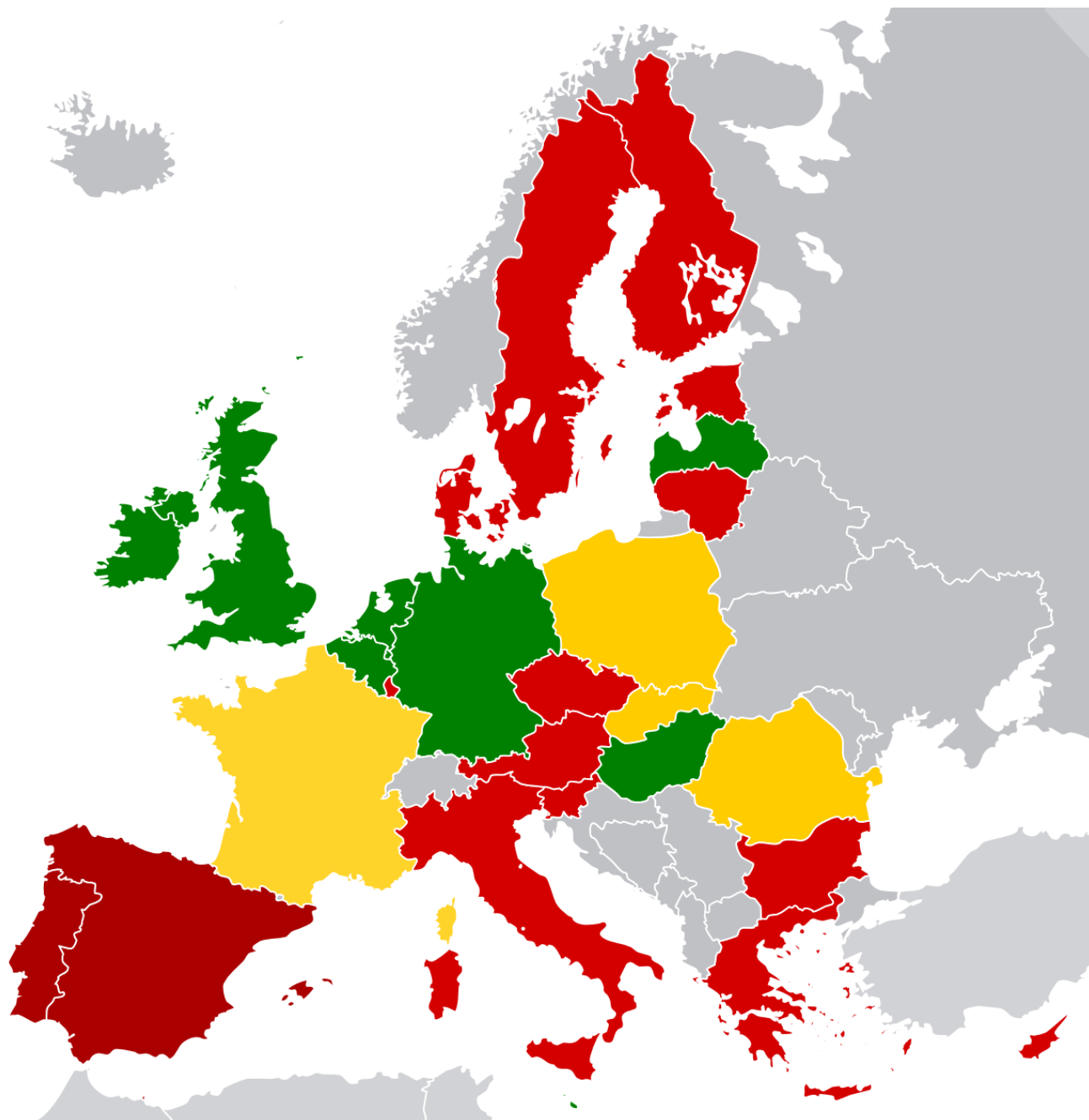
The picture which emerges from across Europe in this respect, can only be described as dismal, with the EU-wide average rating being a failure, at only 2.37 / 5. Only 9 countries from the entire EU show index scores of 60% or better, namely the UK, the Netherlands, Belgium, Ireland, Germany, Hungary, Latvia, France and Malta. The graph below shows the index scores, in order of rating:



By means of a survey amongst national stakeholders, the same study also asked whether the countries in question had implemented or were in the stage of implementing a national e-skills strategy. Again, the results here were rather dismal, with only eight countries, including Malta, reporting the existence of a national skills strategy, and a further four reporting initial development of such a strategy.

Our surveying of individual countries, matched with desk research of a selected number of national contexts, confirm the same results found by the independent evaluation. Further, we found significant confusion as to the concept of professional e-skills, with a number of respondents referring us to their overall digital literacy strategies.

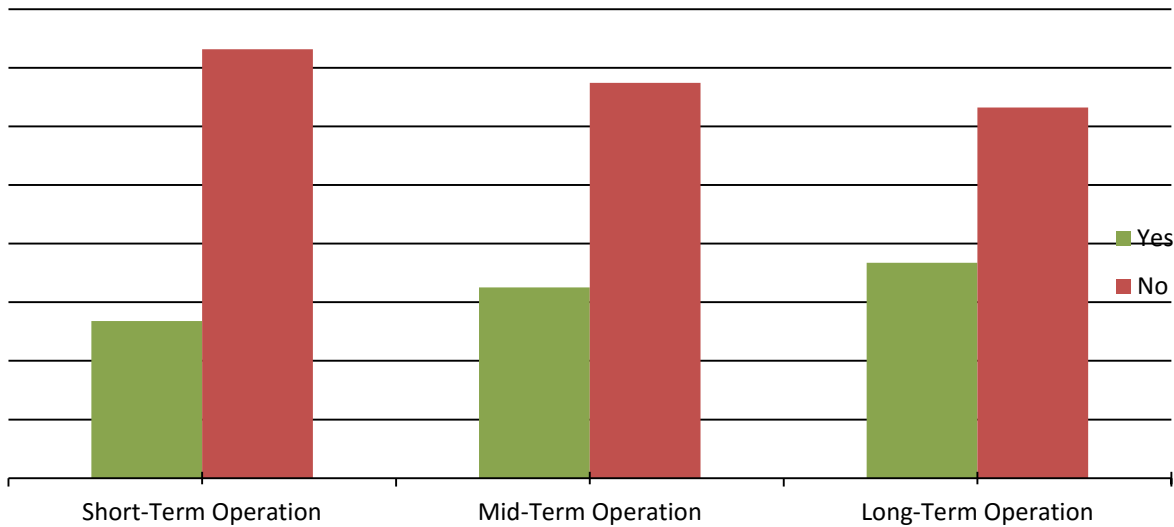
In the following map, the countries in green are those with an already existing long-term e-skills strategy, those in yellow have one under development while those in red currently have no plans in this area. Countries in gray either did not respond or were not included in the study.



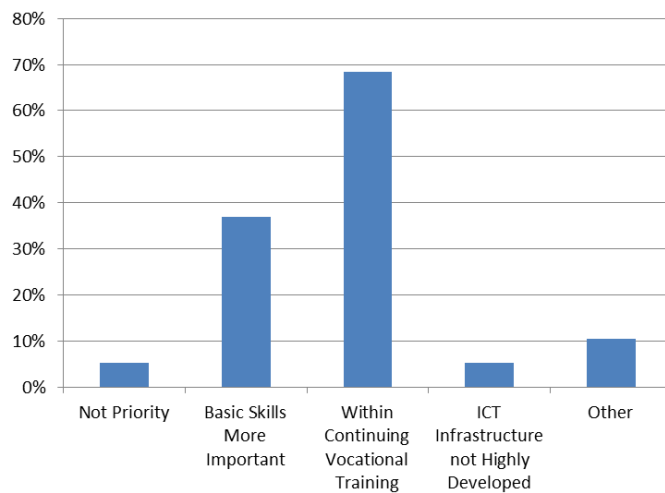
The overall EU-wide picture, as portrayed by this data, is depressed further, when data from stakeholders in the countries is considered. When interviewed as part of the same study referenced above, an overwhelming majority of the stakeholders (90%) reported their government's resource allocations for professional e-skills initiatives as too

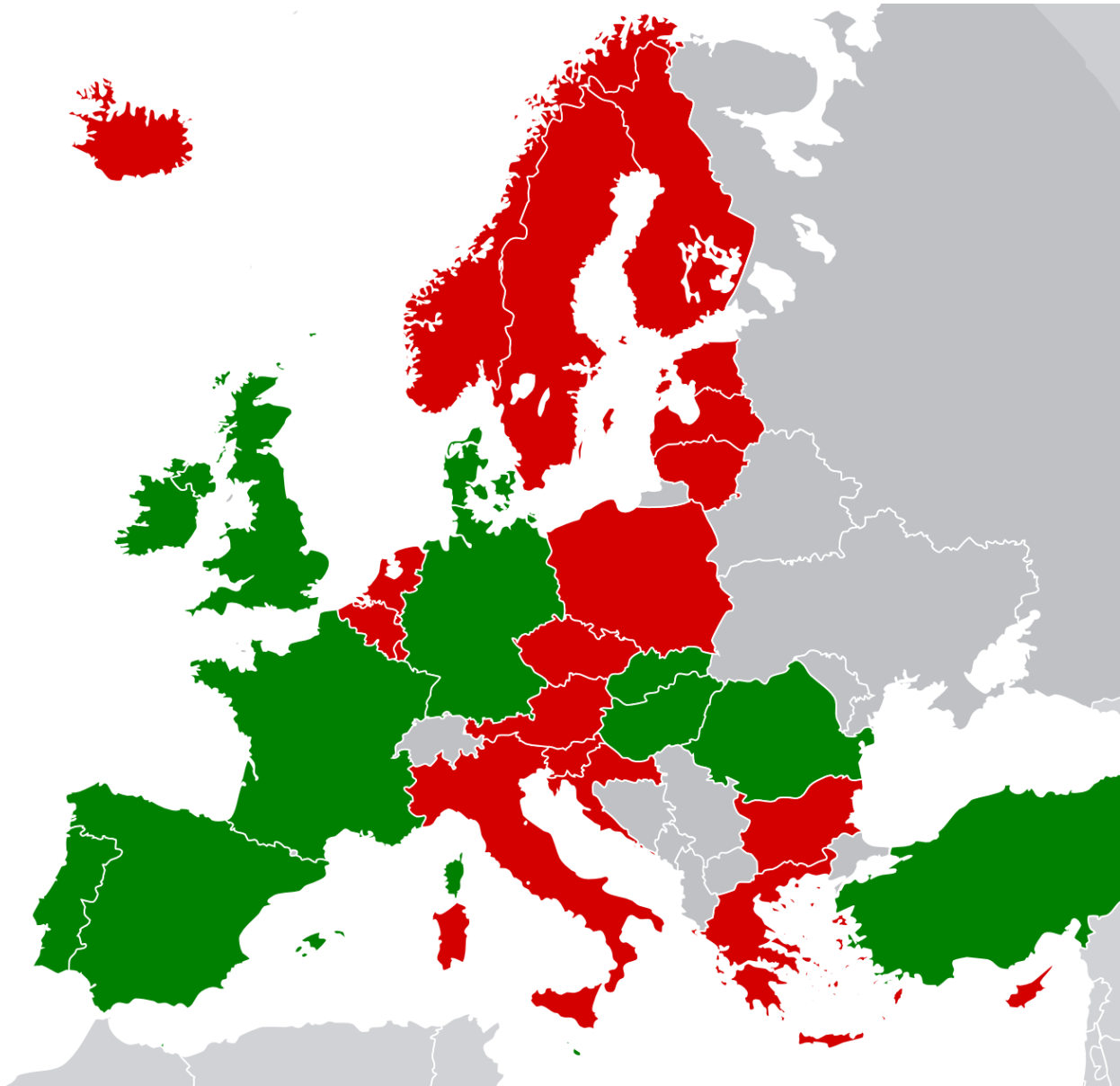
low, with the rest reporting the allocations as adequate. No-one reported national research allocations in this sense as being too high.

These results are further reflected by a question asking stakeholders' views as to whether governments have put in place appropriate measures to sustain their e-skills policies in the short-, medium- and long-term. The graph below shows the results of this question when answered with a yes/no response, corrected to exclude those who chose not to give an opinion (which account for approx. 45% of the total respondents):



A 2009 study on fiscal incentives for professional e-skills, concluded that most countries do not have any sort of operationalized policy for ICT Practitioner Skills, based on the fact that they do not have incentives within the area. The study finds only 9 countries of the EU-27 with such policies, namely Denmark, France, Germany, Hungary, Ireland, Malta, Spain, Portugal, Romania and the United Kingdom. Of the countries, which did not have policies, the main reason for their absence was that e-skills policy was considered an integral part of continuing vocational training policy, and not a policy-area in and of itself.





## 2.2 National Competence Frameworks in Europe

As described in some detail in the previous chapter, most countries in Europe do not show any sort of dedicated policy commitments or incentives in the field of professional ICT skills. As might be imagined, we have thus found even fewer examples of national competence frameworks. In fact, the only full national competence frameworks in operation within the EU-27, are present in the United Kingdom, Germany and France, which served, to varying degrees of extent as templates for the creation of the European e-Competence Framework.



We thus have been able to find no example of a national e-competence framework which has been developed after the establishment of the European e-Competence Framework, although initial steps have been taken towards this aim in both Belgium and Estonia.

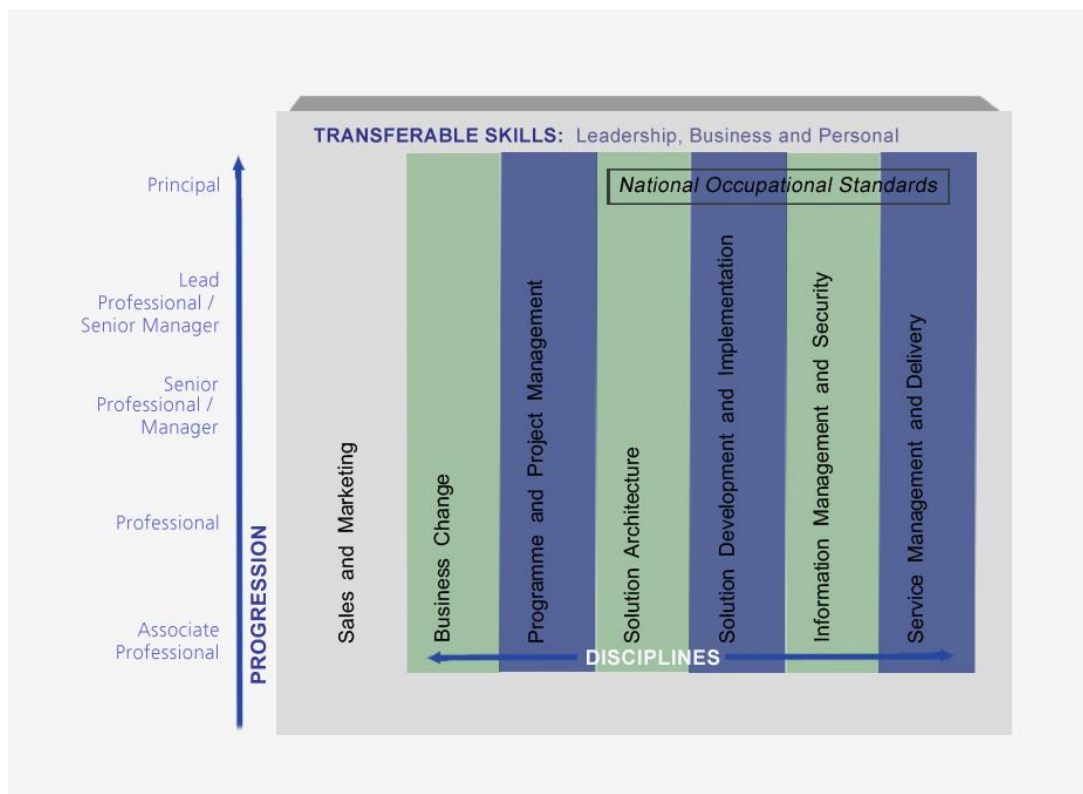
## 2.2.1 United Kingdom

The United Kingdom has a complex system of overlapping competence frameworks, which are loosely linked with each other. These are the IT Professional Competency Model (e-skills procom), the National Occupational Standards for IT and Telecoms, and the Skills Framework for the Information Age (SFIA).

### The IT Professional Competency Model (e-Skills procom)

E-skills procom was created with the aim of becoming an industry recognized, internationally relevant training framework for organizing courses and qualifications by the disciplines of the ICT profession. E-skills procom defines knowledge, understanding and competences for seven broad disciplines (and their sub-disciplines) at five levels of progression, incorporating technical, business and personal skills. E-skills procom has been the basis for e-skills UK's work to reform and simplify the qualifications map for ICT professionals. It was designed to help ICT professionals achieve recognition for their skills, and employers to plan training and development. It is also helping providers of education and training to develop new courses to meet the needs of different ICT disciplines. E-skills procom was developed by employers in both private and public sector, with the support of professional bodies and other partners, to create a united approach to help advance the ICT profession across the UK.

The competence model as laid out by e-skills procom is shown below:



**National Occupational Standards for IT and Telecoms**

The national occupational standards are published by e-Skills UK, which, as the Sector Skills Council for Business and Information Technology, works on behalf of employers to develop the necessary expertise in **software, internet, computer gaming, IT services** and **business change** to thrive in today’s global digital economy. Sector-skill councils are government funded, employer-led agencies with the remit of formulating the UK’s occupational standards in a number of areas.

The standards for IT and telecoms:

- outline the specific skills needed for a variety of IT & Telecoms-related job roles
- were developed with employers to make sure they are relevant to the real world
- are used for writing job descriptions, assessing staff, developing training programmes and more

The occupational standards cover the last 4 of the 7 disciplines outlined in PROCOM. Each discipline is further divided into a number sub-disciplines, for which progression is considered in terms of five roles, namely those of:

- pre-entry/junior technical
- associated professional
- professional
- senior professional
- lead professional

An occupational profile is outlined for each sub-discipline at each role level. The occupational profile consists of a list of competences, each of which is defined in terms of performance, knowledge and understanding criteria.

Thus, a profile would follow the structure below:

<b>Discipline</b>	Solutions Architecture / Solution Development & Implementation / Information Management & Security / Service Management & Delivery
<b>Sub-Discipline</b>	Appropriate sub-discipline from list.
<b>Role</b>	Pre-Entry or Junior Technical / Associated Professional / Professional / Senior Professional / Lead Professional
<b>Competences Required</b>	<ul style="list-style-type: none"> <li>• Competence 1                             <ul style="list-style-type: none"> <li>○ Performance Criteria                                     <ul style="list-style-type: none"> <li>▪ Criteria 1</li> <li>▪ Criteria 2</li> </ul> </li> <li>○ Knowledge                                     <ul style="list-style-type: none"> <li>▪ Knowledge Descriptor 1</li> <li>▪ Knowledge Descriptor 2</li> </ul> </li> <li>○ Understanding                                     <ul style="list-style-type: none"> <li>▪ Understanding Descriptor 1</li> <li>▪ Understanding Descriptor 2</li> </ul> </li> </ul> </li> </ul>

	<ul style="list-style-type: none"> <li>• Competence 2</li> <li>• Competence 3</li> </ul>
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While the occupational standards have not been tied directly to the National or European Qualification Frameworks, making translation somewhat difficult, Role / Competence/ Competence Description structure can be loosely tied to Dimensions 3 / 2 / 4 of the European e-Competence Framework on a per sub-discipline basis.

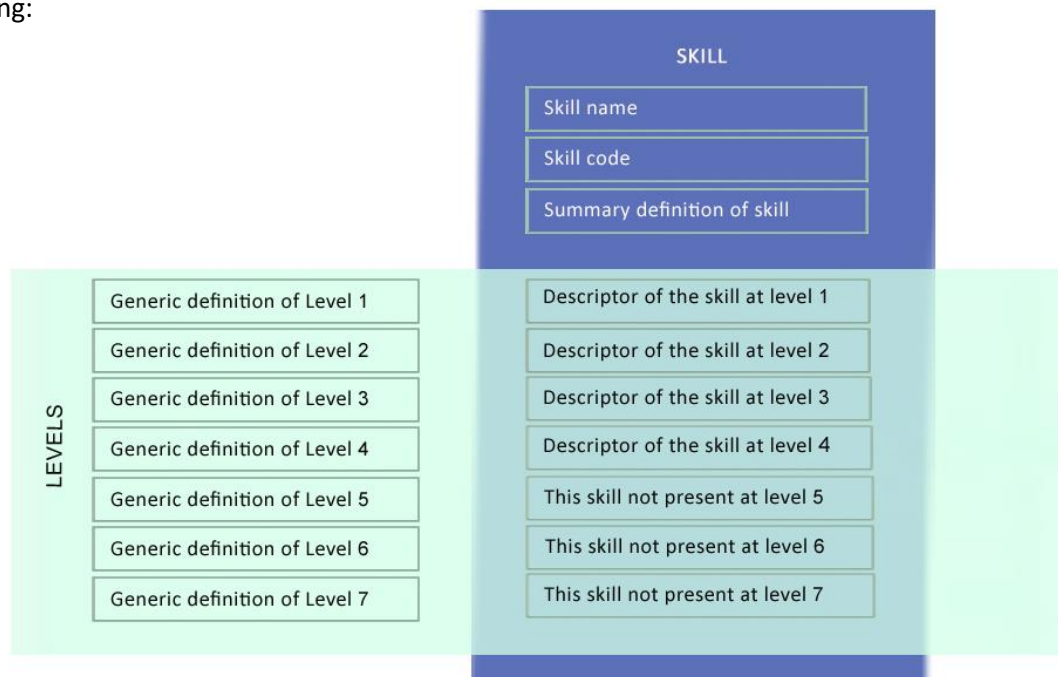
**Skills Framework for the Information Age (SFIA)**

The primary use of the SFIA is as a skills management tool within organisations employing IT staff. It is published by an independent foundation (the SFIA Foundation), which is formed by the Institution of Engineering and Technology (IET), Institute for the Management of Information Systems (IMIS), e-skills UK, the British Computer Society (BCS) and itsMF. The SFIA Council, which manages the foundation is composed of representatives of government, industry and education. The foundation is funded through licensing arrangements involving the SFIA Framework.

According to the Foundation, the SFIA information has been obtained by approximately 15,000 organisations (including the UK Civil Service), with a global spread of over 100 countries.

SFIA describes 86 professional skills (split across a number of categories and sub-categories, which are based on those outlined in the National Occupational Standards) that are relevant to IT Professionals in various roles. Each skill can be practiced at seven different levels of competency, although most skills are not practiced at all levels of competency. These levels are generically described in terms of autonomy, influence, complexity and business skills. Each SFIA skill has a short summary statement of the skill, independent of the level, and a set of descriptors, describing it at each level of practice.

Thus, the relationship between generic skill descriptor, level-based skill descriptor and generic level descriptor can be summarized as following:







## 2.2.2 France

The main competence framework in France is a nomenclature promoted by an organization known as the CIGREF (Club informatique des grandes entreprises françaises). Currently celebrating its 40<sup>th</sup> anniversary, CIGREF is an association of 124 French companies and organizations from all sectors that seek to "promote uses of information systems as a factor of value creation and source of innovation for the enterprise." To accomplish this promotion, CIGREF focuses on three aims:

- To bring together major companies using information systems,
- To support CIOs and help them develop in the exercise of their profession,
- To develop a long-term vision of the impact of information systems and technologies on the enterprise, the economy and society.

CIGREF has long been involved in identifying critical skills that companies and organizations need in order to enhance the business value from their ICT investments. Since 1991, CIGREF members have met monthly to share their experiences and review the state of affairs of ICT job profiles.

Early on, they developed a "job profiles referential" framework, which describes the jobs identified and applied in the large companies' internal ICT departments. In 2002, CIGREM further updated the framework to include descriptions career and qualification pathways and qualifications in response to demands from members. This taxonomy of ICT job profiles has since been regularly updated at the monthly meetings, incorporating emerging ICT competences and skills. It allows the companies to follow the evolution of ICT jobs in the whole industry and facilitates human resource management. In 2010, the Framework was revised with the explicit intention of mapping it to the European e-Competence Framework.

The CIGREF profile describes a number of occupational categories. For each of these categories it specifies:

- Names of specialized occupations which fall within the category
- Mission (describing the purpose of the occupation)
- Activities and Tasks – each activity is described in terms of its component tasks
- Competences and Level – the competences and levels are described using the precise language of the European e-Competence Framework

Select occupations within each category are further described in terms of:

- Deliverables: the types of products which are produced in the course of daily work (e.g. reports etc)
- Performance Indicators
- Career Path: Education and Experience required to qualify for the occupation
- Career Development: The type of competences and skills which are acquired non-formally in carrying out the occupation

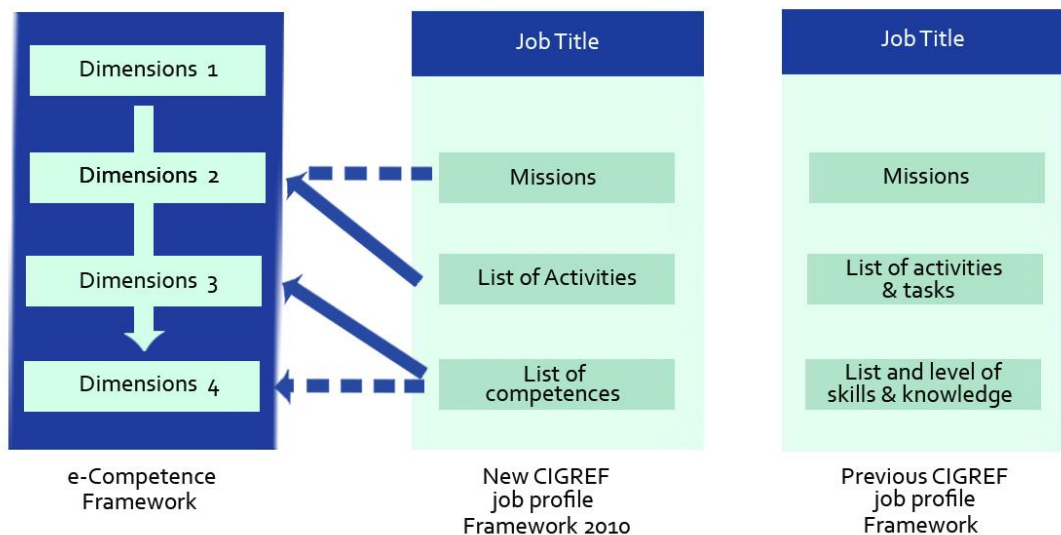


# KNOWLEDGE INNOVATION CENTRE MALTA

Compétences e-CF →		A1	A2	A3	A4	A5	A6	A7	A8	B1	B2	B3	B4	B5	C1	C2	C3	C4	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	E1	E2	E3	E4	E5	E6	E7	E8	E9	
		IS and Business Strategy Alignment	Service Level Management	Business Plan Development	Product or Project Planning	Architecture Design	Application Design	Technology Watching	Sustainable development	Design and Development	Systems Integration	Testing	Solution Deployment	Documentation Production	User Support	Change Support	Service Delivery	Problem Management	Information Security Strategy Development	ICT Quality Strategy Development	Education and Training Provision	Purchasing	Sales Proposal Development	Channel Management	Sales Management	Contract Management	Personnel Development	Information and Knowledge Management	Forecast Development	Project and Portfolio Management	Risk Management	Relationship Management	Process Improvement	ICT Quality Management	Business Change Management	Information Security Management	IT Governance	
4.5	ADMINISTRATEUR DE BASES DE DONNEES									2	2	2	2	2	2	3	2	2										3									3	
4.6	INTEGRATEUR D'EXPLOITATION										4	2	2	2	2	3	2	2																				
4.7	PILOTE D'EXPLOITATION													1			1	2																				
4.8	EXPERT SYSTEMES D'EXPLOITATION					4	1	4		3	2	3	3	2				3			2										2							
4.9	EXPERT RESEAUX - TELECOMS					4	1	4		3	2	3	3	2				3			2										2							
4.10	ARCHITECTE TECHNIQUE					4		5	3	4	3	3		3		3			4												3		3					
5.1	ASSISTANT FONCTIONNEL												1		2	2	2				2							3										
5.2	TECHNICIEN SUPPORT UTILISATEURS														2		1																					
6.1	EXPERT METHODE ET OUTILS / QUALITE / SECURITE							4	3					3					4	4	3						2	5			3	2	3-4	2-4		2-4		
6.2	MANAGER DE CONTRATS								3													2				4				3	4							
6.3	RESPONSABLE SECURITE DES SYSTEMES D'INFORMATION - RSSI						4												5								4	4			3	4				4	4	
7.1	DIRECTEUR DES SYSTEMES D'INFORMATION	5	4	5					4																		4				3	4				5	3	5
7.2	RESPONSABLE D'ENTITE INFORMATIQUE								3																		4			3	3			3	4	3	4	
7.3	RESPONSABLE RESEAUX ET TELECOMS					3		4	3	5					3		3											3	3		3	3	2		3	4	3	4
7.4	RESPONSABLE D'EXPLOITATION								3								3											3	3		3	3	2		3	4	3	4
7.5	RESPONSABLE DES ETUDES	4	4	4		3			3																			3	3		3	3	2		3	4	3	4



In terms of mapping to the European e-Competence Framework, the User Guidelines claim that the French nomenclature can be mapped using the following conversion scheme:



When analysing the 2010 framework, we found that the mapping was in fact implemented differently. The ‘Missions’ and ‘List of Activities’ sections of the CIGREF nomenclature bear little to no resemblance to any part of the e-Competence Framework. However, the List of Competences encompasses Dimensions 2, 3 and 4 of the European Framework.

With respect to the extra fields of the CIGREF dedicated to particular professions, again no way exists to map these descriptors to the European Framework.

Thus, in practice, competence descriptors are outlined as following in an example from the new CIGREF nomenclature (competence extract from occupational category 3.1: Responsable des systèmes applicatifs):

<b>A. PLAN</b>	<b>AB. Sustainable Development</b>	<b>Level 3</b>
	Estimates the impact of ICT solutions in terms of eco responsibilities including energy consumption. Advices business and ICT stakeholders on sustainable alternatives that are consistent with the business strategy. applies an ICT purchasing and sales polic which fulfils eco-responsibilities	<i>Promotes awareness, training and commitment for the development of sustainable development and applies the necessar tools for piloting this approach.</i>
<b>B. BUILD</b>	<b>B2. Systems Integration</b>	<b>Level 3</b>
	Installs additional hardware, software or sub system components into an esisting or proposed sstem. Complies with established processes and procedures (e.g. configuration management), taking into account the specification, capacity and compatibility of existing and new modules to ensure integrity and interoperability. Verifies sstem performance and ensures formal sign off and documentation of successful integration.	<i>Accounts for own and others actions in the integration process. Complies with appropriate standards and change control procedures to maintain integrity of the overall system functionality and reliability.</i>

### 2.2.3 Germany

The German Framework is known as the AITTS (Advanced IT Training System) Competency Model. The model was mainly developed by the Fraunhofer ISST institute, on commission through funding agencies of the German Federal Ministry for Education and Training. The Framework has the status of a legal instrument within Germany.

Of the frameworks we have analysed, the AITTS model is easily the most comprehensive, as well as the most complex by several levels of difficulty. AITTS rest on two columns:

- A system of career profiles associated to three levels of proficiency.
- A training concept for workflow-embedded qualification.

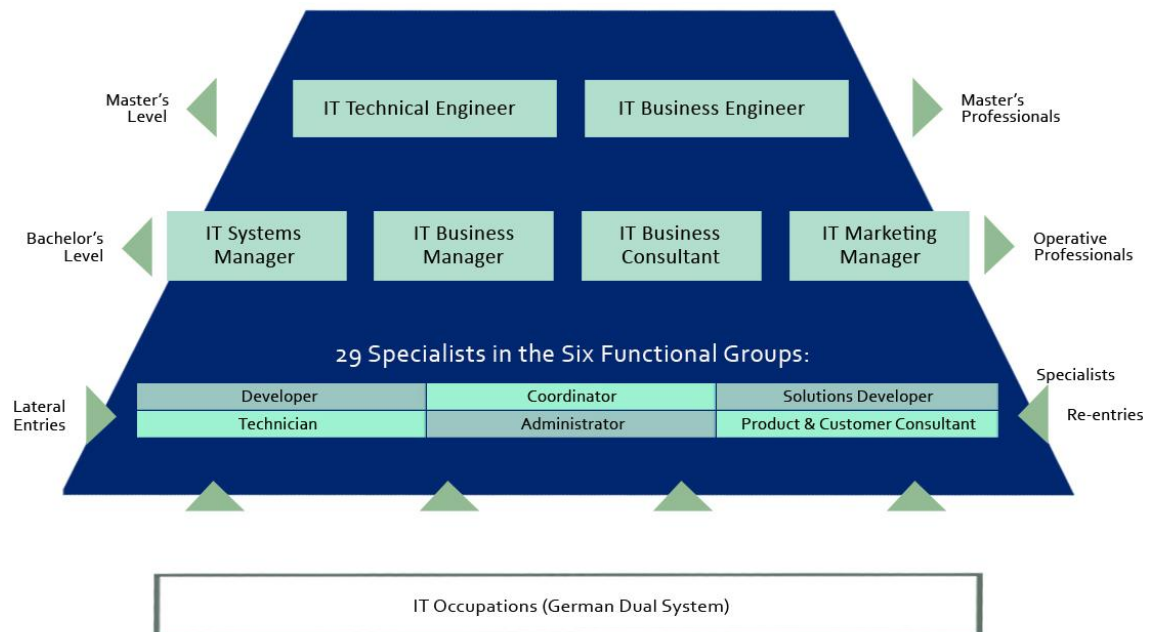
These two components are linked by reference processes: representative work processes that serve simultaneously as a reference for the particular job role and its curriculum.

The key strength of AITTS stems from the seamless integration of

standardization – qualification – certification:

Job profiles are delineated based on “reference processes” which are derived from underlying business processes typical for the IT industries. At the same time, these reference processes constitute the curricula: Work content becomes learning content and vice versa. Certification is obtained by going through, reflecting and documenting these processes in the context of individual work assignments.

In practice, the AITTS system’s most basic level begins with the delineation of different profession levels and categories:



According to the fields of business, the specialist profiles defined are as following:

Fields of bus Fields of activity	Compo- nents & devices	Infrastructure	Applications	Solutions
Systems analysis		IT Systems Analyst		
Hardware and Software development	Industrial Systems Technician	Industrial System Technician Security Technician Network Developer IT Systems Developer	Database Developer User Interface Developer Multimedia Developer	
		Software Developer		
Coordination / documentation	IT Project Coordinator IT Product Coordinator Configurations Coordinator Quality Management Coordinator IT Security Coordinator Technical Writer			
Customer service	IT Supporter IT Key Accounter IT Trainer			
Administration		Network Administrator IT System Administrator	Database Administrator Web Administrator	Business Systems Administrator
Solution development / consulting				Business Systems Adviser E Marketing Developer E Logistic Developer Knowledge Management System Developer
IT usage				Information Brokerer

The various professional levels are defined in terms of:

- Certification levels
- Competences
- Roles in the IT Process (Specialist levels only)
- Work-Processes

**Certification Levels**

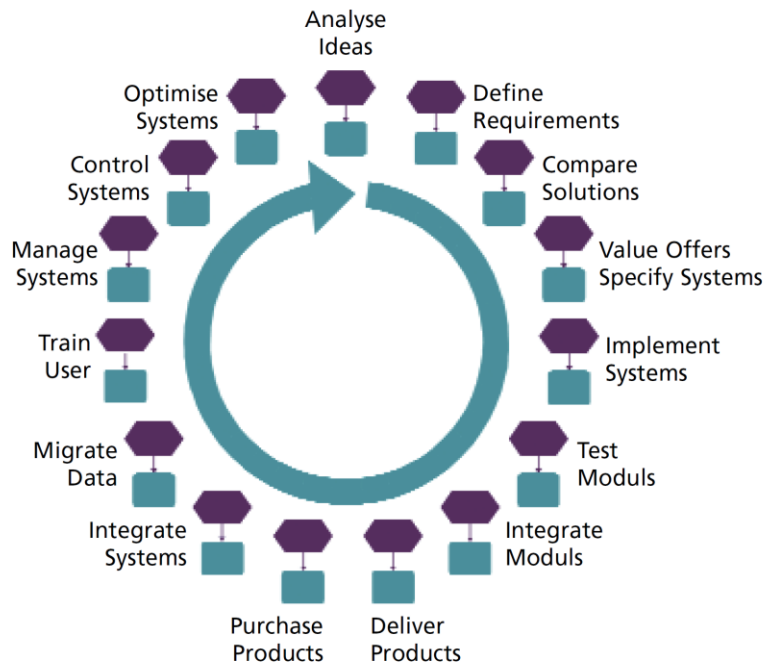
Generally speaking, the strategic professionals’ level requires certification through a masters’ degree, while the operational professionals and specialists require a bachelors’ degree or equivalent. While the operational professionals are certified through public exams organized according to federal regulation, the strategic professionals are certified through a private certification by an accredited certification agency.

**Competences**

For each of the occupations in the framework, a list of competences is defined, divided into universal / fundamental / transversal competences (such as problem analysis, communication, conflict resolution etc), group-specific competences which are required by all professions within the group and profile-specific competences which are particular to the job profile in question.

**Roles in the IT Process**

For the professions with the ‘specialist’ level, a further criterion of distinction is used. The full IT Process, is shown below:



Thus, each of the profiles is characterized by which parts of the above cycle the speciality encompasses.

**Work-Processes**

Work Processes consist of a:

- Definition of the tasks
- Definition of the core work processes
- A sequencing of the reference processes, i.e. the work processes are put into a logical series
- Modelling the work processes from the event-process-chain

The result of such a process is the creation of a so-called reference project, an example of which is given below for the profession of network administrator:

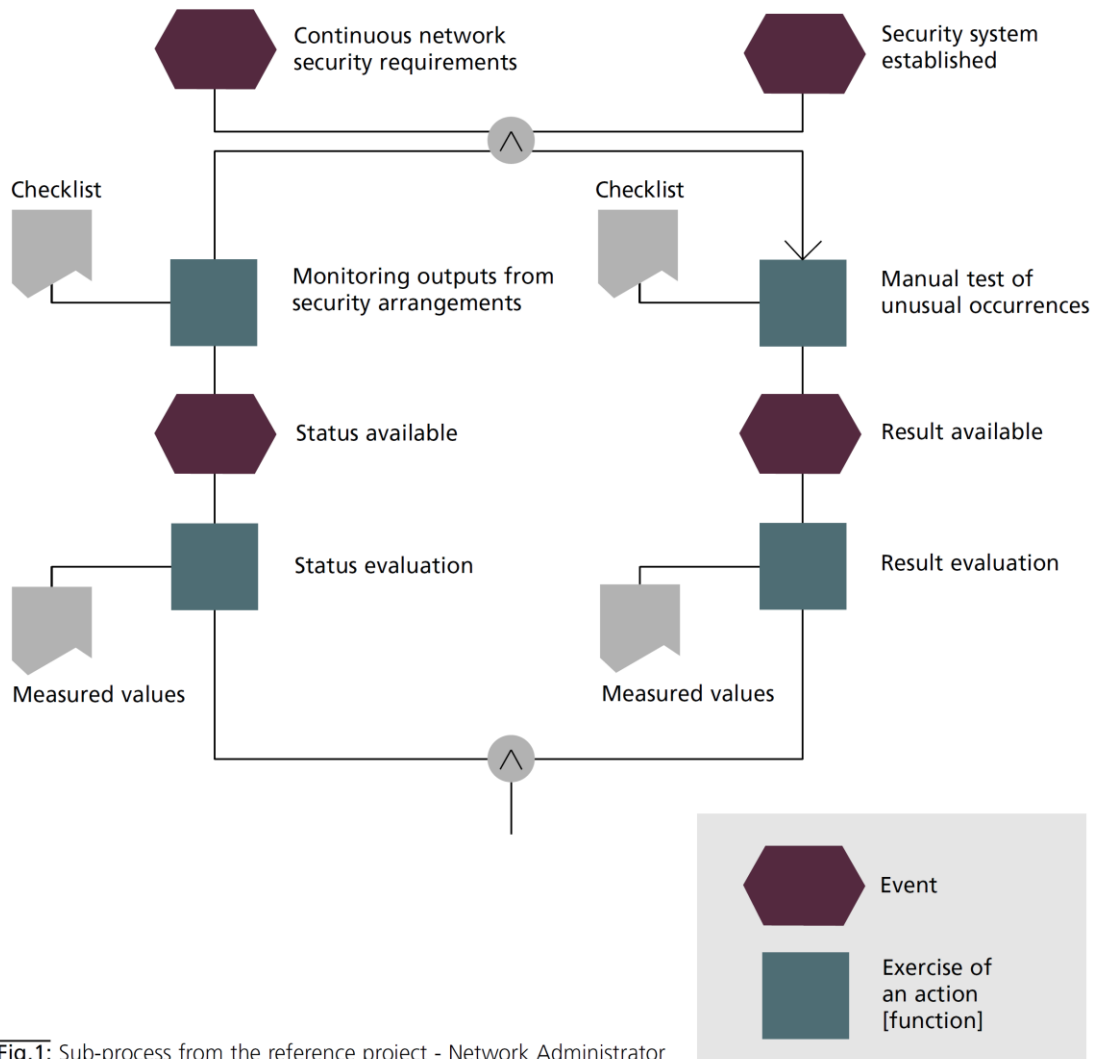


Fig.1: Sub-process from the reference project - Network Administrator

Competences and therefore learning content necessary for the accomplishment of the individual work steps can be derived from the work processes. These learning contents include specialist, methodological, social, and human competencies as part of the professional competence, and can be assigned to individual processes. This assignment then produces the basis for a process-orientated curriculum. The structuring of the learning content is decided therefore not on the basis of a formal organisation of the subject, but rather on the basis of the work process.

A reference project thus enables the identification of a number of work processes relevant for advanced training in a company, which contain similar processes and learning contents despite their

individual characteristics. The reference project serves as a template, which is filled with company-specific content and procedures. A project does not have to be a whole process. Sub-processes can also be carried out.

**Mapping against the European e-Competence Framework**

The complexity and uniqueness of the German AITTS system, does not allow for anything near perfect alignment of the two frameworks. However, AITTS occupations can be described in terms of selected competences from the e-CF. An example from the European e-Competence User Guide is presented below:

AITTS "level"	Selected AITTS	Selected Competences from the e-CF	e-CF level
Operative Professionals	IT Business Manager	A.4 Product or Project Planning	3
		A.6 Application Design	3
		D.5 Sales Proposal Development	3-4
		D.8 Contract Management	3
		D.9 Personnel Development	3-4
		E.2 Project and Portfolio Management	3
		E.3 Risk Management	3
		E.5 Process Improvement	3
		E.6 ICT Quality Management	3
		E.7 Business Change Management	3
Specialists	IT Project Coordinator	<i>if applicable some other and - of course - some more (not integrated in the e-CF)</i>	
		D.5 Sales Proposal Development	2
		E.2 Project and Portfolio Management	2-3
		E.3 Risk Management	2
		E.6 ICT Quality Management	2
IT Occupations (German Dual system)	Information Technology specialists in applications development	E.8 Information Security Management	2
		<i>(if applicable some other)</i>	
		A.6 Application Design	1
		B.1 Design and Development	2
		B.2 System Integration	2
		B.3 Testing	1
		B.4 Solution Deployment	1-2
		B.5 Documentation Production	1-2
C.1 User Support	1		
E.2 Project and Portfolio Management	2		
		<i>(if applicable some other)</i>	

**2.3 Other Approaches to e-Competence Definition**

While national e-Competence frameworks linked to the European e-Competence framework can easily be considered the most sophisticated and comprehensive methods for definition of e-competences, they are not the only method in use. This section, takes a look at three other commonly used approaches, namely: (a) university- and industry- led curriculum building efforts; (b)

sector-wide trans-national qualification frameworks; and (c) inclusion within other national qualification building efforts.

### 2.3.1 University- and Industry-led Curriculum Building

The “European e-competence curricula development guidelines” project was completed in January 2010 by a consortium led by INSEAD. It addressed the crucial role of universities in developing e-competences of both those entering the workforce (e.g. from Higher Education) and those from the existing workforce.

The research concludes that there are two general types of curricula development efforts to develop attractive content for these educational options. Industry-led efforts represent efforts led by ICT vendors to develop courses and certification exams that academic institutions can offer – either for free or by paying a membership fee. For example, Microsoft Academy is an annual membership programme that enables member academic institutions to deliver training on Microsoft technologies. SAP University Alliance also provides University faculty with tools and resources to teach students about how organizations get value from ERP technology - however their content is not specific to SAP products and services. Similarly, IBM's efforts at develop Services Science represent funding of non-IBM specific interdisciplinary curricula on designing and managing services.

University-led efforts at developing curricula represent efforts led by Universities that involve Universities, industry and government offices to develop curricula that foster e-competences. Two notable examples describe in the study are it-vest (Aarhus School of Business - Denmark) and CEFRIEL (Fondazione Politecnico di Milano - Italy). The study also highlights the Innovation Value Institute (Ireland) as an example of a curricula development effort that started as industry-led (specifically, Intel) and is now university-led. Finally, we highlight two university-led efforts (Aalto University Park at Aalto University in Finland and Foundation Degrees in the UK) as important success stories due in large part to the holistic approach taken by participating stakeholder groups.

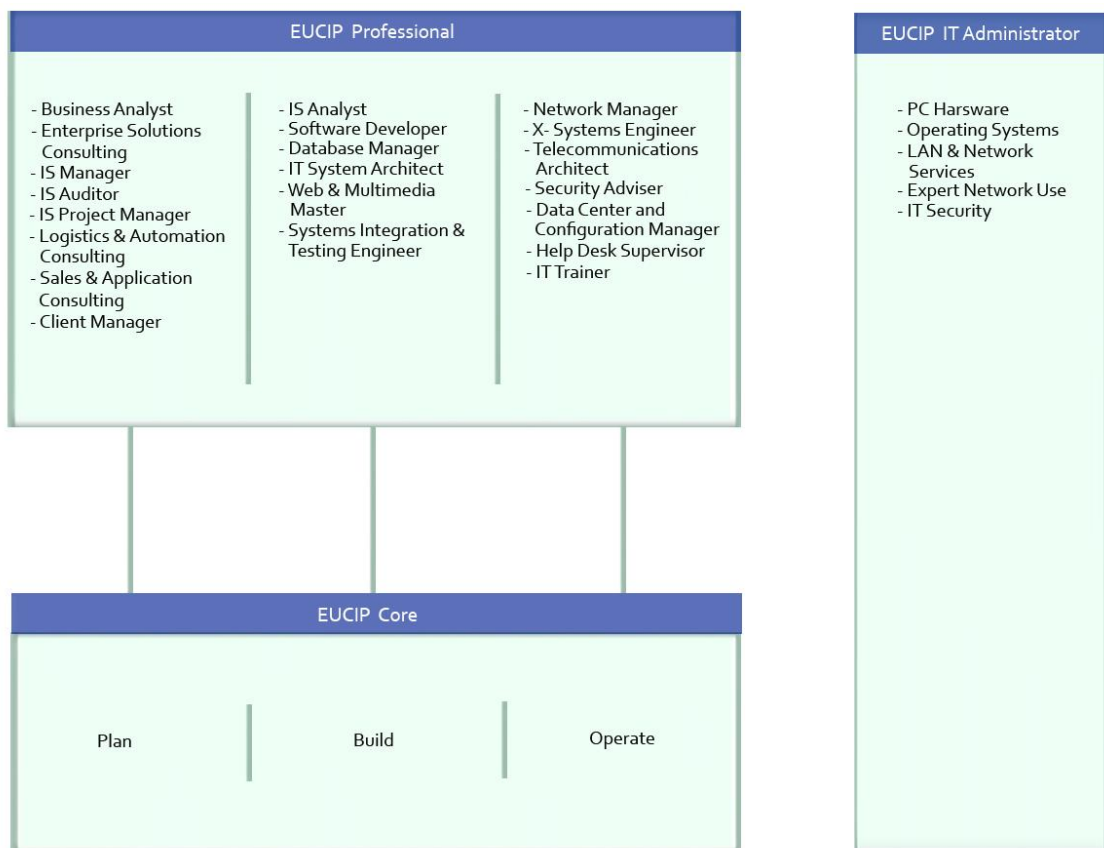
### 2.3.2 Sector-Wide Qualification Frameworks

While the SFIA, in that it is adopted in whole by institutions in over 100-countries can be considered a sector-wide qualification framework, it is built with consultation exclusively from UK stakeholders, and is designed primarily for UK consumption. Thus, we classify as a national framework, with the foreign implementations effectively being implementations of the ‘UK model’.

An example of a true sector-wide trans-national qualification framework (apart from the European e-Competence Framework itself) is the **EUCIP (European Certification of Informatics Professionals)** Framework which is intended as a qualification scheme for people entering the IT Profession and also for people currently involved in the IT Profession and wishing to further their professional development. Similar to ECDL, EUCIP is vendor neutral, and covers the core areas of building and operating an IT environment together with role specific electives such as that of IT Administrator. The qualification enables existing IT professionals to document their competencies and skill sets for employers or prospective employers, and in doing so raises their market value.

EUCIP is promoted by CEPIS – the representative body of national informatics associations throughout greater Europe, and is currently available in Croatia, Estonia, Ireland, Italy, Norway, Poland, Romania and Spain. In Malta, CEPIS it is represented by the Computer Society of Malta.

EUCIP covers a broad range of ICT knowledge on core topics relevant to all ICT practitioners. There are three EUCIP certification programmes: **EUCIP Core**, an introductory-level three-part ICT professional certification; **EUCIP Professional**, which is based around one of 21 different job profiles; and **EUCIP IT Administrator**, which is a stand-alone certification focusing on the skills required by an IT administrator typically working for a small or medium-sized enterprise.



**EUCIP Core is divided into three Knowledge Areas:**

**A) Plan Area: The Use and Management of Information Systems**

This area refers to requirements analysis and planning in the use of ICT within an organisation. It is therefore directly concerned with management processes and defining requirements within a strategic perspective.

**B) Build Area: Development and Integration of Information Systems**



This area includes processes for specification, development and testing, and maintenance of Information Systems. It deals with methodological and technological issues related to development processes.

**C) Operate Area: Operation and Support of Information Systems**

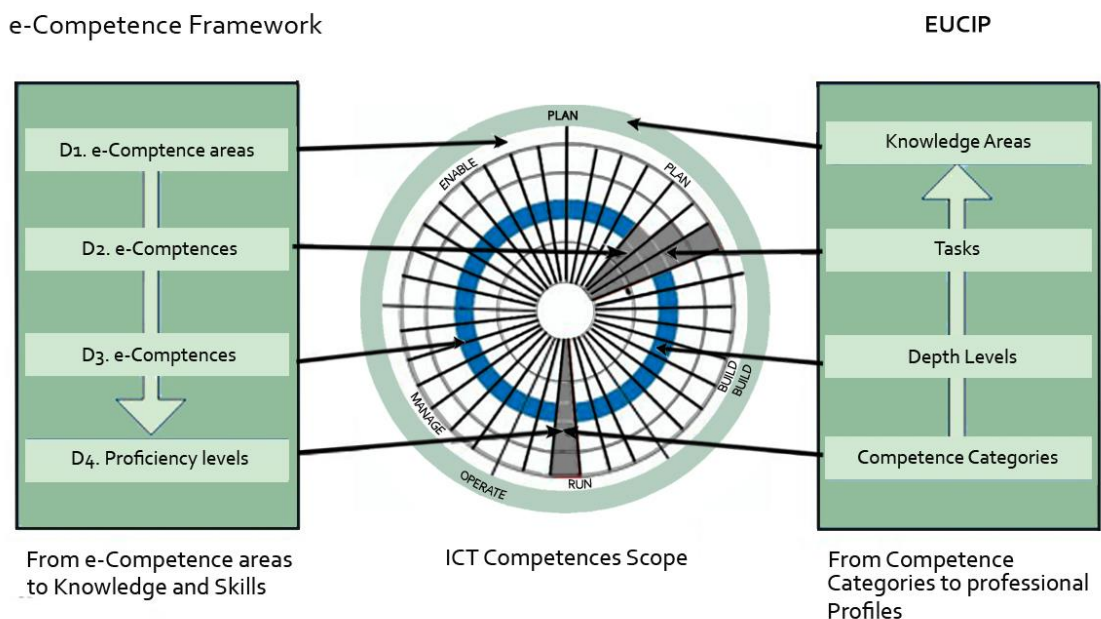
This area concerns installation, supervision and maintenance of ICT systems. Essential topics include: Hardware and software concepts, management of networks, service delivery and support, and security.

**EUCIP Professional** contains detailed profiles for each of the profiles, in terms of: level of knowledge, competence categories and the specific skills which are seen to make up each competence category.

In addition each profile (both in the core areas and the professional/elective areas) contains:

- A sample curriculum for teaching the subject, thus elucidating the knowledge involved in detail
- A list of certifications/modules from both companies and academia which provide the competences described
- A mapping of the job profile with other frameworks, namely the SFIA, the AITTS Framework and the CIGREF nomenclature

In terms of mapping to the European e-Competence Framework, the User Guide proposes the following mapping methodology:



**2.3.3 Absorption of e-Skills into National Qualification Frameworks**

This implementation involves the creation of an all-encompassing national qualification framework, without the creation of a dedicated e-skills competence/occupational framework. These often focus on a concept of 'ICT-User Skills' to the exclusion of a specific focus on Practitioner / Professional skills. Examples of some countries practicing this type of implementation include:

- **Greece:** Common Ministers Decision (Labour & Education) - known in Greece as "KYA-A/25081/2005" - Minimum Syllabus Requirements which determines the whole procedures, regulations and requirements from private certification bodies in IT field. The "Minimum Syllabus Requirements" part of K.Y.A. contains six (6) modules which are disaggregated in 3 Levels (Units- Knowledge/Skills- Actions/Procedures). The structure is identical to modules 2 to 7 of ECDL Syllabus V4.0, which is well recognised in Greece.
- **Romania:** The National Education Pact, named "Education and Research for a Knowledge Society" Strategy, focuses on 8 key competences, which includes one referring to digital competences. These categories make up a framework focused on the development and modernisation of curricula for secondary school and college institutions

## 2.4 Assessing Usability of the Frameworks

### 2.4.1 Criteria for Determining Usability

Based on the specific characteristics of the Maltese system, as well as generally accepted principles of usability, we have defined 5 criteria by which to determine framework usability, namely:

#### UC-1 Flexibility

The idea of flexibility comprises a number of concepts, namely those of:

UC-1.1 **Adaptability** – measured by the number of usage scenarios for which the framework can be applied.

UC-1.2 **Speed of Evolution** – either as part of the iterative evolution of standards, or as *ad-hoc* initiatives, measured by the ease and speed by which the framework can respond to changes in the skill landscape

#### UC-2 Ease of Use

UC-2.1 **Cohesiveness** – the levels and parts of the frameworks show a similar structure, with fluid transitions between levels

UC-2.2 **Ease of Adoption** – the framework can be easily adopted by users without disruption to their processes

UC-2.3 **Support Availability** – the framework includes clear guidelines, instructions and use examples to guide implementation and use

UC-3 **Comprehensiveness**

UC-3.1 **Specificity** - this criterion considers the detail in which the job profiles are described, through the range and quality of the descriptors used.

UC-3.2 **Link to Occupational Standards** – the framework should have a role in establishing or describing occupational standards for ICT

UC-3.3 **Link to Education & Certification** – the framework should have a role in defining curricula, tests and certificates

UC-4 **Sustainability**

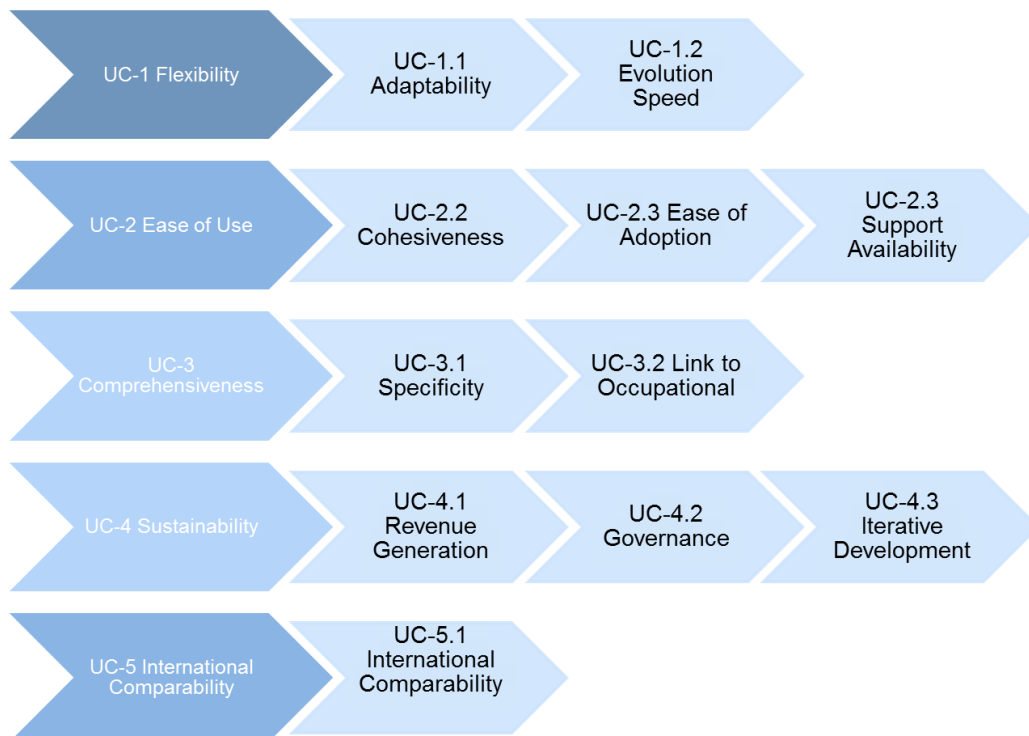
UC-4.1 **Revenue-Generation**: the framework has a sustainable revenue model to guarantee long-term support.

UC-4.2 **Governance** – a governance mechanism is in place to supervise framework design, development and maintenance

UC-4.3 **Iterative Development** – a structure is in place to continuously monitor and review the standards

UC-5 **International Comparability**

UC-5.1 **International comparability** – the qualification framework can be described in terms of other internationally recognized frameworks



## 2.4.2 Analysis of frameworks against usability criteria

### UC-1 Flexibility

- Both the SFIA and CIO frameworks have been applied in numerous countries, due to a focus on describing job profiles / e-competences for the ICT industry as a whole, rather than describing the situation in a particular country
- SFIA and CIGREF show a high speed of evolution due to (a) the institutional structures supporting them (b) a streamlined decision process, not requiring changes to legislative instruments, (c) a generic link with academic qualifications (described in terms of EQF-levels, or specific degrees, as opposed to definition of a curriculum)
- The AITTS shows very low flexibility due to the fact that (a) most of it is implemented by Federal legislative instrument, (b) it is highly customized to Germany's specific system of education, (c) the framework itself is intrinsically linked with job processes and curricula

### UC-2 Ease of Use

- The CIGREF Nomenclature is the most cohesive of the frameworks, with a single structure applied throughout the framework.
- While the SFIA also shows a standard structure throughout the framework, it's relationship with the National Occupational Standards and e-Skills PROCOM is ill-defined, making its implementation within a UK context more challenging
- All three national frameworks show ease of use in terms of their ease of adoption, due to the fact that they are designed as descriptive rather than prescriptive frameworks, i.e. they describe existing job profiles and competences (whether in supply or demand)
- A variety of support tools have been deployed to support the e-skills frameworks including case-studies, sample templates of mapping, curricula and assessments, academic papers, handbooks. All the frameworks use significant graphic facilitation to explain their structures.

### UC-3 Comprehensiveness

- All the frameworks identified show high levels of specificity in description of the competences in terms of knowledge/skills/understanding/attitudes, with the exception of the SFIA, which requires an additional SFIAplus module produced by a separate organization to have a full set of descriptors. This also facilitates mapping to the European e-Competence Framework. Frameworks which include occupational process descriptions (CIGREF by means of its 'deliverables' field and AITTS by means of its ontology for process descriptions), or curricular guidelines (AITTS and EuroCIO) gain improved levels of specificity through this inclusion
- None of the frameworks deal solely with e-competences in the abstract, but apply them to either occupational categories or specific occupations. In the case of the United Kingdom,

this is done through the existence of both National Occupational Standards and the SFIA, which have been designed in close cooperation, but which however do show a significant number of minor variations, making their usage confusing

- In all cases, the frameworks have a link to education and certification processes. Two separate models can be defined:
  - The framework links competence acquisition to the acquisition of particular qualifications. The SFIA does this through a link with the National Qualification Framework, which is in turn linked with the respective qualifications, while the CIGREF nomenclature is more specific, in that it defines the qualifications (including non-formal education acquired as career experience) required to meet the requirements for each job profile
  - The framework defines the curricula and certification structures for acquisition of the competences. This is the model followed by the AITTS and the EuroCIO schemes.
- Only the CIGREF and AITTS frameworks make specific reference to competence acquisition through non-formal/informal learning processes at the workplace

#### **UC-4 Sustainability**

- None of the frameworks were developed directly by governments. In every case, the frameworks were developed by independents, foundations, boards or sub-contractors. The AITTS framework has the highest level of direct-government link in that it was created by sub-contractors contracted by German Federal funding agencies.
- A large variety of governance/funding models are in place across the countries. Since all these models have proven themselves sustainable, we do not have any data to distinguish any of the models as objectively better than the others:
  - SFIA is run by a foundation created for the purpose by the main representative stakeholders in the sector, and financed through licensing fees
  - AITTS and the UK ICT National Occupational standards are run by competence centres – generally described as government-financed, industry-led organisations specifically created to deal with skilling issues
  - CIGREF is a membership organization, which finances its nomenclature development through membership fees
  - EuroCIO is run by an umbrella organization of National ICT bodies, and is financed through licensing fees
- All the frameworks undergo periodic reviews. However, the CIGREF practice of holding monthly meetings over an extended period of several years stands out as an example of good practice (which also contributes very significantly to UC 1.2)

#### **UC-5 International Comparability**

- The competence descriptors of all the analysed frameworks can be mapped to the European e-Competence Framework. However, in most cases the ‘mapped’ version of the

competences, while accurate, bears little resemblance to the original competence framework

- The approach taken by CIGREF is an excellent example of enhancing international comparability. In 2010 it harmonized (as opposed to mapped) its nomenclature with the eCF. Thus, it used the competence list and descriptors *exactly* as described in the European e-Competence Framework, to describe its profiles, and then enhanced the job profiles with some other elements apart from competence descriptors. This makes comparability with the European e-CF seamless, since the French and European frameworks are thus fully integrated
- EuroCIO took a different approach, mapping its job profiles directly against those provided by SFIA, AITTS and CIGREF. This provides an extra level of usability, in that it saves the user from needing to translate competences through the European e-Competence framework, and then find jobs matching those translated competence profiles – in the EuroCIO model, this step is already done, providing the user with just the results.

## 2.5 Application Scenarios in Malta

Based on the above discussions, we can define three different scenarios, each of which addresses a different approach to dealing with e-competences:

- Scenario 1: Full Implementation of an existing competence framework such as the SFIA or the EuroCIO model
- Scenario 2: Creation of a national competence model, based exclusively on the European e-Competence Framework
- Scenario 3: Rejection of a national skills approach, in favour of generic skills competences

Of these options, Scenario 3 is the easiest to reject outright, as it goes directly against the ideas laid out within the national skills strategy. In addition, the projected imminent sharp e-skills gap in Malta, warrants a dedicated strategy to combat it. Scenario 1, while attractive in that it saves on development costs and effort, does not allow for sufficient specificity for the Maltese context, in particular those characteristics described earlier on in this report. In addition, both the frameworks that lend themselves to this type of application only show excellence in certain usability criteria, while lacking in several others. Of the options above, Scenario 2 would seem to be the most desirable, in that it meets the requirements of specificity, however, basing a national skills framework exclusively on the European e-Competence framework, would leave open the questions of job profile specifications and curriculum development, since the competence framework is meant to be used for these applications, but does not explicitly encompass them within its structure.

For this reason, we propose a fourth scenario designed to take elements of all the frameworks in particular reference to the Maltese context, which we have named the *Integrated Hybrid Model*.

This model envisages the development of four inter-related tools which together will create an ecosystem for description, development and certification of professional e-Skills in Malta, namely:

- A competence framework with competence descriptors based closely on the European e-Competence Framework
- A system of credits (structured into qualifications) designed to deliver learning outcomes in line with the competence descriptors
- A system of recognition of non-formal/informal learning at the workplace, through description of work-place processes and outcomes
- Job Profiles for Maltese ICT Professions, integrating the three above tools together.

### 2.5.1 Best Practices for Implementation of the Integrated Hybrid Model

Based on the comparisons made in the previous sections we can make some conclusions as to how to build and manage the structure suggested above.

#### Governance and Development

In terms of development of the models, every successfully implemented framework has been developed by an independent group of experts coming from public administration, academia and industry, who together managed an extensive consultation amongst all related stakeholders.

In Malta, the e-Skills Alliance set up in October 2010 provides an initial pool of experts tasked with exactly such a task. In terms of revenue, it is clear that continued development will need to be largely government-financed, as the potential clientele for the products of this process are insufficient in number to justify either a license-based or membership-fee based models.

As the National Qualifications Council is in the process of defining a set of occupational standards linked to the Malta Qualifications Framework, we would highly recommend that the ICT-Skills Alliance be designated the sector skills council for ICT, and that the development of the Maltese e-competence framework happens exclusively within this forum, in line with guidelines provided by, and with expert support from, the Malta Qualifications Council

In addition, we would recommend that the e-Skills Alliance adopt a continuous iteration approach to developing the standards, similar to the CIGREF system, with regular meetings to discuss skill changes and evolution, leading to updates of the tools as necessary. Using this model, would allow Malta to address the 'Smart-City effect' described earlier in the most effective way possible.

Finally, we would recommend that implementation via legislative tool be kept to the minimum, to minimize the bureaucracy involved in developing and promulgating the framework. (Of the systems surveyed, the German AITTS, which is the most integrated with national law, is also the slowest to evolve, partially for this reason).

### **Competence Framework**

In terms of a competence framework, we would recommend adoption of the European e-Competence framework 'as-is', with an extension/modification of the elements of the fourth dimension to match the local context.

Especially at higher levels, Malta is not capable of providing training in every specialist area of ICT, necessitating students to undertake distance studies, or studies abroad. Having a national e-competence framework which has been harmonized, as opposed to mapped, with the European e-Competence framework, will make translation of these qualifications to the local context far easier.

This method and approach would thus closely mirror the 2010 iteration of the CIGREF nomenclature from France.

### **A system of credits**

The afore-mentioned project lead by INSEAD on ICT-Curricula in Higher Education in Europe identified the following best practices in the authoring of ICT-Curricula:

1. Developing consensus on definitions of e-competences and developing attractive curricula for fostering e-competences require having third-party organizations that coordinate and mediate the diverse interest of participating stakeholder groups
2. the most popular courses include professionals who have left industry and joined the academic institute providing the course
3. successful curricula are developed into components, to avoid becoming dependent on technological changes
4. successful curricula development efforts are part of a broader, more systemic approach at enhancing e-competences

Based on existing best-practices, and the INSEAD recommendations, we would suggest the definition of ICT curricula in terms of ECTS / ECVET credits, on the basis of guidelines provided in the ECTS / ECVET handbooks. One possible model would be to emulate the AITTS system in Germany, whereby the ICT-Skills Alliance would produce a customized version of a credit handbook, explaining how to create credits which are mapped to the Maltese ICT competence structure, thus giving the university and/or MCAST the ability to define the curricula independently (thus the entire process augments rather than infringes on university autonomy), although with a recommendation to involve experts from industry in curriculum design activities.

The definition of groups of credits into qualifications would be done partly at the institutions' discretion, and partly considering the needs of the occupational profiles described within the fourth component of this ecosystem.

### **A system of recognition of non-formal and informal learning**



For such a system, we would advocate aiming for a level of complexity which sits in between that present in the CIFREF Nomenclature and the AITTS Framework. Thus, the recognition system would have two components:

- a description of the competences at various levels in the framework, in terms of the appropriate professional experience (where applicable), as opposed to academic experience, which would lead to their acquisition
- a description of the job processes and outputs in terms of knowledge and skills, which can be expected as part of different job profiles. This second component would however form an integral part of the fourth part of the ecosystem, i.e. the job profiles.

### **Job Profiles**

The job profiles would constitute a detailed description of occupational categories in terms of competences, knowledge required (from education and/or from previous job experience), job processes and job outputs. An occupational category is a definition of a set of occupations which is sharp enough to allow for it to be covered by a unique set of credits and/or competences, but which is still general enough to allow for specification of specific jobs / job functions by individuals or employers within it (modelled on both the SFIA and the CIGREF classification systems).

## 3. A competence-based approach to learning

### 3.1 Defining e-Skills in a Professional context

In the first chapter, we made a distinction between Professional Skills for ICT and e-Skills. Following the discussions in the previous chapters, we will further these definitions. The following definitions are as outlined in the European Communication *e-Skills in the 21<sup>st</sup> Century*, and which, as such, have been recognized as the de-facto definition by the e-Skills Industry Leadership Board, a number of independent studies and the European e-Competence Framework.

**ICT Practitioner Skills** (or what we have referred as Professional e-Skills) refer to:

*the capabilities required for researching, developing, designing, strategic planning, managing, producing, consulting, marketing, selling, integrating, installing, administering, maintaining, supporting and servicing ICT systems.*

**ICT User Skills** (or what we have referred Generic e-Skills) refer to:

*the capabilities required for the effective application of ICT systems and devices by the individual. ICT users apply systems as tools in support of their own work. User skills cover the use of common software tools and of specialised tools supporting business functions within industry. At the general level, they cover "digital literacy"*

**e-Business Skills** (often also referred to as entrepreneurial skills) correspond to:

*the capabilities needed to exploit opportunities provided by ICT, notably the Internet; to ensure more efficient and effective performance of different types of organisations; to explore possibilities for new ways of conducting business/administrative and organisational processes; and/or to establish new businesses.*

The above definitions of ICT Practitioner Skills always highlight “the capabilities needed” as opposed to “the technical capabilities needed”, making it clear that any definition of e-skills in fact includes any number of skills which contribute towards the job profile in question. As such, e-skills will always also need to encompass the concepts of:

**Key Competences for LLL**, which refer to:

*A transferable, multifunctional package of knowledge, skills and attitudes that all individuals need for personal fulfillment and development, inclusion and employment. These should have been developed by the end of compulsory schooling or training, and should act as a foundation for further learning as part of lifelong learning.*

**Transferable Skills**, (also referred to as key skills, generic skills, generic competences, transversal skills, etc), whose simplest definition is:

*Skills developed in one situation which can be transferred to another situation*

A more sophisticated definition describes the skills as those which:

*all study, work and careers have in common. Thus they serve as a bridge from study to work or from one career to another. Once you have demonstrated or mastered a skill in one career, you can easily transfer it from one job to another, from one field to another, from one career to another. That is why they are called transferable skills<sup>8</sup>.*

## 3.2 Competence as a Collection of Knowledge, Skills and Attitudes

The CEN ICT Skills Workshop, in preparing the European e-Competence Framework, defined competence as the:

*demonstrated ability to apply knowledge, skills and attitudes for achieving observable results*

In turn, knowledge, skills and attitudes were defined as following:

*Knowledge represents the "set of know-what" (e.g. programming languages, design tools...) and can be described by operational descriptions.*

*Skill is the "ability to carry out managerial or technical tasks". Managerial and technical skills are components of competences and specify some core abilities that form a competence.*

*Attitude means in this context the "cognitive and relational capacity" (e.g. analysis capacity, synthesis capacity, flexibility, pragmatism...). If skills and knowledge are the components, attitudes are the glue, which keeps them together.*

Within academic literature, numerous articles have been dedicated to the concept of the KSA or Knowledge / Skills /Attitudes. Of the various integration efforts, one of the most recognized is the series of articles published by Graham Cheetham and Geoff Chivers which attempt to synthesise the

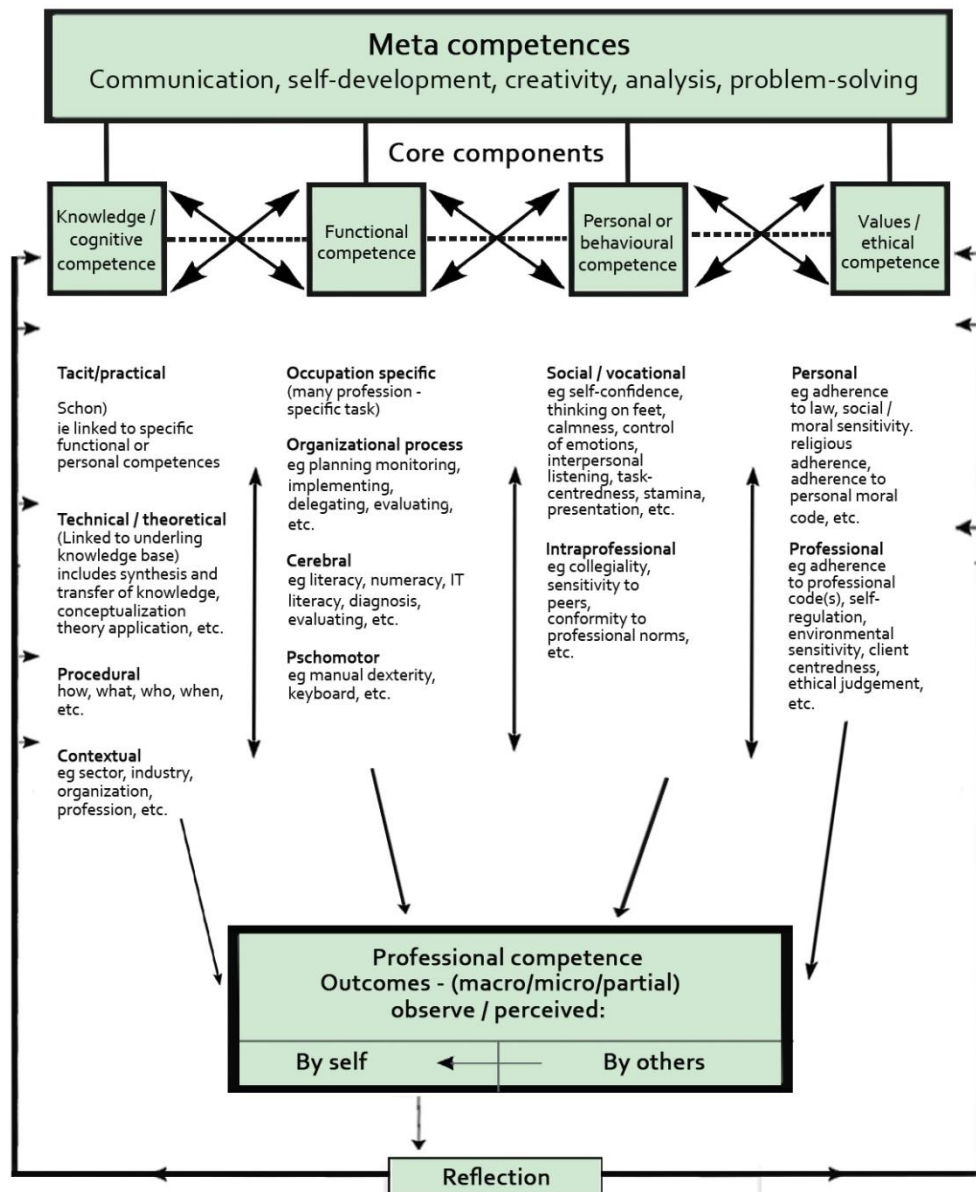
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<sup>8</sup> Source: [www.skillsproject.ie](http://www.skillsproject.ie)

various models in existence, and which shows remarkable similarity to the concepts elucidated in the various competence frameworks which have been analysed in this document.

In the Cheetam / Chivers typology:

- Meta-competences – are equivalent to a combination of what we refer to as transversal and key competences
- Knowledge/cognitive competence equates to Knowledge in our KSA model
- Functional competence describes what we refer to as skills
- Personal/behavioural together with values/ethical competence comprise what we refer to as attitudes



A 2005 CEDEFOP study on competence typologies, analysed the prevalence of the Knowledge/Skills/Attitudes approach in EU states, producing the following overview:

Country	Knowledge or Cognitive competence	Skills or Functional competence	Competencies or Social competence
Austria	Sachkompetenz		Personalkompetenz
		Sozialkompetenz	
Finland	knowledge	working methods	core competences
	safety		
	Savoir (competences theoriques)	savoir faire (competences pratiques)	savoir etre (competences comportementales)
Germany	Fachkompetenz		Personalkompetenz
	Sachkompetenz	Methodenkompetenz	
		Sozialkompetenz	
Hungary	Knowledge	application of knowledge	professional attitudes and behavior
Ireland	Knowledge	know-how and skill	competence - role, insight and learning
	competence - context		
Netherlands	vakmatig-methodische		social-communicatieve
			Ontwikkelings
	bestuurlijk-organisatorische en strategische		
Portugal	competencias cognitivas	competencias funcionais	competencias sociais
United Kingdom England and Wales	underpinning knowledge	functional competence	social competence
United Kingdom Scotland	knowledge and understanding	practice (applied knowledge)	autonomy, accountability, working with others
	generic cognitive skills	communication, numeracy, IT skills	

The European Qualification Framework uses the concepts of knowledge, skills and competences as approximately equivalent to knowledge, skills and attitudes as defined above. By the EQF definitions:

**Knowledge**, is defined as

*the outcome of the assimilation of information through learning. Knowledge is the body of facts, principles, theories and practices that is related to a field of work or study. In the context of the European Qualifications Framework, knowledge is described as theoretical and/or factual;*

**Skills**, is used to refer to:

*the ability to apply knowledge and use know-how to complete tasks and solve problems. In the context of the European Qualifications Framework, skills are described as cognitive (involving the use of logical, intuitive and creative thinking) or practical (involving manual dexterity and the use of methods, materials, tools and instruments);*

**Competence**, (or by the lexicon of this study, attitudes), means :

*the proven ability to use knowledge, skills and personal, social and/or methodological abilities, in work or study situations and in professional and personal development. In the context of the European Qualifications Framework, competence is described in terms of responsibility and autonomy.*

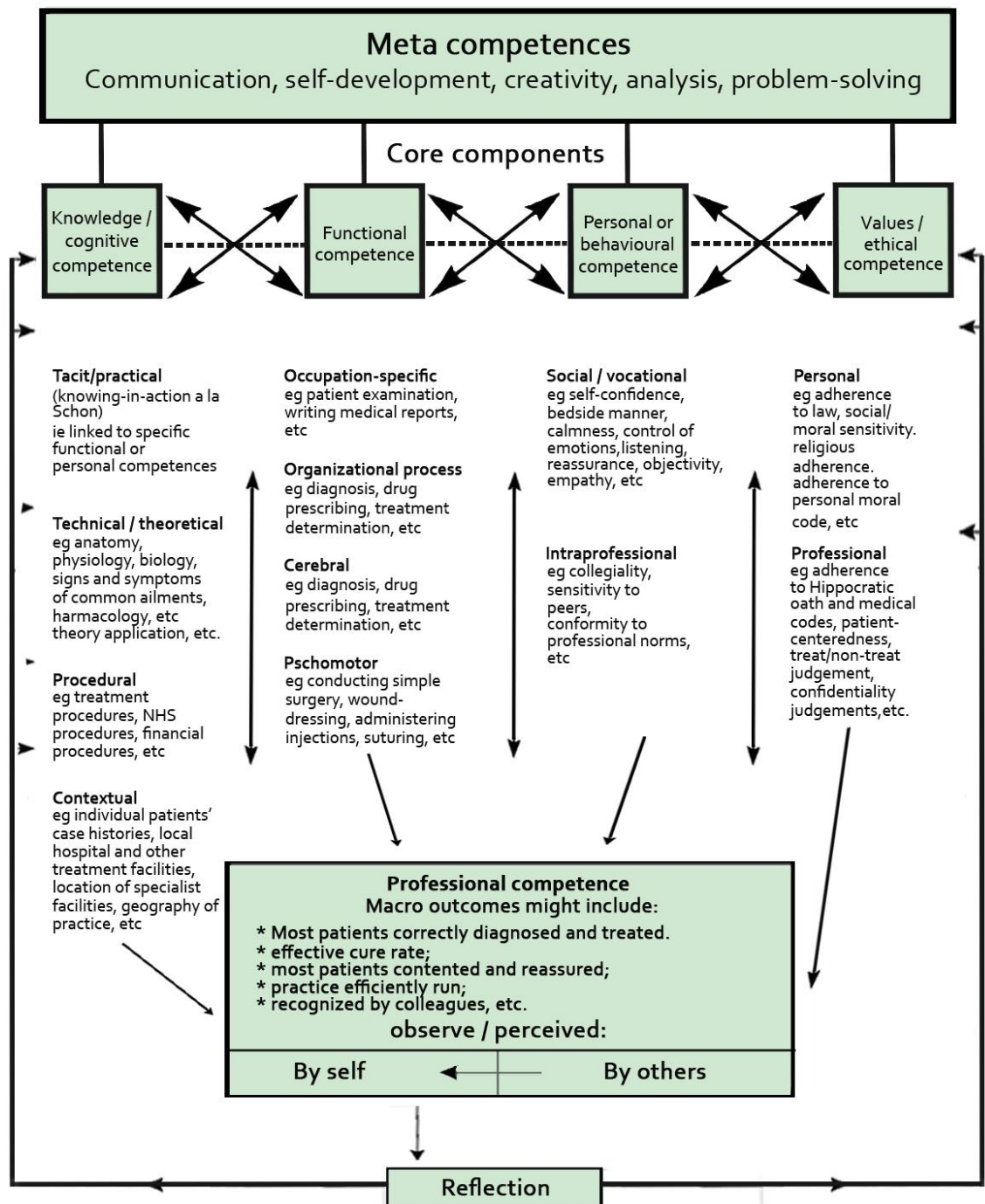
### 3.3 Occupational Standards and Job Profiles

Occupational Profiles consist of a number inter-related tools which can be combined to describe a job. Most commonly, these may include:

#### **Competence Descriptors**

Using the KSA model described above, competences required for a particular profession are described. Due the near-infinite variety of competences which may be described, many systems for occupational standards use a standardized vocabulary in the form of a competence framework, to allow for comparability between different occupational profiles, and for streamlining with the education, training and continuing professional development systems.

If we map the KSA generic synthesis model described above to a particular occupation, in this example, that of Medical GP, we get a result as following:



### Link with Education and Training

While not strictly required in a competence based approach, it is normal for an occupational profile to give an idea of the Education & Training which is considered to be considered as adequate for acquisition of the mentioned competences. In the case of an occupational standard, the standard will certify certain experience and/or learning, as appropriate for the acquisition of a set of competences.

**Link with Work Descriptors**

In addition, a generic occupational standard or job profile, should include a description of the types of tasks which are expected to be performed as part of the normal work-cycle, together with outputs which will be produced. Where such descriptions are produced in detail, they can also be used by education & training institutions to aid curricular design, as well as in the recognition of non-formal learning in the form of on-the-job experience.



## 4. Views from Stakeholders

This chapter is based on a set of interviews conducted with employers, social partners and educational institutions in Malta during December 2010 and January 2011. The interviews were conducted by phone or in person in a semi-structured fashion, guided by an interview grid.

### 4.1 Professional Competences as Demanded by Enterprise

#### 4.1.1 Typology of Job Profiles

The term 'ICT Practitioner' in Malta seems to comprise six different occupational categories. The categories, together with competences required for each role, are described below:

<b>Programmer / Developer</b>	<p><b>Competences:</b></p> <ul style="list-style-type: none"><li>• Knowledge of software design lifecycle</li><li>• Definition of specifications</li><li>• Knowledge of specific programming languages</li><li>• Transversal competences</li></ul> <p><b>Level of Education:</b></p> <ul style="list-style-type: none"><li>• Tertiary, preferably EQF level 6.</li></ul> <p><b>Responsibilities:</b> Software Programmers / Developers are responsible for writing the code which goes into software. At a more senior level they define the overall architecture and specifications. They are responsible for planning, executing, (initial) debugging and maintenance of the code.</p>
<b>Support /Customer Care</b>	<p><b>Competences:</b></p> <ul style="list-style-type: none"><li>• Very strong emphasis on transversal competences, especially interpersonal competences, language competences and problem-solving skills</li><li>• Basic levels of e-Competence</li></ul> <p><b>Level of Education:</b></p> <ul style="list-style-type: none"><li>• EQF Level 5 or higher</li></ul> <p><b>Responsibilities:</b> Customer Care / Support agents, liaise with customers to solve their queries in terms of troubleshooting and sales enquiries. In both cases, the support agent</p>

should have the ability to identify the type of problem, with the help of standardized problem-solving guides, provide solutions where possible, or escalate the issue to the appropriate persons within the company. Due to the fact that many of these agents work in SMEs, many of these agents are also expected to perform some amount of low-level marketing, quality assurance and/or secretarial tasks.

## Administrator / Engineer

### Competences:

- Project management Skills
- Software Design Lifecycle Knowledge
- Technology Watching
- Problem Solving Skills
- Documentation Production
- Hardware / Networking Technologies (Engineer)
- Specific Technical Competences

### Level of Education:

- EQF level 6 or higher (preferably BSc. IT or equivalent)

### Responsibilities:

Responsibilities typically include monitoring of systems for problems, risk management (in terms of security, capacity planning etc), production of documentation for users and technical support, regular maintenance of systems, analysis of systems to improve efficiency, etc.

When designated as an engineer, the occupation often involves more strategic planning of ICT systems, particularly in terms of networking.

## Analyst

### Competences:

- Quality Assurance Methodologies
- Project Management Skills
- Documentation-Writing and Design
- Strong Analytical Skills
- Transversal Skills
- Specific Technical Competences

### Level of Education

- EQF level 6 or Higher

### Responsibilities:

Analysts may take on a variety of responsibilities including that of project management, quality assurance, specification design, market research etc. They generally work on specialist, slightly 'academic' roles in support of other teams within the company.

## Sales

### Competences:

- Communication skills
- Workshop / Presentations
- Sales / Relationship Management
- Transversal Skills

### Qualifications:

- EQF level 6 preferred

### Responsibilities:

Typical responsibilities include, generating new leads through cold-calling, answering requests for information, understanding client requirements, generating proposals based on client requirements, following up relationships etc.

## 4.1.2 Specific Characteristics

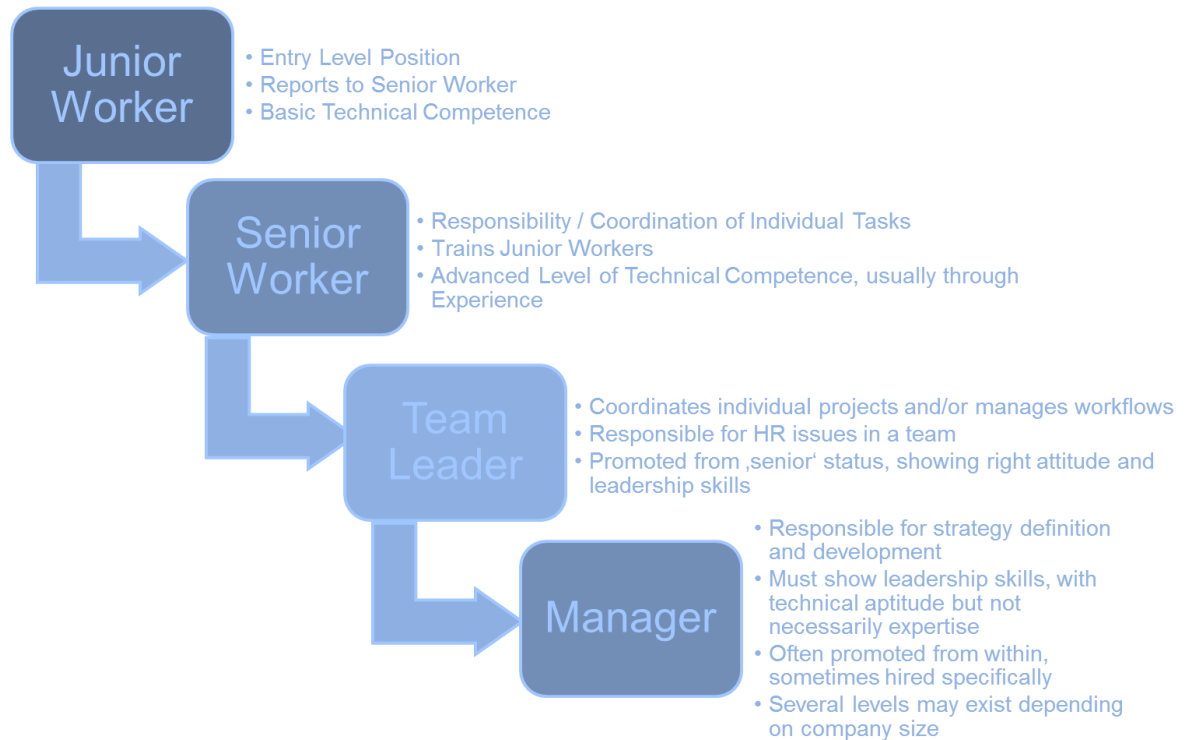
Within the Maltese context, job profiles are often conditioned by the fact that local enterprise is made up nearly exclusively of SMEs. Due to this, many of the roles overlap extensively, with for example software developers being expected to do quality assurance and project management, call centre agents being expected to contribute to quality assurance and marketing activities and so on. Due to this, an even stronger emphasis is put on the acquisition of transversal competences. The quality of being an “all-rounder” and “flexible” is highly sought after.

While all employers in the interviews stressed the need for tertiary education as a qualification, analysis of job profiles made by the employers, nearly always called for specific technical skills without any mention of specific qualifications – this mainly due to the fact that such short, specialized qualifications were not available from the public Higher Education Institutions in Malta. Where specific qualifications were requested, these were nearly always industry certifications. From this we conclude, that tertiary education, notably in Malta the BSc. IT Degree, seems to qualify as the standard evidence of acquisition of the various competences needed to work in the field, together with specific knowledge of the skills needed for the job.

All employers stressed the need for experience, and requested a minimum of 2 years’ experience for all positions, including those at entry level. As was pointed out by some employers themselves, this provides challenges for new graduates, often without job experience, trying to enter the labour market. While employers recognize progress having been made in the field, they stress that tertiary education institutions, particularly university, need to do more to provide practical experience, including in the form of apprenticeships / internships, so as to better prepare graduates for the labour market.

The competences and structures of management roles are hard to define across the sector, also due to the size of the companies involved. All companies interviewed deployed rather flat management

hierarchies, with only 4-6 levels between entry-level and CEO. We have managed to qualify the management levels typically present each company as following:



Generally speaking, the transition from junior to senior to team leader often involved:

- The acquisition of new technical competences
- Confirmation of reliability and responsibility (referred to by many as 'attitude')
- Acquisition of new transversal competences

To reach manager position often involved development of new competences including leadership and entrepreneurial skills. No employer specifically mentioned the need to get further formal training in the form of a degree as a criterion for promotion.

### 4.1.3 Transversal Competences

All employers put a large emphasis onto transversal competences, with many of them complaining of the low level of competence in this area displayed by potential employees. In fact, when queried about skill shortages in Malta, most employers said that they were satisfied with the level of skills provided by the BSc. IT course, and instead pointed out the low level of transversal skills as well as of applicable job experience, shown by graduates. More than one employer used the word 'arrogant' to describe the attitude of graduates. Interestingly, many employers, while not requiring mathematics

as a technical competence, specifically mention a math qualification, or at least proficiency in the subject, as evidence of transversal skills such as problem-solving, accuracy, precision etc.

All employers, with hardly any exception pointed out major skill deficiencies in two areas, namely:

- Level of English: at all levels, including those graduating from university courses, the level of English of graduates is generally perceived to be abysmal
- Interpersonal Skills: broadly speaking these include basic social skills (good manners, politeness), communication skills, team-work, ability to follow instructions etc

In addition to these, various employers also demanded: leadership skills, presentation & workshop organisation and listening, from prospective employees.

It is interesting to note that only one employer specifically mentioned innovation & creativity when asked about transversal skills.

#### **4.1.4 Continuing Professional Development**

From our survey of enterprise, we concluded that there are four prevalent methodologies, namely:

- on the job practical training
- in-house formal training
- training provided through collaborations with industry partners / educational institutions
- self-motivated training on the part of the employees, outside the company

##### **On the Job Training**

On the job training is seen as critical for entry level employees to understand their work, and is usually done under the supervision of a more senior employee. Most companies have a formal guideline or programme to guide entry-level employees through this type of training.

There is obvious recognition of the contribution of on-the-job experience to competence development, however with only one exception, companies seem to prefer to qualify experience in terms of number of years of experience and 'attitude', rather than through the acquisition of specific on-the-job competences.

##### **In-House Formal Training**

Aside from introductory training to familiarise employees with their jobs, this is the preferred method of providing of providing employees with continuing professional development in Malta. A good number of the companies interviewed have formal training programmes for employees and some even have training units or even training academies to support the process.

Most of the companies do systematic and continuous 'refresher' type training to every employee on a regular basis, coupled with specific courses to allow employees to acquire new skills, usually in the context of meeting skill needs for specific projects. All business interviewed emphasised that such training is essential to keep the business up-to-date with the rapidly evolving ICT field.

#### **Training Provided through Collaborations**

The idea of providing company-training through collaborations with the public education authorities does not seem to have gained any real traction in the Maltese context, although both the University and MCAST are in the process of formulating strategies to enter this market.

A number of companies do organise ad-hoc trainings with industry or in collaboration with private training providers, to obtain specialist certifications in proprietary hardware/software solutions.

#### **Self-Motivated Training**

Most of the companies provide some sort of incentives to encourage self-motivated training in terms of paying tuition fees and offering study leave. Generally speaking, most employers prefer employees to obtain specialist certifications to enhance particular skills, rather than full degree-level qualifications.

It was also noted that several employers actively encourage non-IT specialist staff (such as customer-care, sales, etc) to enhance their technical knowledge through such courses.

## **4.2 Competence Provision through Education & Training**

### **4.2.1 University of Malta**

The University of Malta trains ICT Practitioners at the Faculty of Information and Communications and Technology, offering an EQF level 6 qualification known as a BSc IT, with a number of sub-specialities, namely:

- Computer science and artificial intelligence
- Computer Systems
- Communications and Computer Engineering

In addition, a fourth major/minor option is offered, whereby a student may take a Major in one of the three subjects above, together with a minor in one of a number of subjects including entrepreneurship, mathematics, linguistics etc.

The study programme is quite comprehensive, with students being able to customise a study-path within each study programme, by means of a credit system consisting of a set number of 'core' credits, and a system of 'optional' credits, whereby the student makes up the rest of their 180 ECTS quota, by selecting subjects of interest from a menu of options.

The faculty of IT openly admits that the course as currently structured does not offer adequate space for teaching transversal skills. This said, it cites credits on report writing, interpersonal skills, communication skills and presentation skills, together with a number of projects which require teamwork, as evidence of work in this area. It also points out that the acquisition of transversal skills is often ancillary to the main purpose of a credit. Thus, for example, a software development course will necessarily impart some element of interpersonal skills.

### **Prevalence of the Learning Outcome Approach**

The University of Malta is still very much in transition towards a learning outcome approach, and as such, does not truly define its courses in terms of competences. At present, entire courses are described in terms of learning outcomes<sup>9</sup>, and university rules require a description of each credit on offer to be produced, and verified by the centralised internal quality assurance department.

This said, the usage of this description is left largely up to individual lecturers, and vary widely in quality, and type of content. From our analysis of the credit descriptions for courses in the ICT faculty, most of them are *input based* describing what will be taught, listing textbooks etc, rather than learning outcome based. Very few make specific mentions of competences which will be achieved by the end of the credit in question.

In terms of mapping to the Malta Qualifications Framework, all degrees at the University are mapped to the qualifications framework by means of the diploma supplement, a certificate given to each student at the end of their studies. However, in-depth mapping of courses in line with the principles of the framework, so as to adapt them to the learning outcome approach has not yet been done.

This said, in terms of mapping of courses to the EQF, Malta is relatively advanced compared to other EU states, all of whom are committed to having achieved a full mapping of curricula by a 2012 deadline. A large part of the problem in regards to implementation of the learning outcome approach at the university of Malta, seems to be an excessively expansive definition of the concept of university autonomy. Thus, each lecturer is given near total freedom as to how to structure and apply learning principles within their course. Thus, curricular reform, while gently encouraged from on high, is at the moment ultimately up to the discretion of individual lecturers.

In the meantime, consultation meetings and promotion meetings on the qualification frameworks and on learning outcomes, generally target senior university officials, with little evidence that this is leading to a trickle-down effect throughout the institution. However, our understanding is that the University of Malta has recently introduced a quality assurance department, which has begun doing initial checks on credits and courses, and whose powers will be expanded, particularly in terms of promoting the learning outcome approach within university. While this is scheduled for the 'near future', we have not been able to ascertain the exact nature of future reforms and their timetable.

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<sup>9</sup> Although, it is relevant to note that all EQF Level 6 courses on offer by the Faculty of ICT are described in terms of exactly the same set of learning outcomes, each of which in turn, is described in exactly the same way across courses.

**Further Qualifications**

The faculty of IT offers a masters course, which is part-teaching and part-research and a doctoral level course, which consists exclusively of research. These advanced degrees are mainly theoretical in nature, with a strong focus on research. At the moment the university does not offer a practically focused masters programme in ICT, such as for example, an MBA in Information Science. In addition, in collaboration with MITA, the faculty will shortly begin offering a number of post-graduate certificates to aid continuing professional development.

<b>EQF Level 6 Qualifications in ICT at the University of Malta</b>	
<b>Courses on Offer</b>	<ul style="list-style-type: none"> <li>• B.Sc. (Hons.) in Communications and Computer Engineering</li> <li>• B.Sc. (Hons.) in Computer Information Systems with Mathematics</li> <li>• B.Sc. (Hons.) in Computer Science and Artificial Intelligence</li> <li>• B.Sc. (Hons.) in Computer Science and Artificial Intelligence with Linguistics</li> <li>• B.Sc. (Hons.) in Information and Communication Technology</li> <li>• B.Sc. (Hons.) in Computer Information Systems with Computer Science and Artificial Intelligence</li> <li>• B.Sc. (Hons.) in Computer Information Systems with Computer Systems Engineering</li> <li>• B.Sc. (Hons.) in Computer Science and AI with Creativity, Innovation and Entrepreneurship</li> <li>• B.Sc. (Hons.) in Computer Science and Artificial Intelligence with Computer Information Systems</li> <li>• B.Sc. (Hons.) in Computer Science and Artificial Intelligence with Computer Systems Engineering</li> </ul>
<b>Learning Outcomes</b>	<p>The B.Sc. (Hons.) ICT course is a multi-stream programme. Therefore, students graduating from this course will, in particular, exhibit varying emphasis on a number of skill sets. However, in general, it is expected that students will be equipped with the following knowledge and skills:</p> <ul style="list-style-type: none"> <li>• Analytical rigour</li> </ul> <p>The ability to analyse an existing scenario and propose improvements and/or alternative solutions following precise approach patterns and scientific methods.</p> <ul style="list-style-type: none"> <li>• Scientific methodology</li> </ul> <p>Knowledge of the underpinning theory, techniques, and methods</p>



	<p>that should form the arsenal of any ICT professional, allowing one to attain the necessary valid insight into real-world phenomena.</p> <ul style="list-style-type: none"> <li>• Technology expertise and application</li> </ul> <p>Knowledge, study, and use of existing technologies in specific fields of endeavour and the acquisition of skills pertaining to their effective application.</p> <ul style="list-style-type: none"> <li>• Practical relevance</li> </ul> <p>Clear appreciation and real mapping of theoretical knowledge to directly perceivable benefits in terms of practical situations and processes.</p> <ul style="list-style-type: none"> <li>• Research methods</li> </ul> <p>Knowledge and practice in the area of scientific exploration, discovery, representation and presentation of technological and scientific endeavour and propose clarifications, improvements and/or innovation.</p> <ul style="list-style-type: none"> <li>• Development practices</li> </ul> <p>The acquisition of skills relating to the construction of ICT solutions based on established and semi-formalised, or formalised, methodologies and tools.</p> <ul style="list-style-type: none"> <li>• Basic process management</li> </ul> <p>Knowledge and skills to assist in the correct monitoring and direction of modern concerted development effort.</p>
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#### 4.2.2 Malta College of Arts, Science and Technology

MCAST offers courses which train ICT Practitioners through its Institute of Information and Communications Technology. The Institute offers qualifications at EQF/MQF levels 4 through 6:

- At level 4, MCAST offers a National Diploma in “Software Development” or “Computer Hardware & Networks”
- At level 5 it offers a Higher National Diploma in the above two fields as well as in “Software Development” or “Computer Hardware & Networks” or “Interactive Media”.
- At level 6, it offers a BSc degree and this is offered in “Software Development” or “Computer Hardware & Networks”.

The qualifications at level 4 and 5 are BTEC<sup>10</sup> qualifications, and as such, the course programme has been designed according to a strict learning outcome approach, in line with the BTEC standards. The

<sup>10</sup> The Business and Technology Education Council is the British body which awards vocational qualifications. BTEC qualifications are undertaken in vocational subjects ranging from Business studies to Engineering and even Animal Care. They are equivalent to other qualifications such as the GCSE (levels 1 to 2), A Level (level 3) and university degrees (levels 4 to 6).

level 6 qualification is a locally accredited qualification, however it was designed along the same guidelines as the BTEC degree, with MCAST thus showing best practice in application of learning described in terms of competences at all levels.

With respect to transversal competences, as at university, MCAST officials recognise that these receive insufficient priority during the courses (during interviews, soft skills, maturity, English proficiency, mathematics and creativity were seen as weaknesses amongst MCAST graduates). This said, the following efforts are undertaken:

- Level 4 courses include, language and communication, business information systems and mathematics. Level 5 courses include personal skills development, e-commerce and project management modules. Level 6 courses include project management, entrepreneurial and mathematics modules.
- Informally, MCAST also recruits guest speakers to speak about various areas that may or may not be related to the course. For example the Institute asked an HR manager to speak to students about what companies look for when employing people, how to write a CV etc
- The Institute also organises a number of social and sportive events aimed at encouraging students to gain transversal skills through peer interaction.

<b>The BTEC Credit Outline Formula (in use at MCAST)</b>
<p>Each unit is set out in the following way.</p> <p style="text-align: center;">Unit title, learning hours and NQF level</p> <p>Each unit is assigned a notional level indicator of H1 or H2, indicating the relative intellectual demand, complexity and depth of study, and learner autonomy.</p> <ul style="list-style-type: none"> <li>• At H1 level the emphasis is on the application of knowledge, skills and understanding, use of conventions in the field of study, use of analytical skills and selection and organisation of information.</li> <li>• At H2 level the emphasis is on application and evaluation of contrasting ideas, principles, theories and practices, greater specialisation in the field of study, and an increasing independence in systematic enquiry and analysis.</li> </ul> <p><b>Description of unit</b></p> <p>A brief description of the overall purpose of the unit is given, together with the key areas of study associated with the unit.</p> <p><b>Summary of learning outcomes</b></p> <p>The outcomes of the unit identify what each learner must do in order to pass it. Learners must achieve all the outcomes in order to pass the unit.</p>

**Content**

This section picks up highlighted words from the outcomes and amplifies the content coverage required when addressing the outcomes. The content section will often provide lists of topics.

**Outcomes and assessment criteria**

Each unit contains statements of the evidence that each learner should produce in order to receive a pass.

**Guidance**

This section is not prescriptive but provides additional guidance and amplification related to the unit to support teachers/deliverers and assessors. Its subsections are given below. Only those subsections which apply to the unit will appear.

- Delivery — offers guidance about possible approaches to delivery. The guidance is based on the more usual delivery modes and is not intended to rule out alternative approaches.
- Assessment — provides advice about the nature and type of evidence that learners are likely to need to produce. This subsection should be read in conjunction with the assessment criteria and the generic grade descriptors.
- Links — sets out the links between units. Provides opportunities for integration of learning, delivery and assessment. Any links to the National Occupational Standards will be highlighted here.
- Resources — identifies the specialist resources likely to be needed to allow learners to generate the evidence required by each unit.
- Support materials — identifies, where appropriate, textbooks, videos, magazines, journals, publications and websites that may support the delivery of the unit.

## **5. Stakeholder Views on a Maltese Framework**

### **5.1 Priorities of the Malta e-Skills Alliance**

### **5.2 Analysis of Priorities**

### **5.3 Specific Reactions to Proposals**

## 6. Methodology

### 6.1 International Comparative Research

The contractor compiled a list of e-skills national contact points, based on the lists used for the coordination of European e-skills weeks. These contact points were e-mailed a short questionnaire, so as to verify whether each country has an active, or an in-development e-competence framework, and to obtain a copy of such framework and any associated documents. Due to a low response rate from the national contact points, the information was supplemented using secondary data, focusing on European Commission-commissioned comparative studies on e-skills<sup>11</sup>.

Following the collection phase, four e-competence frameworks were identified, and each one was analysed according to a common grid, considering the capital adoptions costs, the recurrent maintenance costs, and the integration efforts into the European e-Competence Framework, as far as information allowed. In addition, the research will identify *key innovations* in each of the frameworks, and attempted to identify the rationale and effect of each one of these innovations.

The analysis mainly focused on the usability scenarios for the various frameworks, as well as for related options. In order to do this, a set of 5 usability indicators, together with a number of sub-indicators, was constructed to provide a basis for comparison. The usability scenarios were then constructed as following:

1. Analysis of the Key Characteristics of the Maltese system: the analysis, expanding from the description provided in the RFQ from MITA, identified the main objectives of a Maltese framework, together with a SWOT-style analysis of the Maltese situation, which was then taken into account in assessing usability criteria.
2. Frameworks in context: this consisted of an analysis of the fitness for purpose (What are the design objectives? Have these design objectives been reached in theory and practice?) of the frameworks within the contexts they have been applied.
3. Applicability of the scenarios as a whole: this provides an analysis of how adoption of one of the analysed frameworks as a whole would function in Malta
4. Key Success Factors of the Frameworks: this will extrapolate the key transferable practices from across the collection of frameworks, thus providing a list of the most transferable factors in the Maltese context.
5. Alternative approaches: How partial implementations of non-national frameworks are being used to further the same aims, and possible implementations in the Maltese context

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<sup>11</sup> Following extended research, we can now surmise that part of the reason for the low response rate was that many countries had no comparable system to an e-competence framework, and thus found the questions on efforts to develop frameworks, or frameworks in place, to be irrelevant.

In addition, the study considered the various terminologies currently being used to study e-skills, with a focus on identifying and quoting the ‘standard’ lexicon in use in this area, and its consequences for the understanding of concepts. This was prepared by considering a mixture of authoritative sources<sup>12</sup>, and the knowledge and experience of the consortium experts. In addition, general theoretical work on e-skills, the definition of competences and the concept of job profiles were referenced.

### 6.1.1 Secondary Data Sources

A complete list of sources is provided in the bibliography. However, in particular, the following secondary data sources were referenced extensively in the process of identifying the presence or otherwise of e-competence frameworks in European countries:

**Evaluation of the Implementation of the Communication of the European Commission E-skills for the 21<sup>st</sup> Century – Tobias Hüsing & Werner B. Korte (2010)**

The report:

- Evaluates the efficiency and effectiveness of the implementation of the Communication in the different Member States and at European level and the relevance of the EU e-skills agenda;
- Evaluates the results produced so far of the activities of Member States, stakeholders (e.g. industry, associations, trade unions etc.) and the European Commission ranging from policies and initiatives started and implemented to projects and further activities of different type;
- Evaluates how efficiently the activities have been implemented in terms of organisation, management and interactions with stakeholders;
- Formulates recommendations on how the implementation of a long term e-skills agenda may be improved and suggests alternative actions or instruments.

The study covers European as well as national (in all 27 member states) policies, initiatives and activities, as well as those by multi-stakeholder partnerships of industry, associations, training organisations etc. It includes initiatives with respect to formal and industry-based education and deal with the entire spectrum of e-skills which includes “ICT user skills” (in particular digital literacy of citizens) and “ICT practitioner skills”.

**End User e-Skills Framework Requirements – CEN ICT Skills Worskhop (2010)**

The End User e-Skills Framework Requirements project was commissioned by the CEN Workshop on ICT Skills to identify the requirements for an end user e-skills framework for use by industry, certifying organisations, regulatory authorities and individuals. The aims of the project were to assist in having an effective understanding of end user eskills, to make proposals for developing such a reference framework and to outline the associated tools that could benefit framework users.

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<sup>12</sup> Such as documents recognised by the European Commission, the E-skills Industry Leadership Board and/or national e-skills groupings

The initial research produced a view of the European activities around existing implementations of end user e-skills frameworks, with examples of frameworks from six countries highlighted.

The main element of the primary research was carried out with individuals and organisations from 25 European countries, representing four identified target groups of the framework, namely:

- Human resource recruitment
- Training and/or certification organisations
- Individuals
- Government and regulatory authorities

### 6.1.2 E-competence Framework Analysis Grid

<b>Country Analysed</b>	
<b>Contact Point</b>	
<b>Documents Received</b>	
<b>Status of Framework</b>	Published (Date) (Version) / Draft
<b>Target Groups covered by Framework</b>	
<b>Overall Structure of Framework</b>	
<i>Describe the overall structure of the framework, in terms of chapters, sections or similar divisions</i>	
<b>List of Competences Described and Groupings</b>	
<i>List the competences described by the framework, and any categorisation of such competences.</i>	
<i>Please list using numeric bullets, ignoring any numbering in the framework:</i>	

*1.0 Category*  
*1.1 Sub-category*  
*1.1.1 Competence*

*etc.*

**Mode of Measuring Competences**

*Describe the system used by the framework to assess / grade the competences*

**Stated Aims / Rationale of the Framework**

*Please describe as stated in the framework.*

**Other Relevant Content of the Framework**

*Please describe as stated in the framework.*



<p><b>Mapping Against the European e-Skills Competence Framework</b>  <i>Map the competence categories/sub-category numbers outlined earlier against the categories of the European e-Skills Framework.</i></p>				
<p><b>Comments:</b>  <i>Describe difficulties in mapping etc.</i></p>				
Plan	Build	Run	Enable	Manage

<b>Other:</b>				
<b>Implementation Guidelines</b>				
<i>Summarise salient points regarding implementation of the guidelines, particularly aspects which may reflect to implementation and maintenance costs.</i>				
<b>Implementation Examples</b>				
<i>Provide Examples of implementation from provided documents or from website of framework.</i>				
<b>Analysis: Innovative Aspects</b>				
<i>Point out aspects you consider innovative</i>				

<b>Analysis: Transferable Elements</b>
<i>Describe elements of good practice you consider transferable to other contexts, particularly the Maltese one.</i>
<b>Analysis: Compatibility with the eCF</b>
<i>How easily does the said case compare with the eCF.</i>
<b>Analysis: Industry Perspectives</b>
<i>What is the involvement of industry in the construction and/or maintenance of the said framework. Has it made a contribution to industry priorities?</i>
<b>Analysis: Costs</b>
<i>(To be filled in by Malta staff) Estimated costs for implementation of system in Malta.</i>

## 6.2 Research amongst Maltese Stakeholders

A sample of Maltese companies was created using the list of companies forming part of the Malta ICT Skills Alliance and all members of the Malta Stock Exchange. In addition, education social partners, including the National Commission for Higher Education, the Malta Qualifications Council, the University of Malta and MCAST were interviewed. The Human Resource Manager and/or the Chief Technology Officer were interviewed in each responding company, while the University of Malta and MCAST were asked to supply a suitably qualified official to speak on behalf of the institution.

The surveys were either conducted by phone or in person, in the form of semi-structured interview, based on the interview grids annexed to this document. Due to time constraints of the entire exercise, the surveying was done concurrently with the desk research by different interviewers, however full report integration was done by the same personnel for both the Desk and Field Research.

All interviews were coded using the attached data grids, so as to extract meaning information and data points from each interview.

### 6.2.1 Questions for Semi-Structured Interview: Companies

#### Interview Objectives

The objectives of the interview are to:

- Determine how the company classifies job profiles in ICT
- Determine the progression route of each profile
- Determine the competences demanded by each profile

#### Interview Recording Instructions

You should obtain answers to all questions obtained in this document. However, feel free to rephrase questions, and change the order, aiming for a natural flow of conversation, as this is likely to yield more information than using a strict questionnaire-style approach.

Be sure to check that your recording equipment is working before starting, and to record the entire interview, so as to be able to return to specific answers you fail to catch during your note taking.

Also remember to record basic details of the employee, and state that all information during the interview will be kept confidential, i.e. that:

- Full information of the interview will only be shared with KIC-Malta employees conducting the survey and with the project officer at MITA
- All information spread beyond, will not be identified to a particular company. If KIC-Malta wishes to use specific information as a case study, consent will be sought in advance.

## Questions

### Introductions

- Introduce Yourself and the Company
- Explain the Purpose of the Study

### Basic Information

- What is the company's total workforce size?
- What is the overall degree of ICT literacy in the company?
- What is the general skill profile of the company's employees, particularly vis-à-vis educational background?

### Categorisation of Job Profiles

- How would you define an ICT Professional (ICTP)?
- Do you employ a CTO (Chief Technology Officer) and if so, what is his role within the company and level (i.e. executive, managerial, other level)?
- Which job categories / specific job descriptions fall under such definition?
- What skill levels are required to become an ICTP in terms of (a) education and (b) experience?
- *Please ask for the actual calls for the various positions described sent by e-mail*

### Progression of Roles

- What sorts of promotion pathways are available to ICTPs within your company?
- What sort of competence<sup>13</sup> development do you expect of your employees, as they progress with their career?
- Describe how ICTPs pursue further competency development within your company. In particular, which of the following routes are most important to you, and why:
  - o on-the-job practical training
  - o in-house formal training (such as seminars, classes etc.)
  - o training provided through collaborations with industry partners / educational institutions
  - o self-motivated training on the part of the employees, outside the company (e.g. getting an extra degree)
- What sort of incentives do you provide employees to continue personal development?

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<sup>13</sup> Competences are defined as a mix of knowledge, skills and attitudes

Transversal Competences

- What sort of overall skills/competences do you look for when (a) hiring and (b) promoting, and ICTP?
- Are any of these skills/competences specific to ICTPs, or more/less important than with other employees at a similar level

Systemic Context

- How hard is it to find suitably qualified ICTPs for (a) entry level positions (b) higher positions?
- Do Malta's educational institutions suitably respond to your requirements as an employer of ICTPs?
- Within this context, what do you consider to be the main strengths and weaknesses of Malta's training system, and of the graduates it produces?
- What are your most pressing and difficult to tackle skill shortages?

Do you have any other comments you would like us to consider as part of the study?

## 6.2.2 Questions for Semi-Structured Interview: Social Partners

### Interview Objectives

The objectives of the interview are to:

- Determine how the institution translates learning outcomes into competence profiles
- Determine the sensitivity of the institution to demands of industry

### Interview Recording Instructions

You should obtain answers to all questions obtained in this document. However, feel free to rephrase questions, and change the order, aiming for a natural flow of conversation, as this is likely to yield more information than using a strict questionnaire-style approach.

Be sure to check that your recording equipment is working before starting, and to record the entire interview, so as to be able to return to specific answers you fail to catch during your note taking.

Also remember to record basic details of the employee, and state that all information during the interview will be kept confidential, i.e. that:

- Full information of the interview will only be shared with KIC-Malta employees conducting the survey and with the project officer at MITA
- All information spread beyond, will not be identified to a particular company. If KIC-Malta wishes to use specific information as a case study, consent will be sought in advance.

### Questions

Introductions

- Introduce Yourself and the Company
- Explain the Purpose of the Study

Categorisation of Job Profiles

- How would you define an ICT Professional (ICTP)?
- Which educational offerings within the Maltese education system / within your institution are tailored towards training ICTPs? Keep in mind courses at different levels.
- Which job categories / specific job descriptions do you train people for (within above context)?

Progression of Roles

- How does the institution help further training of ICTPs (a) within dedicated ICTP courses, (b) as part of other courses, e.g. management, information systems etc?

Transversal Competences

- What sort of overall skills/competences do you give ICTPs during their courses, whether formally or informally?
- Are any of these skills/competences specific to ICTPs, or more/less important than with other employees at a similar level

Systemic Context (*ask as necessary depending on stakeholder in question*)

- How do you detect / analyse skill requirements of industry, and how do you adapt offerings in response to the results? Give examples.
- Within this context, what do you consider to be the main strengths and weaknesses of Malta's training system, and of the graduates it produces?
- Are there any reform plans already being implemented in this area?
- Could you explain how the MQF is being implemented in Malta by educational institutions? How is the mapping process being conducted? Is a Learning Outcome / Competence based approach being integrated into curricula, at UoM and MCAST?
- What role do MQC / NCHE play in promoting the MQF to educational institutions and to industry? What are the barriers impeding better adoption?
- Does NCHE play any role in bringing stakeholders from industry / academia together for the purposes of (a) skill forecasting, (b) curriculum development. Do you know of any other initiatives in the field?
- Could you give us information about the upcoming National Occupational Standards? How will they be structured? (using a KSA approach?). How will they fit with the MQC?
- What would you envisage as being the roles of a Malta e-competence framework vs. the National Occupational Standards?

- How do Maltese Education Authorities and MITA collaborate on increasing the supply of professional e-competences in Malta? Could you give some examples of initiatives being undertaken?
- What are the main strengths and weaknesses of the current education/industry relationship, and what measures are currently underway, or which you would recommend, to improve the relationship?

Do you have any other comments you would like us to consider as part of the study?



**Knowledge Innovation Centre (Malta)**

50, Triq Menville, L-Ibraġ, Malta

Tel: +356 27552401, +356 27552401, +386 40262698

[www.kic-malta.com](http://www.kic-malta.com)